APPENDIX C

RDIP ADDENDUM

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Transmitted by US Mail and Electronically

4 October 2019

Mr. Yongsheng Sun
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Subject: Revisions to the Draft Final Remedial Design and Implementation Plan ("RDIP") Addendum
5441 International Boulevard, Oakland, California
(EKI B70123.01)

Dear Messrs. Sun and Leach:

EKI Environment & Water, Inc. ("EKI") has prepared these revisions to the Draft Final Remedial Design and Implementation Plan ("RDIP") Addendum on behalf of Bridge Acquisition, LLC ("Bridge") for the property located at 5441 International Boulevard in Oakland, California ("site"). These revisions have been prepared to respond to comments from the Department of Toxic Substances Control ("DTSC") and the United States Environmental Protection Agency ("EPA") on the Draft Final version of the RDIP Addendum dated 26 August 2019.

Because the revisions are limited to the sections of the report listed below, hard copy replacement pages for those sections only have been provided in this transmittal. In addition, electronic copies of the Draft Final RDIP Addendum in its entirety, with revisions incorporated, will be provided separately. The new hard copy pages should be inserted into the appropriate section of the existing report binder, with the old hard copy pages handled as summarized below:

New Section Provided on 4 October 2019	Handling for 26 August 2019 Version
Cover Letter	Retain
Title Pages	Discard
Main Text	Discard
Figure 2	Discard
Appendix B – Shoring and Tenting Plans (ICS): Attachment B-1 Shoring Plan (ICS)	Discard
Appendix E – VIMS Calculation Package, Drawings and Specifications: Text, Sheets SSD-G3, SSD-M1, SSD-M2, and SSD-M5	Discard

New Section Provided on 4 October 2019	Handling for 26 August 2019 Version
Appendix F – Groundwater Remedy Modifications and Off-Site Vapor Intrusion Assessment	Discard
Appendix I – Decontamination Plan	Discard
Appendix K – Air Monitoring Plan: Text and Table K-8	Discard
Appendix M – SWPPP: Text and Table M-1	Discard
Appendix N – Sampling and Analysis Plan Addendum: Text	Discard
Appendix P – Response to Comments on Draft RDIP Addendum	Discard

Please call if you have any questions or wish to discuss this submittal in greater detail.

Sincerely,

EKI ENVIRONMENT & WATER, INC.



Deepa Gandhi, P.E.
Project Manager

Michelle K. King, Ph.D.
President

Copies to: Brendan Kotler, Bridge
Lance Hauer, GE
Pamela Andes, Allen Matkins Leck Gamble Mallory & Natsis LLP

Enclosures: 4 October 2019 replacement pages for the Draft Final RDIP Addendum (transmitted via US Mail to EPA and DTSC only)
Draft Final RDIP Addendum, 4 October 2019 (transmitted electronically)

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Transmitted Electronically

26 August 2019

Mr. Yongsheng Sun
Department of Toxic Substances Control ("DTSC")
Site Mitigation and Restoration Program
700 Heinz Avenue
Berkeley, California 94710

Subject: Draft Final Remedial Design and Implementation Plan ("RDIP") Addendum
5441 International Boulevard, Oakland, California
(EKI B70123.01)

Dear Mr. Sun:

EKI Environment & Water, Inc. ("EKI") has prepared this Draft Final Remedial Design and Implementation Plan ("RDIP") Addendum on behalf of Bridge Acquisition, LLC ("Bridge") for the property located at 5441 International Boulevard in Oakland, California ("site"). This Draft Final version of the RDIP Addendum has been revised to respond to comments from the California Environmental Protection Agency, Department of Toxic Substances Control ("DTSC") and United States Environmental Protection Agency ("EPA") on the draft version dated 19 April 2019.

Bridge is interested in redeveloping the site with an approximately 530,000-square foot warehouse building. This RDIP Addendum describes how the approved 2012 RDIP prepared and implemented thus far by General Electric Company ("GE") will be adjusted to allow for the planned redevelopment.

Please call if you have any questions or wish to discuss this submittal in greater detail.

Sincerely,

EKI ENVIRONMENT & WATER, INC.



Deepa Gandhi, P.E.
Project Manager

Michelle K. King, Ph.D.
President

Copies to: Brendan Kotler, Bridge
Lance Hauer, GE
Pamela Andes, Allen Matkins Leck Gamble Mallory & Natsis LLP

Attachment: Draft Final RDIP Addendum

Remedial Design and Implementation Plan (RDIP) Addendum

5441 International Boulevard
Oakland, California

Prepared for:
Bridge Acquisition, LLC
El Segundo, California

DRAFT FINAL – 26 August 2019
REVISED – 4 October 2019
EKI B70123.01

EKI ENVIRONMENT & WATER, INC.

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O Site Demolition
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ACRONYMS AND ABBREVIATIONS

1,2-DCA	1,2-dichloroethane
ACDEH	Alameda County Department of Environmental Health
AMP	Perimeter Air Monitoring Plan
APE	area of potential effects
API	area of primary importance
BAAQMD	Bay Area Air Quality Management District
bbs	below bottom of slab
bgs	below ground surface
BMP	best management practices
BRA	baseline risk assessment
Bridge or Developer	Bridge Acquisition, LLC
Cal/OSHA	California Division of Occupational Safety and Health Administration
CARB	California Air Resource Board
CASQA	California Stormwater Quality Association
CCR	California Code of Regulations
cDCE	cis-1,2-dichloroethene
CDF	controlled density fill
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
City	City of Oakland
COC	chemical of concern
Contractor	licensed remediation contractor
cVOCs	chlorinated volatile organic compounds
cy	cubic yards
DTSC	California Environmental Protection Agency, Department of Toxic Substances Control
DTSC-SLs	HERO HHRA Note Number 3, DTSC Modified Screening Levels
EIR	Environmental Impact Report
EKI	EKI Environment & Water, Inc.
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
ESL	environmental screening level

FS	feasibility study
GE	General Electric Company
General Permit	Construction Activities Storm Water General Permit (State Water Resources Control Board Order No. 2009-0009-DWQ, as amended)
GETS	groundwater extraction and treatment system
HASP	Health and Safety Plan
HHRA	human health risk assessment
HQ	hazard quotient
HVAC	heating, ventilation, and air conditioning
HAZWOPER	Hazardous Waste Operations and Emergency Response
in-WC	inches water column
ICS	Innovative Construction Solutions, Inc.
LSA	LSA Associates, Inc.
LEED	Leadership in Energy and Environmental Design
mg/kg	milligram per kilogram
MNA	monitored natural attenuation
NRHP	National Register of Historic Places
NOI	notice of intent
OCP	organochlorine pesticides
OMM	operations, maintenance, and monitoring
Order	1997 Consent Order
OSHA	Occupational Safety and Health Administration, United States Department of Labor
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCOC	potential chemical of concern
PLM	polarized light microscopy
PPE	personal protective equipment
ppm	parts per million
PRDs	permit registration documents
PSA	Purchase and Sale Agreement
RAO	remedial action objectives
RAP	remedial action plan
RACR	Remedial Action Implementation Completion Report – Phase I
RCRA	Resource Conservation and Recovery Act

RDIP	Remedial Design and Implementation Plan
RSL	regional screening level
sf	square foot
SAP	Field Sampling and Analysis Plan
SGP	soil gas probe
SIM	selected ion monitoring
SMP	Soil Management Plan
SOP	standard operating procedure
SSD	sub-slab depressurization
SSP	sub-slab probe
SVOCs	semi-volatile organic compounds
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TCE	trichloroethene
TCLP	toxicity characteristic leaching procedure
TPHd, TPHmo	total extractable petroleum hydrocarbons (C12 to C36)
TPHg	total purgeable petroleum hydrocarbons (C6-C12, gasoline range)
TSCA	Toxic Substances Control Act
UCL	upper confidence limit
ug/m^3	micrograms per cubic meter
ULL	Ultra Low Level
UST	underground storage tank
VIMS	vapor intrusion mitigation system
VOC	volatile organic compound
Water Board	California Regional Water Quality Control Board, San Francisco Bay Region
WET	waste extraction test
Wood	Wood Environment and Infrastructure Solutions, Inc.

1. INTRODUCTION

EKI Environment & Water, Inc. ("EKI") has prepared this Draft Final Remedial Design and Implementation Plan ("RDIP") Addendum on behalf of Bridge Acquisition, LLC ("Bridge" or "Developer") for the property located at 5441 International Boulevard in Oakland, California ("the site"; Figure 1). Bridge plans to redevelop this former General Electric Company ("GE") facility into an approximately 535,000 square foot ("sf") warehouse building (Figure 2). This RDIP Addendum describes how the approved remedy for the site will be implemented under redevelopment and supplements the existing 2012 RDIP for the site (Geosyntec, 2012). This document is consistent with EKI's 18 December 2018 memorandum to the Department of Toxic Substances Control ("DTSC") and 8 November 2018 memorandum to the United States Environmental Protection Agency ("EPA") that conceptually outlined the RDIP Addendum and polychlorinated biphenyl ("PCB") cleanup plan, respectively, as modified based on regulatory comments (EKI, 2018d and EKI, 2018c, respectively). The information contained herein is correct and complete to the best of our knowledge. We reserve the right to supplement or correct with additional information.

This RDIP Addendum constitutes both a new Toxic Substances Control Act ("TSCA") Application for a risk-based PCB cleanup and disposal approval and a modification of the 2012 RDIP approved by DTSC. This RDIP Addendum/TSCA Application presents a plan that accommodates the redevelopment and modifies elements of (1) the RDIP DTSC approved in 2012, and (2) the TSCA Application EPA approved in 2013.

This Draft Final version of the RDIP Addendum/TSCA Application has been revised to respond to comments from DTSC and EPA on the draft version dated 19 April 2019 (EKI, 2019a). A response to comments ("RTCs") document is included as an appendix to this version of the RDIP Addendum/TSCA Application and provides details on how each specific comment was addressed. To maintain consistency with the organization of the previous version of this document, Appendices have not been reordered as a result of revisions made to address comments and the response to comment appendix is included as Appendix P.

1.1 Background

The site is approximately 24 acres and entirely covered by buildings, asphalt, or asphalt / bentonite caps. As described in the 2012 RDIP, "[b]etween 1924 and 1975, GE operated a transformer manufacturing facility at the site. Between 1975 and the mid-1990s, GE Apparatus Service Department operated an electrical equipment maintenance and repair operation in portions of the site." The site is currently inactive, and no industrial activities have occurred since 2005. PCBs in soil and chlorinated volatile organic compounds ("cVOCs"), including trichloroethene ("TCE"), in soil, soil gas, and groundwater are the chemicals and media of primary concern. GE is conducting the investigation and remediation of the site under the oversight of DTSC via a 1997 Consent Order ("Order"). EPA also has an environmental oversight role at the site with respect to PCBs.

1.2 Status of the Approved Remedy

A remedial action plan ("RAP") for the site was approved by DTSC on 30 June 2011, with conditional approval received from EPA on 23 May 2013 under TSCA Section 761.61(c), risk-based cleanup. As described in the RAP,

> [t]he selected remedial alternative … consists of groundwater extraction and treatment at the downgradient property boundary; groundwater extraction and treatment in cVOC hot spots; monitored natural attenuation ("MNA") for other areas of groundwater; targeted excavation of the cVOC hot spots in soil; capping for PCBs in soil, and institutional controls. The selected remedial alternative offers the best combination of mass removal, effective containment for the protection of human health and the environment, and level of cost certainty compared to the other alternatives (Geosyntec, 2011).

The final remedy for the site is being implemented by GE in two phases. Phase I was implemented between 2013 and 2015 and consisted of: (1) targeted soil excavations for cVOCs and PCBs; (2) installation and operation of a groundwater extraction and treatment system ("GETS"); (3) capping of un-capped areas of the site; (4) storm water management to mitigate potential migration of impacted sediments off-site; (5) MNA of off-site groundwater; and (6) monitoring and maintenance of the remedy implemented thus far (Wood, 2018). These features are shown in Appendix A, and are supplemented by the existing Covenant of Deed Restriction on the property, dated 19 April 1993 ("deed restriction"). Phase II of the remedy was intended to proceed after removal of the above-grade building structures and consisted of (1) placement of additional capping materials over existing asphalt areas and certain former building footprints that were to remain and (2) abandoning the subsurface storm water system.

Phase II of the remedy was not implemented because the California Environmental Quality Act ("CEQA") process with the City of Oakland ("the City") required for permitting the demolition of the remaining, existing site buildings was not completed. In 2017, the City issued an Environmental Impact Report ("EIR") for public comment which evaluated options to mitigate the proposed demolition of historical structures. In the fall of 2017, GE solicited interest in redevelopment of the site. GE and Bridge entered into a Purchase and Sale Agreement ("PSA") in June 2018 for the site. The PSA describes Bridge's intent to purchase the site and ultimately redevelop it into a warehouse building upon the City's approval of the redevelopment plan.

1.3 Planned Redevelopment

The redevelopment project will involve demolition of the existing aboveground features at the site, and replacement with a new, approximately 535,000 sf warehouse building (Figure 2). The redevelopment project is being permitted through the City and will include the development of a new EIR to meet CEQA requirements. Aside from concrete and portions of the GETS, which

will be reused, the only existing aboveground feature anticipated to be preserved on the site is part of Building 1 facing International Boulevard, as requested by the City (Figure 2).

Utilities required for the redevelopment project will be installed, with connections to existing infrastructure at the property boundary, as appropriate. Existing belowground utilities and structures will be abandoned in place or removed, if in conflict with the redevelopment (Section 3).

The redevelopment will require geotechnical improvement of soil underneath the proposed building pad, which will entail excavation and re-compaction of 3 to 4 feet of soil beneath the lower of the existing or proposed pad grade. In certain areas of the site, ground improvement for geotechnical purposes will be required to depths of up to 18 feet below ground surface ("bgs"). Soil excavation and movement will also be needed for site grading and utility installation.

Additional details on the redevelopment plan are provided in Section 3. The redevelopment project is expected to take approximately one year for demolition through construction, as described in Section 5, Schedule.

1.4 Remedy Implementation under Redevelopment

The main components of the DTSC- and EPA-approved remedy for the site will carry forward under the redevelopment project pursuant to the DTSC 2011 RAP and the 2013 EPA-approved TSCA Application for the site (GE, 2013), with certain modifications to accommodate the redevelopment. The general response actions for the remedy will remain the same: a combination of containment, monitoring, targeted removal, and use restrictions for the protection of human health and the environment.

1.4.1 Remedy Description

A brief overview of the remedy, as it will be implemented under redevelopment, is provided below and is shown on Figures 2 through 5. These remedy components were contemplated in the 2011 RAP, except for the vapor intrusion mitigation system ("VIMS"). The VIMS will be addressed via an Explanation of Significant Differences ("ESD"), a draft of which has been submitted to DTSC under a separate cover (EKI, 2019b).

- Targeted excavation and off-site disposal of soil will be conducted for removal of volatile organic compounds ("VOCs") and PCBs in soil. Excavation of four PCB hotspot locations are proposed to mitigate high concentrations of PCBs within and near the proposed building footprint. Excavation of one remaining cVOC hotspot (defined in the 2011 RAP as concentrations above 10 milligrams per kilogram ["mg/kg"] cVOCs) is proposed for mass removal and to reduce potential impacts to soil gas and groundwater in the vicinity of borehole 5GP5. These hotspot excavations are not needed to meet remedial action objectives ("RAOs") and are in addition to the targeted excavation described in the 2011 RAP, completed as part of the Phase I remedy. However, these excavations

may increase the effectiveness of the groundwater remedy and/or address a potential source of vapor intrusion.

- Targeted excavation and off-site disposal of soil with PCBs ≥50 mg/kg PCBs will be conducted in areas outside of hotspots that could be disturbed by the redevelopment activities (i.e., at depths shallower than 15 feet below current ground surface).

- The planned development will include installation of a VIMS for the new building to address potential vapor intrusion risks from VOCs. The VIMS will be an active sub-slab depressurization ("SSD") system.

- Existing groundwater extraction and treatment will continue as modified after the site is redeveloped. Extraction and monitoring wells that will require relocation or removal to accommodate the planned development are described herein, but the modified network will continue to provide VOC source control and containment as described in the 2011 RAP.

- Exposure to chemicals of concern ("COCs") remaining in soil will be prevented by:

    - Capping. Consistent with the approved 2013 TSCA application and 2011 RAP, the proposed redevelopment will provide a cap for the entire site. The existing caps and building foundations will be removed and replaced with new, functionally-equivalent capping materials.

    - Clean corridors. Clean corridors refer to the installation of subgrade utilities in imported backfill. Clean corridors will be used for non-remediation subgrade utilities that will be active after redevelopment.

    - Storm water controls. Storm water runoff will be collected using surface water control features functionally equivalent to those described in the 2011 RAP and conveyed to a new storm drain system beneath the site.

    - Land use covenant. The current deed restriction for the site limits on-site uses (sensitive and residential use prohibited), requires that the cap not be disturbed, and prohibits penetration of the cap except after notification of DTSC. The deed restriction for the site will be revised as described in the 2011 RAP,[1] including a requirement to prepare a soil management plan ("SMP"). The SMP will cover procedures for post-redevelopment soil handling activities. Land use controls are discussed in Section 4.6.

[1] DTSC, EPA, and GE have prepared an updated draft of the deed restriction.

- Off-site elements of the remedy (i.e., MNA) will continue as described in the 2011 RAP, 2012 RDIP, and the 2015 Remedial Action Implementation Completion Report ("RACR") for Phase I of the remedy (Geosyntec, 2015; Appendix A).

- Monitoring and maintenance of the remedy will be performed as described in the Operations, Maintenance, and Monitoring Plan ("OMM") included in the 2015 RACR, as amended to incorporate the new or changed components of the remedy.

1.4.2 Roles and Responsibilities under Redevelopment

Currently, GE is the site property owner and is the party responsible for meeting obligations to EPA and DTSC. Upon transfer of ownership of the property to Bridge in 2019, GE will retain both legal and financial responsibility for groundwater remediation both on- and off-site related to GE's historical use of the site, including for environmental media off-site related to groundwater impacts. As property owner, Bridge will assume legal and financial responsibility for other environmental media on-site (e.g., soil, soil vapor, and storm water) and responsibilities for some environmental media off-site (e.g. soils). Bridge will also, per an agreement with DTSC, obtain financial assurance for operation and maintenance activities (e.g., cap inspection and repair). The parties' respective obligations will be implemented as provided in this RDIP Addendum.

1.5 Screening Level Risk Evaluation

As indicated above, the planned redevelopment will continue the commercial/industrial use of the site and the remedy described in the 2011 RAP will carry forward, with the addition of the VIMS. The commercial/industrial site use was considered in the baseline risk assessment ("BRA") that was prepared on behalf of GE in 2003, upon which the current remedy was based (URS, 2003). A qualitative screening level risk evaluation is included herein to document that potentially complete exposure pathways will be addressed, and potential receptors protected for the activities described in this RDIP Addendum. A quantitative risk assessment was not completed because: (1) most populations and land uses considered in the 2003 BRA apply to the work described in this RDIP Addendum; and (2) where the conceptual site model has changed and risks have increased, potentially complete exposure pathways will be addressed as described below (e.g., vapor intrusion pathway will be mitigated).

The 2003 BRA considered on-site and off-site potentially exposed populations and potentially complete exposure pathways and was based on data included in the Remedial Investigation Report (Geomatrix, 2002). Chemicals that were evaluated in the risk assessment included metals,[2] PCBs, and VOCs. A summary of the lifetime incremental cancer risks and hazard indices calculated in the BRA are presented in the table below.

[2] Although metals were not considered COCs for the site, they were evaluated as a conservative measure because they were detected in soil.

Land Use	Receptor	Receptor Location	Lifetime Incremental Cancer Risk	Main Cancer Risk Driver	Hazard Index	Main non-Cancer Risk Driver
Current Site Conditions	Construction Worker (Outdoor)	On-site	6×10^{-5}	PCBs	14	PCBs
	Vegetation Management	On-site	2×10^{-6}	PCBs	0.5	PCBs
	Resident (Downgradient)	Off-site	8×10^{-7}	1,2-DCA	0.02	1,2-DCA
	Commercial Worker (Downgradient)	Off-site	3×10^{-11}	1,2-DCA	7×10^{-8}	1,2-DCA
Future Site Conditions	Commercial Worker (Outdoor)	On-site	4×10^{-4}	PCBs	22	PCBs
	Commercial Worker (Indoor)	On-site	4×10^{-5}	1,2-DCA	1	1,2-DCA
	Resident (Downgradient)	Off-site	2×10^{-9}	Vinyl Chloride	1×10^{-5}	cDCE

Source: Table 23 of the BRA.

EPA defines incremental cancer risks ranging from one in one million (10^{-6}) to one in ten thousand (10^{-4}) as "safe and protective" of human health (EPA, 1991). The non-carcinogenic hazard of an individual potential COC ("PCOC") through a particular exposure pathway is called the Hazard Quotient ("HQ"). The hazard index is the sum of all HQs. A total hazard index less than or equal to one (1) represents an exposure that is unlikely to cause adverse non-cancer health effects, even for sensitive populations (EPA, 1989).

The BRA indicates that under existing conditions with the deed restriction in place, the site does not pose a threat to human health and that construction workers would be protected by the safety requirements already established in the deed restriction and the Order.

EKI evaluated potentially exposed populations during remediation and redevelopment construction activities and after redevelopment. The following potentially exposed populations were identified (see Figure 6):

<u>During remediation and redevelopment construction:</u>

- On-site earthwork/remediation workers involved in earthwork and subsurface construction activities, which will involve excavation of soil including soil below the water table. Potentially complete exposure pathways include soil and groundwater incidental ingestion, dermal contact with soil and groundwater, and inhalation of particulates in dust or vapors.
- Off-site residents living in the residences near the site's northern boundary. The only potentially complete exposure pathway is inhalation of vapors and particulates in dust.

- Off-site industrial/commercial workers working on the properties near the site's southern and western boundaries. The only potentially complete exposure pathway is inhalation of vapors and particulates in dust.
- On-site redevelopment construction workers who will construct aboveground improvements before the site has been capped. Potentially complete exposure pathways include soil incidental ingestion, dermal contact with soil, and inhalation of particulates in dust or vapors.
- On-site redevelopment construction workers who will construct aboveground improvements after the site has been capped. The only potentially complete exposure pathway is inhalation of vapors.

<u>After redevelopment:</u>

- On-site industrial/commercial workers working inside the site's warehouse. The only potentially complete exposure pathway is inhalation of vapors.
- On-site groundskeeper/maintenance workers performing maintenance activities, which may involve shallow soil excavation within clean utility corridors. The only potentially complete exposure pathway is inhalation of vapors while working on a utility trench.
- Off-site residents living in the residences near the site's northern boundary.[3] The only potentially complete exposure pathway is inhalation of vapors.
- Off-site industrial/commercial workers working on the properties near the site's southern and western boundaries.[3] The only potentially complete exposure pathway is inhalation of vapors.

These potentially exposed populations and their potentially complete exposure pathways are similar or equivalent (in the case of off-site populations) to the populations evaluated in the BRA. If human health risks for the on-site construction worker population were re-evaluated in this RDIP Addendum, it is likely that the updated risks would be higher for the following reasons: (1) higher concentrations of PCBs (Aroclor 1260) have been detected on-site than considered in the BRA (the maximum Aroclor 1260 concentration in soil in the BRA was 2,500 mg/kg and the maximum Aroclor 1260 concentration detected to date is 13,000 mg/kg); (2) the inhalation of PCBs in airborne particulates in outdoor air pathway was not included in the risk calculations; and (3) dermal exposure parameters used in the BRA were less conservative than

[3] In 2009, GE conducted soil gas investigations at a residential property north of the site and a commercial/industrial property west of the site. The results of the investigations did not identify a risk to receptors and at that time, DTSC did not require further action. As discussed in Appendix F and Appendix P, at DTSC's request GE plans to submit a separate work plan to re-evaluate the inhalation pathway.

parameters currently recommended by DTSC (DTSC, 2019a).

For example, EPA's online calculator[4] was used to estimate the lifetime incremental cancer risk for PCBs in soil for the construction worker scenario using the exposure assumption in DTSC's Note 1 (DTSC, 2019a) and the representative concentration of Aroclor 1260 used in the BRA of 226 mg/kg. The estimated lifetime incremental cancer risk increased from 1.7×10^{-5} to 5.8×10^{-5}. If the representative concentration is increased to reflect the higher concentrations of Aroclor 1260 detected to date (i.e., from 226 to 364 mg/kg[5]), the estimated lifetime incremental cancer risk increases to 9.3×10^{-5}, slightly below the upper-range target risk level of 10^{-4}.

Similarly, human health risks due to inhalation of VOCs would likely be higher due to (1) the more conservative toxicity data for TCE published by EPA in 2011[6] and (2) higher concentrations of TCE detected in soil gas since the BRA (see Section 2.1.2.1).

That said, even if human health risks are higher than estimated in the BRA, potentially exposed populations will be protected from COCs that may remain in soil after redevelopment by: (1) removal of PCB and VOC hotspots; (2) lack of direct contact due to the presence of the permanent cap; (3) creation of clean utility corridors to protect on-site groundskeeper and maintenance workers; (4) installation of a VIMS in the new building; and (5) replacement and operation of the GETS.

Similarly, placement of crushed concrete generated from on-site demolition activities below the new permanent cap will not create a significant risk to on-site or off-site receptors. Potentially exposed populations will be protected from exposure to PCBs and other COCs in the crushed concrete by: (1) lack of direct contact with potentially exposed populations due to placement of the crushed concrete under the cap; (2) transitioning of crushed concrete to import baserock within 2 feet of a clean utility corridor to protect on-site groundskeeper and maintenance workers; and (3) placement of the crushed concrete well above the groundwater table and under the low-permeability cap to minimize the potential for leaching to groundwater.

In summary, even though human health risk estimates presented in the BRA may overestimate actual risks, the approved remedy, as it will be implemented under redevelopment, is still protective of human health. This is discussed further below for potentially exposed populations (see Table 1).

[4] https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search

[5] The updated Aroclor 1260 representative concentration is the 95% upper confidence limit ("UCL") of the mean and was calculated using the latest version of EPA's ProUCL software (5.1, EPA, 2016) and PCB in soil data up to 15 feet bgs included in (1) the draft Five Year Review Status Report for the Period August 2013 through December 2017 (Wood, 2018) and (2) Appendix C.

[6] https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0199_summary.pdf

1.5.1 On-Site Earthwork/Remediation Workers during Remediation and Redevelopment

On-site earthwork/remediation workers will be protected from exposure to COCs during remediation and redevelopment construction activities by the following:

- Implementation of health and safety measures included in the Bridge's Hazardous Waste Operations and Emergency Response ("HAZWOPER") trained and licensed remediation contractor's ("Contractor's") Health and Safety Plan (["HASP"] e.g., use of engineering controls and personal protective equipment ["PPE"]).
- Breathing zone air monitoring, as required in the Contractor's HASP.
- Implementation of dust control measures.
- Implementation of vapor control measures, if needed.

1.5.2 Off-Site Residents and Off-Site Industrial/Commercial Workers during Remediation and Redevelopment

Off-site residents and off-site industrial/commercial workers will be protected from exposure to COCs during remediation and redevelopment construction activities by the following:

- Perimeter air monitoring.
- Implementation of dust control measures.
- Implementation of vapor control measures, if needed.

1.5.3 On-Site Redevelopment Construction Workers before Capping

On-site redevelopment construction workers will be protected from exposure to COCs during redevelopment activities before capping by the following:

- Implementation of health and safety measures included in the Contractor's HASP (e.g., use of engineering controls and PPE).
- Perimeter air monitoring.[7]
- Implementation of dust control measures.
- Implementation of vapor control measures, if needed.

[7] Although perimeter air monitoring does not directly relate to the protection of on-site construction workers, the need to meet the low perimeter action levels for airborne dust should result in relatively low airborne dust concentrations for the on-site workers.

1.5.4 On-Site Redevelopment Construction Workers after Capping

On-site redevelopment construction workers will be protected from exposure to COCs during redevelopment activities after capping by the following:

- VOC hotspot removal.
- Temporary capping of uncapped portions of the site (optional).

1.5.5 On-Site Industrial/Commercial Workers after Redevelopment

On-site industrial/commercial workers will be protected from exposure to COCs after redevelopment by the following:

- VOC hotspot removal.
- Capping of the whole site.
- Installation of a VIMS for the new building.

1.5.6 On-Site Groundskeeper/Maintenance Workers after Redevelopment

On-site groundskeeper/maintenance workers will be protected from exposure to COCs after redevelopment by the following:

- VOC hotspot removal.
- Capping of the whole site.
- Creation of clean utility corridors. In the unlikely event that the cap needs to be breached outside of clean utility corridors, groundskeeper/maintenance workers will be protected by the health and safety requirements specified in the SMP.

1.5.7 Off-Site Residents After Redevelopment

Off-site residents will be protected from exposure to COCs after redevelopment by the following:

- VOC hotspot removal to address a source of potential vapor intrusion.[8]
- Capping of the whole site to prevent fugitive dust from leaving the site.
- Replacement and operation of the GETS to limit further off-site migration of VOCs in groundwater.

[8] Potential vapor intrusion impacts to off-site receptors will be addressed via a separate work plan to be prepared by GE; see Appendix P - RTCs.

1.5.8 Off-Site Industrial/Commercial Workers after Redevelopment

Off-site industrial/commercial workers will be protected from exposure to COCs after redevelopment by the following:

- VOC hotspot removal to address a source of potential vapor intrusion.[9]
- Capping of the whole site to prevent fugitive dust from leaving the site.
- Replacement and operation of the GETS to limit further off-site migration of VOCs in groundwater.

In 2009, GE conducted a soil gas assessment south of the site at a commercial/industrial property and based on the DTSC Note 3 (DTSC, 2019b) and EPA risk screening levels at that time, no inhalation risk was identified for commercial/industrial workers and DTSC required no further action. Due to the recent changes in vapor intrusion protocols and risk screening levels, GE plans to include evaluation of the vapor intrusion pathway south of the site in the separate work plan discussed in Section 1.3 of Appendix F.

[9] GE will be reassessing potential off-site vapor intrusion; see Appendix P - RTCs.

2. REMEDIAL DESIGN

The proposed remedial design for the engineered remedy elements is described below. The design for the engineered remedy elements will be incorporated into the overall design for the redevelopment construction project. The redevelopment project is currently in the entitlements phase and detailed design has not yet commenced. The design of the remedy elements has been developed based on information available at the time this report was written. To the extent that the remedy elements described below depend on the redevelopment design, the remedy design will be refined and adjusted as more information about the redevelopment design becomes available.

For example, as part of the entitlements process, the redevelopment site plan may be modified. Potential site plan modifications include adding site access along San Leandro Street. This alternative site plan is included in Appendix D and will depend on obtaining access to the Union Pacific Railroad parcel directly adjacent to the site along San Leandro Street. As access negotiations are currently ongoing, the site plan shown on Figure 2 has been used as the basis of this Draft Final RDIP Addendum. If the alternative site plan with access along San Leandro Street is selected, it should not significantly change the remedy implementation described herein. Changes will be documented as needed in the Remedial Action Implementation Completion Report – Phase II ("Completion Report") (Section 4.7).

2.1 Soil Excavation

Soil excavation was completed as part of Phase I of the remedy implementation by GE, and no additional excavation is required as part of the approved remedy to meet RAOs. However, because soil will be accessible when the cap is temporarily removed during redevelopment construction, opportunistic soil excavation is planned (a) in five hotspots, where soil removal may increase the effectiveness of the groundwater remedy and/or address a potential source of vapor intrusion, and (b) in areas where previously collected sampling data indicate that California hazardous levels of PCBs (≥50 mg/kg) may be present in soil that may be disturbed by the redevelopment construction. These excavations are proposed in addition to the excavation required as part of the approved remedy, which was previously completed by GE as part of Phase I remedy implementation (Geosyntec, 2015).

Excavation locations have been identified to address the highest concentrations of PCBs and cVOCs remaining on the property and extents have been selected based on economic, logistical, and implementability considerations, along with input from DTSC and EPA. No remediation goals have been established for PCBs or cVOCs in soil for the site (2011 RAP; Geosyntec, 2011). Sampling data collected previously by GE and screening level soil samples collected on behalf of Bridge in September 2018, described below, were also included in the data assessment. A summary of the excavation locations is provided on Figure 3, with excavation dimensions provided in Table 2. No post-excavation soil confirmation sampling is proposed; the areas will be excavated to the indicated dimensions.

Soil excavation in areas where PCBs are known to be present at concentrations greater than 1,000 mg/kg and would generate dust if disturbed will be performed within an enclosure with air pollution control equipment (i.e., particulate air filters) in accordance with the tenting plan in Appendix B. Excavations will be backfilled with aggregate base or other import fill that meets the requirements summarized in Section 3.5. Excavated soil from areas with known PCB concentrations above 1,000 mg/kg will be directly loaded into bins that can be sealed and stored on-site pending characterization and transport for off-site disposal. Excavated soil from other areas will be stockpiled on-site pending characterization and transport for off-site disposal. Excavation methods and procedures, including the (1) shoring plan for the deeper excavations exceeding 10 feet bgs and anticipated to encounter groundwater (i.e., VOC hotspot and pyranol tank area PCB hotspot) and (2) the tenting plan for soil excavations with PCBs >1,000 mg/kg are described in Section 3 and Appendix B.

2.1.1 Screening Level Soil Sampling for PCBs

EKI performed a subsurface soil sampling investigation for PCBs at the site on 13 and 14 September 2018. The September 2018 soil sampling was performed as a screening level assessment to guide due diligence and targeted locations under existing and former buildings that (1) have known high PCB concentrations in concrete or (2) are proximate to other known locations with significant PCB impacts in soil (Figure 5). EKI collected soil samples from the site at 12 locations (E01 to E12) at various depths for PCB analysis. Where present, one baserock sample from each building under investigation was also analyzed for PCBs. The work was completed with EPA concurrence. Additional details about the investigation methods, procedures, and results, including laboratory reports, are provided in Appendix C, with a summary provided below.

Soil sampling was primarily conducted beneath Building 1, due to its history of use for transformer manufacturing and age (Building 1 was the first building built by GE on the property, and transformer manufacturing occurred as early as 1924). Samples from Building 1 were collected immediately beneath concrete where the highest concentrations of PCBs were previously detected at 1,600 mg/kg in the concrete. The maximum PCB concentration detected in samples beneath Building 1 was 12 mg/kg, reported in the baserock sample for borehole location E03 (Figure 5). Overall, PCB concentrations beneath Building 1 were at least one order of magnitude lower than overlying concrete. PCB results were similar for other buildings beneath which samples were collected during the September 2018 sampling event, with the maximum concentration detected in shallow soil samples (up to 5 feet below bottom of slab ["bbs"]) of 12 mg/kg beneath Building 21.

Deeper sampling results from borehole location E09, inside Building 2 and adjacent to the PCB hotspot associated with the location of the former pyranol tanks, indicate that PCBs in soil do not extend significantly beneath Building 2. The highest PCB concentration at borehole location E09 (73 mg/kg) was detected in the sample collected at 15 and 15.5 feet bbs, where a change in lithology to finer-grained materials was observed. However, this result is much lower than the maximum concentration detected in the adjacent PCB hotspot of 11,000 mg/kg. Similarly, PCB

results from boreholes below and near Building 21 (E12A and E12B, maximum concentration of 12 mg/kg) were much lower than the adjacent hotspot with a maximum PCB concentration of 13,000 mg/kg.

These results indicate that PCB hotspots underneath building slabs are not expected at the site, even where adjacent PCB hotspots have been identified or where high PCB concentrations in overlying concrete were previously detected. Therefore, the data gap in PCB soil characterization beneath buildings has been addressed and additional PCB soil sampling is not warranted prior to redevelopment.

2.1.2 Hotspot Soil Excavation

The design of the hotspot excavations for VOCs and PCBs in soil is described below.

2.1.2.1 VOC Hotspot

The approved remedy calls for targeted excavation of elevated cVOCs in soil characterized by TCE concentrations in excess of 10 mg/kg. One such area was excavated by GE as part of Phase I of the remedy implementation (Geosyntec, 2015). A remaining known area of elevated cVOCs is located between Buildings 1 and 4 near the northern property boundary in the vicinity of location 5GP5, where TCE at 21 mg/kg was previously detected in soil at 13 feet bgs (Figure 4). Elevated soil gas concentrations have also been detected in the vicinity of location 5GP5 with TCE detected in soil gas up to 1,200,000 micrograms per cubic meter ("ug/m^3"). These results were considered during the Feasibility Study ("FS")/RAP process and no response actions were identified for this area as part of the approved remedy. However, this area has been identified for excavation and off-site disposal of soil prior to redevelopment to increase the effectiveness of the groundwater remedy via mass removal and address a potential source of vapor intrusion.

The proposed excavation layout is shown on Figure 4 and is designed to address the highest concentrations of TCE previously detected in soil and soil gas in this area. The excavation will encompass a 40-foot by 45-foot area to a depth of 20 feet, for a total estimated in-place excavation volume of approximately 1,330 cubic yards ("cy," rounded). As discussed in Section 1.3 of Appendix F, a permeable material will be used to backfill along the north perimeter of the excavation to disrupt a potential vapor migration pathway from the site to adjacent off-site residences.

Post-excavation soil gas samples will be collected in this area prior to completion of redevelopment activities, and if the soil gas results from the point closest to the property boundary are above applicable screening levels, then following placement of the cap, GE will attempt to collect soil gas samples from off-site, as described in Section 4.2 and Appendix F.

2.1.2.2 PCB Hotspots

Targeted excavation and off-site disposal of soil at four PCB hotspot locations are proposed prior to redevelopment to mitigate potential impacts of PCBs to groundwater within and near the proposed building footprint. The targeted excavations will address the highest previously detected concentrations of PCBs in soil at the site shown on Figure 5 and include:

- The former pyranol tank area outside of Building 2, encompassing sampling locations S-626, W-792, W-793, and W-613. This 20-foot by 35-foot area will be excavated to a depth of 25 feet.
- The location of the oil-water recovery sump adjacent to Building 21 encompassing the sampling location Trench 1. This 15-foot by 25-foot area will be excavated to a depth of 5 feet.
- Two sampling locations near former Building 7. A 10-foot by 10-foot area around location S-602 will be excavated to a depth of 6 feet. A 10-foot by 10-foot area around location S-604 will be excavated to a depth of 5 feet.

The total estimated in-place excavation volume for these areas is approximately 760 cy.

2.1.3 Other Soil Excavation

Outside of hotspot areas, known locations of PCBs in soil above California hazardous waste levels (PCB concentrations of 50 mg/kg or greater) will be excavated in areas of the site that could be disturbed by the redevelopment activities (i.e., at depths shallower than 15 feet below current ground surface). The known locations of PCB concentrations of 50 mg/kg or greater in shallow soil are shown in Table 2 and on Figure 5.

The excavation extents were designed using data previously collected by GE and based on input from EPA. The vertical extent of these excavations will extend 1 foot below a known detection of 50 mg/kg or greater. The horizontal extent will be determined by nearby soil sampling locations <50 mg/kg as shown on Figure 5. Where sampling data are not available, a 10-foot by 10-foot area of soil around the sampling location will be removed. On the western portion of the site, the excavation depths account for the estimated depth of fill (if any) and capping materials placed at these locations during implementation of the Phase I remedy (Appendix A).[10] The dimensions of the excavation extents are provided in Table 2. The total estimated in-place excavation volume for these excavation locations is 560 cy.

[10] Pre- and post- Phase I survey data provided by GE were used to estimate the change in elevation at each location with known PCB concentrations ≥50 mg/kg on the western portion of the site (referred to by others as "Area 2 West" or "South Area"; see Appendix A). The survey data indicate that the six locations of interest in the western portion of the site were either in fill areas or areas of no apparent change in elevation for the Phase I remedy.

2.2 Cap

Consistent with the approved 2013 TSCA application and 2011 RAP, the proposed redevelopment will provide a cap for the entire site to prevent exposure of receptors to site soil with COCs above health-based action levels and control drainage of surface water. The existing caps and building foundations will be removed and replaced with new capping materials functionally equivalent to the 6-inch asphalt cap contemplated in the approved remedy described in the 2011 RAP. The cap will be integrated into the redevelopment plan, and the design will vary based on the different anticipated ground surfaces under the redevelopment plan (building foundation and concrete pavement; see Figure 2), as described below.

2.2.1 Building Foundation

The proposed warehouse building will cover approximately 52% of the site area and will be a slab-on-grade construction with column spacing approximately 50 to 60 feet on-center. Within the building footprint, the new building slab will serve as the cap, and will be a six-inch thick (minimum) layer of reinforced concrete underlain by the VIMS (Section 2.3). The final slab thickness will be determined during the detailed design phase of the redevelopment project. Standard details for the planned building foundation provided by the structural engineer have been included in Appendix D.

2.2.2 Concrete Pavement

Approximately 48% of the ground surface of the site (or 100% of the area outside of the building footprint) will be concrete pavement comprising the site driveways, truck aprons, parking lot, truck court, and floor slab of the GETS compound or sidewalk. The concrete pavement and sidewalk will serve as a cap for these areas of the site and will be a minimum of six inches thick. The final pavement and sidewalk design will be determined during the detailed design for the redevelopment; standard details and sections for the concrete pavement areas provided by the civil engineer have been included in Appendix D.

2.2.3 Landscaping

Aboveground landscaping is planned for areas immediately adjacent to the building (except in the truck court area) and along most of the property boundary aside from driveways, with the largest landscaping areas in the frontage along International Boulevard, and comprise approximately 8% of the site surface area (Figure 2). Aboveground landscaping will be contained in planters constructed above the concrete pavement cap (see Section 2.2.2 above) that will drain into the new surface water control system planned for the site.

The final landscape design will be determined during the detailed design for the redevelopment; standard sections for these areas provided by the civil engineer have been included in Appendix D.

2.2.4 Surface Water Controls

After redevelopment, storm and surface water runoff on the site will be collected using a new system consisting of a new retaining wall/curb around the perimeter of the site and drainage/catch basins for the entire site (hardscape, parking lot, driveways, building, truck aprons, truck court, and aboveground planters) that is conveyed to a new storm drain system beneath the site. The final discharge location before storm water leaves the site will be MH-24R, the replacement manhole to be installed in the same location as existing MH-24. The new storm water collection system and site grades will be designed to keep runoff on-site, restrict run-on from off-site, provide uniform drainage of the site, prevent ponding except in a designated on-site aboveground detention area during high flow storm events (as required to meet the City's Storm Drainage Design Standards [City, 2014]). The new storm water system will also provide treatment as required by local, regional, and state agencies (e.g. Alameda Countywide Clean Water Program and California Regional Water Quality Control Board – San Francisco Bay Region ["Water Board"]).

The new storm and surface water collection system is in the preliminary design phase for the redevelopment, and information available thus far is depicted on the preliminary grading and utility plans, along with associated details and description from the civil engineer included in Appendix D. Final grades, detention area sizing and location, catch basin locations and sizing, piping alignments, sediment treatment approach (if needed) and other system design details will be finalized during the redevelopment design phase when the entitlements process with the City has progressed sufficiently.

Storm water and sediment sampling has been requested by EPA to assess the performance of the cap. As described in Section 4.5.3, during the wet season, storm water and sediment samples, if sediment is present, will be collected from MH-24R prior to any treatment that may be installed to comply with applicable storm water regulations for the redevelopment project.

2.2.5 Clean Corridors

Clean corridors refer to the installation of subgrade utilities in imported backfill (see import fill requirements in Section 3.5). Clean corridors will be used for subgrade utilities that will be active after redevelopment, except for remediation utilities (Section 2.2.5.1). The clean corridors will extend approximately 2 feet on either side and 1 foot below (where feasible) subgrade utility piping and related structures such as catch basins, manholes, and vaults. Marker or delineation fabric (orange polypropylene needle-punched nonwoven geotextile; Geotex® 401 Orange DND[11] or similar) will be placed at the interface between import fill and native soil in trenches for utilities in clean corridors to demarcate the boundary of the clean corridor for future construction/maintenance workers.

Clean corridors may be installed under a design-build contract with Bridge's Contractor based on the location of the utilities and related features shown on the utility plan and associated

[11] Manufacturer: Propex Operating Company, LLC of Chattanooga, TN.

details prepared by the civil engineer. The preliminary utility plan showing the storm drain and sanitary sewer alignment outside of the building footprint and associated details are included in Appendix D. These redevelopment design drawings will be completed during the detailed design phase of the redevelopment project. As-built utility alignments will be included in the Completion Report and SMP to document the locations of clean corridors.

To limit preferential pathway migration of soil gas and groundwater, clean corridors will be:

- Backfilled using low-permeability backfill;[12] and/or
- Installed with cutoff features.

In addition, seams, holes, connections, and other openings in vaults and other underground utility structures will be sealed to restrict infiltration of soil gas and/or groundwater.

Low permeability backfill may include a low strength grout mix known as controlled density fill ("CDF") or "flowable fill" or controlled low strength material. This material is poured like grout, has low strength and therefore can be excavated by hand, and flows into gaps and around utilities. It can provide a low permeability restriction to gas and liquid flow when used as utility backfill. Other low permeability fill materials may also be used, subject to approval by EKI or the environmental engineer.

If a permeable backfill material is used in a trench, a cutoff feature will be installed at a minimum of every 300 feet, within 50 feet of branches in the distribution system, and at the building perimeter should the utility intersect with the building footprint. The cutoff feature will be a wall of low permeability material, such as bentonite, concrete, or CDF. The cutoff feature will be at least 2 feet thick and will span the width of the trench from the base of the trench to a minimum of 1 foot below the ground surface. The sides of the cutoff feature will be keyed into native soil. Cutoff wall details are included in Appendix D.

Health and safety requirements for construction/maintenance workers working in clean corridors after redevelopment will be described in the SMP and will address the potential inhalation of vapors.[13] In the unlikely event that work outside of clean corridors is required, additional health and safety requirements and procedures described in the SMP will apply.

2.2.5.1 Remediation Utilities

Utilities associated with the environmental remediation systems on-site (GETS and VIMS) will not be installed in clean corridors. Maintenance of the GETS will be conducted by workers with appropriate health and safety training and maintenance work will be conducted in compliance with the requirements of their site-specific health and safety plan.

[12] If low-permeability backfill is used within the building footprint for clean corridors, a permeable layer will need to be included below the building slab, consistent with the VIMS design.

[13] As described in Section 1.5, the only potentially complete exposure pathway for the construction/maintenance worker population working in clean corridors is the potential inhalation of vapors.

Subsurface utilities, conduits, and piping installed for the VIMS are expected to remain in place, undisturbed. The VIMS piping and utilities will not be located in clean corridor areas and maintenance of VIMS subsurface piping and utilities is neither required nor anticipated to occur in the future. However, in the unexpected event that repairs of the subsurface piping of the VIMS are required, the health and safety requirements and procedures for work outside of clean corridors will be implemented as required by the SMP.

2.2.5.2 Other Utilities

Subsurface utility trenches associated with other utilities such as electrical and sanitary sewer under the building footprint are anticipated for the redevelopment and will be installed in clean corridors as described above. However, these utilities have not yet been designed. Locations of other utilities will be determined during the redevelopment design phase after the entitlements process with the City has progressed sufficiently. The locations of these utilities will be included in the Completion Report and SMP.

2.3 Vapor Intrusion Mitigation System

The planned development will include installation of a VIMS for the new building to address potential vapor intrusion risks from VOCs. The VIMS will include an active SSD system with the following elements:

- Sub-slab liner;
- Sub-slab permeable aggregate layer;
- Seven suction trenches;
- Conveyance piping from suction trenches to an SSD blower system;
- SSD blower system; and,
- Sub-slab probes ("SSPs") for sub-slab vacuum monitoring and sub-slab soil gas sampling.

The VIMS implementation is described further in Section 3.13 and in Appendix E. The SSD system will cover the entire ground-floor footprint of the new building, approximately 535,000 sf. As indicated in Appendix E, the final design of the VIMS system will be submitted to DTSC for review prior to construction.

The SSD system will be constructed during core and shell construction of the new building and will be started and tested prior to building occupancy.

2.4 Modifications to the Groundwater Remedy

To facilitate the proposed redevelopment and maintain the effectiveness of the remedy, modifications are proposed to the groundwater remedy by GE in coordination with Bridge and in accordance with the requirements in Section 4.15 of the Order and the deed restriction. The proposed modifications are described below and in more detail in Appendix F (developed by Wood Environment & Infrastructure Solutions, Inc. ["Wood"] for GE) and include:

- Relocation of the GETS;
- Destruction of monitoring wells not used as part of the current monitoring program and wells no longer needed to monitor the plume;
- Destruction of three extraction wells;
- Relocation of one extraction well;
- Installation of replacement monitoring wells;
- Groundwater sampling and analysis after the GETS is shut down for redevelopment of the property and after the new groundwater treatment system is brought on line; and
- Preliminary design of the relocated groundwater treatment system.

If site redevelopment activities, including grading or soil excavation, interfere with extraction and/or monitoring wells not proposed for relocation or destruction, these wells may require destruction and reinstallation after redevelopment is completed. A plan for these wells will be provided under a separate cover by GE.

2.4.1 Groundwater Extraction and Treatment System

The proposed redevelopment conflicts with the location of the following elements of the GETS:

- Treatment compound;
- Groundwater conveyance, electrical, and controls lines;
- Electrical power drop;
- Vapor discharge line and stack; and
- Extraction wells EW-5, EW-6, and EW-7.

The GETS treatment compound will be relocated southwest of 12th Street to avoid conflict with the proposed warehouse footprint, and the vapor discharge stack will be relocated to the landscaping along San Leandro Street (Figure 2). Associated infrastructure and equipment will be modified as needed based on the new locations of the treatment system and vapor discharge stack.

Extraction wells EW-5 and EW-6 are proposed for destruction as these wells are not needed for hydraulic capture and are not removing a significant mass of CVOCs. EW-7 will be destroyed and a replacement extraction well will be installed. Appendix F provides more details about the planned modifications, including rationale for destruction of extraction wells EW-5 and EW-6, and relocation of extraction well EW-7.

2.4.2 Groundwater Monitoring Network

As described in Appendix F and below, modifications are planned for the groundwater monitoring network in coordination with the redevelopment.

- Two (2) GETS performance monitoring wells (W-614A and GW-4B) associated with extraction wells proposed for destruction (EW-5 and EW-6) and located within the planned building footprint will be destroyed.

- Seven (7) GETS performance monitoring wells (W-004A, W-529A, W-004B, W-741B, GW-1B, GW-2B, and GW-1C) and one (1) deep monitoring well (GW-4D) will be relocated from within or near the planned building footprint to outside of and adjacent to the planned building.
- Two (2) new upgradient A and B Zone monitoring wells will be installed.
- Thirty two (32) monitoring wells not part of the approved monitoring well network are proposed for destruction by GE, fifteen (15) of which are located within the planned building footprint (W-022A, W-035A, W-035B, W-613A, W-615A, W-621A, W-625B, W-733A, W-734A, W-757A, W-757B, W-792B, W-793C, W-801B and W-802B).

The rationale for these modifications is provided in Appendix F, along with supporting tables and figures providing more information about these wells.

3. REMEDY IMPLEMENTATION

This section describes the implementation approach for the engineered remedy elements described in Section 2 above. Bridge will retain Contractors to complete the work described in this document, including excavation of PCB- and VOC-impacted soil during site redevelopment, site demolition and preservation/abatement of the Building 1 façade, installation of clean corridors for belowground utilities, construction of a sitewide cap, installation of a VIMS, and modifications to the groundwater remedy.[14]

The approximate schedule for remedy implementation is discussed in Section 5.

3.1 Pre-Implementation Activities

The main tasks to be performed prior to commencement of the remedy implementation include:

- Procurement of entitlements from the City of Oakland for the redevelopment project, which will involve finalization of the project concept and completion of an EIR to fulfill the City's CEQA obligations.
- Preparation of an RDIP Addendum/TSCA application (this document) that describes the details of work to be implemented and the sequence of cleanup actions. This Draft Final document addresses EPA and DTSC comments on the draft version as described in Section 1 and Appendix P. The Draft Final RDIP Addendum/TSCA application will be submitted to DTSC and EPA for concurrence, and will be finalized and approved after completion of the CEQA and ESD processes.
- Development of a demolition plan, including identification of appropriate facilities for off-site disposal or recycling of demolition waste. During this activity, building materials sampling will be conducted as described below in Section 3.3 to supplement information presented in GE's Phase II Building Materials Characterization Report ("GE's Building Materials Report") (Geosyntec, 2010b; see Appendix G).
- Preparation of a shoring plan and tenting plan for soil remediation excavation based on the final, approved design of the excavation extents that are stamped by a professional engineer.[15] The final stamped shoring plan will be provided to DTSC for review and comment 60 days prior to implementation.
- Detailed design of remedy features by the redevelopment team, including design of the site building foundation, concrete pavement, landscaping, and surface water controls; VIMS design; and finalization of a plan to retain and/or modify the groundwater remedy elements to remain on-site.

[14] Modifications to the groundwater remedy will be overseen by GE and its consultants.
[15] Preliminary versions of these plans are included in Appendix B.

- Completion of Contract Documents for procurement of Contractor(s) to perform the cleanup and remedy-related activities, including development and/or finalization of plans and specifications.
- Selection of Contractors and completion of contract negotiation and award.
- Contractor procurement of necessary permits and utility clearances prior to the commencement of redevelopment and cleanup activities at the site.

Most of these pre-field activities will be conducted as part of the redevelopment project and will include those needed for remedy implementation. The sections below describe the pre-field activities that are most applicable to the remedy described herein.

3.1.1 Permitting

The Contractor will be required to procure necessary permits prior to beginning remedy implementation. Permits required may include the following:

- California Occupational Safety and Health Administration ("Cal/OSHA") excavation permit;
- Alameda County Public Works Agency Well Destruction/Drilling Permit;
- Bay Area Air Quality Management District ("BAAQMD") Soil Excavation Notification, along with VIMS permit (Authority to Construct and Permit to Operate);
- City of Oakland permits, including demolition, grading, excavation, encroachment, etc.;
- Filing a notice of intent ("NOI") under the Construction Activities Storm Water General Permit ("General Permit") (State Water Resources Control Board ["SWRCB"] Order No. 2009-0009-DWQ, as amended); and
- Permit for discharge of groundwater from excavation dewatering or surface water from on-site accumulation (if needed). Water could be discharged to the sanitary sewer under permit from East Bay Municipal Utility District or the storm drain under permit from the Water Board.

During the detailed design of the remedy elements, other permits may be identified and will be obtained as necessary. Copies of the obtained permits, including notifications and reporting related to BAAQMD Regulation 8, Organic Compound Rule 40, will be included in the Completion Report (Section 4.7).

3.1.2 Utility Clearance

As part of site redevelopment, all existing utilities will be deactivated and removed except for utilities associated with the GETS planned for reuse after redevelopment. Depending on the

project sequencing, existing active utilities may still be present on-site during soil hotspot excavations described in Section 3.3. If utilities have not been deactivated and removed at the time of implementation of a given remedy component that involves subsurface disturbance, the Contractor will notify Underground Services Alert to clear subsurface areas of utilities at least two working days in advance of initiating activities. In addition, the planned work areas will be surveyed for the presence of existing utilities by a private utility locating service. Temporary utilities may be established at the site to facilitate demolition and construction activities, and utility location will be coordinated with the site construction manager to avoid these temporary features.

3.1.3 Initial Site Preparation

As part of overall site redevelopment activities in compliance with the project permit obtained from the City, Bridge's Contractors will conduct initial site preparation, including setting up temporary facilities (trailer and sanitary) to create the Support Zone, staging areas, and establishing on-site security. The responsibility for these tasks will depend on the scopes of services established for individual Contractors as part of the redevelopment project.

Prior to initiation of remedy implementation on the site, the Contractor's field crew will conduct initial mobilization activities that are non-invasive. These activities include modification or installation of site control features to restrict access to the site; constructing a decontamination pad and work zones for worker health and safety (Contaminant Reduction Zone); establishing an Exclusion Zone; creating staging areas for truck, heavy equipment, and stockpiles; locating underground utility lines; preparing dust control measures; marking the hotspot excavation areas; and other pre-excavation activities.

Bridge's Contractors will be responsible for maintaining site control and these temporary features over the course of redevelopment construction, which will include remedy implementation.

3.1.4 Surveying

Bridge has retained Kier & Wright Civil Engineers & Surveyors, Inc., a licensed surveyor, to create a topographic map of the existing site conditions, which is included in Appendix D. Table D-1 in Appendix D contains survey coordinates of the proposed excavation boundaries for soil excavations described in Section 3.3. The Contractor will subcontract with a licensed land surveyor to establish field points to manage excavation areas defined in Table D-1. The Contractor will also establish field points to identify wells, grading cut and fill limits, and other pertinent site features. Post-implementation surveying is described in Section 4.1.

3.1.5 Public Notification

The Landmarks Committee and Planning Commission will hold two public hearings planned for the fall of 2019 to receive public comments on the content of the draft EIR currently being developed by the City. For both hearings, notices will be sent by the City to residents within 500 feet of the property, to key environmental organizations, the local school, and social

organizations serving the area, and posted online and in the Oakland Tribune. Notices will also be posted at the site in visible locations. Following approval of the project, the Landmarks Committee and Planning Commission with hold two additional hearings, noticed in the same manner. These hearings are anticipated to occur in late 2019 or early 2020.

In addition, Bridge conducted a voluntary meeting with the community at a public location near the site on 21 August 2019. This meeting was broadly advertised, including to local community groups and council members in addition to neighboring residents.

Prior to the start of construction activities, residents located within 500 feet of the site will be sent fact sheets describing the remediation work to be conducted and its purpose. Door-to-door outreach to immediate neighbors will also be conducted. Notices with project information and points of contact for questions and concerns will provided to neighboring residents in-person or via mail drop and will also be posted on signs at the site in visible locations.

3.1.6 Cultural Resources Study

A report was prepared by LSA Associates, Inc. ("LSA") entitled Cultural Resources Study, General Electric Remediation and Reuse Project and dated July 2019 (LSA, 2019), to document cultural resource identification efforts to meet EPA's responsibilities under Section 106 of the National Historic Preservation Act (36 Code of Federal Regulations ["CFR"] 800). LSA's study analyzed both archaeological and historical built environmental resources and identified three historic-period industrial properties within the direct area of potential effects ("APE"): Building 1, Building 2, and the northern portion of the 57th Avenue Industrial District Area of Primary Importance ("API") (57thAvenue Industrial District API). Building 1 is individually listed in the California Register of Historical Resources and Oakland Register and is an API contributor. Building 2 is not individually eligible but is an API contributor. This API is a National Register of Historic Places ("NRHP")-eligible district recorded by the Oakland Cultural Heritage Survey and includes 18 contributing elements built from the 1910s-1950s on 22 parcels. The parcel containing the direct APE is within the API boundary and Building 1 and Building 2 contribute to the significance of the API. No archaeological historic properties or historic properties of tribal importance were identified in the direct APE.

The project would include partial demolition of Building 1 and demolition of Building 2 which are identified as historical resources. The two-story portion of the street-facing brick portion of Building 1 would be retained and incorporated in the new proposed building and the rest of Building 1 and all of Building 2 would be demolished. The portion of Building 1 that would be retained will be incorporated into the new building in a manner that maintains the prominence of Building 1 with a new building that references but does not replicate the historic building.

LSA applied the criteria at 36 CFR 800.5(2) to assess the potential for the project to result in an adverse effect under Section 106. Based on this technical analysis, the project would substantially alter the northern half of the API, which would result in an adverse effect to the 57th Avenue Industrial District API as a whole; however, the Cultural Resources Study concluded

that the alterations to the API as proposed by this project will not diminish the overall integrity location, setting, design, materials, workmanship, feeling, and association of the remaining contributing elements of the API. Indeed, the API, as a whole, will retain those characteristics as an assemblage of 1910s-1950s industrial properties that qualify it as a NRHP-quality district.

The Cultural Resources Study recommends five treatment measures that would minimize the adverse effect to historic properties: 1) Architectural Photo-Documentation, 2) Façade Improvement Program Donation, 3) Archaeologically Sensitive Areas—Pre-Construction Measures, 4) Archaeological Resources—Discovery during Construction, and 5) Human Remains—Discovery during Construction. These will be reviewed with EPA and the State Historic Preservation Officer and documented in a Historic Property Treatment Plan.

3.2 Preparation of Plans

This section provides a general description of the plans or addendums to the existing 2012 RDIP plans that will be prepared prior to implementation of the excavation and soil management described herein for the site. These plans include the following:

- Transportation Plan Addendum (see Appendix H);
- Decontamination Plan (see Appendix I);
- Dust Control Plan (see Appendix J);
- Perimeter Air Monitoring Plan ("AMP"; see Appendix K);
- Site-Specific Health and Safety Plan (see Appendix L);[16]
- Construction Storm Water Pollution Prevention Plan ("SWPPP"; see Appendix M); and
- Field Sampling and Laboratory Analysis Plan ("SAP") Addendum (see Appendix N).

The following subsections summarize the contents of each plan or plan addendum and describe requirements for the Contractor to prepare their own HASP and plan addendums. Plan addendums will be prepared by the Contractor to add Contractor-specific information (e.g., SWPPP addendum) or if the Contractor proposes deviations from procedures specified in any of the plans listed above. The Contractor's HASP will be submitted to DTSC for approval prior to the start of on-site activities. The Contractor's plan addendums will be submitted to EKI for review and approval prior to the start of on-site field activities and will be submitted to DTSC and EPA along with the Completion Report. Hard copies of these plans will be maintained on-site during demolition and soil handling activities while the ground surface is not capped.

[16] This appendix is not included in this version; see Section 3.2.5 and response to comments (Appendix P).

3.2.1 Transportation Plan Addendum

The Transportation Plan in the 2012 RDIP describes the proposed truck routes, approved disposal facilities, loading and transportation procedures for materials leaving the site during implementation of remedial activities, documentation protocol, and emergency response procedures. While site access and controls, traffic control, and waste transporter truck schedules and frequencies will depend on the City's EIR findings and associated requirements for the overall redevelopment project, the remaining components of the 2012 RDIP Transportation Plan are applicable to this RDIP Addendum.

Therefore, a Transportation Plan Addendum (see Appendix H) has been prepared that documents the relevant changes and includes additional disposal facilities along with the proposed truck routes for those facilities. The 2012 RDIP Transportation Plan has been included as an attachment to this plan Addendum for ease of reference.

If the Contractor proposes deviations from procedures specified in the Transportation Plan and its addendum, these deviations will be approved by EKI and documented in the Completion Report. The Contractor will be responsible for implementing the approved Transportation Plan and addendum.

3.2.2 Decontamination Plan

The Decontamination Plan (Appendix I) specifies procedures for removal, collection, and containment of soil and other potentially contaminated material from equipment and transportation vehicles, guidelines for the construction of a decontamination pad, decontamination of personnel and tools, and methods for temporary storage, characterization, and off-site disposal/on-site placement of decontamination wastes generated during decontamination activities (i.e., placement of access road materials and soil and sediment decontamination waste under the permanent cap).

If the Contractor proposes deviations from procedures specified in the Decontamination Plan, these deviations will be approved by EKI and documented in the Completion Report. The Contractor will be responsible for implementing the approved Decontamination Plan.

3.2.3 Dust Control Plan

The Dust Control Plan (see Appendix J) specifies measures to limit generation of dust and vapors, measures to implement to control dust from spreading outside of designated work areas to off-site properties or to public streets, and contingency measures if perimeter air monitoring shows the need to control such emissions following identification of problems as defined by Action Levels specified in the Perimeter Air Monitoring Plan (see below).

If the Contractor proposes deviations from procedures specified in the Dust Control Plan, these deviations will be approved by EKI and documented in the Completion Report. The Contractor will be responsible for implementing the approved Dust Control Plan.

3.2.4 Perimeter Air Monitoring Plan

The AMP (see Appendix K) specifies perimeter air monitoring procedures and criteria to monitor the effectiveness of the Contractor's dust control practices and to determine if contingency measures, specified in the Dust Control Plan, need to be implemented. Bridge's representative will be responsible for implementing the approved AMP, and the Contractor will be responsible for implementing contingency measures in response to notification from Bridge's representative to do so based on air monitoring data.

3.2.5 Site-Specific Health and Safety Plan

All personnel involved with the implementation of the RDIP Addendum will be responsible for operating in accordance with the most current requirements of Cal/OSHA outlined in the State General Industry and Construction Safety Orders (California Code of Regulations ["CCR"], Title 8) and Federal Construction Industry Standards (29 CFR 1910 and 29 CFR 1926), as well as other applicable federal, state and local laws and regulations. In addition, Cal/OSHA's Construction Safety Orders (especially CCR, Title 8 Sections 1539 and 1541) will be followed as appropriate.

EKI's HASP will be prepared in accordance with Cal/OSHA standards for hazardous waste operations (Title 8 California Code of Regulations Section 5192). EKI's corporate HASP has been reviewed and signed by a Certified Industrial Hygienist ("CIH"). EKI will prepare its own HASP that addresses health and safety protocols for activities specific to EKI employees, which differs from activities performed by the Contractor. EKI will be responsible for the health and safety of its employees and for implementing the EKI HASP.

The Contractor will prepare its own HASP in accordance with health and safety standards as specified by federal Occupational Safety and Health Administration ("OSHA") and Cal/OSHA. The Contractor will be responsible for health and safety of their employees and workers sub-contracted to them at the site. The Contractor's HASP must be reviewed and signed by a CIH. The Contractor's HASP will address site-specific issues, site COCs, hazard communication, notification of workers, and other topics required by applicable laws and regulations. The Contractor's signed HASP will be submitted to DTSC for review when available.

The Contractor's site-specific HASP will also specify, among other things, employee training and PPE, training and medical surveillance requirements, standard operating procedures, and a contingency plan that conforms to the requirements of 29 CFR 1910.120 et seq. and other applicable federal and state laws and regulations, including Title 8, CCR Section 5192.

As described in Appendix P, EKI's HASP has not been included in this document. It will be revised and provided to DTSC for review and approval under a separate cover prior to the start of field work.

3.2.6 Construction Storm Water Pollution Prevention Plan

The SWPPP (see Appendix M) for the redevelopment project was prepared consistent with requirements of the permit that will be obtained by the Contractor or other Bridge

representative under the General Permit. The SWPPP addresses regulatory requirements for construction storm water pollution management and best management practices ("BMPs") that will be implemented, such as those identified by the California Stormwater Quality Association (["CASQA"]; CASQA, 2015). The SWPPP specifies minimum measures to be undertaken to limit storm water impacts from the site such as limiting the sediment load to storm water runoff from the site during demolition, remediation, and other redevelopment-related soil handling activities while the ground surface is not capped at the site and preventing accidental spills from impacting storm water.

Site demolition and remediation excavation activities while the cap remains in place will be considered regulated activities under the General Permit as they are part of a larger common plan of development that exceeds 1 acre; existing sediment control measures will remain in place during this phase of work. If this work occurs during the wet season, sampling for PCBs will be performed using the methods described in the SAP. PCB sampling (and pH, if needed) will be included as part of the non-visible pollutant monitoring program and will be conducted at MH-24 for each qualifying storm event per General Permit requirements. Additionally, sediment samples will be collected and analyzed for PCBs if sediment is present in MH-24. Non-visible pollutant monitoring in storm water will continue until the storm drain line is plugged and there is no off-site discharge.

During the time the site is not capped, surface and storm water runoff and run-on from off-site properties will be restricted by the existing concrete curb (see Appendix A), which will be retained until it is replaced by the planned storm water management system for the new development (see Section 2.2.4). Accumulated storm water will be allowed to infiltrate or, if needed for the construction, will be captured and stored on-site prior to sampling, treatment (if needed), and discharge under permit to the sanitary sewer or the storm drain as described in Appendix M.

During the wet season, existing groundwater extraction wells EW-1, EW-2, and EW-3, located on the western (downgradient) property boundary will be operated and monitored to the extent practicable to demonstrate that storm water infiltration while the site is not capped does not result in changes in the trends for COCs in extracted groundwater. Groundwater from extraction wells EW-1, EW-2, and EW-3 will be sampled quarterly when the wells are operating during the wet season until the new cap is in place. Extraction well groundwater samples will be collected as described in the SAP (Appendix N). Consistent with the existing sampling protocols for the GETS[17], samples collected from EW-1, EW-2 and EW-3 will be analyzed for VOCs by EPA Method 8260B, and PCBs by EPA Method 8082, Ultra Low Level ("ULL"). The Contractor or other Bridge representative will be required to file a NOI and required Permit Registration Documents with the SWRCB prior to site demolition, excavation, and other

[17] GETS sampling protocols are described in the *Operation, Maintenance and Monitoring Plan, General Electric Site, 5441 International Boulevard, Oakland, California,* prepared by Geosyntec, dated 24 November 2015, and included in the RACR.

redevelopment-related soil handling activities. A copy of the NOI and receipt letter will be included in the Completion Report.

The Contractor or other Bridge representative will be required to comply with the General Permit and submit permit registration documents ("PRDs") prior to the start of field activities, as described in the SWPPP. The PRDs will be prepared and certified by a Qualified SWPPP Developer, in accordance with the General Permit requirements for the project Risk Level determined for the site. Bridge or its representative will be responsible for observing Contractor implementation of the SWPPP by conducting periodic reviews of Contractor efforts.

3.2.7 Field Sampling and Laboratory Analysis Plan Addendum

The SAP in the 2012 RDIP describes standard operating procedures for collection of air, water, soil, and soil gas samples and quality assurance and quality control requirements and has been included as an attachment to this plan Addendum for ease of reference.

The SAP Addendum (see Appendix N) includes the following: (1) PCB sampling of concrete; (2) PCB and lead sampling in support of the Building 1 façade abatement; (3) collection of soil gas samples from temporary soil gas probes; (4) collection of indoor air samples; (5) sub-slab vacuum monitoring for the VIMS; (6) sub-slab vapor monitoring for the VIMS; (7) storm water sediment sampling for PCBs during (if needed) and after redevelopment; and (8) extraction well sampling for VOCs and PCBs during wet-season operation of the GETS while site is uncapped during redevelopment. Bridge's representative will be responsible for implementing the approved SAP and SAP Addendum.

3.3 Site Demolition

As described in Section 1.3, the redevelopment plan will involve demolition of the existing aboveground features at the site and belowground utilities and structures that conflict with redevelopment. Except in the two cases described below, materials generated from demolition of aboveground features will be appropriately disposed of off-site after characterization and profiling as required (1) by the City for their compliance with the Bay Area Municipal Regional Stormwater Permit issued by the Water Board and (2) for acceptance by the selected disposal or recycling/salvage facilities.[18]

Existing aboveground building materials to be retained on-site after redevelopment include:

- The two-story brick portion of Building 1 facing International Boulevard, that will be incorporated into the new warehouse building; and
- Concrete with PCBs less than 50 mg/kg and TCE less than 10 mg/kg will be crushed and placed on-site beneath the new cap.[19]

[18] To the extent practicable, demolition waste will be recycled or salvaged off-site (e.g., asphalt used to construct the caps during Phase I of the remedy implementation in 2013-2015 may be recycled).
[19] Concrete will also be tested for other PCOCs, as described in Appendix O.

While site demolition is not a part of the approved remedy, for the purpose of the RDIP Addendum and TSCA cleanup application, the following demolition activities are discussed in Appendix O:

- Concrete sampling, crushing, and placement on-site under the new cap;
- Sampling and handling of PCB-containing demolition waste; and
- Building 1 brick cleanup plan.

Appendix O describes demolition of aboveground structures and is based on information presented in GE's Building Materials Report (Geosyntec, 2010b; see Appendix G). Management of known and unknown underground structures is discussed in Section 3.10.[20]

3.4 Soil Excavation

The specific equipment and means that will be utilized to implement this work will be at the discretion of the Contractor. It is anticipated that excavation activities can be accomplished with standard excavation and backfill equipment. Some of the equipment expected to be used at the site includes hydraulic excavators, backhoes, loaders, reach forklifts, scrapers, tractors, bulldozers, water trucks, end dump trucks, and compactors. If the cap is still in place at the time of excavation, it will be cut at the excavation limits (with appropriate offset) using concrete saws and removed from the work area prior to excavation. During soil excavation activities, Contractor will implement the Transportation Plan and addendum, Decontamination Plan, Dust Control Plan, Contractor's HASP, and SWPPP and Bridge's representative will implement the AMP as described in Section 3.2 above and in the respective Appendices.

As described in Section 2.1, both hotspot and non-hotspot soil excavation is planned in a number of locations during redevelopment construction. The excavation locations are shown on Figures 3 through 5, with excavation dimensions provided in Table 2. Prior to excavation of the VOC hotspot and the former pyranol tank area PCB hotspot, all or portions of the adjacent buildings (Buildings 1 and 2, respectively) will be demolished as needed to perform the excavations safely. Prior to the excavations adjacent to Building 21 (S-506, W-030, W625/Trench 2, Trench 1, W-018, and S-047; see Figure 3), the oil recovery sump and french drain system will be demolished as described in Section 3.10.

Soil remediation excavation in areas where PCBs are known to be present at concentrations greater than 1,000 mg/kg will be performed within an enclosure that is vented to air pollution control equipment (i.e., particulate air filters) as described in the tenting plan in Appendix B. For the VOC hotspot near Building 1 and the PCB hotspot near Building 2, Contractor will install sheet piling in accordance with the shoring plan in Appendix B. A final stamped shoring plan will be submitted to DTSC for review and comment 60 days prior to implementation. A crane may be required for placement of shoring. The deep portions of the excavations requiring

[20] Relocation of the GETS, including both aboveground and belowground components, are discussed in Appendix F.

shoring may need to be dewatered during the excavation. Dewatering will be performed in accordance with Section 31 23 19 of the Technical Specifications from the 2012 RDIP.

No post-excavation soil confirmation sampling is proposed after excavation; the areas will be excavated to the indicated dimensions.

Excavated soil from areas with known PCB concentrations above 1,000 mg/kg will be directly loaded into bins that can be sealed and stored on-site pending characterization and transport for off-site disposal. Excavated material from other areas will be stockpiled on plastic sheeting and covered with plastic sheeting or placed in roll-off bins with covers, per Section 02 61 13 of the Technical Specifications from the 2012 RDIP. Stockpiled materials will be characterized for disposal as described in the 2012 SAP followed by transportation and disposal off-site as described in the Transportation Plan and addendum. Excavated soil with PCBs ≥50 mg/kg will be disposed of at a Resource Conservation and Recovery Act ("RCRA") Class II landfill (e.g., Kettleman Hills Facility). Excavated soil characterized with PCBs <50 mg/kg will be disposed of at an appropriately permitted landfill (e.g., Altamont Landfill).[21]

Groundwater generated from dewatering will be managed as described in the 2012 RDIP (Technical Specifications Section 31 23 19) and will be collected and stored on-site to be either treated by the GETS or appropriately disposed of off-site. Equipment used on site, including excavators and sheet piles, will be decontaminated before leaving the site as described in the Decontamination Plan. Water used for decontamination will be managed as described in the Decontamination Plan.

Excavations deeper than 4 feet bgs will be backfilled with gravel or other import fill that meets the requirements summarized in Section 3.5 to a depth of 4 feet bgs, pending rough and fine grading for the redevelopment. Backfilling will meet Bridge's geotechnical engineer's requirements for compaction. Rough grading may be conducted concurrently with excavations and depressions remaining after excavation will be graded as required for the redevelopment. If construction sequencing results in lag between excavation and rough grading, remaining excavation sidewalls will be sloped for site safety to allow other activities to occur in the interim.

3.5 Import Fill Requirements

This section addresses material imported to the site for use as surface and subsurface fill, including soil amendments for landscaping, clean corridors, drain rock, class 2 baserock, and/or other specialty materials. Relevant documents include:

- Information Advisory Clean Imported Fill Material, DTSC, October 2001 ("DTSC Fill Guidance"; [DTSC, 2001]).

[21] Proposed disposal facilities require approval by EPA to dispose of PCB-containing waste as a non-TSCA waste.

- HERO Human Health Risk Assessment ("HHRA") Note Number 3, DTSC Modified Screening Levels ("DTSC-SLs"; DTSC, 2019b).
- EPA Regional Screening Levels ("RSLs"; EPA, 2019).
- Environmental Screening Levels ("ESLs") – January 2019, Revision 1, Water Board. Issued February 2019 (Water Board, 2019).
- Analysis of Background Distributions of Metals in the Soil at Lawrence Berkeley National Laboratory, Lawrence Berkeley National Laboratory Environmental Restoration Program, April 2009 ("LBNL Study"; LBNL, 2009).

For virgin material from a quarry, one sample of import material per source will be collected and analyzed by a California-certified laboratory on a dry-weight basis for the analytes listed below. For non-virgin material from other sources, samples of each import material will be collected and analyzed at a frequency consistent with the DTSC Fill Guidance. For each source of non-virgin import material, the sampling frequency will be 4 samples for the first 1,000 cy, 1 sample for each 500 cy after 1,000 cy and up to a total of 5,000 cy, and 1 sample per 1,000 cy after 5,000 cy. If the soil is characterized in situ at the borrow site, a lesser number of samples may be appropriate, consistent with the DTSC Fill Guidance. Imported material will be tested by a California-certified laboratory on a dry-weight basis for the following:

- California Title 22 Metals using EPA Method 6020 and EPA Method 7471;
- PCBs and organochlorine pesticides ("OCPs") using EPA Method 8082/8081;
- Semi-volatile organic compounds ("SVOCs") using EPA Method 8270C;
- VOCs using EPA Method 8260B;
- Total purgeable petroleum hydrocarbons ("TPHg") using EPA Method 8015 (modified);
- Total extractable petroleum hydrocarbons (C12 to C36) ("TPHd" and "TPHmo") with silica gel cleanup using EPA Method 8015 (modified);
- Asbestos using California Air Resource Board ("CARB") Method 435 (polarized light microscopy ["PLM"]);
- California waste extraction test ("WET") and leachate analysis for selected metals, as necessary, using California Code of Regulations, Title 22, Division 4.6, Chapter 11, Appendix II and EPA Method 6020; and
- Toxicity characteristic leaching procedure ("TCLP") for selected metals, as necessary, using EPA Method 1311 and EPA Method 6020.

Imported material will meet the following environmental standards:

For metals with defined local background levels (e.g., arsenic), the performance standard will be the local background level. For arsenic, background will be established at 17 mg/kg, the 95th percentile level in the LBNL Study.[22] For lead and other metals, background will be established by the 99th percentile level in the LBNL Study.[23]

For VOCs, SVOCs (including polycyclic aromatic hydrocarbons ["PAHs"]), PCBs, OCPs, and for other metals without agreed-upon local background levels, performance standards will be DTSC-SLs for residential soil (DTSC, 2019b) or EPA residential RSLs (EPA, 2019) if a DTSC-SL was not available, consistent with DTSC Note 3. For total petroleum hydrocarbons fractions (TPHg, TPHd, TPHmo) performance standards will be residential ESLs (Water Board, 2019). The performance standards will be taken from the version of the screening levels that is current at the time of data evaluation.

The imported fill performance standard for asbestos fibers will be less than 0.25 percent by weight as determined by CARB Method 435 (PLM).

Imported fill materials will be non-hazardous in accordance with the criteria in CCR, Title 22, Section 66261.20.

An Import Material Information Report will be developed for each material source prior to import for submittal to Bridge and EKI for approval and will include:

- Intended use of the imported fill material;
- Material quantity to be imported;
- A statement whether the fill material is from a quarry or a borrow site;
- Description of the material's original nature (i.e., undisturbed native condition) including the source material address and property owner (with telephone number);
- Past property uses (industrial, residential, agricultural, etc.) from which the material originated;
- Previous property owner(s) for the past 40 years of the property from which the material originated;
- Previous material use(s) when the material is other than undisturbed native material;
- Chemical analytical results of the material including laboratory data sheets and chain-of-custody documentation, description of sample collection methods, and any additional information that may be necessary to assess the potential of the material being contaminated by designated chemicals; and

[22] Reported value for the arsenic (all) data set in the LBNL study.
[23] The 99th percentile for the background data set for lead is 43 mg/kg in the LBNL Study.

- Comparison of chemical results to environmental standards discussed above.

The sampling results will be evaluated in that context in accordance with the DTSC Fill Guidance, consistent with general industry practice.

3.6 Well Destruction and Relocation

As described in Appendix F, seven performance monitoring wells (W-004A, W-529A, W-004B, W-741B, GW-1B, GW-2B, and GW-1C) will be destroyed and reinstalled to accommodate the proposed redevelopment. In addition, two extraction wells and 32 monitoring wells will be destroyed without replacement (see Table F-1). Well destruction and relocation activities will be overseen by GE and GE's consultant and will be implemented as described in Appendix F and in accordance with the site-specific HASP prepared by GE's consultant and contractor for the work. Except for HASP implementation, well destruction and relocation activities do not require implementation of the Plans and addenda described in Section 3.2, unless redevelopment activities subject to the Plans and addenda are occurring concurrently at the site.

A summary of groundwater monitoring well destruction and relocation will be included in the Completion Report.

3.7 GETS Relocation

In addition to the relocation of groundwater monitoring wells described in Section 3.6, the GETS will be relocated as described in Appendix F. The GETS relocation will be overseen by GE and GE's consultant and will be implemented as described in Appendix F. In summary, the GETS relocation will involve resetting of the remaining extraction wells, wellhead equipment, and vaults; destruction and relocation of extraction well EW-7; rerouting of conveyance piping and associated trenches; relocating or rebuilding the structural components (e.g., concrete pad, equipment enclosures); relocating and reinstallation of process equipment; and reinstallation of electrical and communications components. Where practicable, existing conveyance piping, controls conduits, and electrical conduits will be reused.

A summary of the GETS relocation activities will be included in the Completion Report.

3.8 Grading and Soil Handling

Grading and soil handling activities conducted at the site will be subject to the Plans and addenda described in Section 3.2 above, the import fill requirements in Section 3.5, the soil management protocols described in Section 3.9, and the protocols for management of underground structures described in Section 3.10, including the recommendations of the Cultural Resources Study (see Section 3.1.6). Grading and soil handling activities are expected to be conducted by Contractors during soil excavation, utility installation, cap construction, and other earthwork activities including rough and fine grading for redevelopment. Grading and

soil handling will also be needed for ground improvement and soil preparation for foundation construction.

Workers conducting grading and soil handling activities at the site may contact soil containing site COCs, and all such personnel must have current 40-hour HAZWOPER training as specified by OSHA standard 29 CFR Part 1910.120. New non-remediation utilities installed at the site during redevelopment will be installed in clean corridors as described in Section 2.2.5, and future earthwork or grading activities in the clean corridors will be subject to the requirements of the SMP.

3.9 Soil Management Protocols for Free Product or Oily Soil

Free product or oily soil may be encountered during soil disturbance for redevelopment, and, if so, the protocols summarized below will be followed:

- If visible free product or oily soil is observed during site activities, EKI will notify EPA and DTSC. The soil will be removed until no visible free product or oily soil is observed in place. The removed soil will be stockpiled separately, characterized for disposal purposes as described in the 2012 SAP, followed by transportation and disposal off-site as described in the Transportation Plan and addendum. Such soil will be handled as potential hazardous waste until proven otherwise.

- Disposal sampling results will be shared with EPA and DTSC. If disposal sampling results are consistent with previous soil sampling results for the site, no further action will be taken, and soil may be placed on-site under the cap, rather than being disposed off-site. If disposal sampling results indicate the presence of chemicals not previously detected at the site, PCBs >50 mg/kg, or TCE >10 mg/kg, a representative Evaluation Soil Sample will be collected from the bottom or sidewalls of the excavated area. The list of chemical analyses for the Evaluation Sample will be decided based on discussion with DTSC and EPA.

- The chemical concentrations in the Evaluation Soil Sample will be discussed with DTSC and EPA, in addition to proposed follow-on activities to address the remaining soil in the area, if needed.

3.10 Management of Known and Unknown Underground Structures Uncovered during Redevelopment Activities

Known and unknown underground structures encountered during soil disturbance for redevelopment will be removed and disposed of off-site or crushed and placed under the cap, if concrete, consistent with Appendix O. Soil sampling associated with these structures will not be conducted unless free product or oily soil (see Section 3.9) is encountered or if required for underground storage tank ("UST") closure (see below). Structures expected to be encountered include:

- Previously-abandoned and to-be abandoned utilities. Existing utilities not in conflict with the redevelopment will be abandoned in place, including the existing storm water collection system.

- Utility vaults, sumps, and drains. Utility vaults, sumps, and drains that extend deeper than the expected depths of soil disturbance for redevelopment will be abandoned as appropriate for geotechnical purposes and to prevent conduits (e.g. backfilling or pressure grouting), including the french drain system and sump associated with the former oil recovery system by Building 21. This system will be removed via excavation to a depth of at least 1 foot below the expected soil disturbance zone for preparation of the new building foundation (i.e., 5 to 6 feet below existing grade). Concrete components above this depth will be cut with concrete saws and removed. Deeper portions of the trenches and sump will be grouted in place. Any material that surfaces during grouting will be contained and disposed of as described in the Section 3.12. After demolition of the oil recovery sump and french drain system, soil excavation will be completed in this area as described in Section 3.3.

- USTs. Records indicate that up to four USTs were abandoned in place by GE. If a UST is encountered, it will be closed, removed, and disposed of off-site as required by the Alameda County Department of Environmental Health ("ACDEH").

- Buried railroad tracks, slabs, and other building features abandoned in place when additions were made to the GE facility.

If any such underground structures are encountered, the structure and all associated piping or other appurtenances will be removed in accordance with applicable laws and regulations, the requirements in this RDIP Addendum, and the management protocols described below:

- The Contractor will notify Bridge if an unknown below-grade structure is discovered. Bridge or EKI will be responsible for notifying DTSC and EPA.

- If the structure is a UST, Bridge or EKI will notify DTSC, EPA, and the ACDEH. The UST will be removed in accordance with ACDEH requirements. The ACDEH may require a work plan prior to tank removal, investigation, and closure.

- Residual liquid or sludge, if present in the encountered below-grade structure or pipeline, will be removed, placed in sealed storage containers, characterized as required by laws and regulations and as otherwise required by the permitted disposal facility, and appropriately disposed.

- Free product or oily soil, if encountered around the structure, will be managed in accordance with the soil management protocols described in Section 3.9.

- If the structure is a pipe, it may not be necessary to remove all of a discovered pipe, beyond what may be necessary to complete construction, if the pipe does not contain

contaminated, hazardous, flammable, or explosive liquid, sludge, or gas. Under these conditions, the pipe may be cut, removed, and the ends capped. The removed pipe will be disposed in accordance with applicable laws and regulations. If the pipe material contains asbestos, then the material will be handled in accordance with applicable air quality and hazardous waste management laws and regulations and appropriate protocols for handling asbestos materials. As indicated above, if the pipe contains potentially hazardous materials, the materials will be removed, contained, and disposed of appropriately. The pipe will be removed, and underlying soil inspected for free product or oily soil.

The above requirements do not apply to an encountered pipe if it is an active or abandoned utility, such as sanitary sewer (except for that associated with former Building 7 [laboratory]), water, gas, or steam lines, because they are not anticipated to have contained potentially hazardous materials.

If cultural resources are uncovered during redevelopment activities, they will be handled per the recommendations of the Cultural Resources Study (see Section 3.1.6).

3.11 Clean Corridors

As described in Section 2.2.5 above, clean corridors will be used for subgrade utilities that will be active after redevelopment (and are not part of the GETS and VIMS systems). The clean corridors will extend approximately 2 feet on either side of and 1 foot below (where feasible) subgrade utility piping and related structures such as catch basins, manholes, and vaults. Clean corridors will be installed during redevelopment construction along will underground utility installation following plans and specifications prepared for the redevelopment construction and consistent with design requirements described in Section 2.2.5 and the utility details provided in Appendix D. Equipment and means used to create clean corridors will be at the discretion of the Contractor.

Soil excavated to form clean corridors will be used as fill to make grade in other areas of the site that will be capped by the redevelopment. During clean corridor installation, Contractor will implement the Decontamination Plan, Dust Control Plan, Contractor's HASP, and SWPPP and Bridge's representative will implement the AMP as described in Section 3.2 above and in the respective Appendices.

3.12 Waste Management

Waste anticipated to be generated by the activities described herein that will be disposed of off-site includes: soil and dewatering water from hotspot and non-hotspot excavations; concrete that cannot be placed under the new cap as described in Appendix O; demolition debris associated with all existing aboveground site features except the Building 1 façade to be retained, concrete that will be crushed and placed under the new cap, and groundwater remedy components that will be relocated or retained; any existing belowground feature in

conflict with the redevelopment construction; accumulated surface water in conflict with the redevelopment construction that is not infiltrated while the cap is removed; waste solids and liquids from equipment decontamination; materials, equipment, and PPE in contact with impacted site media used for completion of the work that is disposable or cannot be decontaminated; and waste generated as part of the Building 1 façade abatement as described in Appendix O.

Waste intended for off-site disposal may be temporary stored on-site pending characterization, profiling, and identification of an appropriate off-site disposal facility, as described in the Dust Control Plan and SWPPP (Appendices J and M, respectively). The off-site disposal facility selection will depend on applicable laws and regulations for the type of waste and, for PCB-containing wastes (i.e., wastes with PCBs ≥50 parts per million ["ppm"]), EPA approval of the disposal facilities proposed herein. Sampling for disposal characterization will be conducted by the Contractor or Bridge's representative as required by the disposal facility. For soil, anticipated laboratory analysis for disposal characterization is discussed in the 2012 SAP, provided as an attachment to Appendix N. Activities associated with loading and off-site transportation of waste are described in the Transportation Plan and addendum (Appendix H).

3.13 Vapor Intrusion Mitigation System

The VIMS is an SSD system and will be installed as described in Appendix E. The sequence of construction, testing, and startup will occur as follows:

- The SSD system components will be installed during core and shell construction of the new building. This will include a sub-slab liner, sub-slab permeable aggregate layer, SSD suction trenches, riser piping, rooftop lateral and header piping, blower system, electrical and controls, and SSPs. Soil excavated for installation of in-ground VIMS infrastructure will be used as fill to make grade in other areas of the site that will be capped by the redevelopment.

- An air permit will be obtained from BAAQMD prior to the start of SSD construction if feasible, and no later than prior to installation of the SSD blower system, which is the permitted emissions source.

- The SSD blower system and controls will be installed.

- The VIMS Engineer will perform start-up testing of the SSD system, to include flow balancing and sub-slab vacuum monitoring at the SSPs. Emissions monitoring will be performed as required by the BAAQMD permit.

- Indoor air will be tested with the SSD system operating and the building's heating, ventilation, and air conditioning ("HVAC") system operating to reflect typical occupied conditions to verify mitigation effectiveness (see Section 4.3).

The building foundation design is anticipated to include both grade beams and tie beams beneath the concrete floor, which can act as barriers to vacuum propagation beneath the floor for SSD and thereby impact the layout of SSD suction trenches. The specific location and number of grade beams and tie beams is not currently known, although the grade beams and tie beams are expected to align parallel to the short side of the building, i.e., parallel to the planned SSD suction trenches. The preliminary design for the SSD system as provided in Appendix E will be revised once the number and location of subsurface structural features are known. This may include adding suction trench location(s) or moving the locations for planned suction trenches to provide adequate SSD coverage around tie beams and in the areas between grade beams. Additional implementation details for the VIMS are provided in Appendix E.

3.14 Cap

As described in Section 2.2, the entire site will be capped by the redevelopment (building slab and concrete pavement). The cap will be installed during redevelopment construction according to the final design of the ground surfaces with incorporated cap, as described in Section 2.2 and in the plans and specifications that will be generated for the redevelopment project. The preliminary details, plans, and sections for these ground surfaces, including related surface water control features provided by the civil engineer have been included in Appendix D. Concrete from the existing site demolition will be crushed and placed below the cap as a base layer in areas where the cap is concrete pavement, and other areas as needed for fill. Concrete base produced from crushing existing on-site structures will transition to import baserock within 2 feet of a belowground utility structure that is intended to be installed in a clean corridor.

The cap implementation approach will be developed as part of the redevelopment project, including selection of equipment and means that will be used to construct the cap and associated features. The implementation approach will be based on the final design and will be at the discretion of the Contractor.

Construction of the cap will require soil handling for rough and fine grading. During cap installation, Contractor will implement the Decontamination Plan, Dust Control Plan, Contractor's HASP, and SWPPP and Bridge's representative will implement the AMP as described in Section 3.2 above and in the respective Appendices.

3.15 Greener Cleanups

As required by the City's Green Building Ordinance for Private Development Projects (Chapter 18.02 of the Oakland Municipal Code), the redevelopment project must meet Leadership in Energy and Environmental Design ("LEED") Gold standards (60-79 points) or 75 points on Greenpoint Rated Checklist (a green building rating system developed by Build it Green). These rating systems include many of the same principles and BMPs described in the Standard Guide for Greener Cleanups (ASTM, 2016). Therefore, the overall redevelopment project and thereby the remedy implementation will adopt greener cleanup principles, including use of Tier 3/4

diesel engines on construction equipment, in order to meet the City's green building requirements.

4. POST-REMEDIATION ACTIVITIES

Post-remediation activities that will occur routinely after redevelopment construction is complete will be described in an Addendum to the existing OMM Plan included in the 2015 RACR and are summarized briefly below. In addition, post-remediation activities associated with remedy implementation that will be conducted during redevelopment construction and immediately thereafter, e.g., soil gas sampling in the vicinity of the VOC hotspot excavation and indoor air sampling after startup of the SSD system, are included below.

4.1 Surveying

To document the as-built condition of the remedy, surveying will be performed. Surveying will be coordinated with surveying needed during redevelopment construction, and will include the following features:

- Excavation corners at ground surface and final depth;
- Alignment of underground utility trenches and location of associated structures (e.g., vaults, manholes, catch basins) that will be in active use or planned for use after redevelopment, including those in clean corridors;
- Location of cutoff walls in clean corridors (if installed);
- VIMS suction trench locations, sub-slab piping alignments, sub-slab monitoring and vapor stack locations, and equipment pad location and elevations (if constructed at ground level);
- Location of the retained Building 1 façade;
- Topography of native soil and concrete from existing structures that is crushed and placed under the new cap in key locations (e.g. near clean corridors and other underground structures); and
- Final topography of finished concrete pavement cap.

Surveying of the as-built condition of the groundwater remedy components is described in Appendix F. Surveying will be performed by a California-licensed surveyor.

4.2 Soil Gas Sampling

As described in Section 2.1.2.1, soil gas sampling will be conducted in the vicinity of the VOC hotspot excavation, after excavation, backfilling, and foundation construction[24] has been completed for at least 3 months. Three temporary soil gas probes ("SGPs") will be installed

[24] Foundation construction includes associated earthwork, fine grading, and compaction both inside and outside the building footprint.

within and near the completed excavation to assess soil gas concentrations remaining after excavation and soil handling for redevelopment construction.

As shown on Figure 7, previous soil gas sampling results collected by GE in 2008 indicate soil gas TCE concentrations decrease with distance closer to the property boundary. In order to compare soil gas concentrations close to the property boundary to those nearer to the pre-excavation high concentrations in soil and soil gas, post-excavation soil gas probes will be oriented perpendicular to the property boundary.

The SGPs will be installed to a depth of 5 feet bgs at the time of the installation, which is anticipated to be after fine grading but before paving. The final number and locations of SGPs installed at the site is subject to change based on encountered field conditions such as tight soil and/or shallow groundwater. SGPs will be sampled and analyzed for VOCs as described in Appendix N – Field Sampling and Laboratory Analysis Plan.

In accordance with DTSC/Water Board guidance (DTSC/Water Board, 2015), two rounds of soil gas sampling will be conducted at least three months apart to account for seasonal variability. If possible, given the redevelopment construction schedule, one of the rounds will be conducted during late spring or summer.

If the soil gas results from the two rounds of sampling from the point closest to the property boundary are above applicable screening levels, then following placement of the cap, GE will attempt to collect soil gas samples from off-site as described in Section 1.3 of Appendix F.

Due to the recent changes in vapor intrusion (VI) protocols and screening levels, GE will re-evaluate the commercial/industrial VI pathway south of the Site as described Section 1.4 of Appendix F.

4.3 Indoor Air Sampling

Indoor air sampling will be performed following construction of the planned warehouse building and startup of the SSD system. The initial indoor air sampling event will occur after startup of the SSD system and prior to occupancy to verify vapor intrusion is not occurring and that PCB abatement for the front portion of Building 1 was adequate. Therefore, during the initial sampling event, indoor air samples will be collected and analyzed for VOCs and PCBs. During the initial indoor air sampling event for VOCs, samples will be collected in two rounds: in one round, the SSD system will be operational and the HVAC system will be off; in the other round, the SSD system will remain in operation and the HVAC system will operate normally.

Indoor air sampling conducted after the initial sampling event will occur with the SSD system and HVAC operating normally. Subsequent indoor air sampling for VOCs will be performed (1) approximately six months after the initial event and (2) prior to the next five-year review. Indoor air testing for VOCs is planned to coincide with potential 'worst case' months of

January/February and June/July to the extent feasible. Indoor air testing will include collecting 8-hour integrated indoor air samples during normal working hours.

Twelve indoor air samples (ten equally-spaced throughout the building and two at potential pathways, i.e., penetrations) and two outdoor air samples will be collected for VOC analysis during each round of testing. Samples for analysis of PCBs will be collected from a subset of six of these sample locations during the initial sampling event. Proposed indoor air and outdoor air sampling locations are shown on Figure 8. Outdoor air samples will be collected concurrently with the indoor air samples using the same sampling and analytical methods as the indoor air samples, as described in Appendix N – Field Sampling and Laboratory Analysis Plan. Sub-slab soil gas samples will be collected concurrent with indoor air sampling as described in Section 4.4.

For each round of indoor air testing, the SSD system will be operating normally, the building ventilation system (HVAC) will be operating to reflect typical occupied conditions, and the building envelope will be closed to the outside (e.g., doors and windows closed except as needed for normal occupant use) throughout the duration of sample collection.

The samples will be analyzed for PCBs using EPA Method TO-10A and/or select VOCs using EPA Method TO-15 in selected ion monitoring ("SIM") mode as described in the Indoor Air Sampling Standard Operating Procedure ("SOP") provided in Appendix N – Field Sampling and Laboratory Analysis Plan.

The VOC concentrations measured in indoor air samples will be evaluated relative to outdoor air concentrations and the most-recently updated/published DTSC-SLs for commercial/ industrial air (April 2019 is the most current version). PCB concentrations in air samples will be compared to the most-recently updated/published commercial/industrial DTSC-SLs (DTSC, 2019b) or EPA composite worker RSLs (EPA, 2019) if a DTSC-SL is not available, consistent with DTSC Note 3.

Indoor air testing will be scheduled as follows:

- The first round of indoor air testing will be performed following startup of the SSD system and prior to building occupancy.
- The second round of indoor air testing will be performed within six months of the first round and during either the January/February or June/July timeframe to target potentially worst-case vapor intrusion conditions.
- An additional round of indoor air testing will be performed in the January/February or June/July time, as applicable, prior to the next five-year review.

After the first three indoor air sampling events as described above, the need for and frequency of subsequent indoor air monitoring will be reassessed during the five-year review.

4.4 Sub-Slab Monitoring

After startup of the SSD system, sub-slab soil gas and vacuum sampling will be performed, as described in the sections below.

4.4.1 Soil Gas Sampling

Sub-slab soil gas sampling will be performed concurrently with indoor air sampling with the HVAC system operating normally to assist in evaluating indoor air sampling results. Because an active SSD system will be operating at the time of sampling, the sub-slab soil gas samples will be collected by sampling from the SSD system riser pipes (along with sampling SSPs during the first round for comparison, as discussed below). The soil gas in the SSD riser pipes are representative of sub-slab soil gas removed by the SSD system from the suction trenches beneath the building, and thus provide integrated samples representative of sub-sab soil gas conditions beneath the building. These samples are more representative of conditions than can be obtained from discrete SSP sampling points which sample from much smaller areas. The samples will be analyzed for VOCs using EPA Method TO-15. The samples from the riser pipes will be collected concurrent with each round of indoor air testing with the HVAC system operating normally to represent the VOCs present in sub-slab soil gases at the time of the indoor air testing.

Concurrent with the initial sampling round at the riser pipes, sub-slab soil gas samples will also be collected from the SSPs located beneath building (see Figure 2) to verify that the samples collected from the SSD riser pipes are comparable to samples from the SSPs. Sub-slab soil gas samples will be collected from the SSPs as described in the Sub-Slab Soil Gas Sampling SOP provided in Appendix N – SAP. The samples will be analyzed for VOCs using EPA Method TO-15.

The VOCs detected in the soil gas samples from the riser pipes and SSPs, and the concentrations of those VOCs, will be evaluated in conjunction with indoor air sample analytical results to assess whether vapor intrusion is occurring in the building. Vapor intrusion may be occurring if the specific VOCs detected in soil gas samples are also detected in indoor air samples in similar proportions as in the soil gas samples. Other lines of evidence, such as VOCs in outdoor air samples, will also be considered in the evaluation. However, vapor intrusion will only be considered "significant" if the indoor air VOC concentrations exceed the then current commercial screening levels.

4.4.2 Sub-Slab Vacuum Monitoring

The sub-slab vacuum created by the SSD system will be measured during startup and periodically thereafter. The target vacuum below the floor is 0.02 inches water column ("in-WC"). The vacuum will be measured relative to outdoor air at the 22 SSPs shown on Figure 2, and will be measured during SSD system startup, daily for 5 days, weekly for one month, and monthly for the first year. Sub-slab vacuum monitoring will continue at a monthly frequency after the first year until sufficient data is provided to DTSC for review and approval of changes in monitoring frequency. A datalogger with a pressure transducer will also be setup at

two of the SSPs to measure the sub-slab vacuum over a 5-day period following startup to record intra-day variations.

4.5 Operations, Maintenance, and Monitoring Plan

An OMM Plan was submitted by GE as part of the 2015 RACR for the remedy implemented thus far, and addressed routine OMM for the GETS system, monitoring requirements for the MNA program, inspection requirements for the cap, and site security. To the extent that these portions of the remedy have been modified during redevelopment, an OMM Addendum will be developed to document those changes. The OMM Addendum will also include information related to the routine OMM of the VIMS and the retained Building 1 façade, if OMM is needed. The OMM Addendum will be submitted to EPA and DTSC for review and approval prior to implementation. Sample collection and laboratory analysis will be completed as described in Appendix N – Field Sampling and Laboratory Analysis Plan. The components of the OMM Addendum are briefly described below.

4.5.1 VIMS

An OMM Plan will be prepared for the VIMS concurrent with completion of construction of the SSD system. The OMM Plan for the VIMS will include:

- A description of the SSD system and its objective, components, controls, and design operating ranges;
- A start-up monitoring plan which will include plans and procedures for:
  - flow-balancing the SSD system;
  - measuring sub-sab vacuum at the SSPs;
  - monitoring emissions in accordance with requirements of the BAAQMD permit;
- An operational monitoring plan which will include:
  - guidance for routine operation of the SSD system;
  - guidance for responding to alarm conditions and system troubleshooting;
  - monitoring frequency, procedures, and forms for measuring flow rates in the SSD blower and from individual suction trenches;
  - monitoring frequency, procedures, and forms for measuring sub-slab vacuum in SSPs;
  - monitoring frequency, procedures, and forms for collecting and evaluating soil gas samples from SSD riser pipes;
- A sampling plan which conforms to the monitoring requirements of the BAAQMD permit;
- An SSD system inspection checklist for quarterly inspection of the SSD system;
- A description of requirements for maintaining the components of the SSD system, protecting the sub-slab liner, and repairing penetrations through the liner according to the liner manufacturer's instructions; and,

- Appendices that will include operation manuals, equipment and instrumentation cut sheets, safety data sheets, and other manufacturer or product-specific information useful for operation and maintenance of the SSD System.

4.5.2 Cap and Building 1 Façade

After redevelopment construction is completed, the cap and Building 1 façade (if encapsulated) will be inspected regularly to document its general condition and identify maintenance needs. The inspections will be conducted quarterly for the first year and semi-annually in subsequent years. During cap inspections, site security features such as fences, gates, and signage will also be inspected and repaired as needed.

4.5.3 Storm Water Management

Although the site is not expected to qualify for regulation under SWRCB's Industrial General Permit after redevelopment, a SWPPP will be developed for inclusion in the OMM Plan Addendum to document the storm water controls on the site and their long-term maintenance. The SWPPP will also describe wet season storm water and sediment (if any is present) sampling for PCBs requested by EPA. Wet season sampling for PCBs will be conducted twice in the first year after redevelopment, and then annually thereafter until the next five-year review, when the frequency for wet season storm water and sediment sampling for PCBs will be reassessed.

4.5.4 Modifications to the Groundwater Remedy

The modifications to the groundwater remedy made to accommodate the redevelopment will be documented in the OMM Plan Addendum, including changes to system components and their location (e.g., wells, piping alignments, and GETS equipment).

4.6 Land Use Controls

The current deed restriction for the site limits on-site uses (i.e., sensitive and residential use prohibited), requires that the cap not be disturbed, and prohibits penetration of the cap except after notification of DTSC. DTSC, EPA, and GE have prepared an updated draft, which will be revised to include the new development plans and finalized and filed after redevelopment. The updated deed restriction will include both DTSC and EPA as beneficiaries with enforcements rights to the Land Use Covenant.

4.6.1 Soil Management Plan

A SMP will be prepared after redevelopment construction is complete. The SMP for the site will (1) identify known contaminants and their concentrations; (2) identify the location of clean corridors and procedures for working in these areas; [25] and (3) protocols if the cap needs to be breached in the future (e.g., health and safety, soil handling, and cap replacement

[25] Health and safety protocols in the SMP will address potential vapor intrusion to clean corridors and other subsurface structures that may be entered by onsite workers after redevelopment.

requirements). This document will be submitted separately for DTSC and EPA review and approval.

4.7 Completion Report

Following redevelopment construction, a Remedial Action Implementation Completion Report – Phase II will be prepared. The Completion Report will provide a description of the work completed and a summary of the testing results conducted during remedy implementation. The Completion Report will provide the as-built condition of the remedy, including any adjustments or modifications to the remedy design described herein made as the redevelopment plan evolves during the entitlements process with the City.

5. SCHEDULE

While the overall schedule for the remedy implementation cannot be determined at this time because it is dependent on the entitlements process which is still ongoing and the City's work schedule requirements in terms of grading, demolition, and excavation, a preliminary work sequence and associated anticipated durations (shown parenthetically) are provided below. This schedule is contingent upon weather conditions and as such may be subject to change.

- Building 1 façade feasibility study and pilot test and building materials sampling, including concrete sampling (6 weeks);
- Hazardous materials abatement and demolition of the existing aboveground features except building slabs, and Building 1 façade preservation and abatement, including paint removal or coating (9 weeks);
- Demolition of oil recovery sump and french drain system near Building 21, VOC hotspot excavation, and PCB tented excavations (6 weeks);
- Shutdown of the GETS, well destruction, and protection of wells to remain (concurrent with hotspot excavations);
- Remaining PCB excavations (not tented; 2 weeks);
- Removal of the cap and building slabs, including removal of concrete with ≥50 mg/kg PCBs, and concrete crushing operations (3 weeks);
- Underground utility demolition and UST removals, if needed (5 weeks);
- Mass and fine grading and soil preparation for foundation construction (9 weeks);
- Building foundation construction, including installation of sub-slab VIMS components and underground utilities/clean corridors within the building footprint (15 weeks);
- Installation of underground utilities and clean corridors outside the building footprint (3 weeks; concurrent with building construction);
- Installation of temporary cap (1 week; concurrent with building construction);
- Building construction, including GETS and well relocation, remaining VIMS component installation, and construction of Building 1 façade false wall, if needed (28 weeks);
- First and second soil gas sampling events, 3 and 6 months after building slab construction (concurrent with building construction);
- Startup and testing of VIMS (2 days);

- First round (pre-occupancy) indoor air sampling and concurrent sub-slab soil gas sampling (1 day);
- Site pavement, utility connections, landscaping, and GETS startup (10 weeks; concurrent with building construction); and
- Vapor intrusion assessment for off-site receptors by GE.

Based on the schedule above, the estimated time between removal and placement of the temporary cap is approximately 8 months or 36 weeks. Following redevelopment construction, the Completion Report, the OMM Plan Addendum, and SMP will be prepared and submitted to DTSC and EPA within 120 calendar days. An Operation and Maintenance Agreement will be prepared by DTSC and a Land Use Covenant will be prepared by Bridge.

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LSA, 2019. Cultural Resources Study – General Electric Remediation and Reuse Project, Oakland, Alameda County, LSA Associates Inc., July 2019.

LBNL, 2009. Analysis of Background Distributions of Metals in the Soil at Lawrence Berkeley National Laboratory; Lawrence Berkeley National Laboratory Environmental Restoration Program, LBNL-1782E, April 2009.

URS, 2003. Baseline Human Health Risk Assessment and Tier 1 Ecological Risk Assessment: Revision II, General Electric Company, 5441 International Boulevard, Oakland, California, URS Corporation, 8 August 2003.

Water Board, 2019. Environmental Screening Levels, January 2019 (Revision 1), California Regional Water Quality Control Board, San Francisco Bay Region, Issued January 2019 (updated 14 February 2019).

Wood, 2018. Draft Five Year Status Report for the Period August 2013 through December 2017, GE Oakland Site, Oakland, California, Wood Environment & Infrastructure Solutions, Inc., 20 June 2018.

TABLE 1

Measures to Protect Potentially Exposed Populations

5441 International Blvd., Oakland, California

Potentially Exposed Populations	Potentially Complete Exposure Pathways (a)	Protective Measures
During Remediation and Redevelopment Construction		
On-Site Earthwork/Remediation Worker	Inhalation of airborne particulates	HASP, DCP
	Inhalation of volatile chemicals	HASP, DCP
	Incidental ingestion of groundwater	HASP
	Dermal contact with groundwater	HASP
	Incidental ingestion of soil	HASP
	Dermal contact with soil	HASP
Off-Site Resident	Inhalation of airborne particulates	AMP, DCP
	Inhalation of volatile chemicals	AMP, DCP
Off-Site Commercial/Industrial Worker	Inhalation of airborne particulates	AMP, DCP
	Inhalation of volatile chemicals	AMP, DCP
On-Site Redevelopment Construction Worker (before capping)	Inhalation of airborne particulates	HASP, AMP, DCP
	Incidental ingestion of soil	HASP
	Dermal contact with soil	HASP
On-Site Redevelopment Construction Worker (after capping)	na	VOC hotspot removal, Cap
After Redevelopment (Site Will Be Completely Capped)		
On-Site Commercial/Industrial Worker	Inhalation of volatile chemicals	VOC hotspot removal, Cap, VIMS
On-Site Groundskeeper/Maintenance Worker	Inhalation of volatile chemicals	VOC hotspot removal, Cap, SMP, CC
Off-Site Resident	Inhalation of volatile chemicals	VOC hotspot removal, Cap, GETS
Off-Site Commercial/Industrial Worker	Inhalation of volatile chemicals	VOC hotspot removal, Cap, GETS

Abbreviations:

AMP = Perimeter Air Monitoring Plan
CC= clean corridors
DCP = Dust Control Plan
System
HASP = Health and Safety Plan
na = not applicable
SMP = Soil Management Plan
VOCs = volatile organic compounds
VIMS = Vapor Intrusion Mitigation System

Notes:

(a) See Figure 6. Exposure pathways considered not significant are not included herein.

TABLE 2

Proposed Excavation Dimensions for VOCs and PCBs in Soil[1]

5441 International Blvd., Oakland, California

Location(s)	Depth (ft)	Length (ft)	Width (ft)	Volume (cubic ft)	Volume (CY)
VOC Excavation					
5GP4, 5GP5, 5GP7, 5GP10, 5GP11, 5GP12	**20**	**40**	**45**	**36,000**	**1,333**
PCB Hotspot Excavations					
S-602	**6.0**	**10**	**10**	**600**	**22**
S-604	**5.0**	**10**	**10**	**500**	**19**
Trench 1	**5.0**	**15**	**25**	**1,875**	**69**
S-626, W-792, W-793, W-613	**25.0**	**20**	**35**	**17,500**	**648**
PCB Excavations					
S-609 (Note 2)	3.0	10	10	300	11
S-610 (Note 2)	8.5	10	10	850	31
SB-21	2.5	10	10	250	9
W-791	2.0	10	10	200	7
S-606	2.0	10	10	200	7
S-014	7.0	10	10	700	26
S-015	7.0	10	10	700	26
S-703, G-002	2.0	20	30	1,200	44
S-704	7.0	10	10	700	26
G-114	2.0	10	10	200	7
G-001	2.0	10	10	200	7
S-506	3.0	10	10	300	11
W-030	2.0	10	10	200	7
S-528	3.0	10	10	300	11
W-016	2.0	10	10	200	7
W-625, Trench 2	2.0	40	25	2,000	74
W-018	2.0	10	10	200	7
S-047	2.0	10	10	200	7
S-020	2.0	10	10	200	7
S-010	3.0	10	10	300	11
S-008	4.0	10	10	400	15
S-045	3.0	10	10	300	11
W-035A	2.0	10	10	200	7
S-040	3.0	10	10	300	11
S-012	2.0	10	10	200	7

TABLE 2

Proposed Excavation Dimensions for VOCs and PCBs in Soil[1]

5441 International Blvd., Oakland, California

Location(s)	Depth (ft)	Length (ft)	Width (ft)	Volume (cubic ft)	Volume (CY)
W-022	2.0	10	10	200	7
S-712	5.0	10	10	500	19
G-121	2.0	10	10	200	7
G-118	2.0	10	10	200	7
W-736	2.0	10	10	200	7
G-119	2.0	10	10	200	7
S-005	2.0	10	10	200	7
S-611 (Note 2)	3.0	10	10	300	11
G-004 (Note 2)	4.0	10	10	400	15
S-702 (Note 2)	8.0	10	10	800	30
SB-25 (Note 2)	3.0	10	10	300	11
W-503	Excavated to 20 ft during Phase 1				0
S-601	Excavated to 5 ft during Phase 1				0
W-622	2.0	10	10	200	7

Total Proposed Excavation Volume for VOC and PCB Hotspot Excavations (rounded): 2,090

Total Proposed Excavation Volume for PCBs in Soil ≥50 mg/kg (rounded): 560

Abbreviations:

CY = cubic yards in place

ft = feet

mg/kg = milligrams per kilogram

PCBs = polychlorinated biphenyls

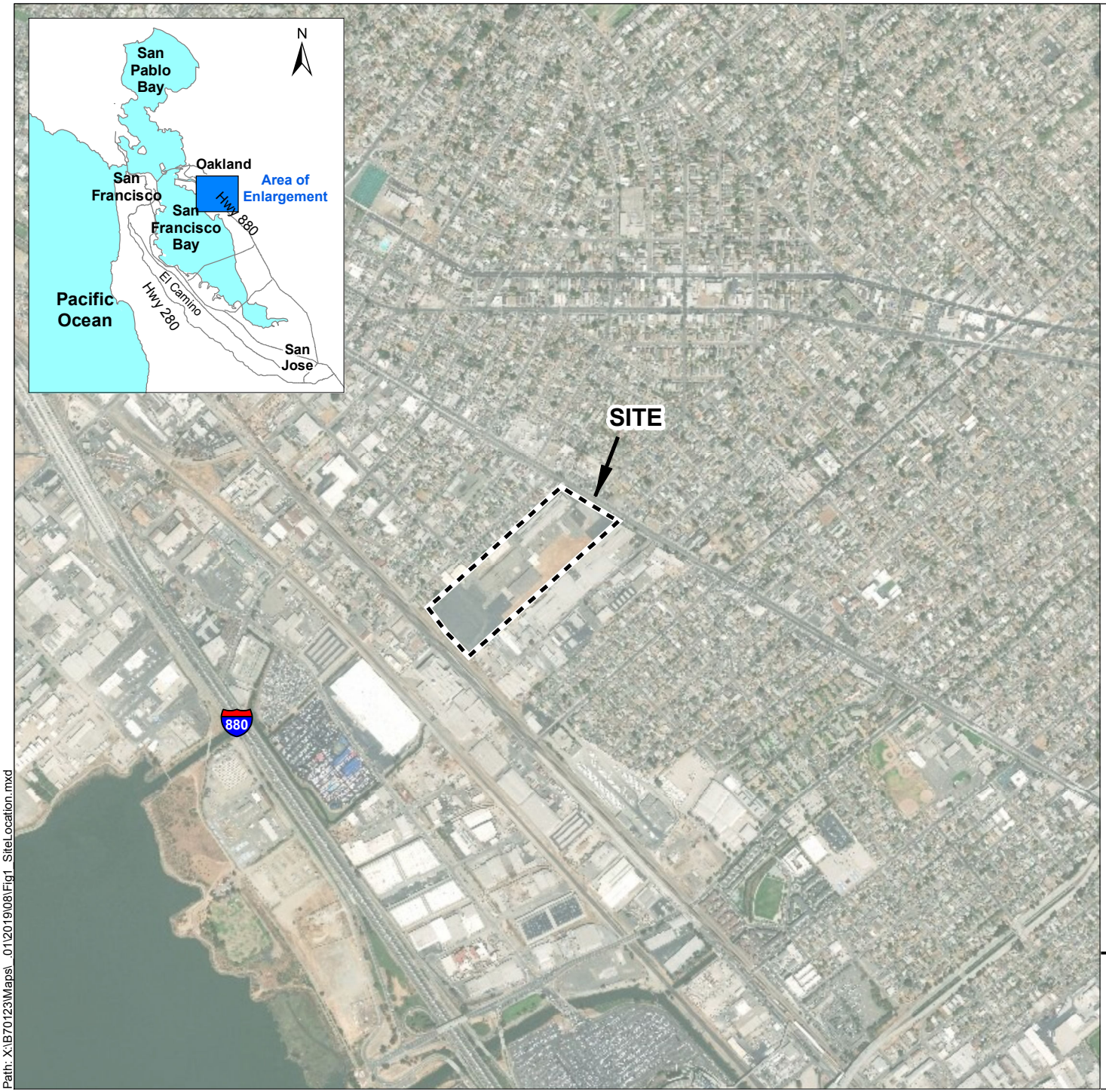
VOC = volatile organic compound

Notes:

(1) Hotpsot excavation locations are shown in bold. Other locations have ≥50 mg/kg PCBs in soil.

(2) Locations S-609, S-610, S-611, G-004, S-702, and SB-25 are located in the western portion of the site that was regraded during the Phase 1 remedy. Based on elevations before and after regrading, these locations were either in fill areas or areas with apparently no elevation change before capping materials were placed. The proposed excavation depth for these locations includes the estimated depth of fill (if any) and capping materials (shown below, rounded up to the nearest 0.5 foot) placed at these locations during the Phase 1 remedy:

- S-609: 0.9 feet
- S-610: 1.3 feet
- S-611: 0.95 feet
- G-004: 1.6 feet
- S-702: 1.0 feet
- SB-25: 0.75 feet



Path: X:\B70123\Maps\...01\2019\08\Fig1_SiteLocation.mxd

Note
1. All locations are approximate.

Source
1. Aerial photograph provided by ESRI's ArcGIS Online, obtained 26 July 2019.

N 0 0.25 0.5
(Scale in Miles)

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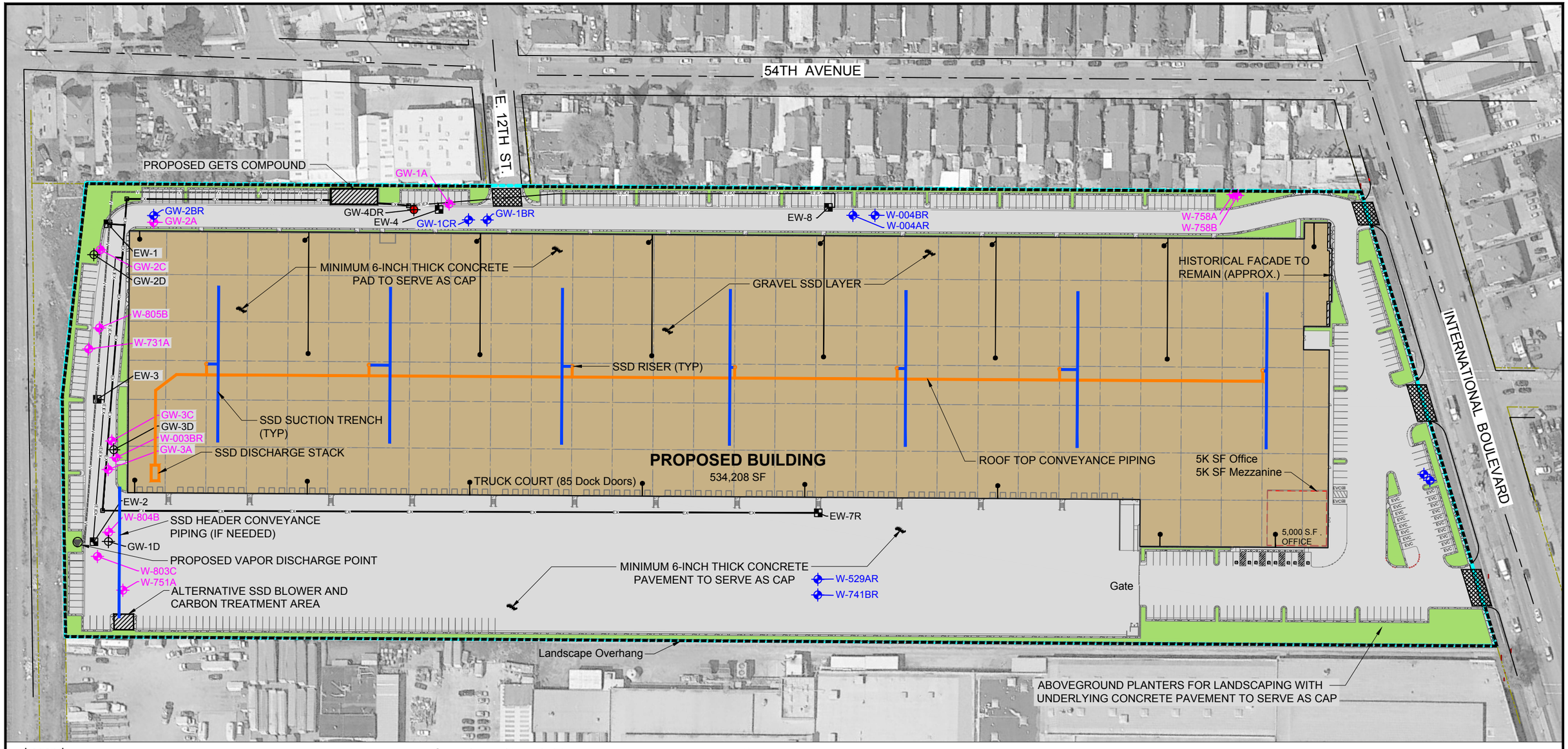
Site Location Map

5441 International Blvd.
Oakland, CA
August 2019
B70123.01

Figure 1



Legend:

- Retaining Wall/Curb at Property Boundary for Surface Water Control
- Proposed Building to Serve as Cap
- Proposed Aboveground Landscaping with Underlying Concrete Pavement to Serve as Cap
- Proposed Concrete Pavement to Serve as Cap
- Sloped Drive for Surface Water Control
- Underground SSD Components
- Roof Top SSD Components
- Sub-Slab Probe Tubing
- Sub-Slab Vapor Probe

Groundwater Remedy Elements:

- EX — New Extraction Lines (one per well)
- (E)EX — Existing Extraction Line to Reuse
- V — New Vapor Discharge Line
- Extraction Well
- Proposed Vapor Discharge Point
- MNA Monitoring Well
- GETS Performance Monitoring Well
- Proposed Location of Replacement MNA Monitoring Well
- Proposed Location of Replacement GETS Performance Monitoring Well

Notes:

1. All locations are approximate.
2. California State Plane Coordinate System, NAD1983, Zone 3.
3. Underground storm drain conveyance system design to be completed during detailed design of the redevelopment, including sediment removal (if needed). See Appendix D for Preliminary Utility Plan.

Sources:

a. Google Earth Pro, date of imagery 2 April 2018.

b. Adapted from Scheme 3M Site Plan, Figure A17-2096, Herdman Architecture + Design, 2019. Conceptual Site Plan, Bridge Development, 5441 International Blvd., Oakland, California, Bridge Aquisition, LLC, 23 April 2019.

c. Groundwater remedy elements to remain on site after redevelopment are based on information provided by GE and their consultant Wood Environment & Infrastructure, Inc. (see Appendix F for more details).

Abbreviations:

HDPE = high density polyethylene
GETS = groundwater extraction and treatment system
MNA = monitored natural attenuation
SF = square feet
SSD = sub-slab depressurization

0 125 250
(Scale in Feet)

N

Site Plan Under Redevelopment

5441 International Blvd.
Oakland, CA
October 2019
EKI B70123.01

Figure 2

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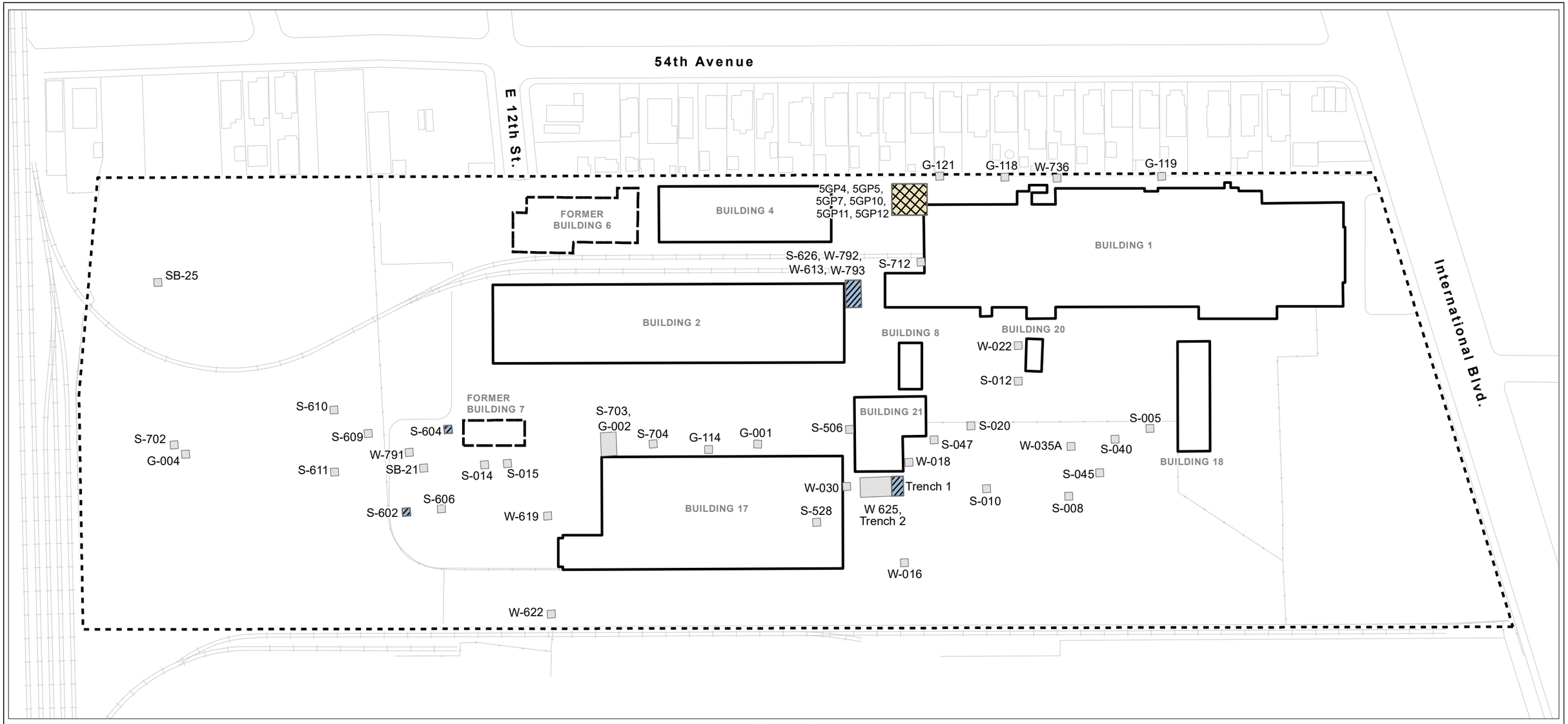
20190925.1211 G:\B70123.01\2019-09\Figure 02.dwg C1-TOPO



Legend

- Hotspot PCB Excavation
- PCB Excavation
- VOC Excavation
- Former Building
- Existing Building
- Site Property Boundary

Abbreviations

PCB = Polychlorinated biphenyl
VOC = Volatile organic compound

Notes

1. EKI proposed excavation limits shown in blue, grey, and tan.
2. Excavation labels represent sampling locations shown on Table 2 and Figures 4 and 5.

0 125 250
Feet

Summary of Soil Excavation Locations

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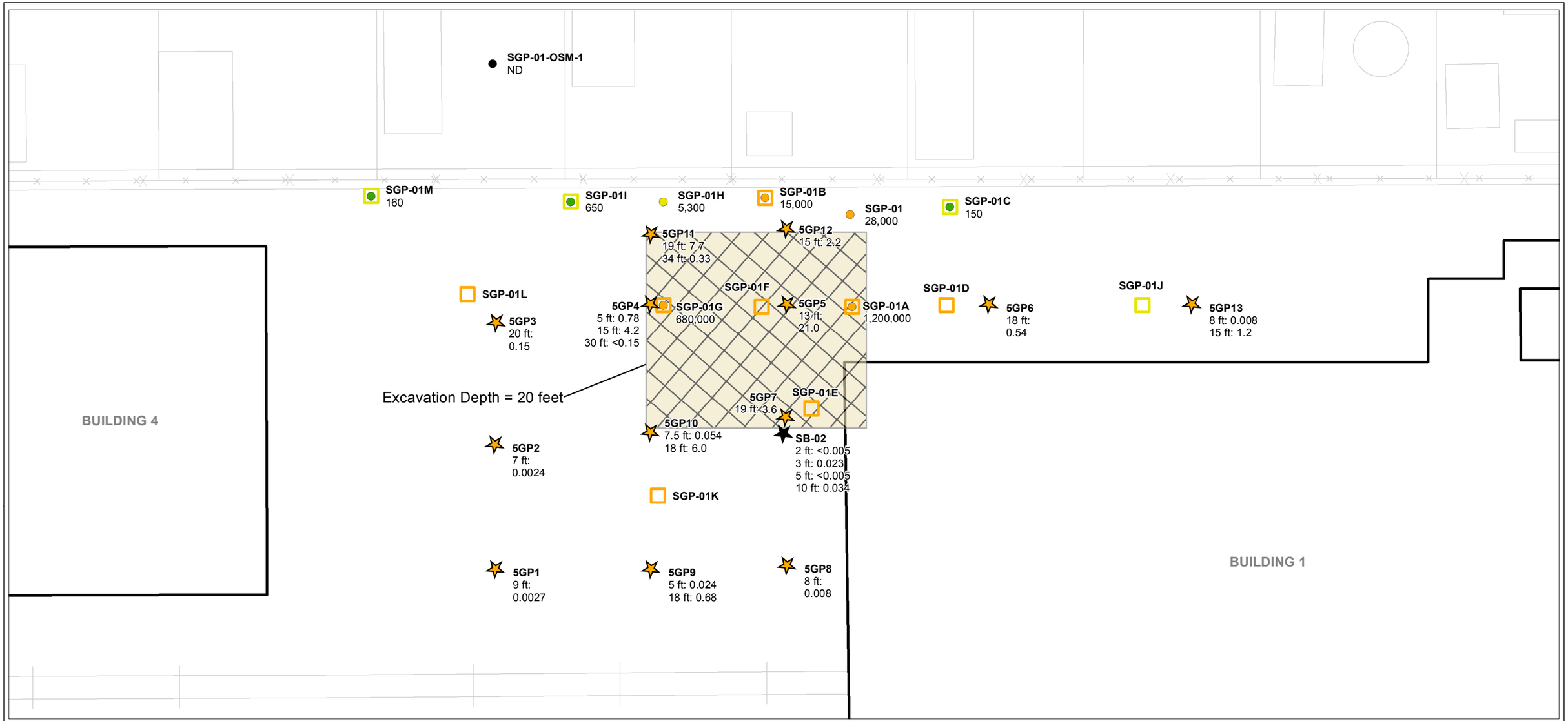
5441 International Blvd.
Oakland, CA
August 2019
B70123.01

Figure 3

Path: X:\B70123\Maps_01\2019\08\Fig3_SummExcavAreaLocs.mxd



Legend

TCE in Soil, mg/kg

- Geoprobe / Cone Pentometer
- Soil Boring

TCE in Soil Gas, ug/m^3

- ND
- 10 - 100
- 100 - 1,000
- 1,000 - 10,000
- >10,000

Peak PID in Soil Gas, ug/m^3

- Peak PID >10,000
- Peak PID >1000 - 10,000
- VOC Excavation
- Existing Building

5GP13 — Location ID
8 ft: 0.008
15 ft: 1.2 — Sample Depth (feet) and TCE concentration in mg/kg

SGP-01B — Location ID
15,000 — TCE concentration in ug/m^3

Abbreviations

mg/kg = milligrams per kilogram
ND = non-detect
PID = photoionization detector
TCE = Trichloroethene
ug/m^3 = micrograms per cubic meter

Note

1. EKI proposed excavation limit shown in tan.

Source

1. Adapted from Figures 9 and 10, Geosyntec, 2009. Feasibility Study Report, General Electric Site, 5441 International Boulevard, Oakland, California, Geosyntec Consultants, Inc., 6 and 7 August 2009.

0 20 40
Feet

DRAFT FINAL

Proposed VOC Excavation Limits

5441 International Blvd.
Oakland, CA
August 2019
B70123.01
Figure 4

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Path: X:\B70123\Maps_01\2019\08\Fig4_ProposedVOCExcavLimits.mxd



Sources:
Geomatrix Consultants, Inc., 2001, Report of Soil Removal Activities, General Electric Company, 5441 International Boulevard, Oakland, California, May.
URS, 2005. Completion Report for the North Property Line Soil Removal Action, December 19.
ARCADIS, 2009. Phase I Building Assessment Report, January.
SCA, 2010. Summary Report: Phase 2 Hazardous Materials Survey, June 2010.
GeoSyntec, 2011. Final Remedial Action Plan, June 30.
GeoSyntec, 2015. Remedial Action Implementation Completion Report – Phase 1, November 24.
Adapted from Figure 3 in Wood, 2018, Draft Five Year Status Report for the Period August 2013 through December 2017, June.

Proposed Removal Areas for PCBs in Soil

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5441 International Blvd
Oakland, CA
August 2019
EKI B70123.01
Figure 5

Source	Transport Mechanism	Potential Exposure Medium	Potential Exposure Pathway	Potentially Exposed Populations: During Remediation and Redevelopment Construction: On-Site Earthwork/Remediation Worker[1]	Off-Site Resident[2]	Off-Site Commercial/Industrial Worker[3]	On-Site Redevelopment Construction Worker (before capping)[4]	On-Site Redevelopment Construction Worker (after capping)[4]	After Redevelopment (Capped Site): On-Site Commercial/Industrial Worker[5]	On-Site Groundskeeper/Maintenance Worker[6]	Off-Site Resident[2]	Off-Site Commercial/Industrial Worker[3]
Chemicals in Soil	Airborne Particulate	Air	Inhalation	Complete	Complete	Complete	Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete
	Volatilization	Air	Inhalation	Complete	Complete	Complete	Not Significant	Not Significant	Complete	Complete	Complete	Complete
	Leaching	Drinking Water	Ingestion	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete
			Dermal Contact	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete
		Groundwater	Ingestion	Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Significant	Not Complete	Not Complete
			Dermal Contact	Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Significant	Not Complete	Not Complete
		Groundwater Seeps	Ingestion of Water, Fish, or	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete
			Dermal Contact	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete
	Storm Water	Surface Water	Ingestion of Water, Fish, or	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete
			Dermal Contact	Not Significant	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete
		Soil	Dermal Contact	Complete	Not Complete	Not Complete	Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete
			Ingestion	Complete	Not Complete	Not Complete	Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete
	Plant Uptake	Homegrown	Ingestion	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete	Not Complete

Legend:

Complete	Pathway Complete or Potentially Complete
Not Complete	Pathway not Complete
Not Significant	Pathway not Significant

Notes:

1. It is assumed that Earthwork/Remediation Workers will perform remediation work at the site and will install utilities in clean corridors. Monitoring and engineering controls to protect this population will be conducted as part of remediation and redevelopment activities.

2. Off-Site Resident population will be represented by the individuals living on the neighboring residences to the north of the site. Monitoring and engineering controls to protect this population will be conducted as part of remediation and redevelopment activities.

3. Off-Site Commercial/Industrial Workers will be represented by the individuals working on the neighboring industrial areas to the south and west of the site. Monitoring and engineering controls to protect this population will be conducted as part of remediation and redevelopment activities.

4. It is assumed that Redevelopment Construction Workers will engage only in building above grade improvements at the site. Monitoring and engineering controls to protect this population will be conducted as part of redevelopment.

5. On-Site Commercial/Industrial Workers will be represented by the individuals working on-site after redevelopment. Engineering controls will be installed during redevelopment to protect this population.

6. It is assumed that Groundskeeper/Maintenance Workers will only perform activities that require digging below the cap only for potential utilities repair within clean corridors.

Potential Human Health Exposure Pathways

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5441 International Blvd.
Oakland, CA
August 2019
B70123.01
Figure 6

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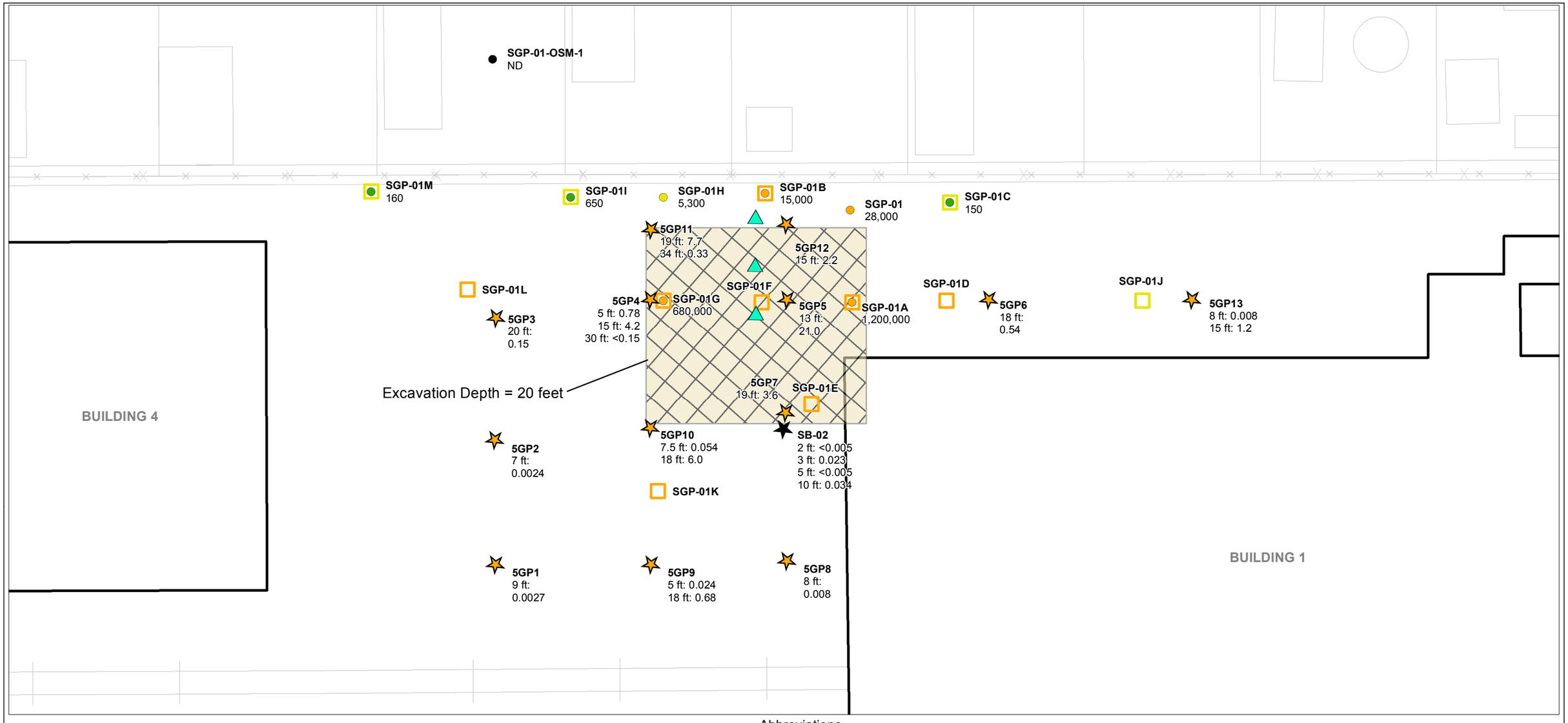

Legend

TCE in Soil, mg/kg

- Geoprobe / Cone Pentometer
- Soil Boring

TCE in Soil Gas, ug/m^3

- ND
- 10 - 100
- 100 - 1,000
- 1,000 - 10,000
- >10,000

Peak PID in Soil Gas, ug/m^3

- Peak PID >10,000
- Peak PID >1000 - 10,000
- VOC Excavation
- Existing Building
- **Post-Excavation Soil Gas Sampling Locations**

5GP13 — Location ID
8 ft: 0.008
15 ft: 1.2 — Sample Depth (feet) and TCE concentration in mg/kg

SGP-01B — Location ID
15,000 — TCE concentration in ug/m^3

Abbreviations

mg/kg = milligrams per kilogram
ND = non-detect
PID = photoionization detector
TCE = Trichloroethene
ug/m^3 = micrograms per cubic meter

Notes

1. EKI proposed excavation limit shown in tan.
2. EKI proposed soil gas sampling locations shown as blue triangles. Actual locations subject to change based on encountered field conditions such as tight soil and/or shallow groundwater. Depth of installation will be 5 feet below ground surface at the time of installation, after fine grading and before paving.

Source

1. Adapted from Figures 9 and 10, Geosyntec, 2009. Feasibility Study Report, General Electric Site, 5441 International Boulevard, Oakland, California, Geosyntec Consultants, Inc., 6 and 7 August 2009.

0 20 40
Feet

Soil Gas Sampling Locations

DRAFT FINAL

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5441 International Blvd.
Oakland, CA
August 2019
B70123.01
Figure 7

Path: X:\B70123\Maps_012019\08\Fig7_SoilGasSamplingLocs.mxd



Legend:

▬ ▬ ▬	Subject Property Boundary
⊡ IA-1	Indoor Air Sample Location - VOCs and PCBs
□ OA-1	Outdoor Air Sample Location - VOCs and PCBs
■ IA-2	Indoor Air Sample Location - VOCs Only

Abbreviations:

PCBs = polychlorinated biphenyls

VOCs = volatile organic compounds

Sources:

a. Google Earth Pro, date of imagery 2 April 2018.

b. Adapted from Scheme 3M Site Plan, Figure A17-2096, Herdman Architecture + Design, 2019. Conceptual Site Plan, Bridge Development, 5441 International Blvd., Oakland, California, Bridge Aquisition, LLC, 23 April 2019.

Notes:

1. All locations are approximate.
2. Two additional indoor air samples will be collected at potential pathways (i.e., penetrations).

0 125 250

(Scale in Feet)

N

Proposed Indoor and Outdoor Air Sample Locations

5441 International Blvd.
Oakland, CA
August 2019
EKI B70123.01

Figure 8

DRAFT FINAL

eki environment & water

20190401.15230672 G:\B70123.01\2019-04\Figure 8.dwg C1-TOPO

APPENDIX A

PHASE I REMEDY INFORMATION

5441 International Boulevard
Oakland, California

Draft Final - August 2019

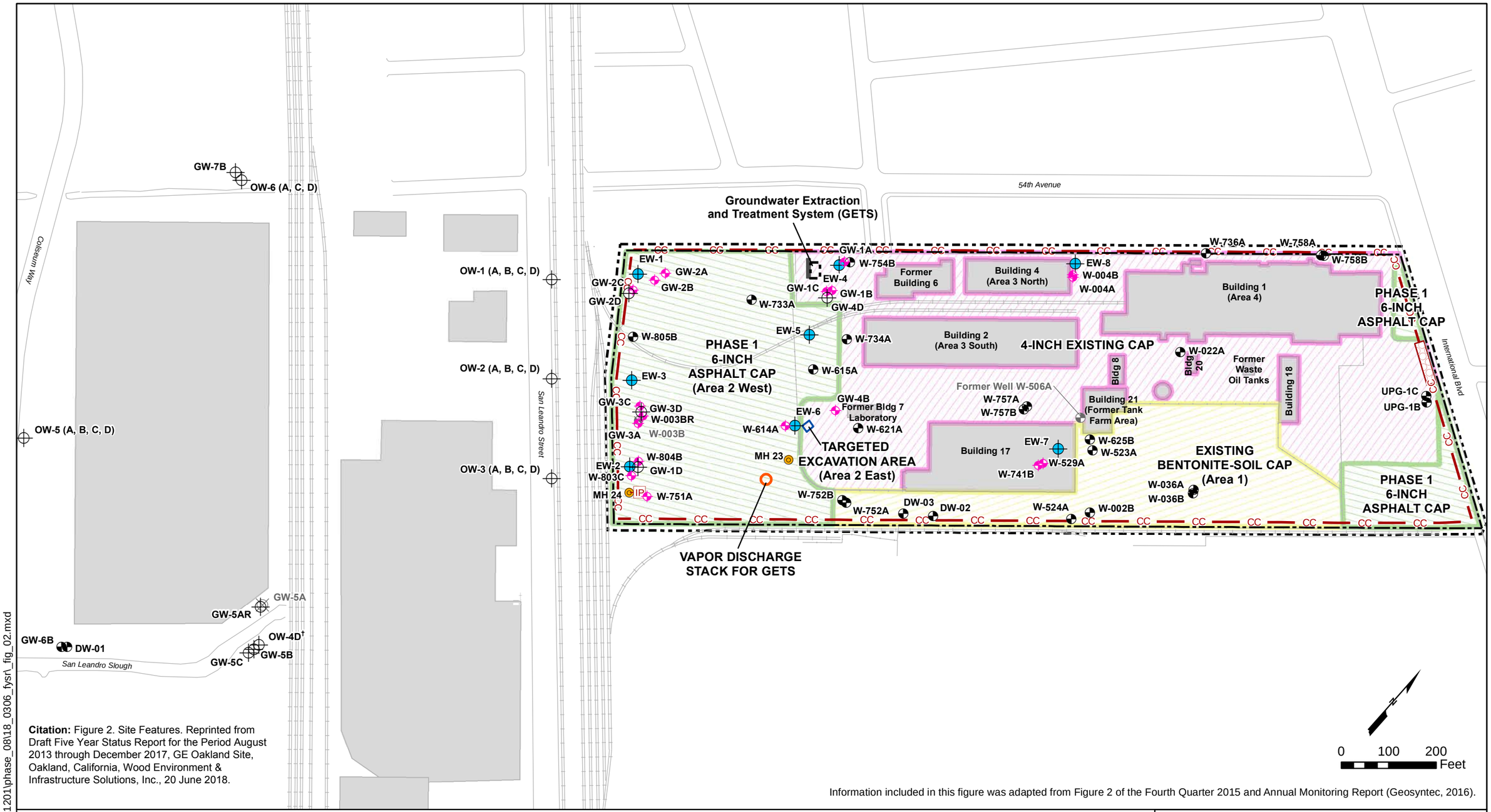
(EKI B70123.01)

FIGURE 2 AND FIGURE 2A
FROM DRAFT FIVE YEAR STATUS REPORT
FOR THE PERIOD AUGUST 2013 THROUGH
DECEMBER 2017

WOOD, 2018

5441 International Boulevard
Oakland, California

20 June 2018



Citation: Figure 2. Site Features. Reprinted from Draft Five Year Status Report for the Period August 2013 through December 2017, GE Oakland Site, Oakland, California, Wood Environment & Infrastructure Solutions, Inc., 20 June 2018.

Information included in this figure was adapted from Figure 2 of the Fourth Quarter 2015 and Annual Monitoring Report (Geosyntec, 2016).

Legend

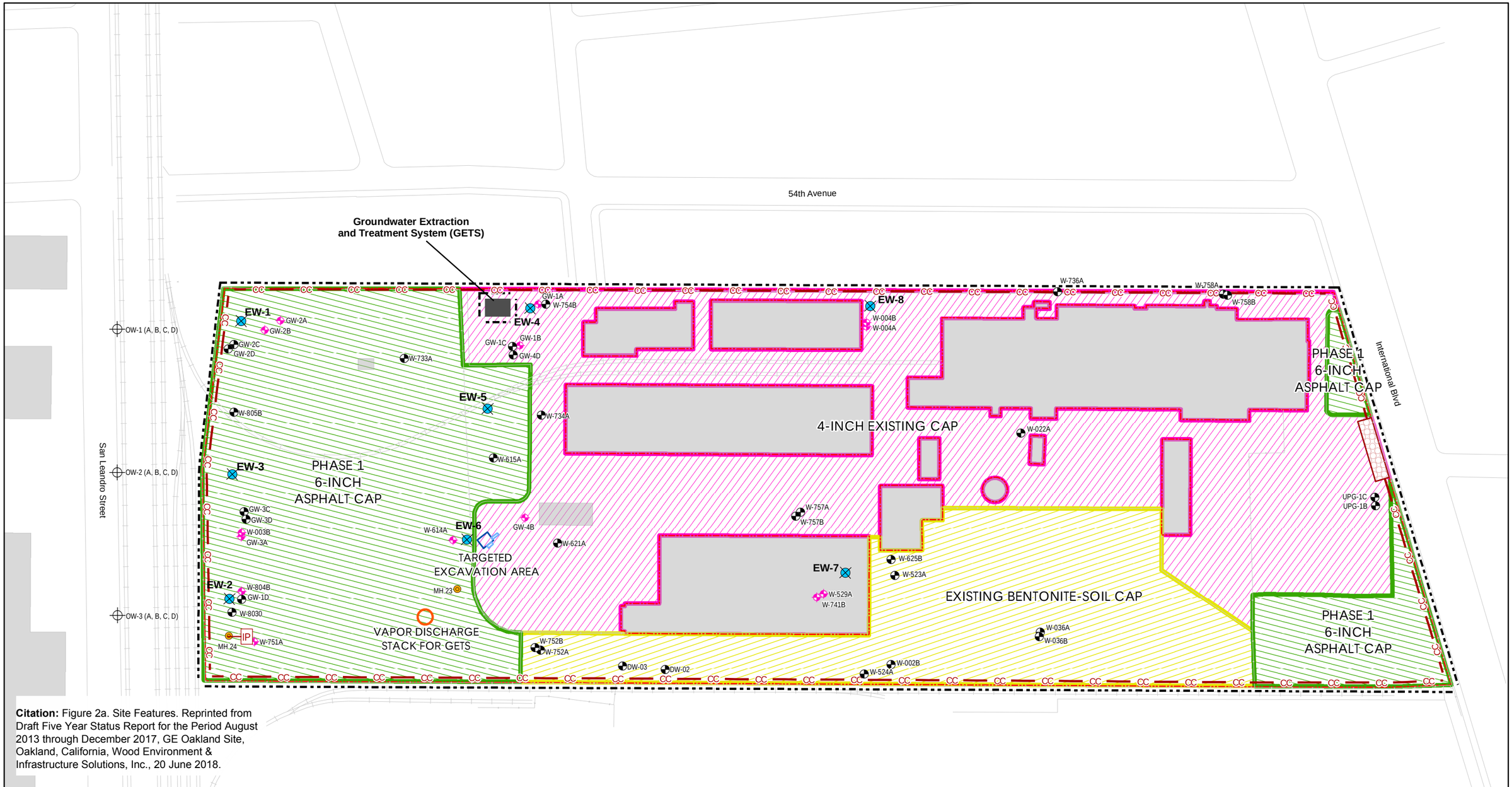
- MNA Monitoring Well Location
- MNA Monitoring Well, Destroyed
- GETS Performance Monitoring Well Location
- GETS Performance Monitoring Well, Destroyed
- Other Monitoring Well Location
- Extraction Well
- Manhole 24 (MH-24) and Catch Basin with Inlet Protection
- Entrance/Exit (Asphalt Berm)
- CC — Concrete Curb
- Property Boundary
- Security Fence
- 4-Inch Existing Cap
- 6-Inch Asphalt Cap
- Existing Bentonite-Soil Cap
- Buildings
- † Resurveyed Well

SITE FEATURES
5441 International Boulevard
Oakland, California

wood.

By: KLU	Prj. No. 8616181201
Date: 04/24/2018	Figure 2

\\oad-gis1\s-3000s$\180001\181201\phase_08\18_0306_fysr_fig_02.mxd



Citation: Figure 2a. Site Features. Reprinted from Draft Five Year Status Report for the Period August 2013 through December 2017, GE Oakland Site, Oakland, California, Wood Environment & Infrastructure Solutions, Inc., 20 June 2018.

Legend

- MNA Well Network
- GETS Performance Monitoring Well Location
- Other Monitoring Well Location
- Extraction Well Location
- Construction Entrance/Exit (Asphalt Berm)
- CC Concrete Curb
- IP MH 24 and Catch Basin with Inlet Protection (SE-10)
- Security Fence

N

140 70 0 140

Feet

Site Features

5441 International Blvd., Oakland, CA
General Electric Company

Geosyntec consultants

Oakland | May 2015

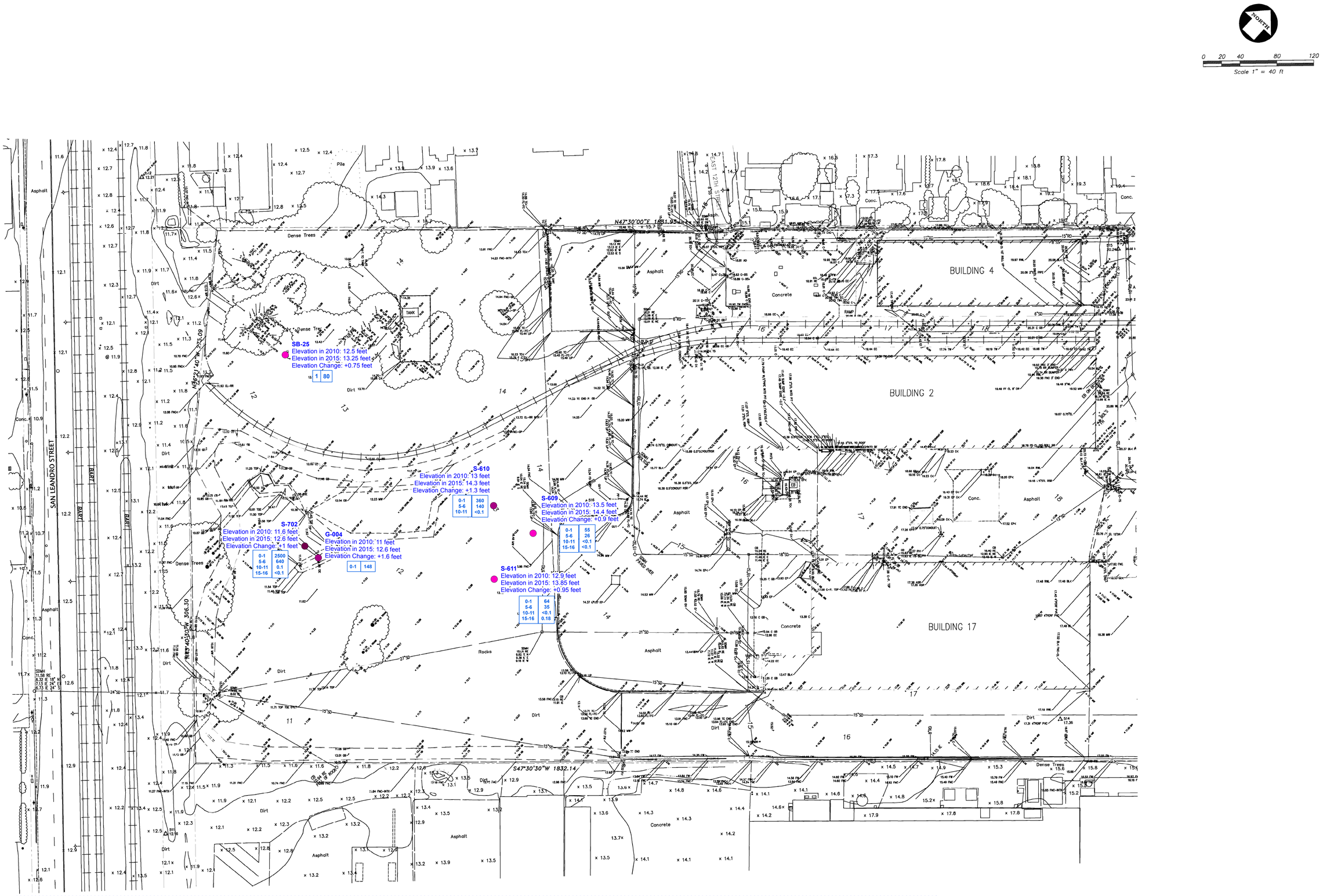
Figure 2a

P:\GIS\GE-Oakland\project\2015_RemedyImplementationReport\Fig02a_Site Features.mxd

SURVEY INFORMATION FOR WESTERN PORTION OF THE SITE PRE- AND POST- PHASE I REMEDY

5441 International Boulevard
Oakland, California

July 2010 and April 2015



Notes:

1. EKI modifications are in blue and include addition of sampling locations and PCB results.
2. 2015 elevations were estimated from Kier & Wright's "As-Built Survey - Pavement", Sheet C4, dated April 2015.
3. 2010 elevations were estimated from Kier & Wright's "Topographic Survey", Sheet C2, dated July, 2010.

Legend

Soil Boring ○ W-761B

Soil Sample Depth Range in Feet	PCB Concentration in Soil (mg/kg)
30-31	<0.1
35-36	<0.1
40-41	<0.1

Maximum PCB Concentration

- Not Detected
- >0 and <1 mg/kg
- >1 and <=10 mg/kg
- >10 and <=25 mg/kg
- >26 and <50 mg/kg
- >50 and <100 mg/kg
- >100 and <1,000 mg/kg
- >1,000 mg/kg

PREPARED BY OR UNDER THE SUPERVISION OF KEVIN J. MARTIN, L.S. 8345 LICENSE EXPIRES: 12-31-11 DATE

LICENSED LAND SURVEYOR KEVIN J. MARTIN No. 8345 Exp. 12/31/11 STATE OF CALIFORNIA

NO.	REVISION	BY

KIER & WRIGHT
CIVIL ENGINEERS & SURVEYORS, INC.
1233 Quarry Lane, Suite 145
Pleasanton, California 94566
(925) 249-6555
Fax (925) 249-6563

TOPOGRAPHIC SURVEY OF THE GENERAL ELECTRIC SITE FOR GEOSYNTEC CONSULTANTS

OAKLAND, CALIFORNIA

DATE	JULY, 2010
SCALE	1" = 40'
SURVEYOR	KJM
DRAFTER	REG
JOB NO.	A07520-3
SHEET	C2
OF	2 SHEETS



Z:\Bridge Development Partners - Oakland\Work Product\Regulatory Communications\PCB Cleanup Plan Memo\Supporting materials for western portion\Oakland, CA TS-A07520-4-AS BUILT-2015-04-22.dwg 11-06-18 01:24:35 PM jcatania

NO.	REVISION	BY

NO.	REVISION	BY

KIER & WRIGHT
CIVIL ENGINEERS & SURVEYORS, INC.
2850 Collier Canyon Road
Livermore, California 94551
Phone (925) 245-8788
Fax (925) 245-8796

AS-BUILT SURVEY - PAVEMENT
OF
5441 INTERNATIONAL BLVD.
FOR
GEOSYNTEC CONSULTANTS
OAKLAND, CALIFORNIA

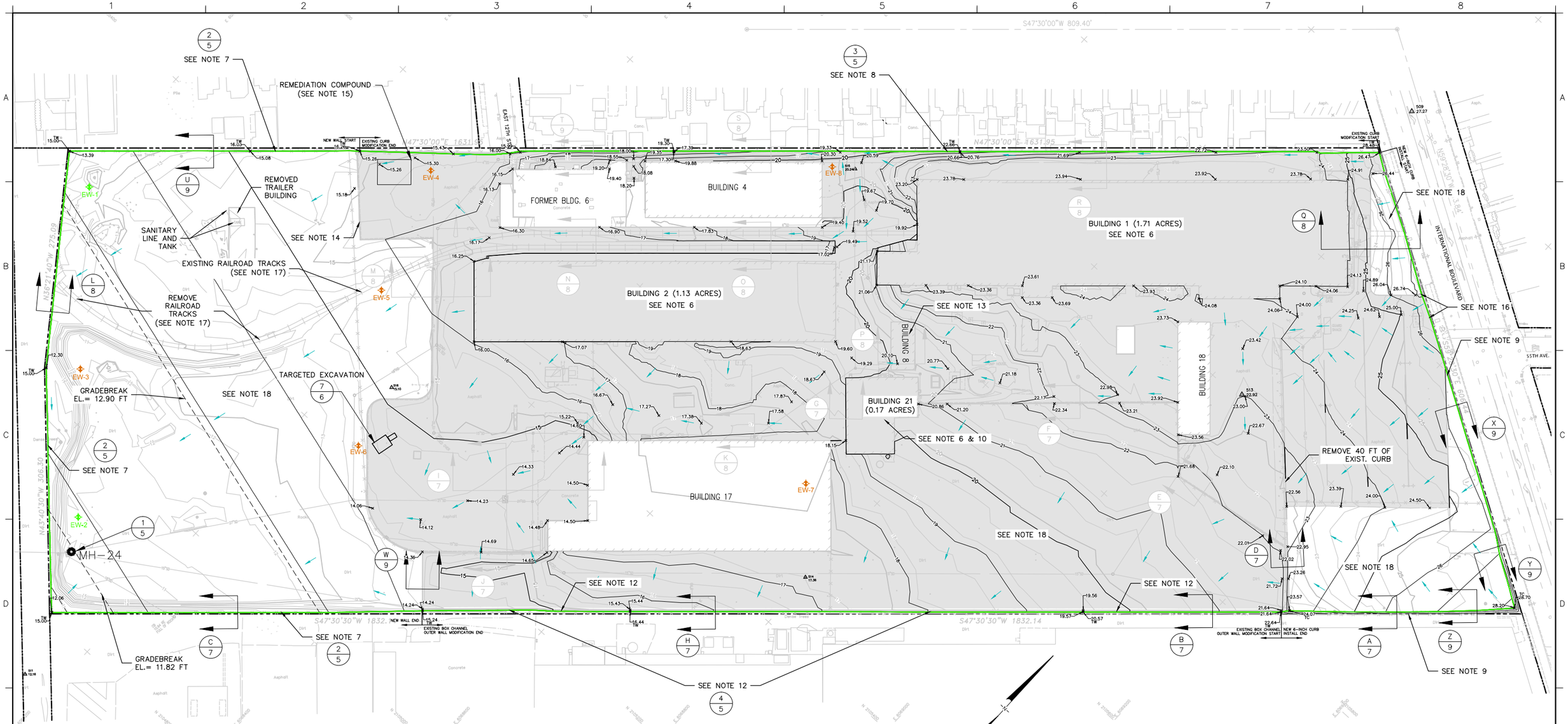
DATE	APRIL, 2015
SCALE	1" = 40'
SURVEYOR	GH
DRAFTER	REG
JOB NO.	A07520-4
SHEET	C4
OF	5 SHEETS

DRAWINGS
FROM REMEDIAL ACTION IMPLEMENTATION COMPLETION REPORT – PHASE I

GEOSYNTEC, 2015

5441 International Boulevard Oakland,
California

24 November 2015



NOTES

(GRAYED NOTES = PHASE II ONLY)

1. EXISTING SITE FEATURE AND TOPOGRAPHIC DATA WERE PROVIDED BY KIER & WRIGHT OF LIVERMORE, CALIFORNIA.
2. SURVEY COORDINATE GRID SYSTEM BASED UPON AN ASSUMED PROJECT COORDINATE SYSTEM.
3. ALL CATCH BASINS AND MANHOLES, WITH THE EXCEPTION OF MH–24, SHALL BE ABANDONED PER TECHNICAL SPECIFICATIONS. MH–23 AND MH–25 RIMS SHALL BE ADJUSTED TO NEW FINAL GRADE.
4. ALL DEMOLITION, REMOVAL, OR ABANDONMENT OF EXISTING STRUCTURES AND UTILITIES TO BE COMPLETED PRIOR TO BEGINNING OF THIS PROJECT.
5. CRACKS IN EXISTING ASPHALT SURFACES AND CONCRETE SLABS TO BE REPAIRED WITH ASPHALT PATCH.
6. BUILDINGS 1, 2, AND 21 REQUIRE A MINIMUM OF 2–INCHES OF ASPHALT PAVEMENT. ALL OTHER BUILDING SLABS DO NOT REQUIRE ASPHALT PAVEMENT.
7. INSTALL 1,400 LF LONG CONCRETE WALL (MIN. TOP EL.= 15 FT MSL).
8. MODIFY THE HEIGHT OF 1,270 LF OF EXISTING CURB TO BE 24–INCHES TALL FROM FINAL ASPHALT GRADE AND A MINIMUM OF 12–INCHES FROM OFF–SITE GRADE.
9. INSTALL 883 LF OF CURB TO BE 6–INCHES TALL FROM FINAL ASPHALT GRADE.
10. REMOVE EXISTING FEATURES AND REPAIR SLAB SURFACE WITH ASPHALT PATCH.
11. FILL IN EXISTING BOX CHANNEL WITH APPROXIMATELY 128 CY OF CLASS II ASPHALT BASE.
12. MODIFY THE HEIGHT OF 1,069 LF OF EXISTING OUTER BOX CHANNEL WALL TO BE 12–INCHES TALL FROM FINAL ASPHALT GRADE.
13. DEMOLISH AS NECESSARY SOUTHERN HALF OF EXISTING BUILDING 8 FOUNDATION TO ENSURE PROPER DRAINAGE THROUGH FOOTPRINT.
14. REMOVE EXISTING CURB AS NECESSARY TO FACILITATE SOUTHERN UNPAVED AREA CAP SUBGRADE EARTHWORK OPERATIONS AND/OR FINAL GRADING.
15. SEE SHEET C–2 OF GROUNDWATER TREATMENT AND EXTRACTION SYSTEM DESIGN DRAWINGS FOR SPECIFIC DETAILS PERTAINING TO THIS AREA.
16. AT EXISTING DRIVEWAY, 30 LF OF PROPOSED 6–INCH CURB SHALL BE MODIFIED TO ACCOMMODATE SITE VEHICULAR TRAFFIC (I.E. CONSTRUCT A SPEED BUMP IN LIEU OF A CURB).
17. REMOVE APPROXIMATELY 275 FT OF EXISTING RAILROAD TRACKS IN GRADING AREAS THAT REQUIRE EXCAVATION ONLY. IN FILL AREAS, RAILROAD TRACKS TO REMAIN IN PLACE.
18. CLEAR AND GRUB VEGETATION IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS.
19. ENGINEERED FILL AND CLASS II ASPHALT BASE SHALL BE PLACED AND COMPACTED IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS.

0 60' 120'
SCALE IN FEET

LEGEND

- EXISTING GROUND MAJOR CONTOUR (5 FEET)
- EXISTING GROUND MINOR CONTOUR (1 FOOT)
- TOP OF PAVEMENT MAJOR CONTOUR (5 FEET)
- TOP OF PAVEMENT MINOR CONTOUR (1 FOOT)
- GRADE BREAK
- PROPERTY BOUNDARY
- EXISTING PROPERTY FENCE
- PROPOSED WALL/CURB ALIGNMENTS
- FLOW DIRECTION
- FINAL GRADE SPOT ELEVATION
- SURVEY CONTROL POINT
- EW-2 EXISTING EXTRACTION WELL
- EW-3 PROPOSED EXTRACTION WELL
- PHASE II AREAS

ISSUED FOR BID

IF SHEET IS LESS THAN 22" BY 34", THEN PRINT–SCALE HAS BEEN REDUCED ACCORDINGLY.

REV	DATE	DESCRIPTION	DRN	APP
2	5/12/14	ISSUED FOR BID	MC	CL
1	3/13/14	ISSUED FOR PERMIT REVIEW	MC	CL

Geosyntec consultants
10875 RANCHO BERNARDO RD, SUITE 200
SAN DIEGO, CA 92127
PHONE: 858.674.6559

TITLE: TOP OF PAVEMENT PLAN (1 OF 2)

PROJECT: GENERAL ELECTRIC SITE

SITE: 5441 INTERNATIONAL BLVD. OAKLAND, CALIFORNIA

THIS DRAWING MAY NOT BE ISSUED FOR PROJECT TENDER OR CONSTRUCTION, UNLESS SEALED.

SIGNATURE
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DATE

DESIGN BY:	VG	DATE:	MAY 2014
DRAWN BY:	MC	PROJECT NO.:	WR1881
CHECKED BY:	CL	FILE:	WR1881–03
REVIEWED BY:	GC	DRAWING NO.:	3 OF 11
APPROVED BY:	CL		

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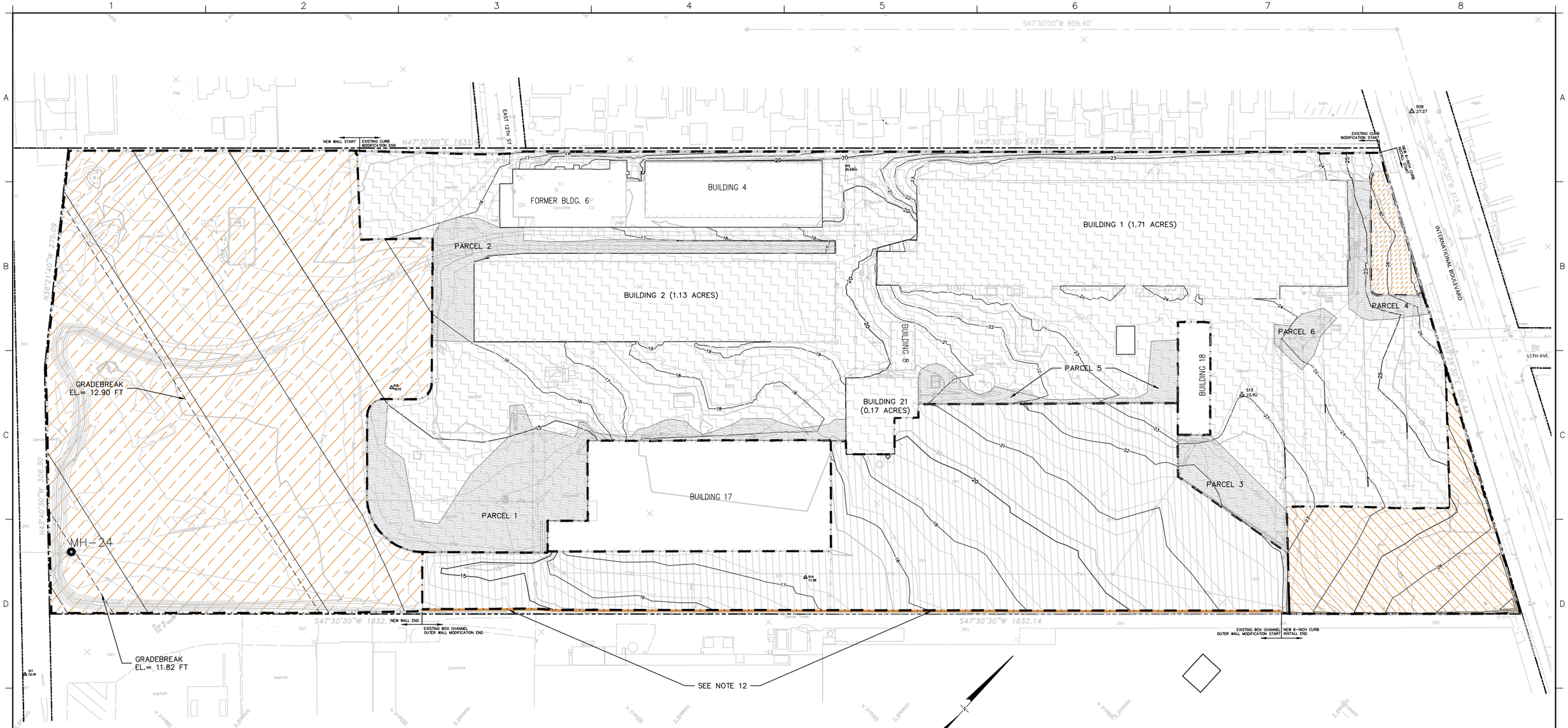

PHASE I CONSTRUCTION:

SOUTHERN UNPAVED AREA:

PLAN AREA = 5.62 ACRES

CAP SUBGRADE EARTHWORK:
CUT = 1,477 CY; FILL = 1,908 CY; NET = 431 CY <FILL>

3-INCH CLASS II AB = 2,268 CY
6-INCH AC PAVEMENT = 4,537 CY } 9-INCH (MIN.) CAP

NORTHEAST UNPAVED AREA:

PLAN AREA = 0.92 ACRES

CAP SUBGRADE EARTHWORK:
CUT = 396 CY; FILL = 396 CY; NET = 0 CY

3-INCH CLASS II AB = 371 CY
6-INCH AC PAVEMENT = 741 CY } 9-INCH (MIN.) CAP

NORTHWEST UNPAVED AREA:

PLAN AREA = 0.15 ACRES

CAP SUBGRADE EARTHWORK:
CUT = 1 CY; FILL = 77 CY; NET = 76 CY <FILL>

CLASS II AB VOLUME TO REACH ASPHALT SUBGRADE = 60 CY
6-INCH AC PAVEMENT = 120 CY } 9-INCH (MIN.) CAP

FORMER BENTONITE CAP AREA EXISTING CHANNEL

CLASS II AB = 114 CY

PHASE II CONSTRUCTION:

FORMER BENTONITE CAP AREA:

PLAN AREA = 3.65 ACRES

2-INCH AC PAVEMENT = 1,074 CY } 2-INCH (MIN.) CAP

PAVED AREAS & BUILDING PADS:

PLAN AREA = 10.69 ACRES

PROPOSED CLASS II AB FILL AREAS TO REACH AC SUBGRADE:

PARCEL 1 = 781 CY
PARCEL 2 = 383 CY
PARCEL 3 = 106 CY
PARCEL 4 = 157 CY
PARCEL 5 = 115 CY
PARCEL 6 = 33 CY
TOTAL PARCEL CLASS II AB = 1,575 CY } 2-INCH (MIN.) CAP

AC PAVEMENT = 3,139 CY

SITE VOLUME TOTALS:

TOTAL CLASS II AB = 5,860 CY

TOTAL AC PAVEMENT = 9,610 CY

0 60' 120'
SCALE IN FEET

LEGEND

- EXISTING GROUND MAJOR CONTOUR (5 FEET)
- EXISTING GROUND MINOR CONTOUR (1 FOOT)
- TOP OF PAVEMENT MAJOR CONTOUR (5 FEET)
- TOP OF PAVEMENT MINOR CONTOUR (1 FOOT)
- GRADE BREAK
- PROPERTY BOUNDARY
- EXISTING PROPERTY FENCE
- SITE VOLUME BOUNDARIES
- CLASS II AB PARCELS
- SURVEY CONTROL POINT

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TITLE:
TOP OF PAVEMENT PLAN (2 OF 2)

PROJECT:
GENERAL ELECTRIC SITE

SITE:
5441 INTERNATIONAL BLVD.
OAKLAND, CALIFORNIA

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REVIEWED BY:	GC	DRAWING NO.:	4 OF 11
APPROVED BY:	CL		

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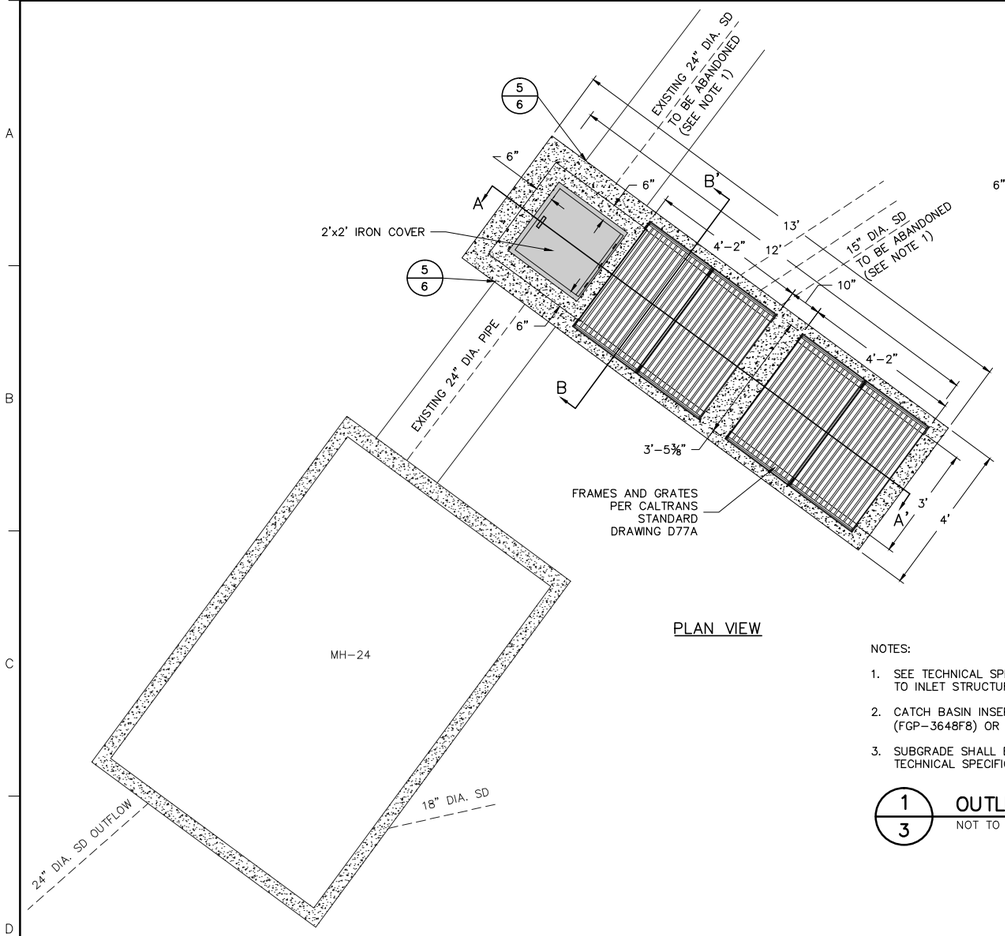
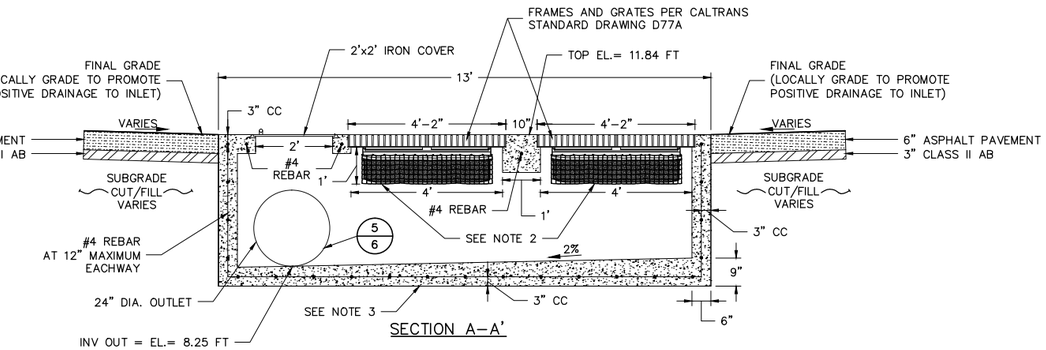


PLAN VIEW



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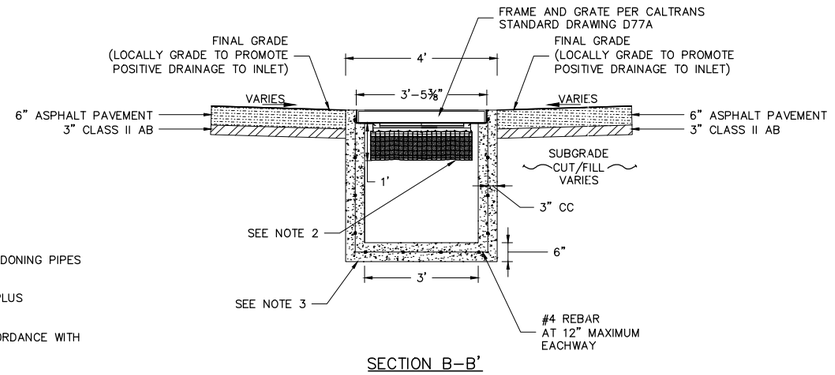

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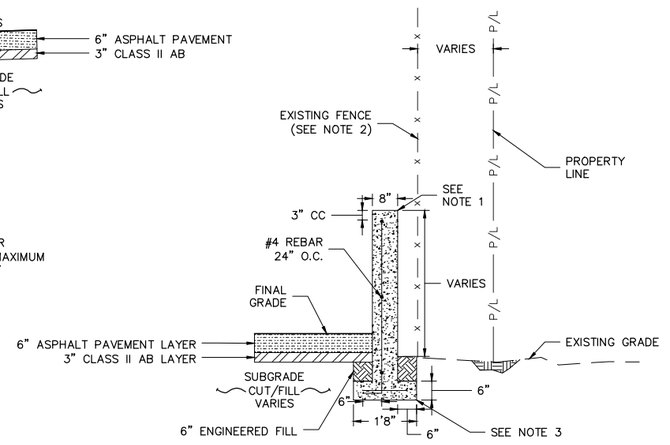


NOTES:

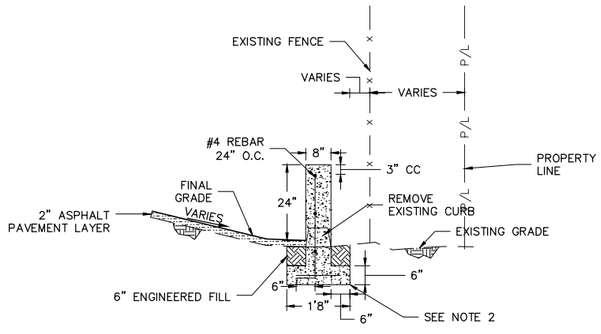
1. TOP OF WALL SHALL BE CONSTRUCTED TO A MINIMUM ELEVATION OF 15 FT MSL.
2. WALL FOOTING SHALL BE CONSTRUCTED INSIDE EXISTING FENCE LINE.
3. WALL FOOTING SUBGRADE SHALL BE COMPACTED IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS.

2 / 3,7,8,9 SOUTHERN UNPAVED AREA PERIMETER WALL
NOT TO SCALE

NOTES:

1. SEE TECHNICAL SPECIFICATIONS FOR ABANDONING PIPES TO INLET STRUCTURE.
2. CATCH BASIN INSERTS TO BE FLOGARD® PLUS (FGP-3648F8) OR EQUIVALENT.
3. SUBGRADE SHALL BE COMPACTED IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS.

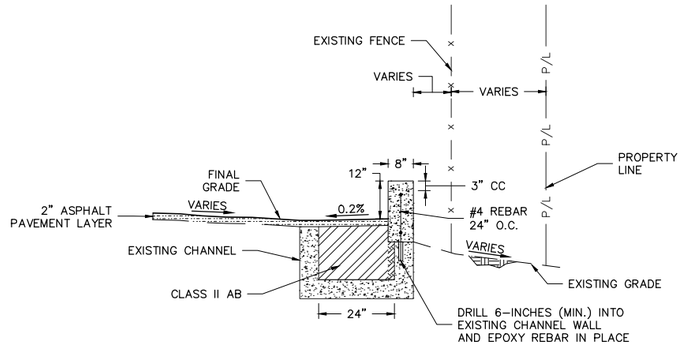
1 / 3 OUTLET STRUCTURE
NOT TO SCALE



NOTES:

1. MODIFIED CURB HEIGHT SHALL BE 24-INCHES TALL AND A MINIMUM OF 12-INCHES FROM EXISTING GRADE OUTSIDE CURB LINE.
2. WALL FOOTING SUBGRADE SHALL BE COMPACTED IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS.

3 / 3,8,9 NW PROPERTY LINE EXISTING CURB MODIFICATION
NOT TO SCALE



4 / 3,7 EXISTING BENTONITE CAP CHANNEL WALL MODIFICATION
NOT TO SCALE

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SAN DIEGO, CA 92127
PHONE: 858.674.6559

TITLE: DETAILS (1 OF 2)

PROJECT: GENERAL ELECTRIC SITE

SITE: 5441 INTERNATIONAL BLVD. OAKLAND, CALIFORNIA

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DESIGN BY:	VG	DATE:	MAY 2014
DRAWN BY:	MC	PROJECT NO.:	WR1881
CHECKED BY:	CL	FILE:	WR1881-05-06
REVIEWED BY:	GC	DRAWING NO.:	
APPROVED BY:	CL		5 OF 11

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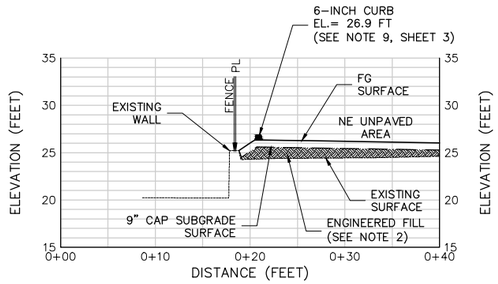

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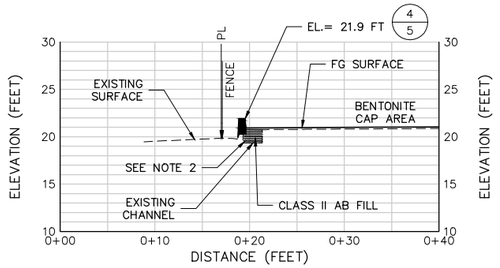

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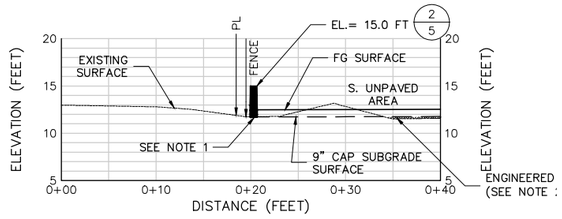

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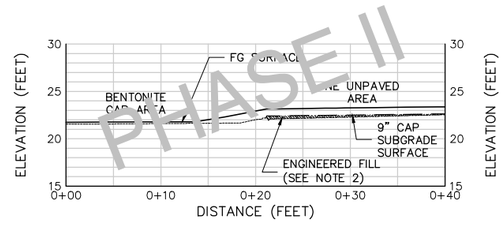

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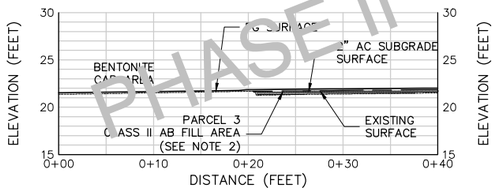

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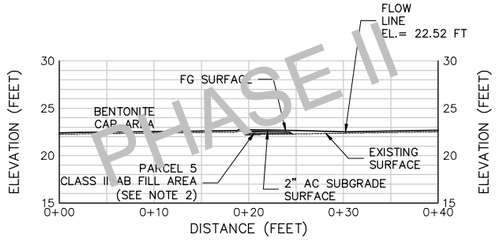

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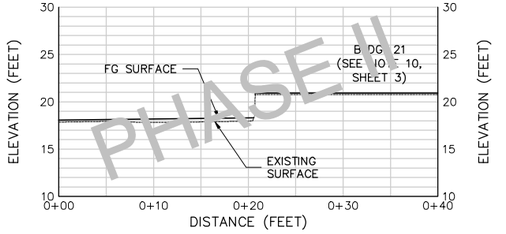

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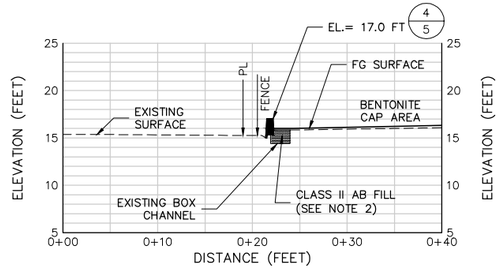
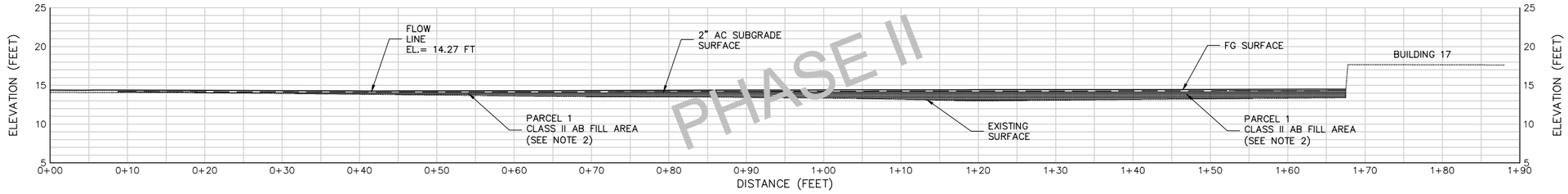


SECTION – H

NOTES:

1. WALL FOOTING SUBGRADE SHALL BE BE COMPACTED IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS.
2. ENGINEERED FILL AND CLASS II ASPHALT BASE SHALL BE PLACED AND COMPACTED IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS.



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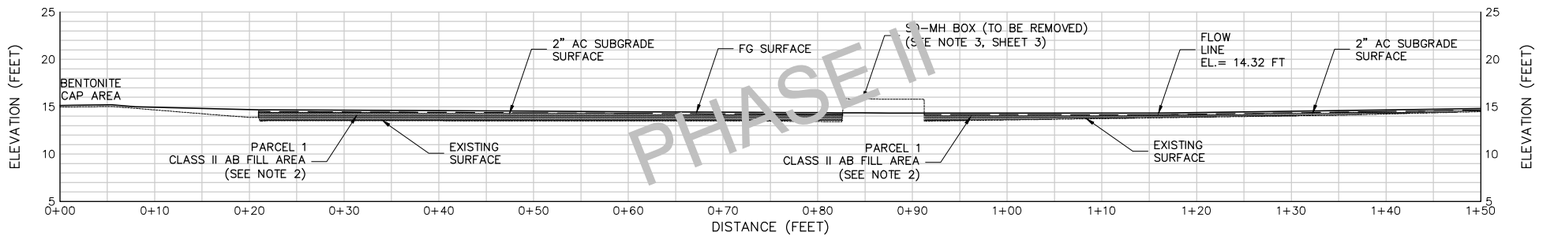

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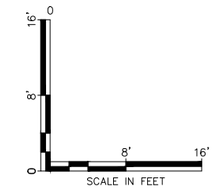

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Geosyntec consultants
10875 RANCHO BERNARDO RD, SUTE 200
SAN DIEGO, CA 92127
PHONE: 858.674.6559

TITLE: SECTIONS (1 OF 3)

PROJECT: GENERAL ELECTRIC SITE

SITE: 5441 INTERNATIONAL BLVD.
OAKLAND, CALIFORNIA

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DESIGN BY:	VG	DATE:	MAY 2014
DRAWN BY:	MC	PROJECT NO.:	WR1881
CHECKED BY:	CL	FILE:	WR1881-07-09
REVIEWED BY:	GC	DRAWING NO.:	7 OF 11
APPROVED BY:	CL		

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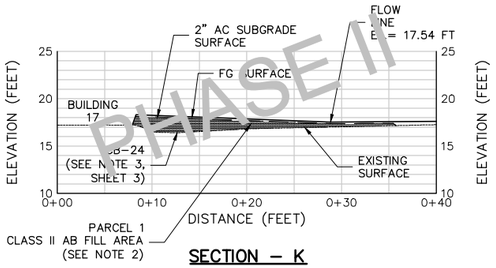

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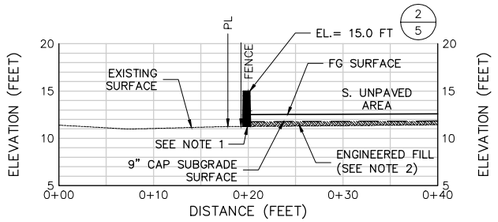

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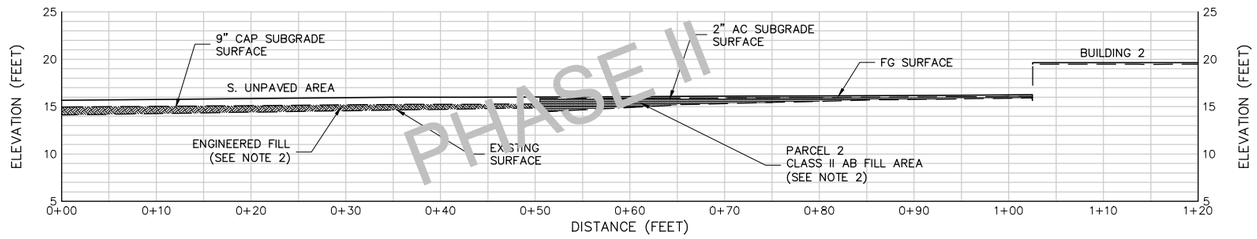

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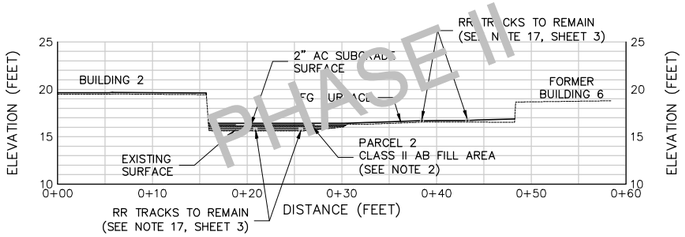

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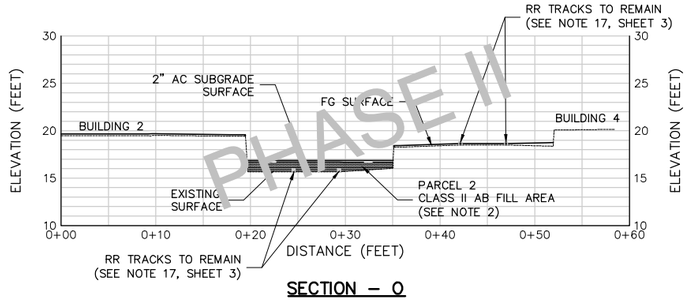

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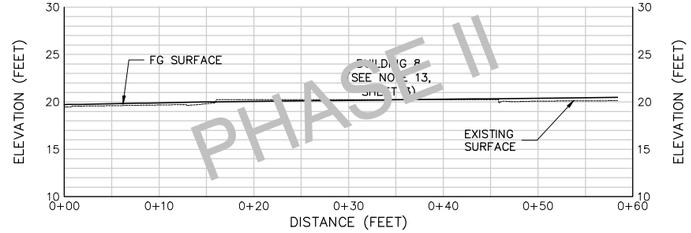

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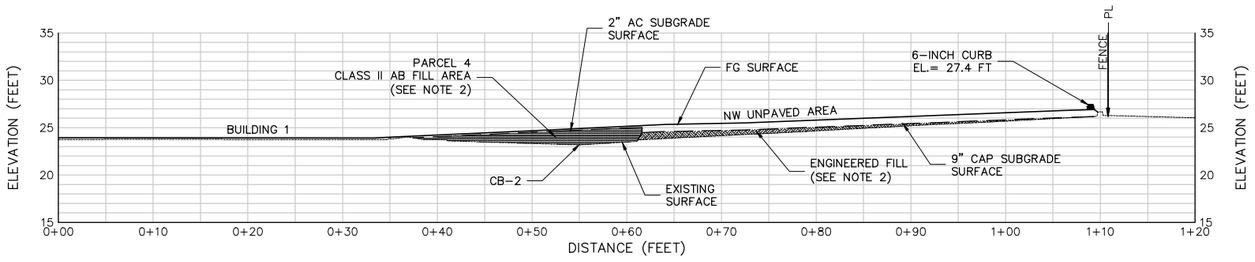

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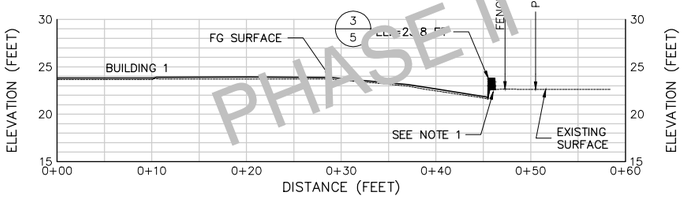

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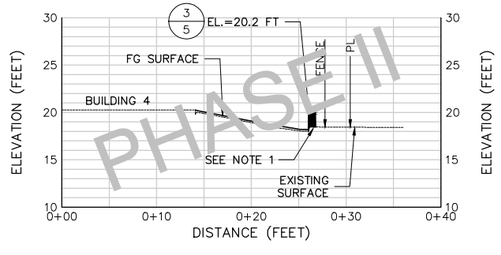
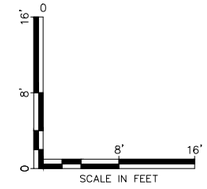


SECTION – S

NOTES:

1. WALL FOOTING SUBGRADE SHALL BE BE COMPACTED IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS.
2. ENGINEERED FILL AND CLASS II ASPHALT BASE SHALL BE PLACED AND COMPACTED IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS.



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OAKLAND, CALIFORNIA

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APPROVED BY:	CL		

ISSUED FOR BID

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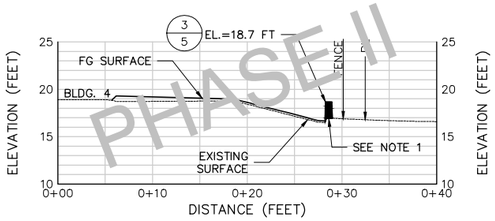

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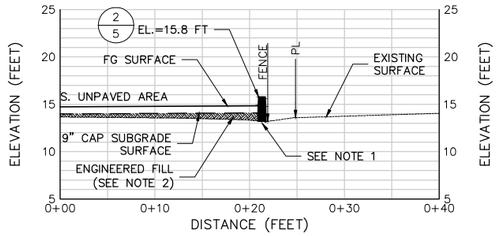
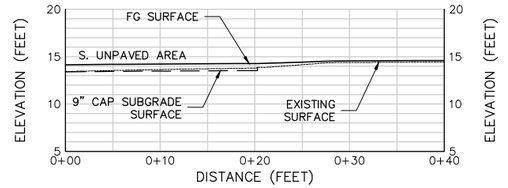


SECTION – U



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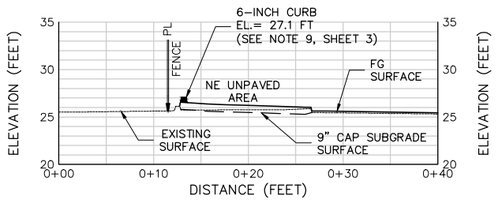
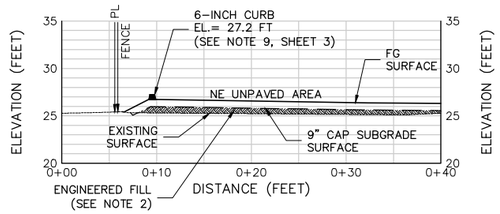
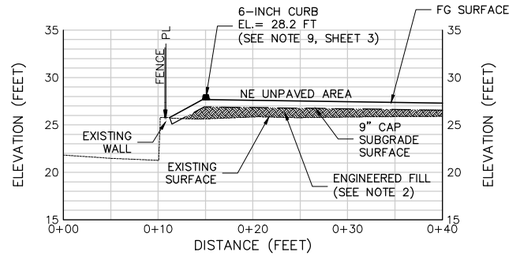


SECTION – X



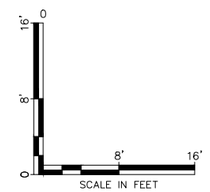
SECTION – Y



SECTION – Z

NOTES:

1. WALL FOOTING SUBGRADE SHALL BE BE COMPACTED IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS.
2. ENGINEERED FILL AND CLASS II ASPHALT BASE SHALL BE PLACED AND COMPACTED IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS.



IF SHEET IS LESS THAN 22" BY 34", THEN PRINT–SCALE HAS BEEN REDUCED ACCORDINGLY.

REV	DATE	DESCRIPTION	DRN	APP
2	5/12/14	ISSUED FOR BID	MC	CL
1	3/13/14	ISSUED FOR PERMIT REVIEW	MC	CL

Geosyntec consultants
10875 RANCHO BERNARDO RD, SUTE 200
SAN DIEGO, CA 92127
PHONE: 858.674.6559

TITLE: SECTIONS (3 OF 3)

PROJECT: GENERAL ELECTRIC SITE

SITE: 5441 INTERNATIONAL BLVD. OAKLAND, CALIFORNIA

THIS DRAWING MAY NOT BE ISSUED FOR PROJECT TENDER OR CONSTRUCTION, UNLESS SEALED.

SIGNATURE

XXXX
DATE

DESIGN BY:	VG	DATE:	MAY 2014
DRAWN BY:	MC	PROJECT NO.:	WR1881
CHECKED BY:	CL	FILE:	WR1881-07-09
REVIEWED BY:	GC	DRAWING NO.:	9 OF 11
APPROVED BY:	CL		

ISSUED FOR BID

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Geosyntec consultants

1111 Broadway, 6th Floor
Oakland, California 94607
Phone 510.285.2700
Fax 510.836.3114

COVER DESIGN CHANGE COVER SHEET

TO:	Eric Rager	**Date:** October 20, 2014	**Job No.:** WR1922
ADDRESS:	Innovative Construction Solutions	5441 International Boulevard	
	4721 Tidewater Ave., Suite D	GETS Construction	
	Oakland, CA 94601	Oakland, California	

Cover Design Change I.D. No.: 2	Revision No.: 0	Contractor RFI No.: 7
RFI Subject: NE Corner Planter Box and Perimeter Wall Modification	Date of RFI: October 20, 2014	

LIST OF DRAWINGS/DETAILS AFFECTED:

Cover Design Sheet 3, 7 (Section A), and 9 (Section Z)

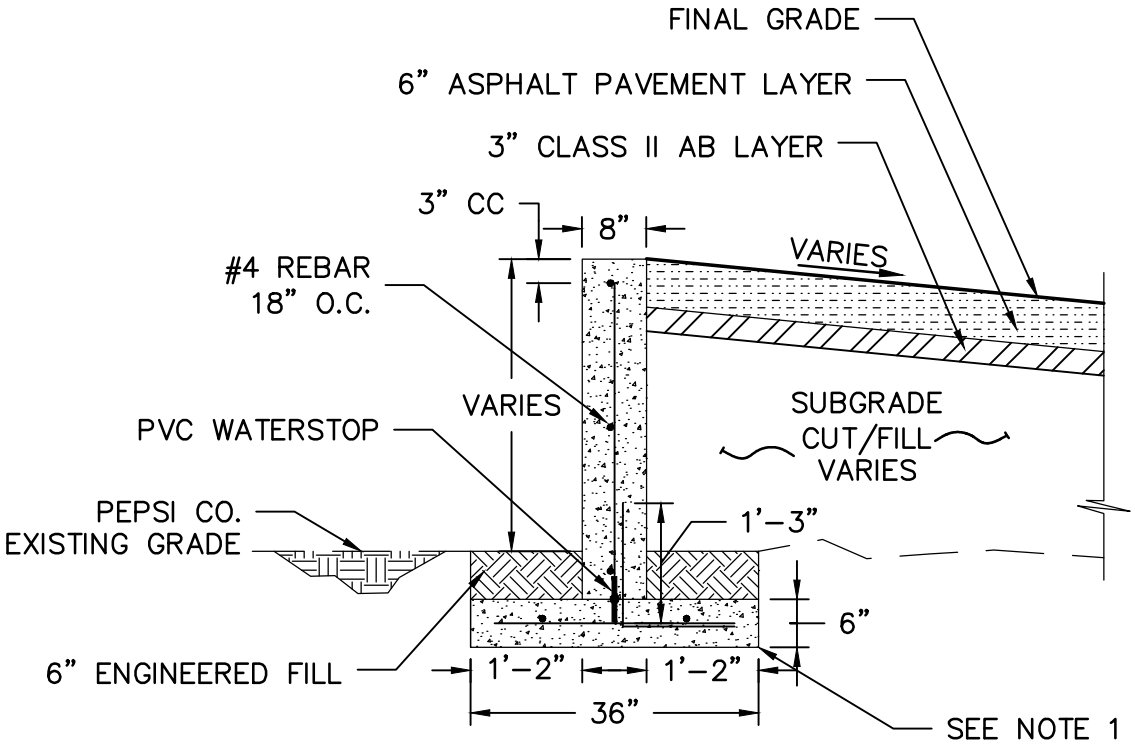
Notations:	☐ No Exception Taken ☒ Approved as Noted ☐ Rejected ☐ Revise and Resubmit ☐ Submit Specified Items	**Cost Impact:**	☐ No Impact ☒ Change Order Required

Remarks: To eliminate storm water flow from the site towards the direction of the adjacent PepsiCo property, a 40 foot section planter area located in the NE corner of the site (International Blvd. and PepsiCo property boundary) will be removed and an extension of the existing retaining wall and concrete curb along this boundary will be constructed. The retaining wall will be 8" thick poured with a 36" wide footing and will be doweled into the existing retaining wall with #4 rebar, 18" on center. Wall height will vary, but will not exceed 4' above existing grade. Following construction of the retaining wall and footing, the removed planter area will be backfilled and compacted to 95% compaction. The site perimeter fence will be constructed on top of the newly placed retaining wall in line with the fencing on the existing wall (as shown on Sheet 9, Section-Z).

Following completion of the retaining wall and backfill of removed planter box, a 30" tall concrete perimeter wall/curb will be constructed adjacent to and doweled into the existing and newly extended retaining wall with a minimum of 6" of freeboard above proposed grading plan (New Detail 8, Figure 1 October, 2014).

Review of this RFI does not relieve the Contractor from their responsibility for deviations from the Contract Documents nor from their responsibility for errors or omissions in the RFI. Contractor is, and Engineer is not, responsible for matters relating to fabrication, shipping, handling, storage, assembly, installation, construction (including safety), and coordination for performing the Work.

for	10/20/2014		10/20/2014
Prepared by	**Date**	**Construction Manager**	**Date**
Name: Nicholas Godinez, P.G.		Name: Chris Lieber PG	
Accepted by Contractor	**Date**		
Name:			



NOTES:

1. WALL FOOTING SUBGRADE SHALL BE COMPACTED IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS.
2. REBAR SPACING NOT TO SCALE.

5 / 3,7,9

NE PROPERTY LINE PERIMETER WALL

NOT TO SCALE

0 2'

SCALE IN FEET

REVISED DETAIL 5
GENERAL ELECTRIC SITE
5441 INTERNATIONAL BLVD.
OAKLAND, CALIFORNIA

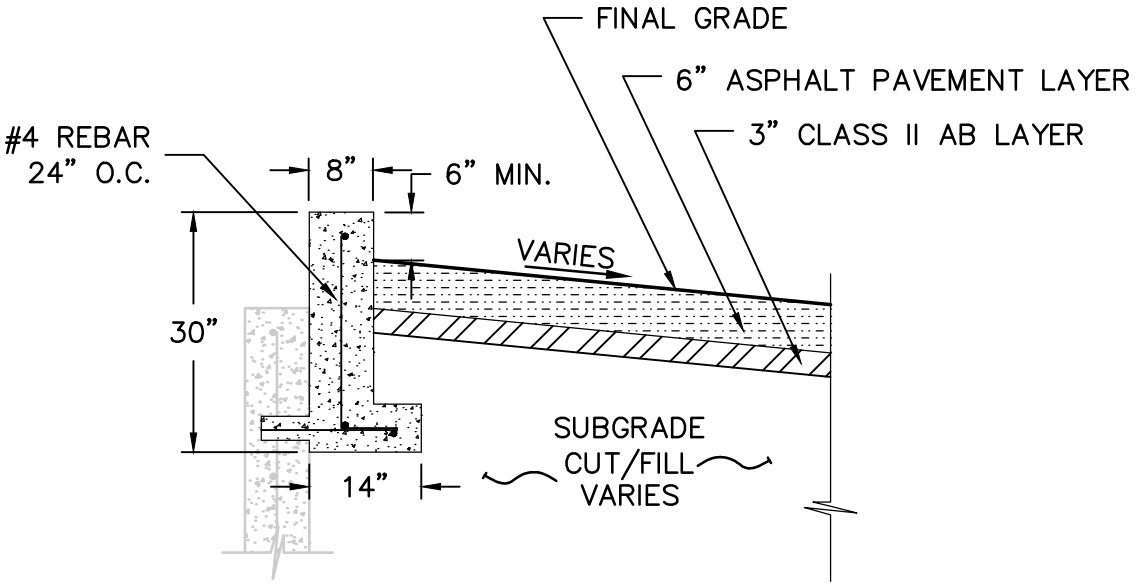
Geosyntec consultants

DATE: OCTOBER 2014

PROJECT NO. WR1881

FIGURE 1

P:\PRJ\SDCadd\CADD\REVISED DETAIL 3_10-3-14.dwg Last Edited by: MikeC on 10/3/2014 1:42 PM



NOTES:

1. WALL FOOTING SUBGRADE SHALL BE COMPACTED IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS.

8
3,7,9

NE PROPERTY LINE

PERIMETER WALL

NOT TO SCALE

0 2'

SCALE IN FEET

NEW DETAIL 8
GENERAL ELECTRIC SITE
5441 INTERNATIONAL BLVD.
OAKLAND, CALIFORNIA

Geosyntec consultants

DATE: OCTOBER 2014

PROJECT NO. WR1881

FIGURE 1

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APPENDIX B

SHORING AND TENTING PLANS (ICS)

5441 International Boulevard
Oakland, California

Draft Final - August 2019

(EKI B70123.01)

ATTACHMENT B-1

SHORING PLAN (ICS)

Revised October 2019

5441 International Boulevard
Oakland, California

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Dublin, CA 94568
(925) 574-2600 Telephone
(925) 574-2601 Facsimile
License No. 764815 A-HAZ-C21
www.ICSinc.tv

September 25, 2019

Ms. Deepa Gandhi, PE
EKI Environment & Water
577 Airport Boulevard, Suite 500
Burlingame, California 94010

via email: dgandhi@ekiconsult.com

RE: SLIDE RAIL SHORING INSTALLATION AND REMOVAL WORK PLAN FOR THE DEEP VOC AND PCB SOIL EXCAVATIONS, 5441 INTERNATIONAL BOULEVARD, OAKLAND, CALIFORNIA 94601 (ICS PROJECT NO. 18-1423R1)

Dear Ms. Gandhi:

Innovative Construction Solutions (ICS) is submitting this Shoring Installation and Removal Plan for the proposed 20-foot and 25-foot deep remedial excavations at the above referenced facility. The 20-foot deep excavation is for removal of VOC-impacted soil and the 25-foot deep excavation is for removal of PCB-impacted soil. ICS will use similar methodologies for both excavations. The PCB excavation will be conducted within a tent. The excavation scopes of work will include installation and removal of a slide rail shoring systems (SRSSs) to safely remove impacted soil from the excavations. ICS will obtain the SRSS equipment from United Rental Trench Safety. The shoring equipment will be installed per the manufacturer's requirements. The proposed SRSSs meet OSHA regulations for trench safety. The draft engineered design drawings for the SRSSs are included **Attachment A**.

As part of permitting of this work through the City of Oakland, final design drawings and shoring plan will be prepared, under the oversight of and stamped by a professional engineer registered in California.

The design, planning, installation, and removal of the SRSSs, shall be accomplished in such a manner as to maintain the required excavation section, maintain the undisturbed state of the soils below and adjacent to the excavation, and to protect adjacent structures, utilities, and other improvements. ICS will dewater on an as-needed basis to prevent accumulation of groundwater in the excavation.

I. Installation Procedures

1. Deliver and stage SRSS components near the excavation areas
2. Saw cut and remove hardscape from excavation areas. ICS will "over cut" a 12-inch section around the excavation areas
3. Inspect slide rail panels and posts before installation
4. Excavate "non-target soil" up to 3 feet below existing ground surface around and outside the design perimeter (i.e., boundary) of the excavation areas. Stockpile non-target soil in the center of the excavation area. Excavated spoils from this activity are not planned for off-site disposal and will remain on-site under the new site-wide cap. This non-target soil may be used to support exterior wall panels in the beginning stages of installation only.
5. Set one wall panel along each excavated area. Place previously excavated soils for additional support (if required)
6. Set corner post on each side of installed wall panels

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7. Proceed with installation of the other 3 wall panels (per SRSS) in the same manner; wall panel first then posts. This installation procedure will ensure a "square and plumb" set of the system and will reduce the possibility of binding during the remainder of the installation
8. Utilize an 85,000-100,000-lb excavator (Cat 350 or similar) to excavate and set the corner posts. The excavator bucket will be equipped with side cutters. A reach fork lift will be used to assist with the panel installations.
9. Excavated soil from within the targeted boundaries of the PCB excavation, which will be performed within a tent, will be loaded into roll-off bins and covered. Roll-off bins will be cycled in an out of the work area. Excavated soil from within the boundaries of the VOC excavation, which will not be tented, will be placed in stockpiles, and managed consistent with the requirements of the Dust Control Plan and Construction Storm Water Pollution Prevention Plan.
10. Excavate 12-inch lifts and advance the SRSSs as the excavations progress. The corner posts will be pushed down by the excavator and wall panels will be added as required to achieve the designed excavation grades
11. De-water excavation area as needed during excavation activities

II. Removal Procedures

1. De-water excavation areas as required to complete backfill and compaction activities
2. Install a single layer of Mirafi 140N geo-textile fabric at the base of the excavation prior to backfill operations
3. Provide and place ¾ crushed gravel to fill approximately 1-foot above the groundwater table. The gravel will be placed in 12-inch lifts
4. Raise/pull exterior wall panels in 6-9-inch increments in conjunction with the fill material. Panels will be properly rigged with appropriate rigging and raised with the excavator
5. Except as noted in 6, Once above the water table, place Mirafi 140N geo-textile fabric and complete backfill with Class II aggregate base material compacted to 95% maximum dry density per ASTM D1557 with a moisture content +/- 3% of optimum
6. For the VOC excavation only, a 3/4-inch gravel or similar permeable material will be used to backfill a minimum 2-foot wide section along the north perimeter of the excavation to the subgrade elevation or the bottom of the clean corridor (if present).
7. Simultaneously remove wall panels
8. At approximately 3 feet below existing grade surface, the SRSSs will be completely removed
9. Decontaminate SRSS components

Note: Shoring shall be removed in a manner that does not loosen the bedding or backfill. Shoring will be removed during the backfilling operation. ICS will not excavate soil, or create voids, which may result in area deformation or backfill settlement. Following removal, the resulting voids shall be backfilled in lifts not exceeding 8 inches. Compact backfill to 95 percent of optimum dry density as determined from the Proctor Test for each type of backfill material.

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III. Monitoring Procedures

In the event the shoring becomes unstable or large surface settlements occur, ICS will be responsible for implementing corrective measures. ICS will be responsible for maintaining a safe work site and will protect workers and the public health and safety from the consequences of its operations. ICS will provide fencing and barricades around shored excavation to prevent unauthorized persons to access the shored excavation during non-working hours. ICS' competent person will be onsite at all times during the excavation, shoring and backfill activities.

INNOVATIVE CONSTRUCTION SOLUTIONS

If you have any questions or comments regarding this work plan, please contact me at (925)

574-2600.
Sincerely,

Eric Rager
Vice President, Client Solutions
Executive

innovativeconstructionsolutions

6693 Sierra Lane
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Dublin, CA 94568
(925) 574-2600 Telephone
(925) 574-2601 Facsimile
License No. 764815 A-HAZ-C21
www.ICSinc.tv

Attachment A

Slide Rail Shoring System Drawings

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United Rentals®

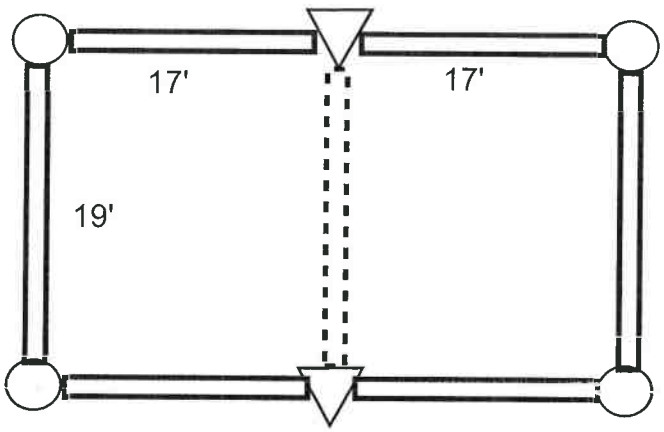
TRENCH SAFETY

Engineering Conceptual Design

Date:	January 18, 2019	**Designer:**	JIG
Customer:	Innovative Construction	**Salesperson:**	Jose Lizaola
Project:	Oakland Project-Remediation	**Branch:**	712 - Hayward
Project Location:	Oakland, CA	**Engineering Fee:**	TBD

Shoring System:

- System Type: 4-Sided Slide Rail pit application
- System Dimensions: 20' wide x 35' long x 25' deep
- Phasing Required: No
- Sheeting Required: No
- Benching/Sloping Required: No
- Soil Description: Soft clay; additional soil information is needed prior to final engineering.
- Dewatering Required: Base of excavation
- Surcharge Setback: HS20-44 vehicular traffic 35', Structures 50'
- Additional Notes: The proposed system is based on the information available, adverse site or soil conditions may affect design and engineering.



(2) 8x19 H URO
(4) 8x19 H URI
(2) Stacking Bracket Sets
(4) 24' Corners
(2) 27' Linears
(2) Carts
(4) 16'-6" W8x67 Ext
(1) Job Box

(4) 8x17 URO
(8) 8x17 URI
(4) Stacking Bracket Sets

Design Details:

- Bottom strut is 5.5' above base o.c., Top Strut is 5.5' below grade o.c.
- Corners & panels may be held up max 1' above the base.

United Rentals®

TRENCH SAFETY

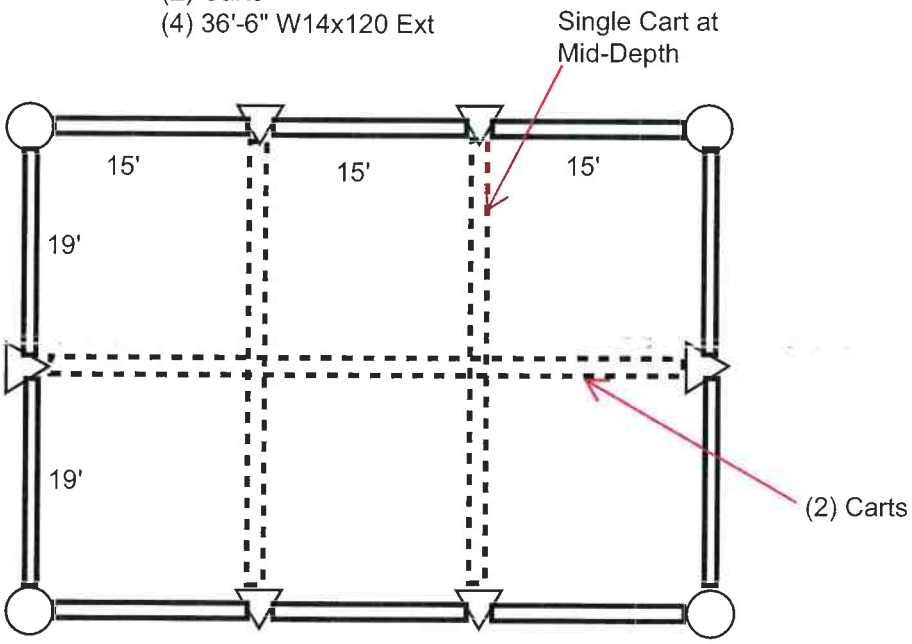
Engineering Conceptual Design

Date:	January 18, 2019	**Designer:**	JIG
Customer:	Innovative Construction	**Salesperson:**	Jose Lizaola
Project:	Oakland Project-Remediation	**Branch:**	712 - Hayward
Project Location:	Oakland, CA	**Engineering Fee:**	TBD

Shoring System:

- System Type: 4-Sided Slide Rail pit application
- System Dimensions: 20' wide x 35' long x 25' deep
- Phasing Required: No
- Sheeting Required: No
- Benching/Sloping Required: No
- Soil Description: Soft clay; additional soil information is needed prior to final engineering.
- Dewatering Required: Base of excavation
- Surcharge Setback: HS20-44 vehicular traffic 35', Structures 50'
- Additional Notes: The proposed system is based on the information available, adverse site or soil conditions may affect design and engineering.

(6) 8x15 Out
(12) 8x15 IN
(6) Stacking Bracket Sets
(2) Carts
(4) 36'-6" W14x120 Ext



(4) 20' Corners
(6) 20' Linears
(4) 8x19 H Out
(8) 8x19 H IN
(4) Stacking Bracket Sets
(2) Carts
(4) 44'-6" W14x120 Ext
(1) Job Box

Design Details:

- Bottom strut is 5.5' above base o.c., Top Strut is 5.5' below grade o.c.
- Corners & panels may be held up max 1' above the base.

ATTACHMENT B-2

TENTING PLAN (ICS)

5441 International Boulevard
Oakland, California

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www.ICSinc.tv

August 21, 2019

Ms. Deepa Gandhi, PE
EKI Environment & Water
577 Airport Boulevard, Suite 500
Burlingame, California 94010

via email: dgandhi@ekiconsult.com

RE: TENTING PLAN FOR PCB SOIL EXCAVATIONS, 5441 INTERNATIONAL BOULEVARD, OAKLAND, CALIFORNIA 94601 (ICS PROJECT NO. 18-1423)

Dear Ms. Gandhi:

Innovative Construction Solutions (ICS) is submitting this Tenting Plan for the remedial excavation of soil impacted with polychlorinated biphenyls (PCB) at the above referenced facility. Tents will be utilized during excavation of PCB soils with concentrations above 1,000 milligrams per kilogram (mg/kg) to mitigate migration of PCB-impacted dust. Specifically, the tents will be utilized during remedial excavation of the 11 areas shown on **Figure B-1**.

The foot print of nine of the 11 excavations will be approximately 10' x 10.' For these nine excavations, ICS proposes to utilize a 30' long by 30'wide by approximately 19' tall tent structure (Sprung Structure brand or similar) to cover the work area during excavation activities. The tent will be moved from location to location by a crane. A larger tent approximately 75' long by 30' wide by 26' tall will be utilized for the remaining two excavations. The interior of the tent structures will be high enough to allow for soil removal with heavy equipment. Manufacturer supplied information for the tent system, including installation instructions is provided in **Attachment 1**. Final design of the tents will occur following approval of this plan and permit approval from the City of Oakland.

The tent structures will be ventilated and kept under negative pressure during active work hours. The ventilation systems will be designed to achieve the appropriate air exchanges per hour as necessary for worker safety, based on input from a Certified Industrial Hygienist. An Envent Filter Box (EFB), trailer-mounted filtration system (or similar) will be connected to the exhaust end of the ventilation blower system. The EFB filtration system can filter the flow rates required to achieve the air exchanges and will remove over 99.999% of particulates. Manufacturer data for the EFB is provided in **Attachment 2**. Final design of the filtration system will occur following approval of this plan.

During excavation activities inside of the tents, excavated soil will be directly loaded into covered bins or super sacks within the tent. Prior to excavation activities, exposed soil will be pre-wetted, and water will be misted over the work area, as necessary, during excavation activities to prevent visible dust. Respiratory protection and worker breathing zone monitoring will be conducted in accordance with the Health and Safety Plan for the project.

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A contaminant reduction zone (CRZ) will be set up immediately outside of the tent to wash or dispose of PPE and reusable equipment at the end of each work shift to prevent cross-contamination. Particulate air filters will be changed out in accordance with the manufacturer's specifications and used filters from the air filtration system will be disposed of in accordance with applicable laws and regulations. At the end of the project the tent fabric will be decontaminated and reused elsewhere or disposed of in accordance with applicable laws and regulations.

Sincerely,

INNOVATIVE CONSTRUCTION SOLUTIONS

Eric Rager
Vice President, Client Solutions Executive

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Attachment 1

Tent Manufacturer Information

Innovative Building Solutions

Engineered & Manufactured by Sprung Instant Structures



Environmental Remediation

40 foot radius craneliftable structure



Project Report:

Workers in full Level-A protective gear conduct remedial investigations in a vapor containment Sprung structure.

- 40’ round non-insulated structure w/ Desert Sand Tedlar® membrane
- 1 End Sliding Door, 2 Single Personnel Doors
- Structure was anchored w/ballast weights (110 gallon plastic drums filled w/ sand).
- Structure has crane-lifting hooks, allowing for a smaller structure to be utilized and moved around the larger remediation site.
- The residue is a mixture of ash and highly corroded metal fragments, including remnants of ordnance items.
- Lead recycling activities were also conducted in this area leaving scrap metals, remnants of ordnance and burn residue ash.
- The area is currently being used for equipment storage.
- This environmental remediation contractor chose Sprung based on quality and performance. The structure also needed to handle a negative pressure using a charcoal filtration system. The limited foundation requirements and relocatability were also factors in choosing Sprung.




WILLIAMS
6 11:33AM


27 4:15PM


Weston Solutions, Inc.
WESTON


6 11:34AM

Erecting the Sprung structure

Erecting the Sprung Structure

The following document outlines the key procedures used in erecting the Sprung Structure. It is to be used in conjunction with the Manpower & Equipment Guide provided by our Contracts department. This document is in no way a definitive guide to the erection of a Sprung Structure. An animated video showing the erection process can be viewed on YouTube at: https://youtu.be/JosC_2u2wc0

The construction of a Sprung Structure can be categorized into six distinct operations. These are:

1. Layout and assembly
2. Erect the substructure
3. Install the membrane panels
4. Install the insulation package (optional)
5. Tension and anchor
6. Install the options

Permits

Please ensure all building permits are in place prior to erecting the structure.

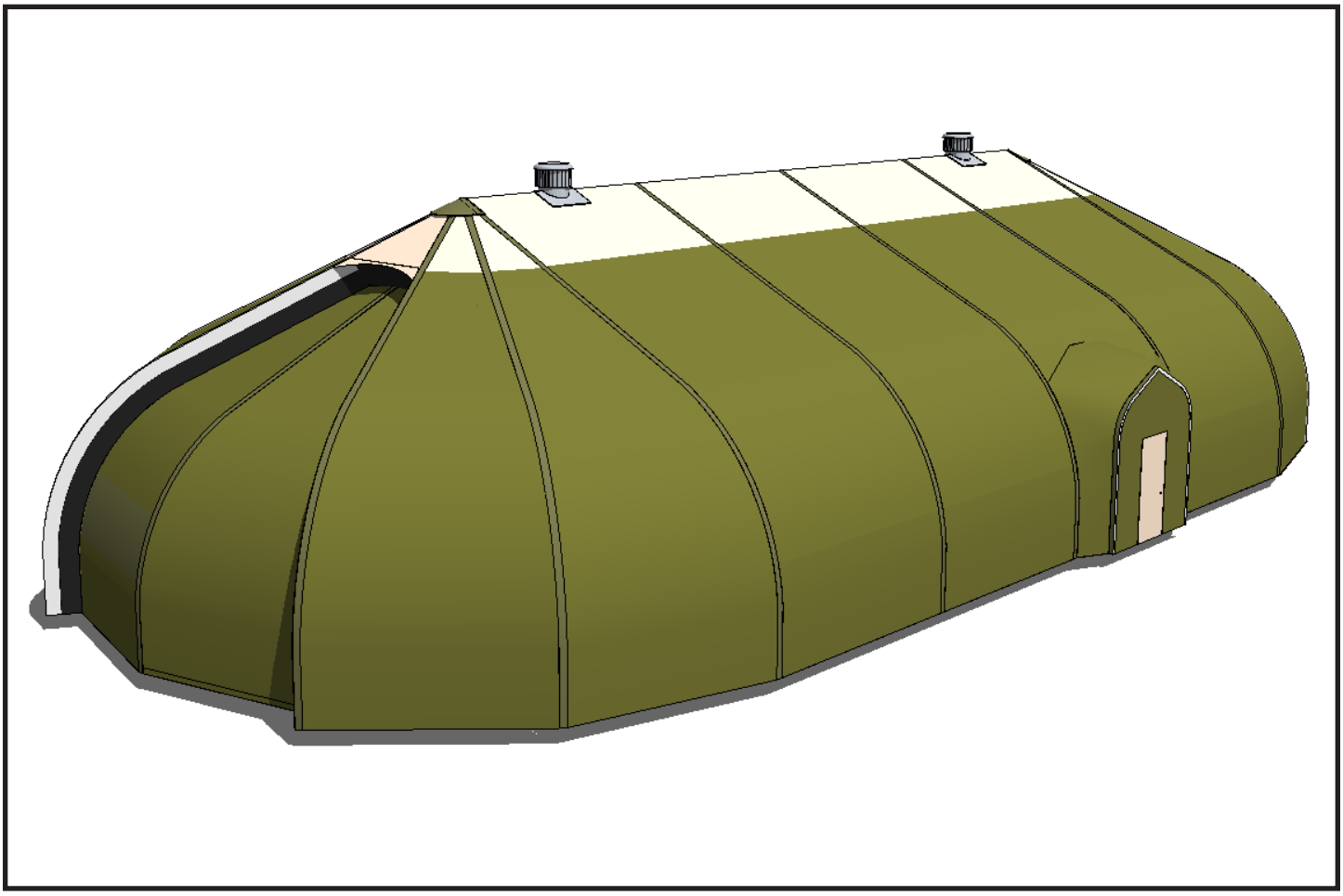
The following pages will give you a basic idea of what is entailed for each general procedure. Equipment recommendations are listed for each operation. Refer to the appendix for notes regarding the specifics of the equipment.

Special Inspection

It is the contractor's responsibility to coordinate any requirements for special inspection as required by the local Building Authority and/or Building Code. These should be arranged and scheduled with a local inspector or engineer (properly licensed and qualified to provide special inspection) during the construction phase of the project. The Sprung Structure incorporates structural bolts and post-installed anchors (concrete or earth). Special Inspection, if required, is the responsibility of the owner or the registered design professional acting as the owner's agent. Other inspections include foundation, mechanical, electrical and architectural.

The structural bolts which are typically utilized on the structure are zinc plated SAE grade 8. The connections on the Sprung structure are typically not slip critical and the bolts need only be tightened to a snug tight condition. The snug tight condition is defined as the tightness that exists when all plies are brought into firm contact with a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench.

When special inspection is required, the inspector designated by the owner or design professional shall ensure, while the work is in progress, that the requirements of the contract documents and/or the building Code are met.



The primary example structure, 50’ x 110’

Procedures - Layout and assembly

The Sprung Structure will be delivered to your site by truck. The structure components are bundled and crated for transport and protection from the elements. Lockable tool boxes are also supplied. A forklift will be required to unload the truck(s). Components should be distributed around the job site in appropriate areas. Avoid placing components on the structure footprint, as assembly moves very quickly and these items will have to be relocated.

Task overview

- Inventory structure components and tools
- Move beams into location
- Splice beams into arches
- Install base plates and spreader angles

Basic equipment required:

- Forklift
- Dunnage
- Electric power
- Hand Tools – provided by Sprung

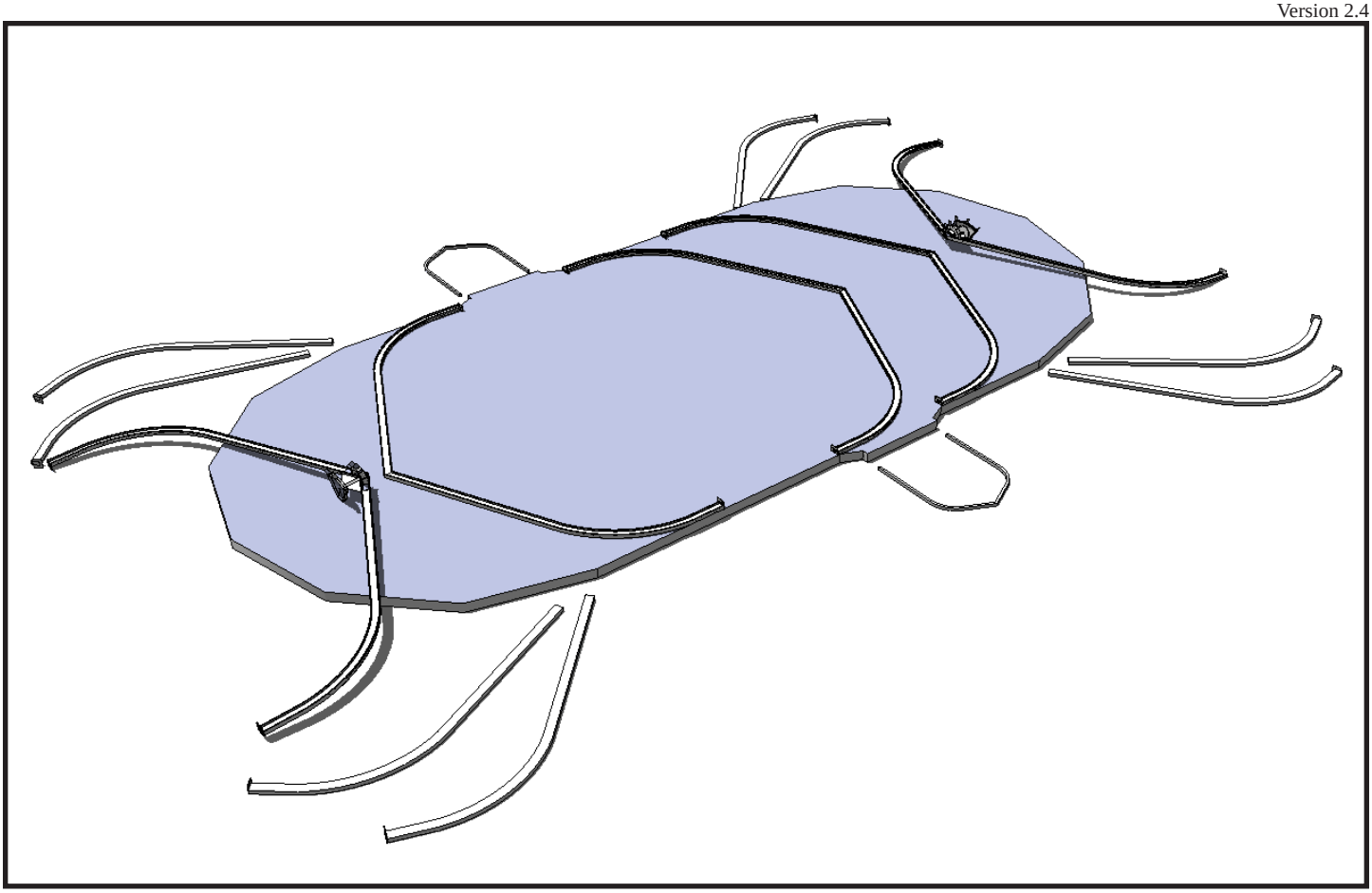
Inventory structure components and tools. Structure components should be inventoried and inspected for shipping or handling damage. While damage is unlikely, identifying damaged beams or other items early can help keep your project on schedule. Tools are provided for structure erection, your site Foreman will be required to inventory and sign for all tools. At the end of the project, these tools will be inspected and returned to Sprung.

Move beams into location. The aluminum beams, which form the substructure, will arrive on site in a condensed manner. These beams will be moved into position, one at a time, on to the pad (foundation) where the structure is to be erected. They will be staged in a specific pattern which facilitates their assembly and subsequent erection with a crane. Dunnage (wooden blocks) should be placed under the beams to ease the assembly operation.

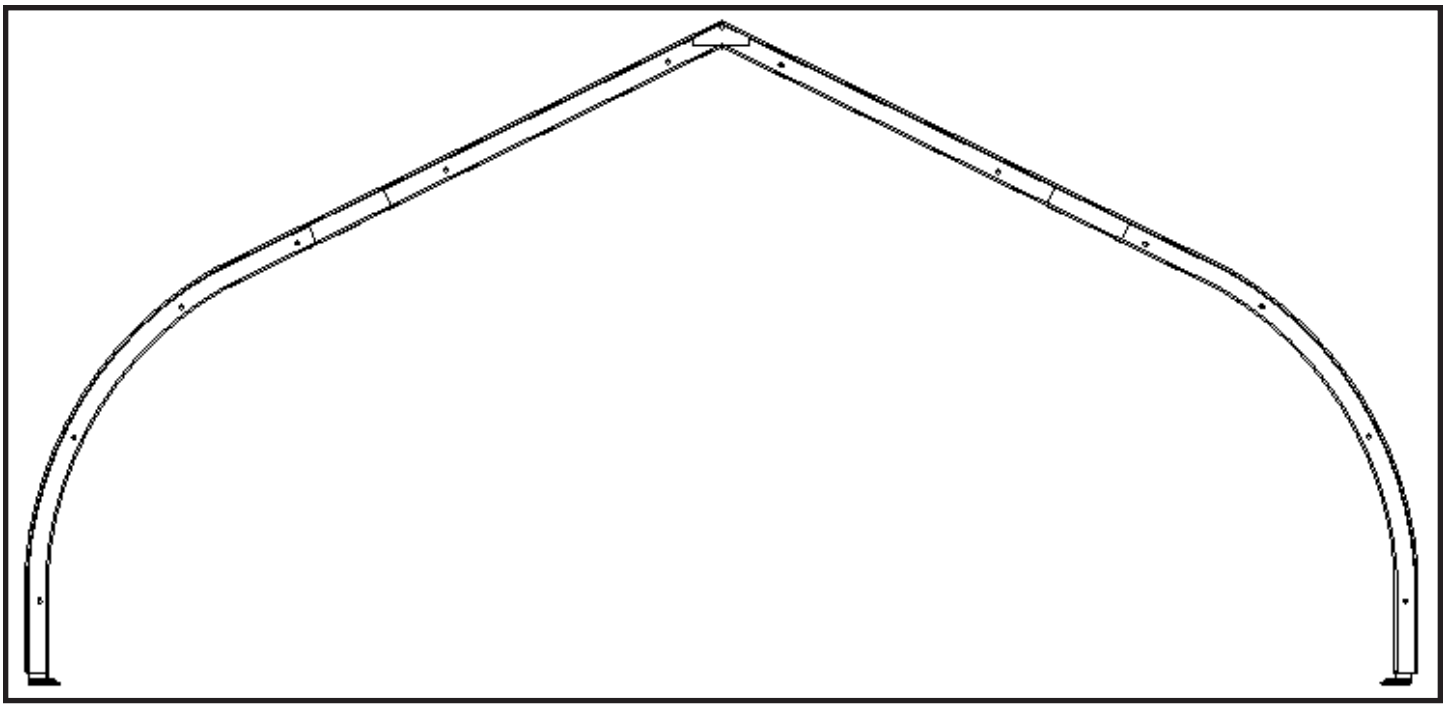
Splice beams into arches. Curved beams are attached to straight beams using sistered splice plates. Straight beams are mitered at the peak, and the splice is made with a specialized top splice plate. Details for these assemblies will be located in the provided drawings. Splice plates and fasteners are located in the component crate(s).

Install base plates and spreader angles. Each arch will require a base plate assembly and spreader angles to be installed. Additional components may be required depending on structure options and foundation requirements.

See the following graphics for basic layout and assembly information.



The general layout pattern of the Sprung Structure – radius end, with steel cones



A typical center arch

Erecting the substructure

Depending on the size of your structure (both width and length), the raising of the substructure may occur over a period of days. Speak with your Technical Consultant about any concerns you may have regarding this task.

Each arch is erected using a crane. Structures 70’ wide and larger will require a small spreader bar. Sprung recommends that only nylon straps be used for this operation to avoid damage to the aluminum arch. It is the responsibility of the erecting subcontractor to ensure that the aluminum beams are not damaged.

Task overview

- Raise the tie-off arch
- Raise the adjacent arch
- Install spreaders (purlins)
- Repeat as necessary

Basic equipment required:

- Electric power
- Crane c/w Rigger
- 2 manlifts
- Hand tools

Raise the tie-off arch.

The process begins with the erection of the first arch, called the tie-off arch. This arch is typically located in the center of the structure. While still on the ground, nylon and/or wire ropes are attached to this tie-off arch in specific locations. These ropes will support the first arch, as it is required to be free-standing until adjacent arches are raised.

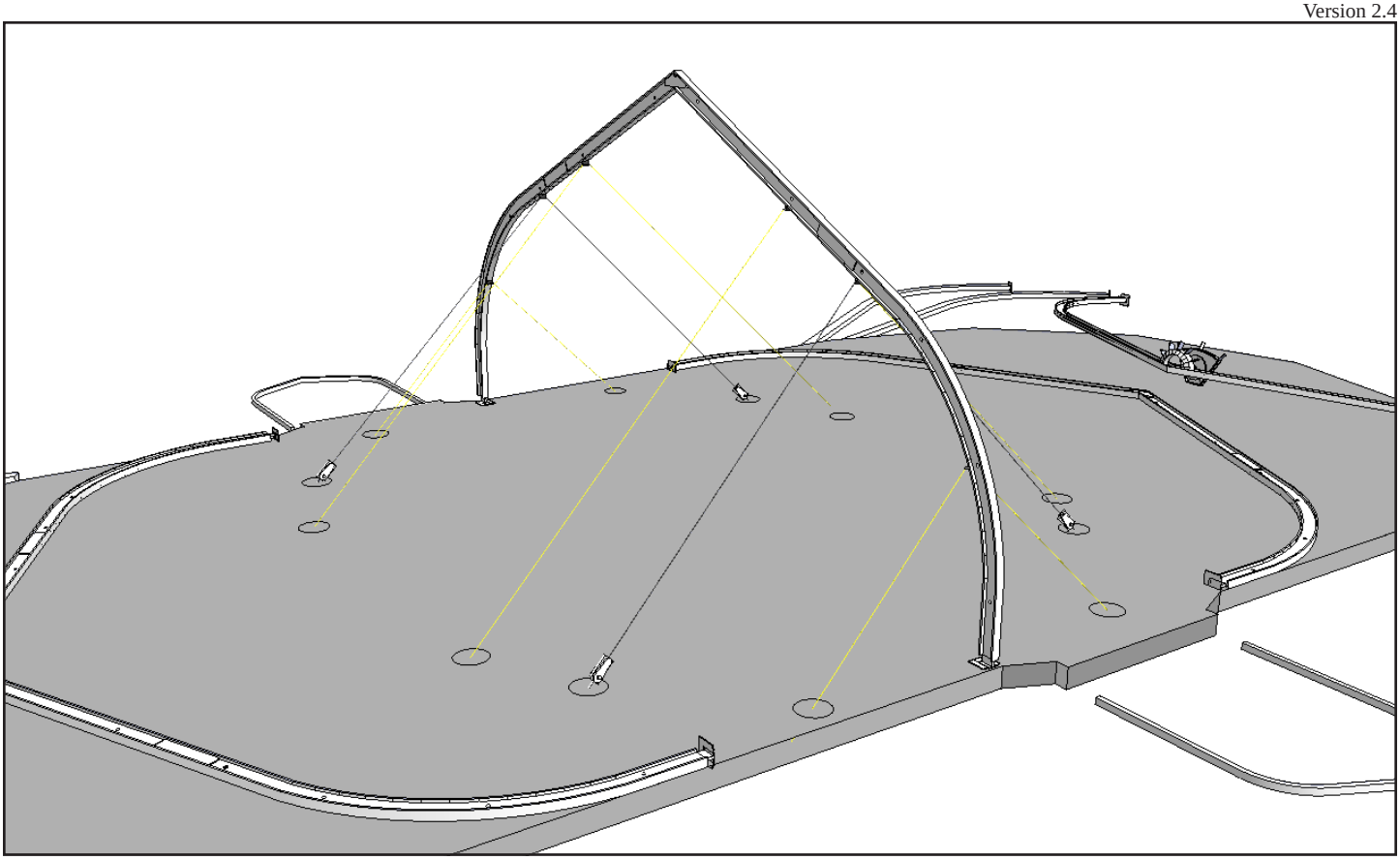
Raise the arch with a crane, and position the base of the arch into its proper location; anchor the base plates.

Tighten the tie off ropes to guy the arch. When the arch is secured,

Slowly lower the crane to put a little slack into the rigging and, using the tie off ropes, plumb the arch.

On very large structures (100’ wide and larger), it may be convenient to use an optical transit.

Once the arch is plumb, disconnect the rigging and prepare to raise the second arch.

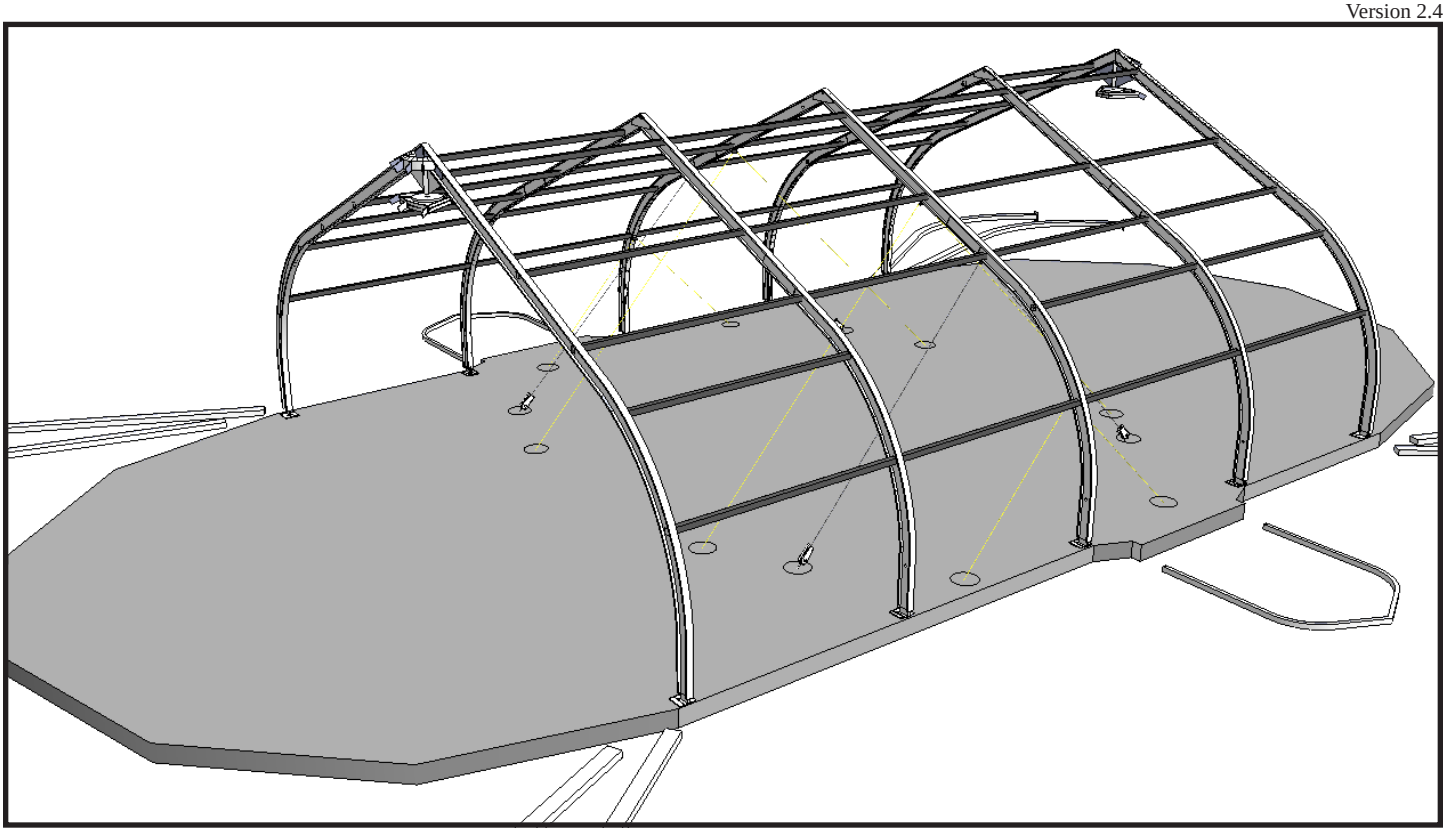


The tie-off arch

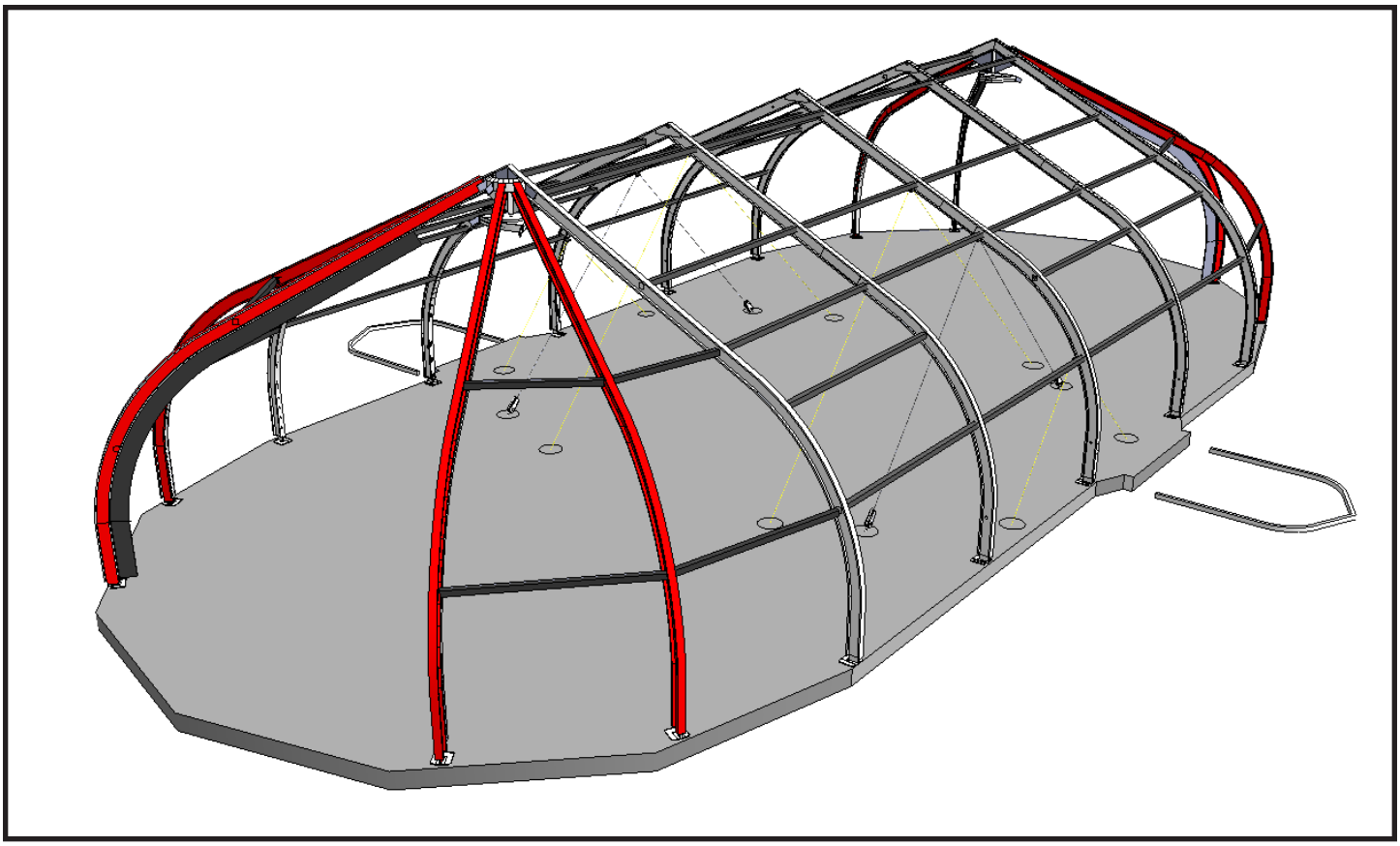
Raise the adjacent arch.
The second arch is raised into position approximately 15’ from the first arch (this distance depends on your structure’s bay width, 15’ is typical).

Install spreaders.
This arch is connected to the first with spreaders (aluminum purlins). This second arch is then temporarily anchored to the foundation.

Move on to the next arch. Each arch is erected in the same manner.



Center arches complete with spreaders



Installing the end beams (highlighted)

Installing the membrane panels

This process begins once an adequate amount of the substructure has been erected (usually 100 linear feet, or completion of the center bays). Each modular bay of the Sprung Structure receives one membrane panel. There are two main types of membrane: center panels and end panels. These are packed rolled in wooden crates. Each panel has a ½" nylon rope welded along the length of both edges. The center panels are rectangular in shape, whereas the end panels are triangular. If your Sprung Structure is insulated it is a good idea to install the insulation retention system prior to installing the exterior membrane. This option is covered in the next section.

Task overview

- Install the membrane center panel
- Vertically tension the membrane
- Repeat as necessary
- Install the membrane end panel
- Vertically tension the membrane
- Repeat as necessary

Typical equipment required:

- Man lifts
- Fall arrest gear
- Hand tools
- Winches

Install the membrane center panel.
Center panels are installed from the ground using an innovative procedure which involves electric winches (Sprung designed and supplied).

Five workers are required for this operation.

Two workers guide the membrane into the integrated channel of the beam on the feeding side; two workers operate the winches on the opposite side, while the remaining worker monitor the process at the structure's apex.

These winches are attached to the beam using the integrated bolt chase. The roped edge of the membrane is inserted into the chase and fed from the ground up. Once the membrane has been installed the workers then move on to the next bay.

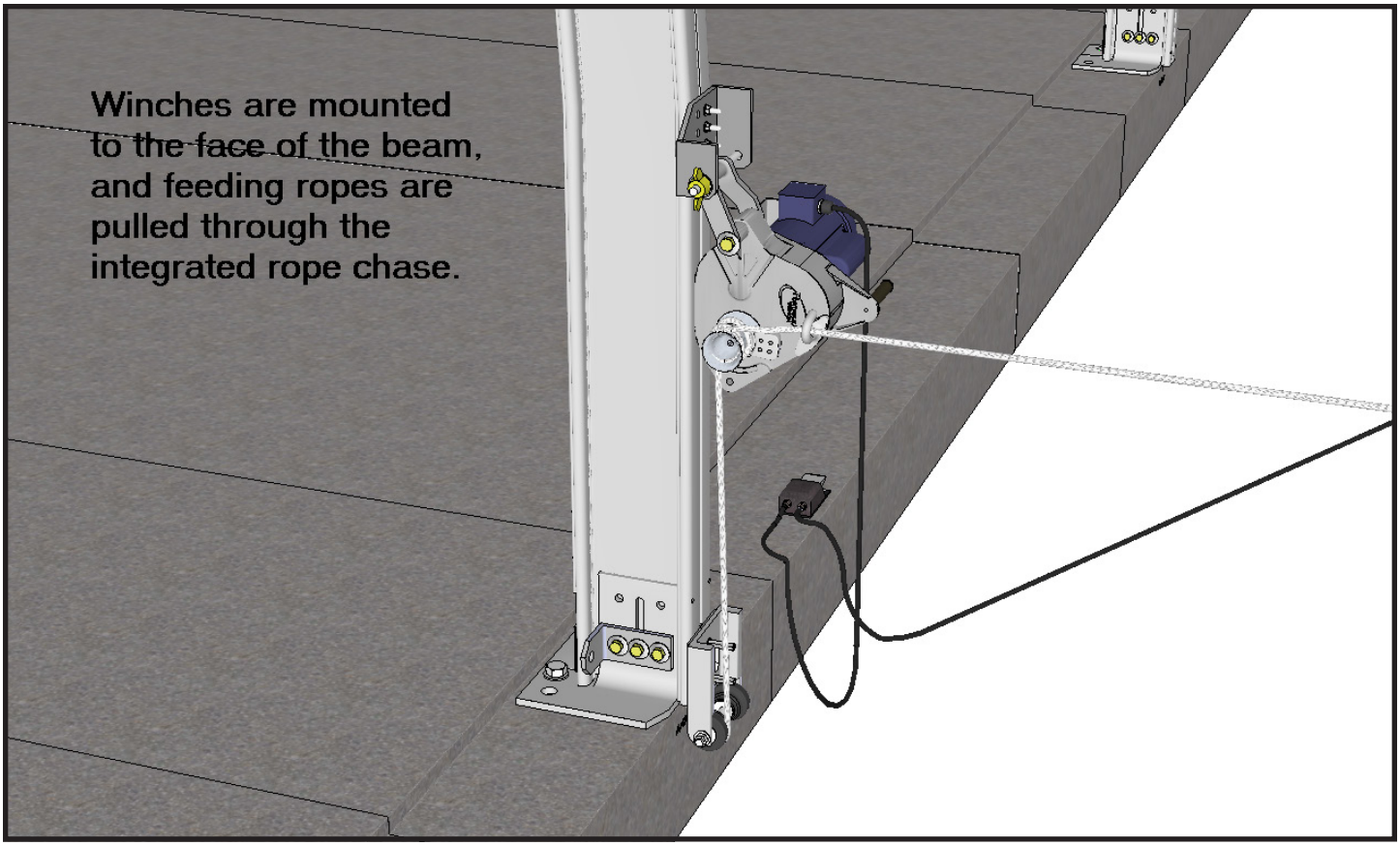
Vertically tension the membrane.
Two other workers follow behind this crew and vertically tension the membrane with a small hydraulic device. The vertical "stretch" required in the membrane panel has been calculated at Sprung's fabric plant, each panel will include "downstretch marks" to facilitate consistent tensioning.

Repeat as necessary.
The installation and vertical tensioning (downstretch) of the membrane center panels will continue as necessary until all center modules have been completed, or as directed by our Technical Consultant.

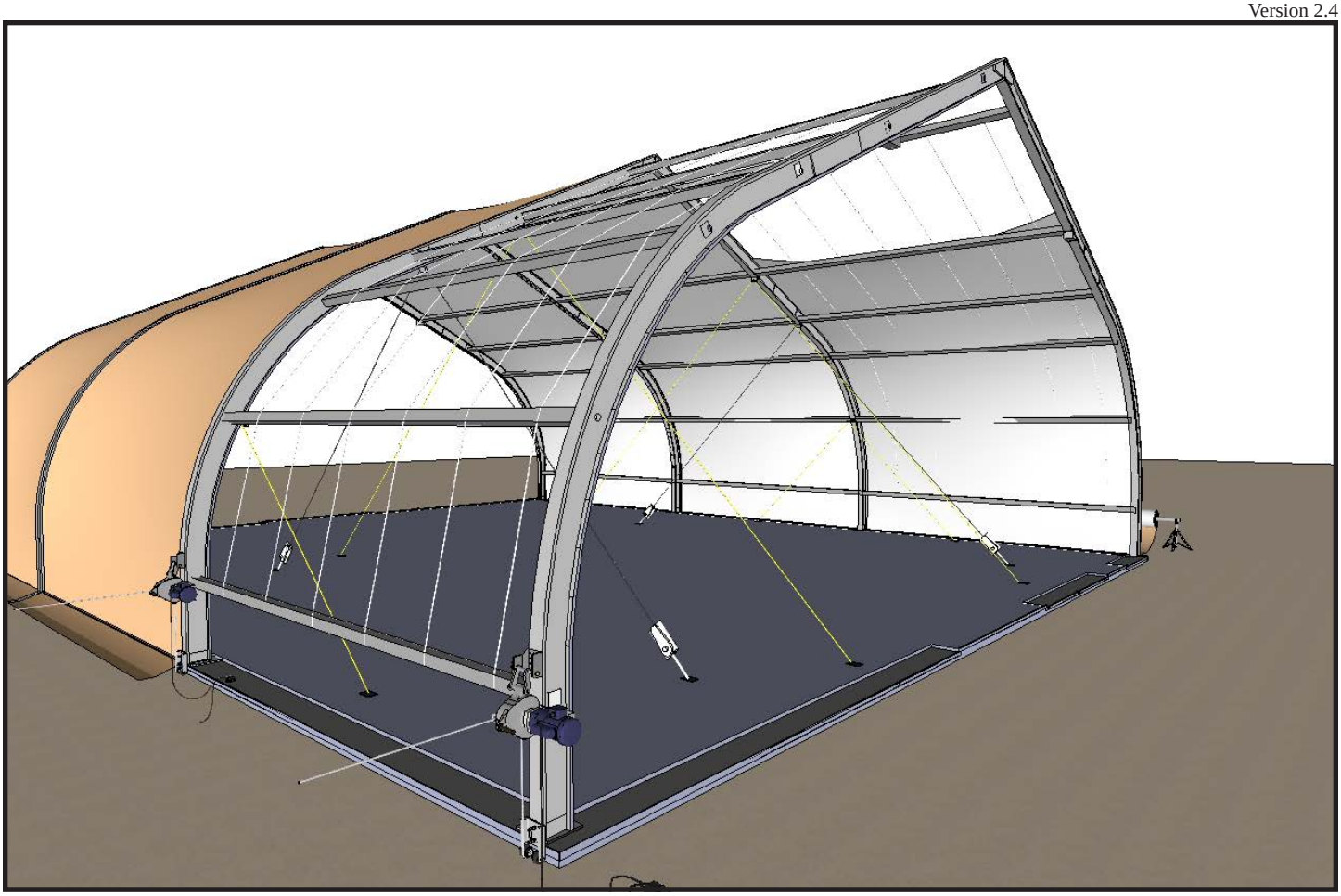
Install the membrane end panel. End panels are installed using the same principle.

Two workers place themselves at the crown of the radius end of the structure. Beginning at the first end module adjacent to the final center module, these two workers guide the membrane into the integrated channel while workers at the base operate the winches. End panels are typically installed once the center panels are complete.

Vertically tension the end panels and repeat the process as described above.



A close up view of winch installation



Installing membrane center panels, insulation retention system also shown

Install the optional insulation package

Our comprehensive insulation package includes an R-25 to R-30 blanket of Johns Manville formaldehyde-free foil-backed fiberglass insulation.

The Sprung Structure can be fully insulated with a fiberglass blanket up to 9” thick. This insulation is encapsulated between two layers of architectural membrane providing both an aesthetically pleasing finish, and a double vapor barrier system.

Additional information about our insulation is available here:
http://www.sprung.com/building-components/premium-insulation

Once the poly-rope is installed the insulation is simply rolled into place. When all insulation is completed in a bay, the interior membrane is then installed using the same principle as the exterior (outlined in Section 3).

Task overview
- Install the insulation retaining system
- Roll in the insulation
- Tape insulation rolls together to eliminate voids
- Install the interior membrane

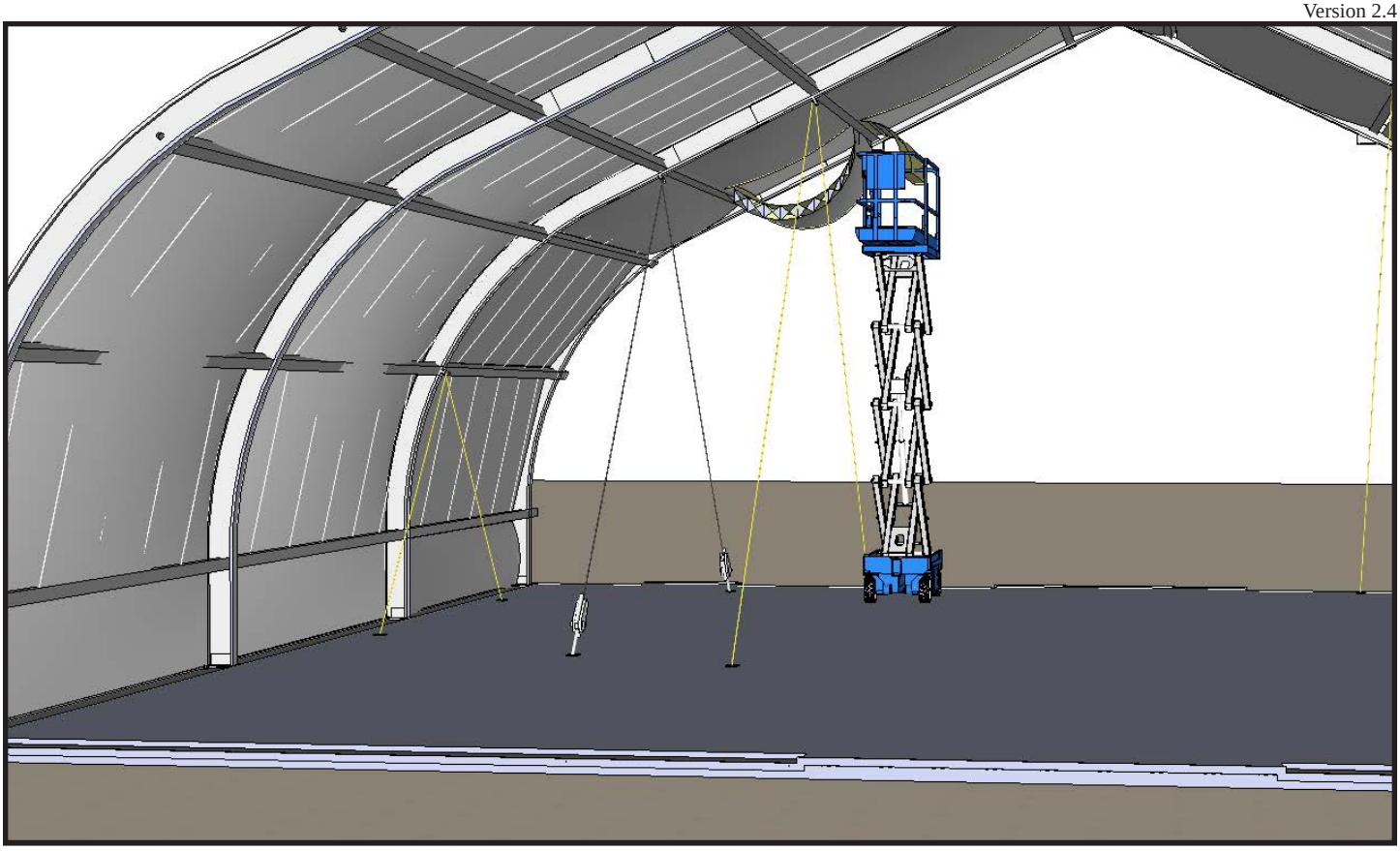
Typical equipment required:
- Man lift
- Scissor lift
- Fall arrest gear
- Hand tools

Install the insulation retaining system. Prior to installing the exterior membrane the insulation retaining system should be installed. This system is comprised of polypropylene rope running vertically from the peak of the structure to the base, secured to the highest and lowest spreaders. This system supports the rolled insulation and prevents it from sagging into the interior membrane. The number of ropes required will depend on module width. Sprung will supply the required rope, and the Technical Consultant will direct its installation.

Roll in the insulation. Once the poly-rope and exterior membrane is installed, the insulation is simply rolled into place, between the exterior membrane and the retention system. The rolls are usually 5’ wide, requiring as few as 6 rolls to complete a typical module width (down each side, from the peak to the base).

Tape the insulation rolls together to eliminate voids. Sprung provides a high-quality reinforced foil tape, used to secure the insulation rolls to each other. In addition, the foil backing on the rolls incorporates a self-adhesive strip along its length. When correctly installed, this system provides a true beam-to-beam insulation cross section.

CAUTION:
The interior membrane is a high quality architectural fabric. It is very important that adequate ventilation is provided when installing the structure, especially during the final stages of construction. Heavy exhaust in a confined space may cause permanent staining to the membrane.

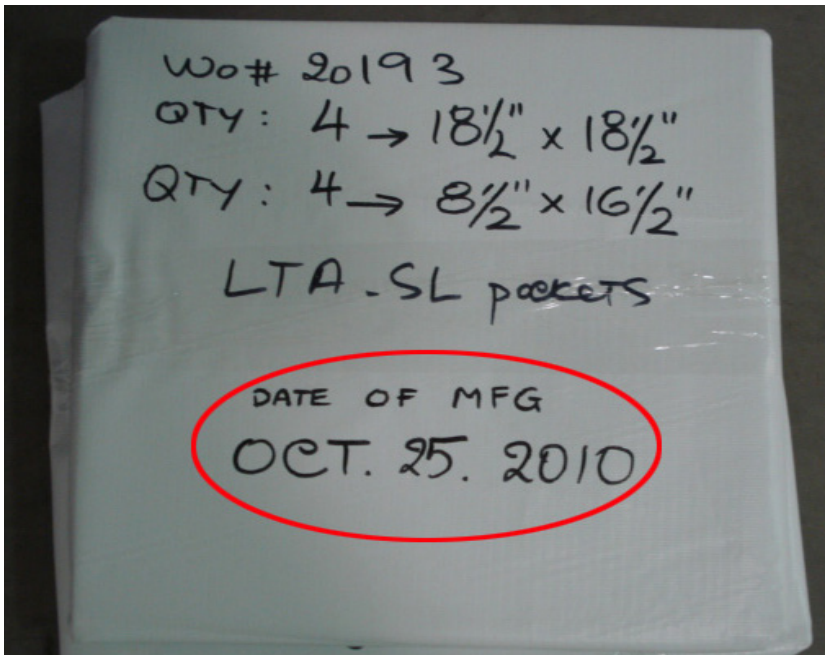


Installing rolled insulation – center module

Install the interior membrane.
Once all insulation is in place, the interior membrane is installed using the same principle as the exterior.

Access Pockets with Pressure Sensitive Adhesive

Access to the inner wall cavity between the membrane skins is granted with the use of a membrane access pocket. This piece of membrane is has an adhesive backing that is a simple 'peel & stick' application. Each package of access pockets has a date of manufactured noted on the label. Under typical storage conditions the adhesive will offer guaranteed performance for a period of one year after the date of manufacture. The adhesive backed access pocket should be used within this time period. If the access pockets are past the expiry date please contact your Sprung Sales Representative



Tension and anchor

In this phase, tensioning refers to the act of stretching the membranes laterally, using the supplied hydraulic pumps and rams.
Typically this procedure begins after the membrane has been installed into a few modular bays.

Task overview
- Ensure all installed membranes have been vertically tensioned
- Prepare the spreaders for tensioning
- Install the base cables and remove anchors
- Tension the membrane
- Position and anchor the arch base

Typical equipment required:
- Man lifts
- Hydraulic pumps and rams
- Hand tools

Ensure all installed membranes have been vertically tensioned.
Check that each membrane has been tensioned to the downstretch marks (both exterior and interior (if present) membranes).

Prepare the spreaders for tensioning.
From inside the structure, workers will prepare the stretching bay purlins for tensioning. This is done by removing a spreader bolt and setting it aside. Insulated structures will require that an access “pocket” be cut in the interior membrane to access these bolts. The Technical Consultant will direct your crew to the correct bolts and locations. A pocket template is also provided for consistency.

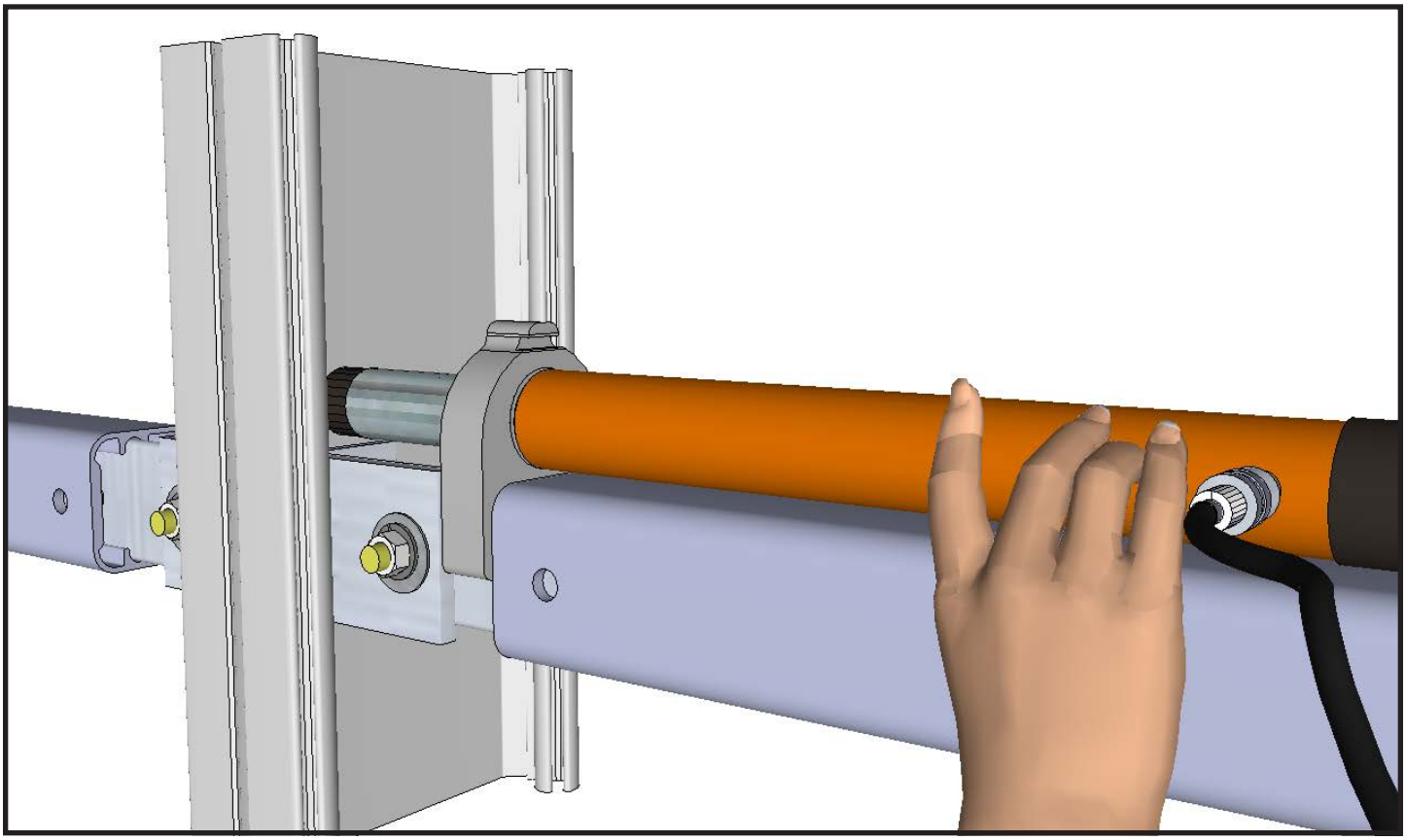
Install the base cables and remove anchors.
Base cables are installed, from base plate to base plate across the width of each moving arch. These cables are sized to keep the structure width correct while the arch is being slid laterally. While base cables are being installed, workers will remove the anchors from each moving arch base plate.

Tension the membrane.
To laterally tension each modular bay, the hydraulic rams are attached to the purlins using a specially designed collar. Each purlin is tensioned (stretched) approximately 6” and secured by the bolt removed in step 2.

Position and anchor the arch base.
When all purlins have been extended and secured, the base plates may be anchored. Double check the width of the bay, and the base plate placement, then secure the base plate to the foundation with the designated permanent anchoring method.

Repeat steps 4 and 5 until completed.

Extend the Ram into the web of the Beam, and keep pumping until you reach the next hole in the TT Bar.



Fitting the hydraulic ram to the purlin

Install the options

Options can include, but not limited to, the following; (door) hoods, vents, cargo doors, personnel doors, windows, graphics, perimeter flat bar, aircraft hangar doors, framed openings for HVAC, tunnels, lights, entrance canopies, architectural cap, etc..

Once the “shell” of the structure has been complete, the crew will shift their focus on to completing the remaining options. The Technical Consultant will have select members of the crew begin work on the various options as soon as permitted by the erection schedule.

A few of the options available:

Aircraft Hangar Doors
http://www.sprung.com/building-components/accessories/aircraft-hangar-doors

Cargo Doors and Rolling Service Doors
http://www.sprung.com/building-components/accessories/cargo-doors
http://www.sprung.com/building-components/accessories/rolling-service-doors

Graphics
http://www.sprung.com/building-components/accessories/graphics

Personnel Doors
http://www.sprung.com/building-components/accessories/personnel-doors

Vestibules and Corridors
http://www.sprung.com/building-components/accessories/vestibules-corridors

Windows and Glazing Walls
http://www.sprung.com/building-components/accessories/windows
http://www.sprung.com/building-components/accessories/glazing-walls

Completing the structure - The walk through

Once the structure is complete, the Technical Consultant will ask the individual supervising the project to attend a "walk through". The Technical Consultant will inform the Project Supervisor of all information relative to the structure. He will answer all questions and concerns you may have. He will then issue a signed document that states the Sprung Structure has been erected within the strict guidelines established by Sprung Instant Structures.



SPRUNG INSTANT STRUCTURES

Completion Certification

Sprung Certification

I, Steve Smith (Print Name), a duly qualified Technical Consultant of Sprung Instant Structures, hereby certify that the structure (s) erected for ABC Drilling (Company) and Well Supply (Company), at West Outfield, ND (Site Description) (our work order # 89123) has/have been erected in accordance with Sprung Instant Structures design drawings and specifications.

This certificate was submitted to your job site representative:

Mr/~~Ms~~ Ervin Johnson (Print Name) on the date below.

[X] Patch kit received

Technical Consultant's Signature: Steve Smith Dated: 4 January 2012

Customer Certification

I, Ervin Johnson (Print Name), Project Manager (Title)

of ABC Drilling & Pipe (Company), hereby certify that the erection of Sprung Structure (s) at West Outfield, ND (Site Description), is/are complete without any obvious deficiencies or incomplete tasks and the services of the Technical Consultant are no longer required.

Customer's Signature: Ervin Johnson Dated: 4 January 2012

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Proprietary & Confidential



Appendix 1 - Equipment

Scissor lift: The size of the scissor lift depends on the size of structure to be constructed. Scaffolding could be used on smaller structures or where circumstances warrant. Our Contracts department will recommend a specific size of lift.

Man lift: This lift is also known as a JLG, Snorkel, or Genie lift. Ideally you would want to avoid an articulating boom, and use a straight boom. Again, our Contracts department will recommend a specific size.

Crane: We will provide all the dimensions and weights of the articles the crane will be lifting. It will be the responsibility of your sub-contractor providing the crane to determine the recommended crane size and type. Typically a boom length of about 100’ is adequate. Structures 70’ and wider will require a spreader bar.

Forklift: The forklift will be used to off-load and move materials around on site. It is usually required only for the first few days of the project. If your structure is very large or work site is spread out you may wish to keep the forklift onsite for the duration of the project. A telescoping forklift is preferred.

Air Compressor: This equipment is only required if your structure has an MR-1 or 2 earth anchor package. The compressor must have an output capacity of 120 psi.

Jack Hammer: A 90 lb. jack hammer will be required if the above mentioned MR-1 or 2 package is required. The jack hammer will be attached to a drive rod (which we provide in the tool kit) and used to install the anchors.

Power Supply: You must provide an 110v power supply. If arranged in advance, it may be possible for Sprung Instant Structures to provide a portable generator for sites in remote locations. We are also able to provide our power tools fitted for 220v operation.

Dunnage: Blocks of wood. A good size to utilize is 4” x 4” x 24”. These will be used during the assembly phase at the beginning of the project.

Tools: We will provide all hand tools required to erect the structure. This includes the specialized winches and hydraulic pumps/rams.

Tool Loan Agreement

StockCode	Description	UnitCost	QttySipped	QttyReturned
ZBIT1X21	HILTI BIT 1" X 21"	$137.73	2	
ZBIT24MM	HILTI BIT 24 MM X 32 MM	$92.68	2	
ZBOXKNACKLRG	TOOL BOX KNACK LARGE	$334	2	
ZCABLELRG100	TIRFOR CABLE LARGE 100 FT.	$ .02	2	
ZCABLELRG66	TIRFOR CABLE LARGE 66 FT.	$	4	
ZCABLESML66	TIRFOR CABLE SMALL 66 FT.	$83.2		
ZCOLLARSQ	HYDRAULIC RAM SQ SPDDR COLLAR	$130.49		
ZCORDDRILL/SAW	CORDLESS 18V DRILL/SAW KIT	$475.0	1	
ZCORDLSSDRILL12	CORDLESS DRILL 1/2" 18 V	$28	2	
ZELECSAWSALL	ELECTRICSAWSALL	9.95	1	
ZELEDRILL12	ELECTRIC DRILL 1/2 IN.	$93.17	1	
ZELEDRILLTE1/5	ELECTRIC HAMMER DRILL TE1	$213.52	1	
ZELEDRILLTE72/7	ELECTRIC HAMMER TE72/75	$1,195.31	1	
ZELEGRIND	4 1/2" HAND GRINDER	$90.90	1	
ZELEIMPACT12	ELECTRIC IM CT 1/2"	$147.67	1	
ZELEIMPACT34	ELECTRIC IM	$457.79	1	
ZFEEDPIPE	FEEDING PIPE 3 STRUC URES	$129.27	2	
ZHOGPLIERS	HO NG PLIERS 1/ OPE	$85.56	3	
ZHYDRAMLRG	HYL AUL M LRG C/W COLLAR	$551.47	3	
ZHYDRAMSML	SML M W SIDE COLLAR	$280.27	1	
ZHYDRAULICPUM	HYDRA IC PUMP C/W HOSE	$245.50	3	
ZROLLERSTA	TRI POD OLLER STAND	$176.72	2	
ZROPEGRAB	RO GRAB	$93.36	2	
ZSAFETYROPE58	SA TY LIFE LINE 5/8" ROPE	$127.31	2	
ZSEAMSEALER	EAM SEALER	$398.00	1	
ZTIRFORLRG	TIRFOR LARGE C/W HANDLE	$591.04	6	
ZTIRFORSML	TIRFOR SMALL C/W HANDLE	$475.59	5	
ZWINCH	ELECTRIC WINCH	$1,199.25	2	

SAMPLE

I hereby acknowledge that the tools listed above have been delivered to our site and will be used for the erection of the Sprung Structure. I understand that upon completion of this project all the above tools will be inventoried before they are shipped back to Sprung Structures and our company will be responsible for the replacement cost of any missing tools.

Agreed and accepted: _____

Print Name: _____

Company: _____

Date: _____

Project Specific Equipment Recommendations

Our Contracts Manager (your construction related contact at Sprung) will provide a list of equipment recommendations, specifically tailored for your project, like the sample below. This information, along with other construction related information, will be provided to the erection contractor.

innovation | versatility | reliability

Recommended Manpower & Equipment
for the Erection of an Insulated Sprung Structure
70' in Width

Sprung will supply a Technical Consultant on site to provide information about structure assembly and erection and will supply hand tools for the Buyer/Lessee's use, at no charge. Sprung's Technical Consultant is not authorized to perform any other services. The Buyer/Lessee alone is responsible for supervision of and safety compliance in structure location, assembly and erection.

The Lessor's Technical Consultant is supplied for an 8 hour day, 5 days per week. Any request for overtime must be agreed to in writing by Buyer/Lessee prior to overtime taking place and will be charged to the Buyer/Lessee at the rate of $40.00 per hour.

Each worker expected to operate an aerial lift should be qualified to do so. This includes operation of the equipment as well as the proper use of the personnel fall protection. Training can be easily obtained from the rental company supplying the equipment.

When pins or earth anchors are required underground utilities must be located and earth anchors installed prior to the Technical Consultant arriving. Failure to do so could delay your construction as membrane cannot be properly installed without the proper anchorage in place. For all technical information regarding the installation of the earth anchors please visit http://www.earthanchor.com.

We also highly recommend that you supply a site supervisor with construction experience to direct your labor force therefore ensuring your project is completed according to your schedule.

Manpower	8 workers
Equipment	Scissor Lift /w 25' high working deck or scaffolding
	Man Lifts /w 60' boom or scaffolding
	Power supply
	Crane[1] /w 80' stick & 15' Spreader Bar
	Jackhammer (90 lb)
	Forklift 8000 lb (to offload truck & stage materials)

[1] The crane must be capable of lifting 1440 lbs (655 kgs) from a distance of 50'. However, this weight refers only to the arch. The spreader bar and rigging will add a significant amount of weight as well. Consult your crane supplier to determine the exact crane size required.

[2] Please refer to the recommendations on the second page of this document.

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SAMPLE

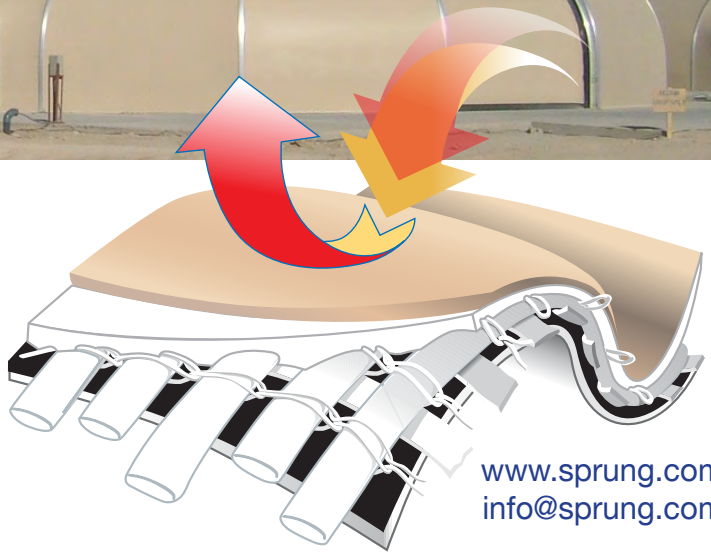
Recommended Fall Protection for an Insulated Sprung Structure – 70' Width

These fall protection recommendations are not intended to interfere with the contractor's right and responsibility to determine appropriate means or methods of fall protection. They are recommendations subject to the contractor's review for applicability and safe use on the contractor's project or other equally safe fall protection system as determined by the contractor.

The fall arrest equipment is available from many companies such as; Miller / Sala (DBI) / North (Honeywell) / MSA / 3M / Titan. A reference supplier code is supplied for convenience.

QTY	ITEM	REFERENCE
2ea / SP100	**100 foot Vertical Life line, 5/8":** c/w safety clasp  *or*  *or* 	NORTH FP16E
2ea	**Rope Grab:** c/w the anti – panic feature  *or*  *or* 	NORTH FP541
2ea	**Carabiner:** A fall protection anchoring device.  *or*  *or* 	NORTH FP86
6ea	**Lanyard:** Energy shock – Absorbing  *or*  *or* 	NORTH FPD 29811 / 4'
6ea	**Full Body Harness**  *or*  *or* 	NORTH FPD 698 / 1 DP





www.sprung.com
info@sprung.com

Our Polyurethane Architectural Membrane Offers Superior Performance

- Blackout design prevents solar gain and manages climate control
- Weighs approximately 20 oz. per square yard
- High strength, rip-stop
- Exceptional fire-retardant capability
- 15-year pro-rata guarantee
- Opaque for maximum longevity and energy efficiency
- Available in white, gray or tan
- Rain Kleen® finish prolongs life of the fabric and is easy to clean

*The selected Pantone color numbers are a visual interpretation of the membrane colors.
The above color chips are not true and accurate representations of the actual membrane color. Please request a membrane sample prior to ordering.

Durability, color choices and ease of cleaning are among the many hallmarks of the architectural membrane of your Sprung structure.

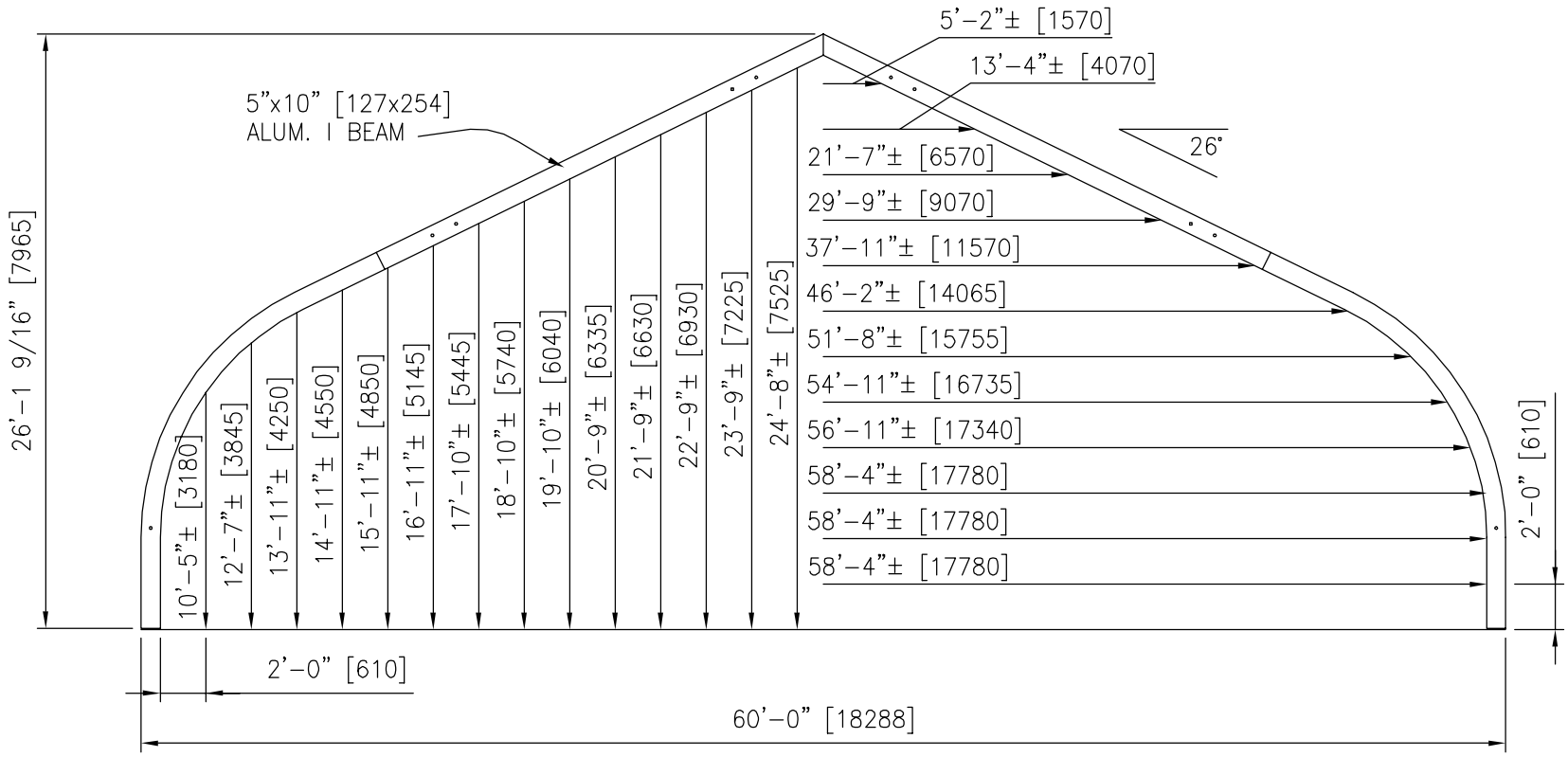
Revised October 4, 2018

POLYURETHANE ARCHITECTURAL MEMBRANE

Base Fabric Type (Scrim)	Polyester
Adhesion ASTM D4431	20lbs (lbs/2in)
Finish Weight Method ASTM D3776	20 oz./sq.yd. (+/- 5%)
Surface Protection	Acrylic Top Coat (Rain Kleen)
Tongue Tear (lbs) Method ASTM D2261	W175/F155lbs
Grab Tensile Method ASTM D5034	W450/F345lbs/in
Strip Tensile 1” FED-STD-191A Method 5102	W325/F245lbs/in
Hydrostatic Burst ASTM D751/A	R600+ F600+
Cold Crack FED-STD-191A Method 5874	Pass -40° F

FIRE RATINGS

1. NFPA 701	Flame Spread Index <25
2. ASTM E84	Smoke Development rating <450
3. California State Fire Marshall	
4. CAN/ULC-S-109	
5. CAN/ULC-S-102	



SECTION 60'–0" [18.3m] STRUCTURE

SIGNATURE SERIES

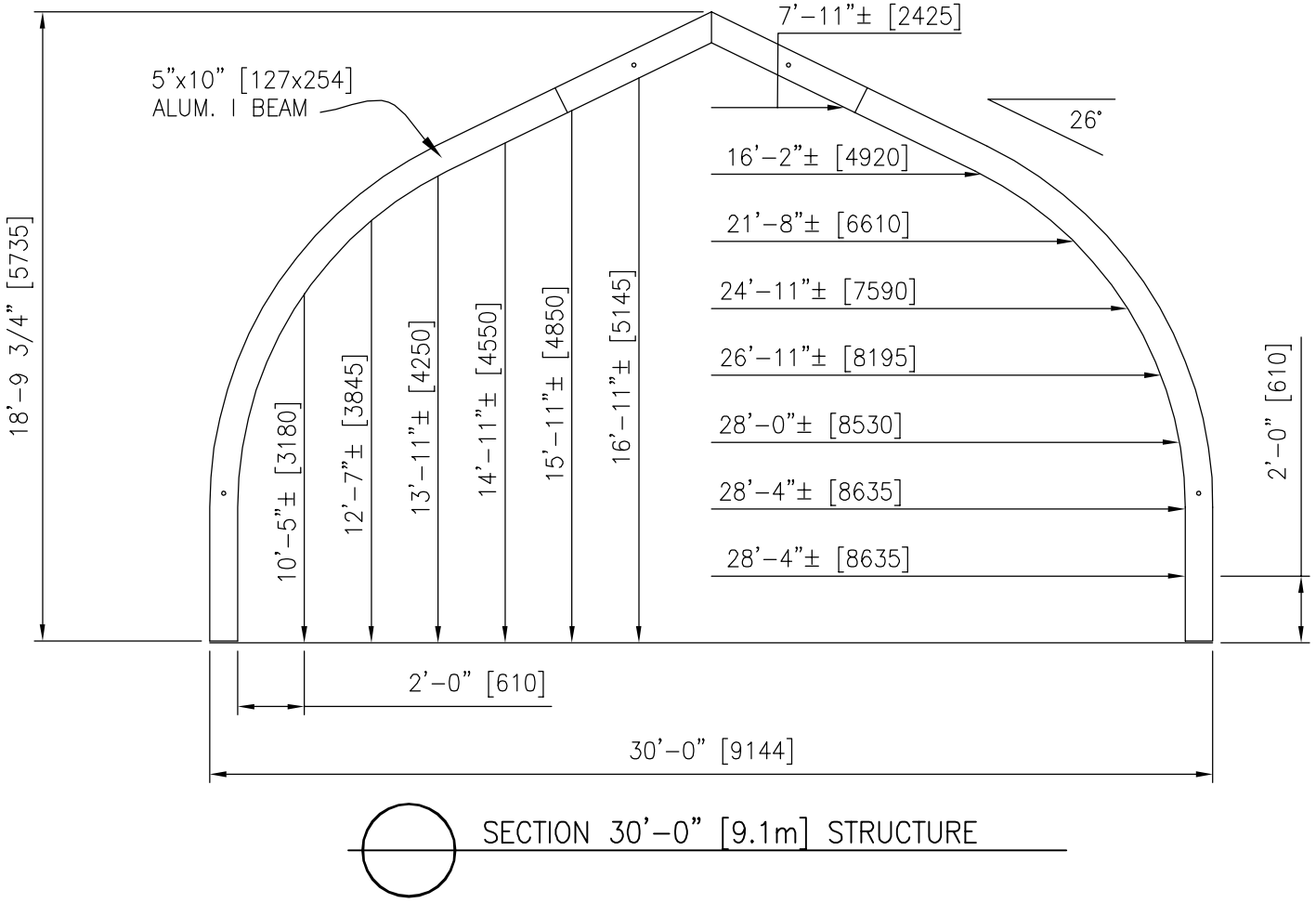
sprung

60'–0" [18.3m] WIDE
STRUCTURE CLEARANCES

DATE 04/19/2016

SCALE AS NOTED

DRAWING # 30–90 SECTION CLEARANCES



SECTION 30'-0" [9.1m] STRUCTURE

SIGNATURE SERIES

sprung

30'-0" [9.1m] WIDE
STRUCTURE CLEARANCES

DATE 04/19/2016

SCALE AS NOTED

DRAWING # 30-90 SECTION CLEARANCES

REPORT ON ENVELOPE AIR

TIGHTNESS TESTING

AT

SPORTS HALL
HMP LITTLEHEY
CROW SPINNEY LANE
PERRY
HUNTINGDON
PE28 0SR

CLIENT:
WATES CONSTRUCTION

2587

Name	Position	Signature	Date
Paul Cousins	Acoustic Office Manager		4/11/09

HRS Services Ltd
81 Burton Road
Sheffield S3 8BZ

Tel 01142723004
altas@hrsservices.co.uk

1. INTRODUCTION

This report details the results of the envelope air tightness test carried out by HRS Services Ltd at:

Sports Hall
HMP Littlehey
Crow Spinney Lane
Perry
Huntingdon
PE28 0SR

The estimated year of construction was 2009.

The test was commissioned by David Bucknall.

2. TEST CONDITIONS AND RESULTS

The worst acceptable building air permeability performance criteria as defined in Section 2 of the Building Regulations 2000 (as amended), Part L2A Conservation of Fuel and Power in New Buildings Other Than Dwellings is $10m^3/(h.m^2)$ @ 50Pa.

The test was carried out on 30.10.09, between 12.45 and 13.15. The result is representative of the building as tested on this day.

The type of HVAC was mechanical.

The envelope area for air permeability is defined as the area of the external walls plus the area of the roof and the ground floor. The envelope area was calculated by the client.

The whole area of the building was tested.

The envelope area of the test area was $2485.5m^2$.

The following air permeability was determined at 50Pa.

$2.01m^3/(h.m^2)$

The test area therefore **passed** the specified air permeability performance criteria

Summary of Temporary Sealing

Temporary sealing was applied to unfinished elements, see table overleaf for full details. It should be noted that temporary seals may, in practice, be more airtight than the element they replace. The finished elements should therefore be of an equal standard of airtightness for the quoted test result to remain unchanged.

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3. TEMPORARY SEALING

The following tables provide a detailed breakdown of the temporary sealing applied to the building during the air test.

Temporary sealing applied to intentional openings		
Element	**Temporarily sealed for air test?**	**Comment/Extent of Sealing**
HVAC supplies	No	Not commissioned
HVAC extracts	No	Not commissioned
Ventilation louvres	No	None
Drainage traps	Yes	Unfilled traps sealed
Other - Specify	No	None

Temporary sealing applied to un-intentional openings/incomplete works	
Element	**Comment/Extent of sealing/Reason for Sealing**
Lift shafts/smoke vents	None
Plant room	None
Service risers	None
Doors	1 door seal unfinished so temporarily sealed
Windows	None
Access hatches	None
Passive ventilation	None
Other - Specify	None

Comments on Temporary Sealing
All temporary sealing applied was in compliance with Building Regulations 2000 (as amended), Part L2A Conservation of Fuel and Power in New Buildings Other Than Dwellings.

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4. TEST METHOD

The envelope air tightness test was carried out in line with the following standards:

ATTMA TS1 Issue 2 - Measuring Air Permeability of Building Envelopes

BS EN 13829:2001 Thermal performance of buildings - Determination of air permeability of building - Fan pressurisation method.

The purpose of the test was method B (building envelope) as stated in BS 13829:2001. This requires that all adjustable openings shall be closed and remaining intentional openings sealed.

The building was pressurised using the HRS Services Ltd 'BLOWERDOOR' system. The BLOWERDOOR system comprises of a portable fan, designed to supply up to 2 m^3/second at 70 Pascals static pressure. The BLOWERDOOR system was UKAS calibrated in accordance with BS 848 Part 1 1997.

The BLOWERDOOR system was set up in the single door.

Pressure differences across the BLOWERDOOR and the building were measured using digital micromanometers at the start, during and end of the test. All equipment used is calibrated to UKAS standards annually. Air temperatures were measured using Therma 1 digital thermometer with K Special penetration probes. Measurements were taken at the start and end of the test. The probes were located central and external to the building. Wind speeds at the start and end of the test were measured using a Kestrel K4000 meter. Barometric pressure was established by an absolute pressure meter.

The test area was prepared for air testing by the client. During the test HRS are external to the test area and are therefore reliant on the client maintaining the test area as agreed. The agreed test state of the test area is with all external windows and doors closed, and all internal doors open, with any temporary seals employed to remain intact for the duration of the test.

5. DETAILS OF TEST RESULTS

Please refer to the test results overleaf. The results have been interpolated from the readings taken between **28**Pa and **59**Pa with a correlation co-efficient of **0.9934**.

Zero-Flow Pressure Differences

The mean fan off Δp at the start of the test, $\Delta p_{0,1}$, was 0
The mean fan off Δp at the end of the test, $\Delta p_{0,2}$, was 0
The zero flow pressure difference $\Delta p_{0,1+}$ at the start of the test was 0
The zero flow pressure difference $\Delta p_{0,1-}$ at the start of the test was 0
The zero flow pressure difference $\Delta p_{0,2+}$ at the end of the test was 0
The zero flow pressure difference $\Delta p_{0,2-}$ at the end of the test was 0

FOR THE FULL SET OF CALCULATIONS USED TO CALCULATE THE AIR PERMEABILITY RATE, PLEASE GO TO
http://www.hrsservices.co.uk/downloads/air_permeability_calculations.pdf

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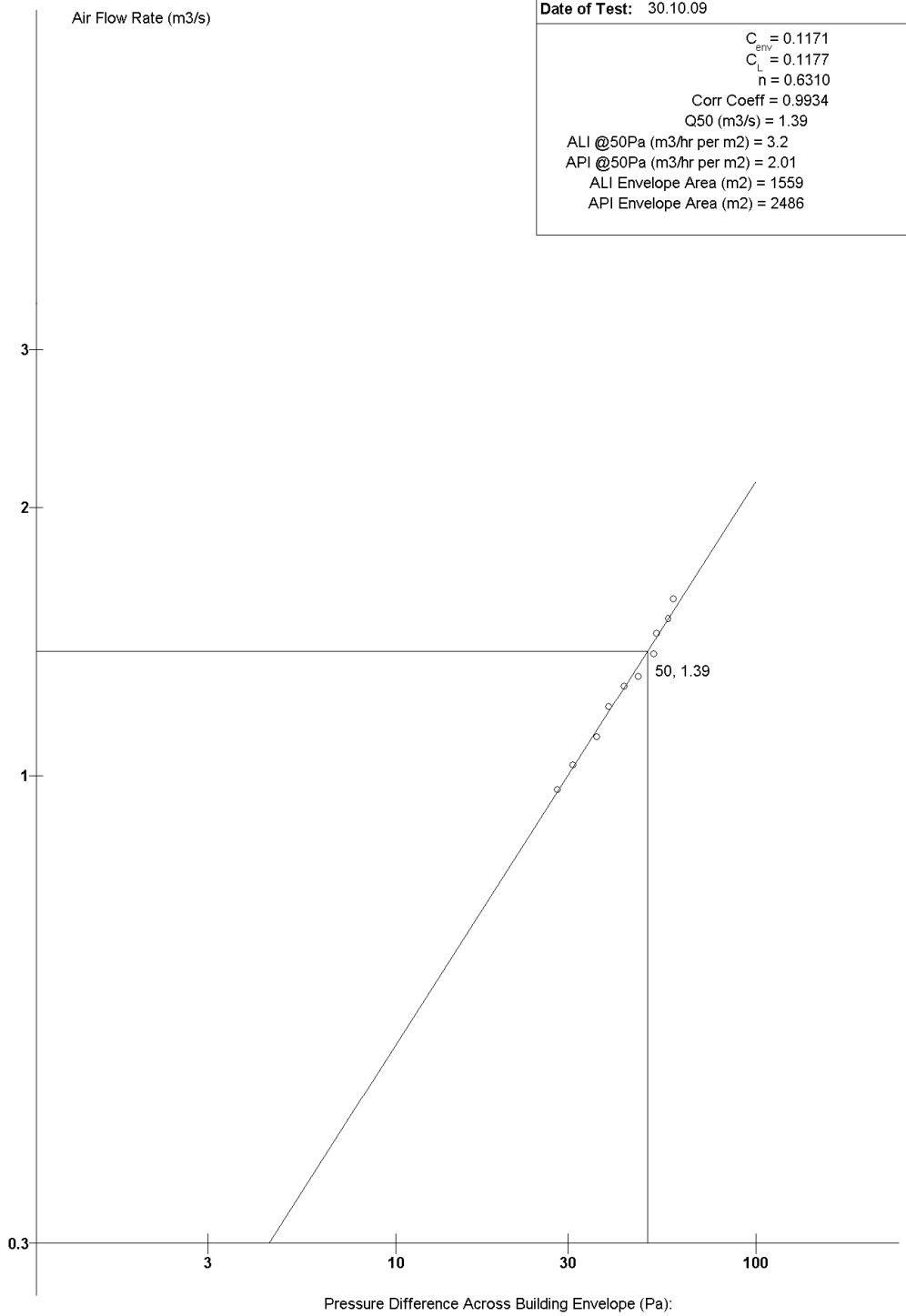
Building Ref: 104557-AT10 Sports Hall

Date of Test: 30.10.09

C_{env} = 0.1171
C_L = 0.1177
n = 0.6310
Corr Coeff = 0.9934
Q50 (m3/s) = 1.39
ALI @50Pa (m3/hr per m2) = 3.2
API @50Pa (m3/hr per m2) = 2.01
ALI Envelope Area (m2) = 1559
API Envelope Area (m2) = 2486



Log-Log Air Leakage Characteristic

Engineer: Gavin Matthews	**Date:** 30.10.09	**Source: Altas V6.3.2 Updated 17/8/2009**

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Building Air Leakage Test Data Sheet

Client Details

Client Name: Wates Construction

Client Contact: David Bucknall

Building Ref: 104557-AT10 Sports Hall

HRS Ref. No: 104557-AT10

Site Address:

Sports Hall
HMP Littlehey
Crow Spinney Lane
Perry
Huntingdon

Air Leakage Test Details

Test Start Time: 12.45

Test Data Base No: 104557

Test Finish Time: 13.15

Date of Test: 30.10.09

Pressurisation: x

Depressurisation:

General Weather Conditions:

Cloudy with moderate winds

Measured Parameters

Parameter	Start	End
Wind Speed (m/s)	2	1.3
External Temp (deg C)	15	15
Internal Temp (deg C)	16.5	16.5
Barometric Pressure (Pa)	100700	100600
Fan off Press. Diff. (Pa)	0	0

Internal temp Sensor Location: central

Fan Speed	0	0	0	0	0	0	0	0	0	0				
(Pa)	59	57	53	52	47	43	39	36	31	28				
(m3/s)	1.59	1.51	1.45	1.38	1.30	1.27	1.20	1.11	1.03	0.97				

Engineer:	Gavin Matthews	Date:	30.10.09	Source: Altas V6.3.2 Updated 17/8/2009

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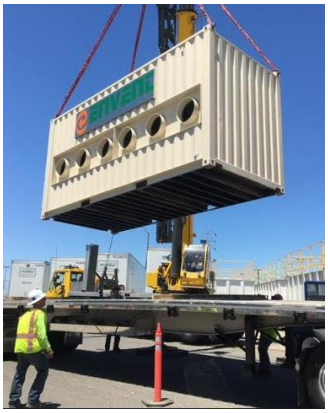
Attachment 2

Ventilation System Manufacturer Information

Envent Filter Box (EFB)

9600197



The EFB was designed for the removal PM_{10} and $PM_{2.5}$ from high flow air streams. The EFB has been utilized in multiple industrial applications. Primarily in large scale industrial paint booths for removal of aerosols, dust, pollen, and any other debris/ particulate air contaminant that could affect downstream process. In paint booth application the act as an upstream filter for the removal of any paint aerosol that would foul or otherwise plug off a downstream RTO and adsorption wheels. The EFB is completely customizable and can be utilized to remove > 99.999% of all particulate.

Rated Flow- 40,000 SCFM Maximum

Connection type-

Inlet	48” x 48” Square Duct
Outlet	Qty (6) 20” Exhaust Outlets

Filter Type- Two-Layer customizable filter construction. Typical configuration consists of a primary large sheet media roll pre-filter followed by a secondary layer consisting of quantity 60, 20” x 20” x 4” extended surface mini-pleat filters. Extended surface mini-pleat filters come in MERV 1 to MERV 20, based on project filtration needs.

Filter Box Characteristics-

Material		Reinforced Corrugated Steel
Coating		6 to 8 mils Carboline Epoxy
Box Dimensions		
	Width	8’ 6”
	Height	9’ 6”
	Length	20’
Weight		6,000 lbs

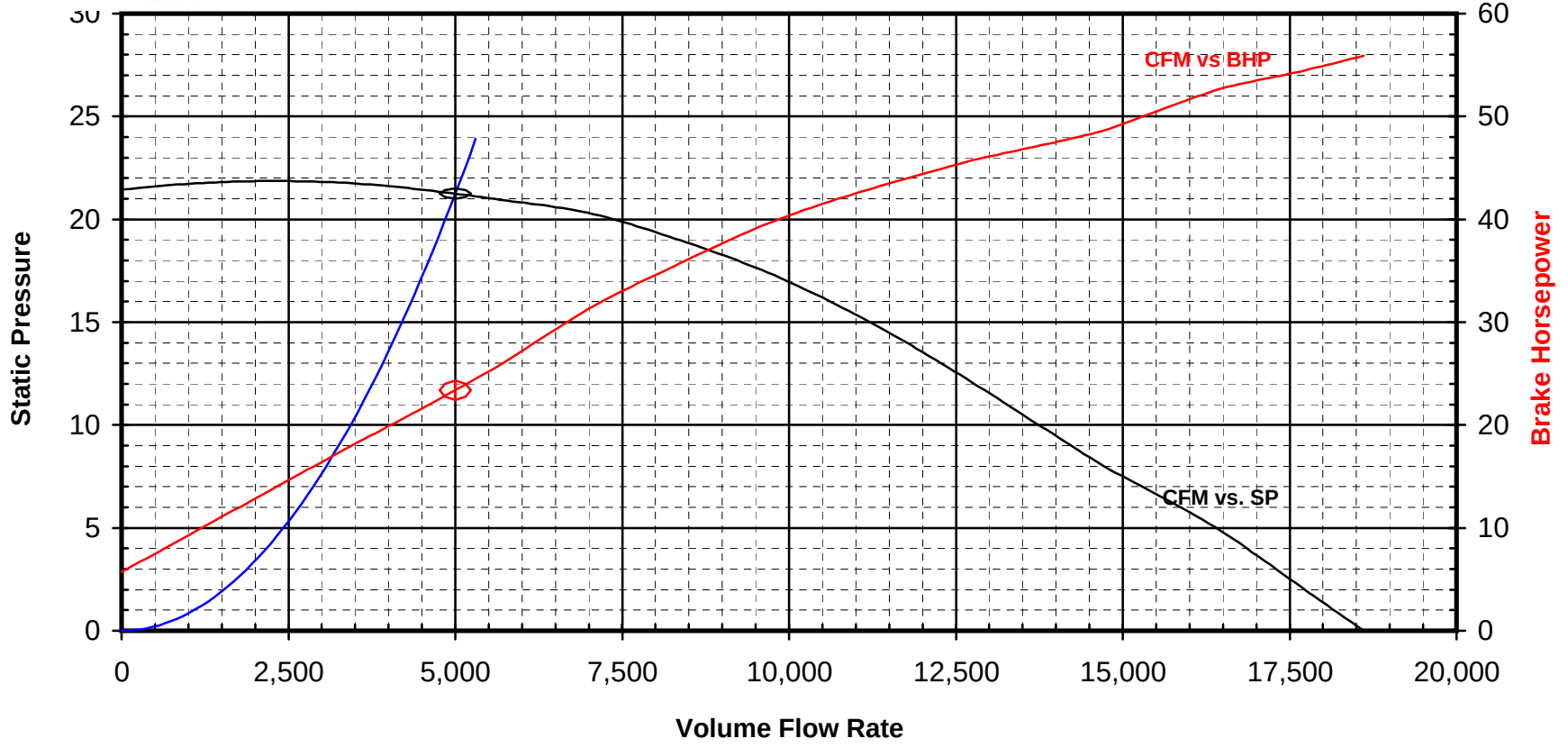
Max Static Pressure 27” WC

Special Features

- Requires no electricity
- Delivered as a trailered unit but can be utilized as standalone skid
- Crane and Forklift-able for setting in tight spaces on long term projects
- Particulate Filtration Efficiency is customizable based on customer need and budget

Hartzell Air Movement Performance Curve

052-29-AHR3, 2062 RPM, 0.075 #/Cu. Ft.



Model	ACFM	SP Actual	SP 0.075	BHP Actual	BHP 0.075	Density	Temp.	Elevation	17-May-16Curve All.xlsVS111.16
052-29-AHR3	5,000	21.25	21.25	23.38	23.38	0.075	70°F.	0'	T5988CSStandard, V05363, N/A

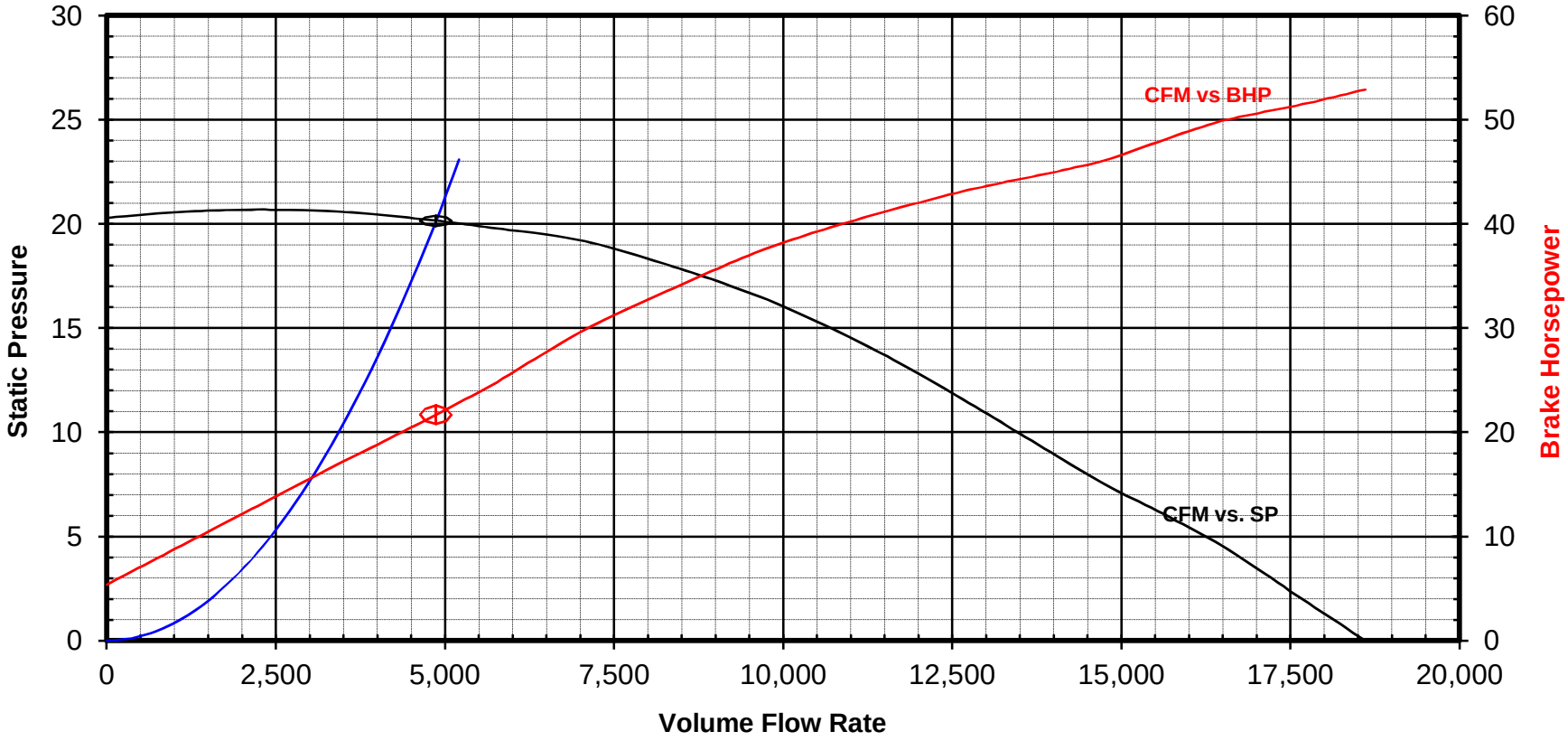
Std 300 Fig:	3	Installation Type:	D	No Of Blades	8

Octave Band	1	2	3	4	5	6	7	8	dBA at 5.0 feet
Center Freq., f (Hz)	63	125	250	500	1000	2000	4000	8000	Q = 2
Sound Power	115	114	107	105	101	98	96	93	96

Values shown are based on specific laboratory test setup and installation types, and are not indicative or guaranteed in field installations. Sound power levels are in decibels, referred to 10^-12 watts, calculated per AMCA Standard 301. A-weighted values are sound pressure, calculated assuming a free-field condition.

Hartzell Air Movement Performance Curve

052-29-AHR3, 2062 RPM, 0.071 #/Cu. Ft.



Model	ACFM	SP Actual	SP 0.075	BHP Actual	BHP 0.075	Density	Temp.	Elevation	06-Jun-181. Curve All.xlsmVS122.18
052-29-AHR3	4,869	20.15	21.29	21.68	22.91	0.071	100°F.	0'	T5988CSStandard, V05363, N/A

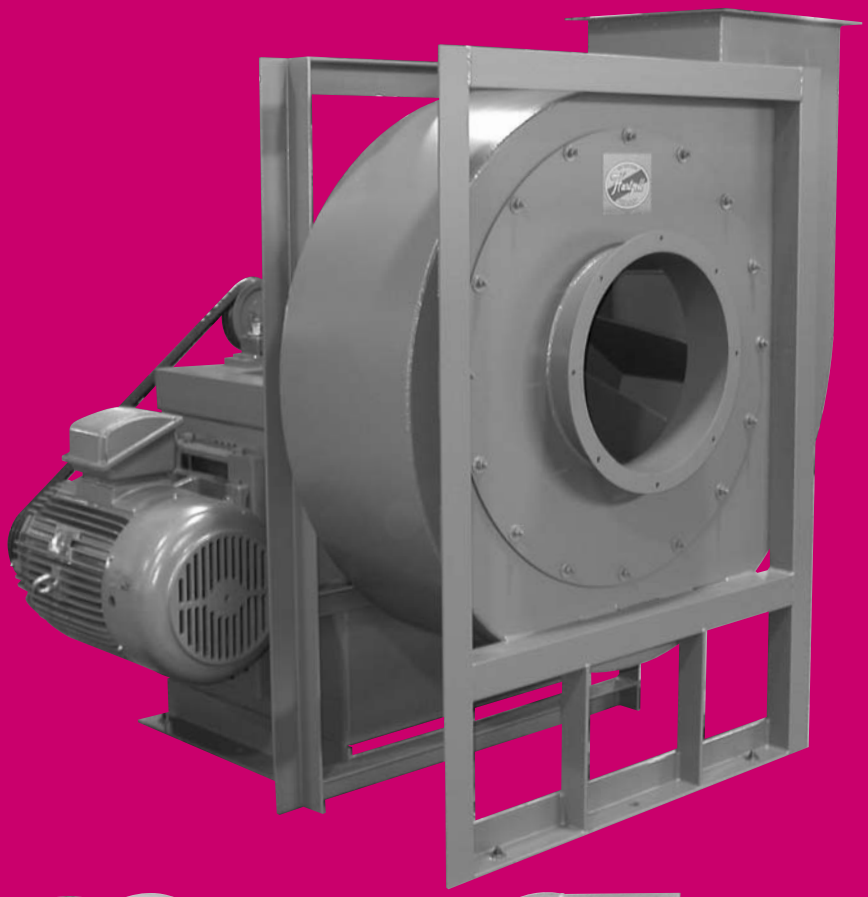
Std 300 Fig:	3	Installation Type:	D	No Of Blades	8

Octave Band	1	2	3	4	5	6	7	8	dBA at 5.0 feet
Center Freq., f (Hz)	63	125	250	500	1000	2000	4000	8000	Q = 2
Sound Power	114	114	106	104	100	98	95	93	96

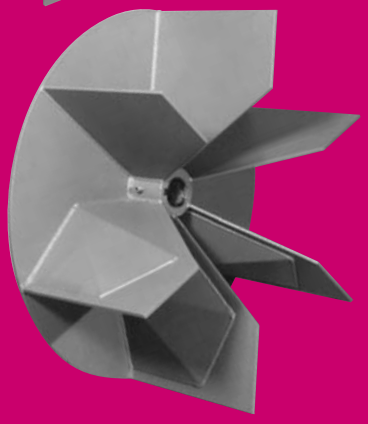
Values shown are based on specific laboratory test setup and installation types, and are not indicative or guaranteed in field installations. Sound power levels are in decibels, referred to 10^-12 watts, calculated per AMCA Standard 301. A-weighted values are sound pressure, calculated assuming a free-field condition.

Industrial Exhausters

Series 05 Series 05F









HARTZELL®

Hartzell Fan, Inc., Piqua, Ohio 45356
www.hartzellfan.com

Bulletin A-155-I October 2007

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Certified Ratings for Air Performance

Hartzell Fan, Inc. certifies that the Series 05 and Series 05F Industrial Exhausters, with the Air Wheel, (type AH), Open Wheel, (Type MH), and Open Paddle Wheel, (Type PW), shown on pages 5 through 24 are licensed to bear the AMCA Seal for Air Performance. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and comply with the requirements of the AMCA Certified Ratings Program.

Certificates of Design Assessment are issued by the American Bureau of Shipping. The assessment is a representation by the Bureau as to the degree of compliance the design exhibits with applicable sections of the Rules. The certificates, by itself, do not reflect that the products are Type Approved.

Hartzell Model Code Explanation

A 05- 9 -29 2 AH 100 ST FC P 3

- Type
  - A – Production Item
  - S – Stock Item
  - Q – Special Quote
- Product Series
- Arrangement (centrifugals only)
- Size (nominal wheel diameter, inches)
- Class
- Wheel Code
- Wheel Width (entries represent percents)
- Material of Construction
- Motor Enclosure
- Motor Horsepower
- Motor RPM/Phase

Motor RPM / Phase Code

3 Phase	1 Phase
2 = 3450	B = 3450
3 = 1750	C = 1750
4 = 1140	D = 1140
5 = 870	E = 870
6 = 690	F = 690
7 = 575	G = 575

Motor Horsepower

Horsepower	1/4	1/3	1/2	3/4	1	1 1/2	2	3	5	7 1/2	10	15	20	25	30	40	50	60	75	100	125	150	200
Code Letter	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

Example:

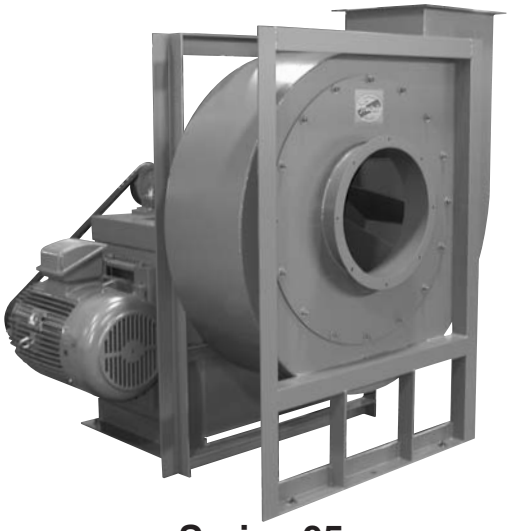
Assume a needed performance of 6,000 CFM at 14" SP, standard air for a dust collector. Reading the Rating Table on page 17 we find a Series 05 Industrial Exhauster, Size 29" with a type AH wheel, 100% Width, Class II Construction with a fan RPM of 1,719 and brake horsepower (BHP) of 18.5.

The model code can be constructed as follows: Type will be a production item (code A), product series for the Industrial Exhauster is 05-, Arrangement desired is 9, size is 29, Class is 2, Blade Type is AH, 100 for percentage width, material for construction is Steel (code ST), motor enclosure will be Totally Enclosed, Fan Cooled (code FC), motor horsepower is 20 (code P), and motor RPM/phase is 1750 (code 3).

Note: All other informational fields must be filled with hyphens/dashes (-) if they are not applicable to the fan being considered.

This bulletin lists Hartzell's line of Industrial Exhausters and accessories. More than 70 Hartzell offices can provide specific performance and installation data to meet your requirements. Call your Hartzell representative for assistance. Visit our website **(www.hartzellfan.com)** or call toll-free **1(800) 336-3267** for the name of your Hartzell representative.

Series 05- Industrial Exhausters



**Series 05-
Fixed Housing**



**Series 05-
Rotatable Housing**



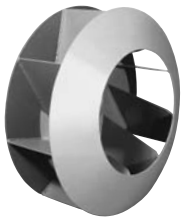
**Series 05 Arrangement 9
With 9M Motor
Mounting Base**



**Series 05-
Direct Drive
Page 10**

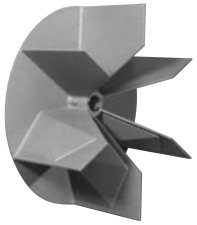


**Series 05F
Flange Mount
Page 11**



Type AH Air Wheel

Ideal for handling air and gasses at high pressure and can handle light dust loading. Blades are continuously welded to back plate and front plate, flat with a slight backward incline to improve performance and reduce noise, and reinforced as necessary. Standard hub is straight bore with set screws. Split taper bushing available.



Type MH Open Wheel

Sturdy wheel designed for resistance to the impact of materials; tends to prevent material buildup. For dust, shavings, flake and granular materials. Radial blades welded to heavy gauge back plate.Standard hub is straight bore with set screws. Split taper bushing available.



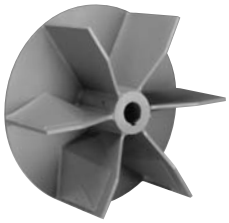
Type PW Open Paddle Wheel

Designed for many air and material moving applications where abrasive particles, granular material, heavy dust or fumes are present in the air stream. Rugged, non-clogging radial blades welded to the hub. Blades have continuously welded reinforcement to reduce stress. Standard hub is straight bore with set screws. Split taper bushing available.



Type PR Reinforced Paddle Wheel

Suited for handling particle-laden air, sawdust, granular material, and gases at higher pressures than the Type PW wheel. Back side and front side reinforcement are continuously welded to rugged, non-clogging radial blades with continuously welded reinforcement to reduce stress. Standard hub is straight bore with set screws. Split taper bushing available.



Type TH Open Trim Wheel

Designed specifically to convey paper trimmings, cardstock trimmings, and other similar materials. Wheel design includes heavier blades and longer hub to withstand loads applied. Special fan inlet and Type TH wheel resist plugging from long continuous material operations. Standard hub is straight bore with set screws.

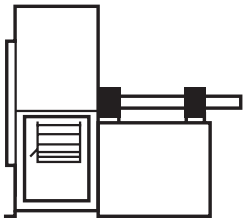
Hartzell Centrifugal Fan Classifications

Hartzell Series 05 Industrial Exhausters are designed and classified in low, medium, and high ranges of static pressures. The parameters are explained in the following table:*

Hartzell Industrial Exhauster Class	Performance Range		
	Maximum Static Pressure	Maximum Outlet Velocity	Maximum Tip Speed (FPM)
Class 2	20"	6,740	16,000
Class 3	30"	7,593	20,000
Class 4	50"	7,593	24,500

*** At standard air conditions (70˚F., 29.92 in. HG barometric pressure, .075 lbs./ft.3). Static pressure shown in inches of water; outlet velocity shown in feet per minute.**

Centrifugal Fan Arrangements



Arrangement 1

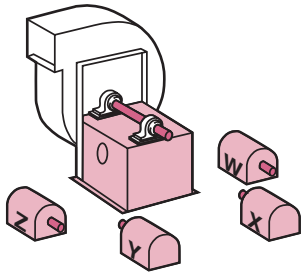
Unit furnished with shaft and bearings, less motor and drive. Designed to be driven by a separately mounted motor. Impeller is overhung – two bearings on base. Temperature limitations:Standard fan to 300°F, heat fan to 800°F.

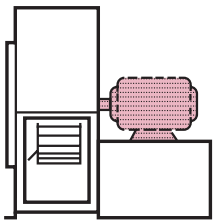
Motor Position Designation

Motor position designation is necessary when ordering the following for Arrangement 1 fans –

1 – V Belt Drive.
2 – Vibration Bases.
3 – Belt Guards.

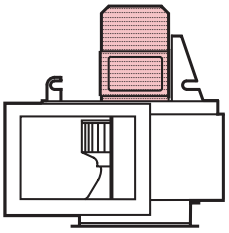
Note: Location of motor is determined by facing the drive side of the fan and designating the motor position by letters W, X, Y, or Z.





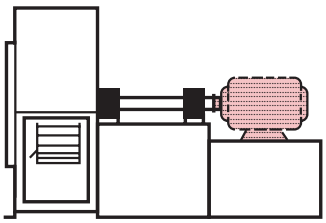
Arrangement 4

Direct drive packaged unit, wheel is overhung and attached to the shaft of the electric motor. No bearings on fan. Available with AH and MH Wheel Types only. Temperature limitations: Standard fan to 200°F.



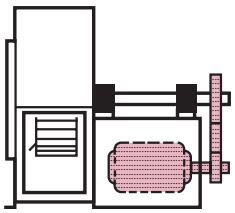
Arr. 4 Flange Mount

Direct drive unit for mounting on fan inlet flange, wheel is overhung and attached to the shaft of the electric motor. No bearings on fan. Temperature limitations: Standard fan to 200° F.



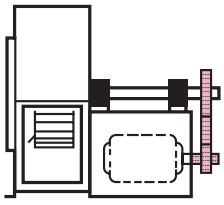
Arrangement 8

Direct Coupled configuration with motor mounted to common fan base. Impeller is overhung and supported by two bearings on fan base. Temperature Limitations: 800°F.



Arrangement 9

Belt drive configuration with motor mounted on outside of bearing base support. Packaged unit, wheel is overhung, slide rail motor base permits easy adjustment of belt tension. Available on either left or right hand side of base (when facing drive end of shaft). Temperature limitations: Standard fan to 300°F, heat fan to 800°F.



Arrangement 10

Belt drive configuration with motor mounted inside base. Packaged unit, wheel is overhung. Temperature limitations: Standard fan to 250°F, heat fan to 600°F.

Adapted from AMCA Standard 99-2404-03, *Drive Arrangements for Centrifugal Fans*, and AMCA Standard 99-2407-03, *Motor Positions for Belt or Chain Drive Centrifugal Fans*, with written permission from Air Movement and Control Association International, Inc.

Series 05 General Construction Features

The Hartzell Series 05 Industrial Exhausters are designed to meet industrial air moving and pneumatic conveying requirements. Heavy industrial duty construction – designed for heavyweight service with ruggedness, use, long life, reliability, and performance taken together.

Applications – These versatile and dependable units are suited for material conveying, dust and fume removal, and handling of hot air and industrial gases. Standard construction operates to 300°F (except Arrangement 4). Construction is available for operation up to 800°F. (See Pages 6-7). These blowers are available in direct drive and belt drive configurations. Efficient airflow is provided at high pressure to flow ratios with lower sound levels than many other selections.

Performance and Efficiency – Series 05, Class 2 from 250 to 40,500 CFM, Static pressure to 20" water gauge. Class 3 from 1,725 to 45,625 CFM, S. P. to 30" W. G. Class 4 from 2,400 to 45,625 CFM, S. P. to 46" W.G. Total efficiencies to 72%. Operates smoothly from free air to near block off without pulsation or vibration.

Performance Ratings – Accurate and reliable air performance and sound power rating, in eight octave bands, in accordance with industry standards, tests, and procedures is available.

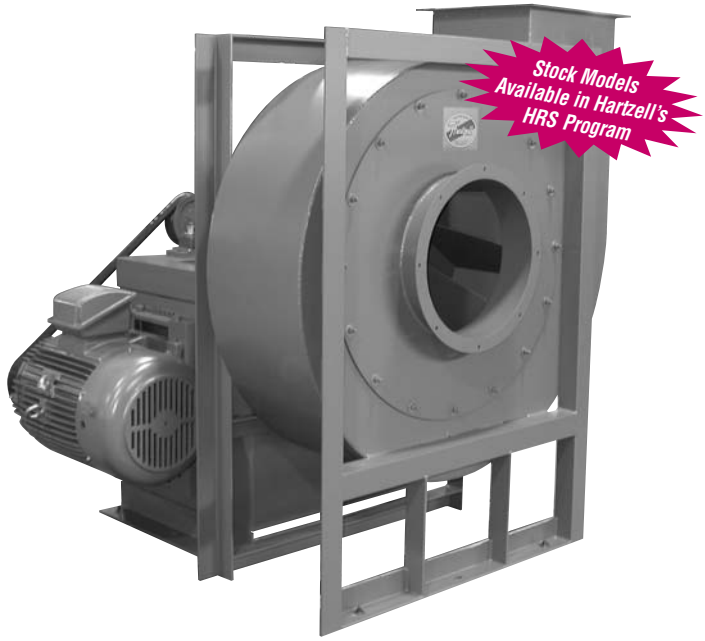
Features

- **Sizes** – Twelve available sizes from 12" through 57" wheel diameters, single width, single inlet construction (SWSI). Available in Class 2, 3, and 4, and narrow width construction.
- **Stock** – Many sizes of the Series 05 are available from stock.
- **Arrangements** – Available in Belt Drive Arrangements #1, #9, #9M, and #10, Direct Drive Arr. #4 and Direct Coupled Arr. #8. Contact Factory for others.
- **Rotation and Discharge Positions** – Available in both clockwise and counterclockwise rotations and in standard discharge positions. Housing discharge position can be changed on fan sizes 12" through 29". Size 33" through 57" are fixed position and are non-rotatable.
- **Standard Construction** – Housings and bases built of heavy gauge hot rolled steel are standard construction. Housings are continuously welded and bearing base/motor pedestal is constructed of hot rolled steel and structural steel. See material specification tables construction details.
- **Fan Inlets and Outlets** – Straight inlet and outlet connections are provided for easy "slip-fit" connection to ducting. Optional continuously welded flanges are available.
- **Wheel** – See page 3. Four non-clogging radial blades.

  Type MH – 12" – 57"
  Type TH – 12" – 57"
  Type PW – 12" – 57"
  Type PR – 29" – 57"

  An air-handling wheel is also available for high-pressure applications.

  Type AH – 12" – 57"
- **Balancing** – Fans are electronically statically and dynamically balanced to the requirements of Fan Application Category BV-3 of AMCA ANSI Std. 204-96 and whenever possible receive Operational Test and Inspection prior to shipment.
- **Bearings** – Fan Bearings are heavy-duty, self-aligning, shielded and mechanically sealed, ball or roller type, in cast iron or malleable pillow block housings. Bearings are selected for minimum L-50 Life of 250,000 hours at maximum catalog speed, horsepower, and static pressure. Lubrication fittings are extended as standard for easy relubrication.
- **Shafts** – Shafts are turned, ground, polished, keyed at both ends, and sized to operate well below critical speed.



Series 05-
Shown with optional equipment

- **Drives** – V-Belt Drives are oversized for long life and continuous duty and are fixed pitch as standard option. Variable pitch drives are available upon request. Belts are oil, heat, and static resistant type.
- **Standard Finish** – Standard fans and accessories are pretreated and painted with blue industrial duty air dry enamel. Alternate coatings are available for high temperature and corrosive environments.
- **Motor Out of the Airstream** – Exterior motor mounting for easy electrical connection, adjustment of belts, and lubrication is standard. An adjustable motor slide base in belt drive models is standard. Motors can be furnished as TEFC, ODP, Mill and Chemical Duty, or to specifications upon request. Motor HP and frame size limits are identified in Dimensions and Material Specifications table.
- **Easy Installation and Maintenance** – Motor, drive and bearings are readily accessible for ease in wiring, installation, adjustment, and lubrication.
- **Easy System Access** – For easy access and servicing, access doors and swing-out construction is available.
- **High Temperature Fans and Systems** – Fan modifications are available to accommodate operating temperatures up to 800°F in most arrangements.
- **Spark Resistant Construction** – AMCA Type A, B, and C is available, membrane type shaft seal is standard with AMCA spark resistant construction. Explosion proof motors are also available.
- **Special Materials of Construction** – Alternate materials of construction; stainless steel, aluminum, fiberglass housing, and other materials are available upon request.
- **Your Special Features and Options** – Hartzell Fan has a wide range of designs, configurations, performances, sizes, materials, finishes, and motors in-stock and from production to fit your ventilation requirements. Accessories including: guards, companion flanges, dampers, louvers, inlet bells, sub-bases, vibration isolators, lifting lugs, leak resistant construction, and sound mufflers are available.

Temperature/Altitude Applications

When a fan operates in ambient conditions, generally it is handling standard air at 70°F., 29.92" barometric pressure, weighing 0.075-lbs./cu. ft. For an application where the fan operates at other than ambient conditions (temperature, altitude, or both), correction factors must be applied to the selection of the fan. In addition, the standard construction of the fan must be modified. The maximum safe operating temperature for each fan arrangement is shown on page 7. High temperature modifications are explained on page 7 and illustrated on pages 26-27.

Correction factors for temperatures and altitudes are provided in Table 1. When a fan operates at other than ambient conditions, the correction factors in Table 1 will be required to correct static pressure and horsepower.

Table 2 shows the maximum safe operating speeds for each size fan wheel at each class of construction. At high temperatures, these maximum safe operating speeds should be derated. Deration varies according to the material of construction. Table 3 provides maximum safe speed correction factors by temperature and material construction.

An example on the use of these tables appears at the bottom of this page.

Rarefaction / Compression

When making selections for pressures greater than 15" W.G. at 0.075#/ft3 the effect of the fan pressure on the actual gas density and actual volume of cubic feet should be taken into account. The effects of rarefaction on actual gas density can be calculated within Hartzell Fan's Electronic Support Package®, ESP. For a copy of Hartzell Fan's ESP, selection assistance, and additional data please contact your local Hartzell Sales Representative or visit our website at **www.hartzellfan.com**.

Table 1 Altitude/Temperature Correction Factors

Temp. (°F)	-25	0	25	50	70	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Factor	0.82	0.87	0.91	0.96	1.00	1.06	1.15	1.25	1.34	1.43	1.53	1.62	1.72	1.81	1.91	2.00	2.09	2.19	2.29	2.38

Alt.** (Ft.)	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000	11,000	12,000
Factor	1.00	1.04	1.08	1.12	1.16	1.20	1.25	1.30	1.35	1.40	1.46	1.51	1.57

Above table has inverted values. Actual density is the reciprocal of the above values. *At sea level. **At 70°F.
For corrections involving both temperature and altitude, correction factors should be multiplied.
Example: 150°F at 7000 ft.: Temperature factor 1.15 x altitude factor 1.30 = 1.50 combined correction factor.

Table 2 Maximum Safe Speeds @ 70°F

Fan Size	Class 2	Class 3	Class 4
12	4,990	–	–
15	3,910	–	–
19	3,195	3,795	–
22	2,700	3,375	4,135
26	2,340	2,925	3,580
29	2,065	2,580	3,160
33	1,850	2,315	2,835
36	1,675	2,095	2,565
40	1,530	1,910	2,340
45	1,355	1,695	2,075
50	1,210	1,515	1,855
57	1,065	1,330	1,630

Table 3 Maximum Safe Speed Correction Factors*

Material Code	Spark Resistance	Material of Construction	Temperature °F								
			0°F	70°F	200°F	300°F	400°F	500°F	600°F	700°F	800°F
ST	None	Steel Wheel & Housing	1.000	1.000	1.000	0.966	0.930	0.890	0.860	0.820	0.770
AA	AMCA "A"	Aluminum Wheel, Aluminum Housing	0.966	0.948	0.837	0.733	–	–	–	–	–
AB	AMCA "B"	Aluminum Wheel, Steel Housing	0.966	0.948	0.837	0.733	–	–	–	–	–
AC	AMCA "C"	Steel Wheel & Housing Aluminum Buffer	1.000	1.000	1.000	0.966	0.930	0.890	0.860	0.820	0.770
CT	None	Corten Wheel, Steel Housing	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.960
S4	None	304SS Wheel & Housing	1.000	1.000	1.000	0.938	0.896	0.852	0.830	0.806	0.792
S6	None	316SS Wheel & Housing	1.000	1.000	1.000	0.987	0.950	0.913	0.894	0.876	0.861
4L	None	304LSS Wheel & Housing	1.000	1.000	1.000	0.938	0.896	0.852	0.830	0.806	0.792
6L	None	316LSS Wheel & Housing	1.000	1.000	1.000	0.987	0.950	0.913	0.894	0.876	0.861

***To correct maximum safe operating speeds (Table 2) for high temperatures, multiply those speeds by correction factors from Table 3.**

Use of Correction Factors and Tables

First select size, RPM and BHP of the blower needed.

If temperature or altitude is involved, correct to standard air.

Example: Assume the required performance to be 6,000 CFM at 9.14" SP, 400°F and 2000 feet altitude.

1. Temperature factor 1.62 x altitude factor 1.08 = 1.75 combined correction factor.
2. Correct SP to standard 9.14" SP x 1.75 = 16.00" SP for 70°F at sea level.
3. A Series 05, size 29" class 2 belt drive Industrial Exhauster, selected from the rating tables (page 17) for the new condition shows 6,000 CFM at 16.00" SP, 1,825 RPM and 21.1 BHP.
4. Correct the horsepower and static pressure in item 3 to non-standard performance by dividing by factor: 16.00" SP divided by 1.75 = 9.14" SP; 21.1 BHP divided by 1.75 = 12.1 BHP.
5. Check the maximum safe speed. Maximum speed at 70°F for fan size 29, 1,825 RPM. Using the maximum safe speed factor table for steel construction yields a safe speed factor of .930. The maximum safe speed is 2,065 x .930 = 1,920 RPM; thus operation at 1,825 RPM at 400°F is satisfactory.
6. Final performance of the unit at the assumed conditions: 6,000 CFM at 9.14" SP, 1825 RPM, 12.1 BHP at 400°F and 2000 feet altitude.
7. Size motor for cold startups and use a special high altitude motor if altitude exceeds 3300 feet.

Material Specifications/Weight

Material Specifications – Gauge – All Sizes

Fan Size	Class	Housing Thickness			Shaft Diameter		Wheel														Fan Weight Arr. 1
							AH					MH / TH				PW / PR					
		Scroll Band & Sides	Flanges				Blade	Back Plate	Inlet Plate	WR2	Weight	Blade	Back Plate	WR2	Weight	Blade	Spider	Rim	WR2	Weight	
			Inlet	Outlet	AH / MH	PW / PR															
12	2	10 Ga.	7 Ga. x 1 1/2	10 Ga. x 1 1/2	1 3/16	1 3/16	12 Ga.	10 Ga.	12 Ga.	1.7	18	10 Ga.	7 Ga.	1.7	20	10 Ga.	7 Ga.	---	0.8	15	200
15		10 Ga.	7 Ga. x 1 1/2	10 Ga. x 1 1/2	1 11/16	1 11/16	7 Ga.	10 Ga.	10 Ga.	6.2	35	10 Ga.	7 Ga.	4.4	30	10 Ga.	7 Ga.	---	2.0	23	334
19		7 Ga.	7 Ga. x 1 1/2	7 Ga. x 1 1/2	1 11/16	1 11/16	7 Ga.	7 Ga.	10 Ga.	15	54	10 Ga.	7 Ga.	9.8	42	10 Ga.	7 Ga.	---	4.5	31	473
22		7 Ga.	1/4 x 1 1/2	7 Ga. x 1 1/2	1 15/16	1 15/16	7 Ga.	7 Ga.	10 Ga.	28	71	7 Ga.	1/4	26	73	7 Ga.	1/4	---	12	50	645
26		7 Ga.	1/4 x 1 1/2	7 Ga. x 1 1/2	1 15/16	1 15/16	7 Ga.	7 Ga.	7 Ga.	55	98	7 Ga.	1/4	46	97	7 Ga.	1/4	---	21	67	704
29		7 Ga.	1/4 x 1 1/2	7 Ga. x 1 1/2	2 3/16	2 7/16	1/4	7 Ga.	7 Ga.	101	139	7 Ga.	1/4	77	124	7 Ga.	1/4	---	35	83	913
33		1/4	1/4 x 1 1/2	7 Ga. x 1 1/2	2 3/16	2 7/16	1/4	1/4	7 Ga.	171	190	7 Ga.	3/8	139	183	7 Ga.	1/4	---	55	105	1260
36		1/4	1/4 x 1 1/2	7 Ga. x 1 1/2	2 3/16	2 3/16	1/4	1/4	1/4	279	244	7 Ga.	3/8	208	222	7 Ga.	1/4	---	80	124	1450
40		1/4	1/4 x 2	7 Ga. x 2	2 7/16	2 7/16	1/4	1/4	1/4	401	294	1/4	3/8	301	268	1/4	1/4	---	141	178	1810
45		1/4	1/4 x 2	7 Ga. x 2	2 11/16	2 11/16	1/4	3/8	1/4	650	373	1/4	1/2	486	337	1/4	1/4	---	229	221	2590
50		1/4	1/4 x 2	7 Ga. x 2	2 15/16	2 15/16	1/4	3/8	1/4	1020	489	1/4	1/2	763	425	1/4	1/4	---	358	279	3550
57		1/4	1/4 x 2	7 Ga. x 2	3 3/16	3 3/16	3/8	1/2	3/8	2571	882	1/4	1/2	1281	544	1/4	1/4	---	600	348	4410
19	3	7 Ga.	7 Ga. x 1 1/2	7 Ga. x 1 1/2	2 3/16	2 3/16	1/4	7 Ga.	7 Ga.	19	67	7 Ga.	1/4	14	71	7 Ga.	7 Ga.	---	6.2	39	521
22		7 Ga.	1/4 x 1 1/2	7 Ga. x 1 1/2	2 3/16	2 7/16	1/4	7 Ga.	7 Ga.	35	91	1/4	3/8	39	107	7 Ga.	1/4	---	12	59	705
26		7 Ga.	1/4 x 1 1/2	7 Ga. x 1 1/2	2 7/16	2 7/16	1/4	1/4	1/4	68	120	1/4	3/8	67	142	1/4	1/4	---	26	62	754
29		7 Ga.	1/4 x 1 1/2	7 Ga. x 1 1/2	2 7/16	2 7/16	1/4	1/4	1/4	121	167	1/4	3/8	111	184	1/4	1/4	---	42	107	974
33		1/4	1/4 x 1 1/2	7 Ga. x 1 1/2	2 11/16	2 11/16	1/4	1/4	1/4	186	203	3/8	3/8	206	269	1/4	1/4	---	66	129	1360
36		1/4	1/4 x 1 1/2	7 Ga. x 1 1/2	2 11/16	2 11/16	3/8	3/8	1/4	330	292	3/8	3/8	320	326	1/4	3/8	---	106	268	1780
40		1/4	1/4 x 2	7 Ga. x 2	2 15/16	2 15/16	3/8	3/8	1/4	475	353	3/8	1/2	447	391	1/4	3/8	---	156	206	1940
45		1/4	1/4 x 2	7 Ga. x 2	3 7/16	3 7/16	3/8	1/2	1/4	773	466	3/8	1/2	722	492	1/4	3/8	---	249	261	2890
50		1/4	1/4 x 2	7 Ga. x 2	3 11/16	3 11/16	1/4	1/2	3/8	1618	746	3/8	1/2	1130	617	1/4	3/8	---	389	318	3840
57		1/4	1/4 x 2	7 Ga. x 2	3 15/16	3 15/16	1/4	1/2	3/8	2718	972	3/8	1/2	1897	790	1/4	3/8	---	652	405	4750
22	4	7 Ga.	1/4 x 1 1/2	7 Ga. x 1 1/2	2 3/16	2 3/16	10 Ga.	7 Ga.	7 Ga.	35	89	1/4	3/8	46	126	7 Ga.	1/4	---	13	57	707
26		7 Ga.	1/4 x 1 1/2	7 Ga. x 1 1/2	2 7/16	2 11/16	7 Ga.	1/4	1/4	73	134	1/4	3/8	79	168	1/4	1/4	---	28	88	766
29		7 Ga.	1/4 x 1 1/2	7 Ga. x 1 1/2	2 11/16	2 11/16	7 Ga.	1/4	1/4	129	184	1/4	3/8	131	217	1/4	1/4	1/4	111	181	1010
33		1/4	1/4 x 1 1/2	7 Ga. x 1 1/2	2 15/16	2 15/16	1/4	1/4	1/4	217	246	3/8	3/8	243	317	1/4	1/4	1/4	169	217	1390
36		1/4	1/4 x 1 1/2	7 Ga. x 1 1/2	2 15/16	3 3/16	1/4	3/8	3/8	379	335	3/8	1/2	378	384	1/4	3/8	1/4	260	278	1810
40		1/4	1/4 x 2	7 Ga. x 2	3 7/16	3 7/16	1/4	3/8	3/8	548	403	3/8	1/2	527	461	1/4	3/8	1/4	377	335	2040
45		1/4	1/4 x 2	7 Ga. x 2	3 7/16	3 11/16	1/4	1/2	3/8	986	569	3/8	1/2	852	581	1/4	3/8	1/4	608	419	2810
50		1/4	1/4 x 2	7 Ga. x 2	3 15/16	4 3/16	1/4	1/2	3/8	1689	773	3/8	1/2	1333	728	1/4	3/8	1/4	950	522	3870
57		1/4	1/4 x 2	7 Ga. x 2	4 3/16	4 7/16	1/4	1/2	3/8	2853	989	3/8	1/2	2238	932	1/4	3/8	1/4	1594	659	4820

Note: Inlet and outlet flanges are optional, with or without holes. Fan weight is approximate. TH wheel weight and WR2 values increase by approximately 17%. Dimensions and specifications are subject to change. Certified prints are available.

Arrangement & Accessory Maximum Temperatures*

Description	Maximum Temperature
Arrangement 1, 8, & 9	800° F
Arrangement 3	150° F
Arrangement 4	200° F
Arrangement 10	600° F
Aluminum Spark Resistant Construction	350° F
Weather Cover Arrangement 9	500° F
Arrangement 9M, Weather Cover Arrangement 10	250° F

***Use in conjunction with High Temperature Modifications table.**

High Temperature Modifications**

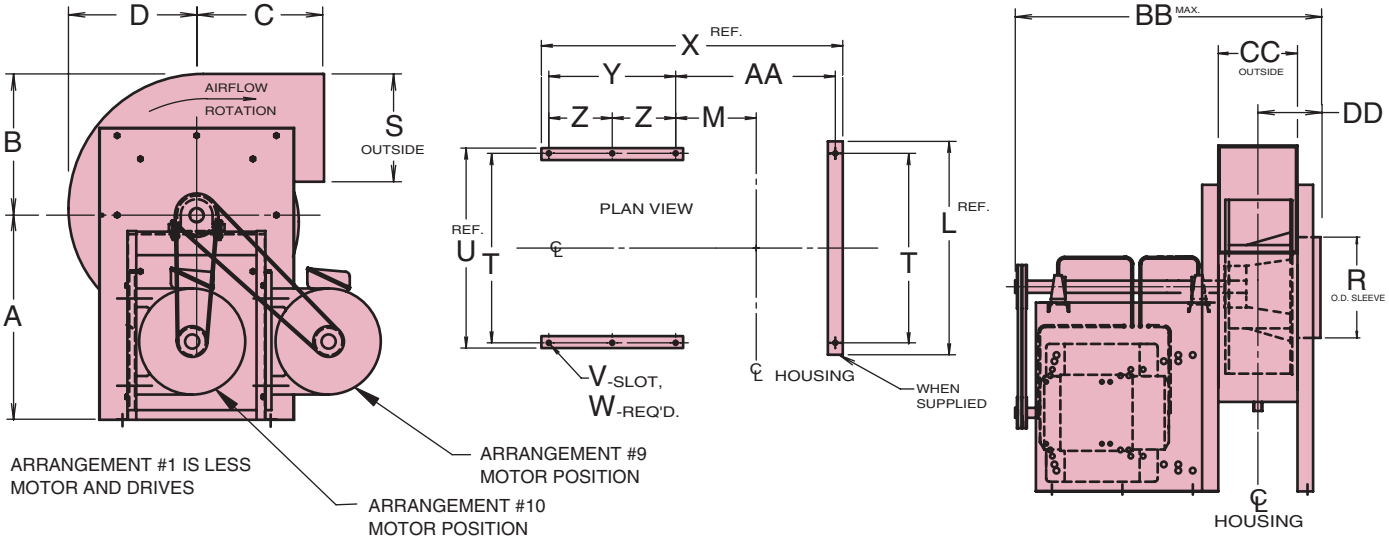
Maximum Design Temperature	High Temperature Modifications Required
70 - 300° F	Standard Construction, none required.
301 - 600° F	Heat Slinger (must be supplied with heat slinger guard or shaft guard), high temperature shaft seal, high temperature paint, special bearing lubricant, fiberglass gasket material, motor heat shield on arrangement 9 or 10.
601 - 800° F	In addition to above, bearing heat shield.
801 - 1000° F	Contact Factory

****Use in conjunction with Arrangement & Accessory Maximum Temperatures table.**

NOTE: High temperature applications require air density calculation, fan accessory items and adjustment of Maximum Safe Speed. See pages 6, 26 and 27..

Dimensions Series 05- Arrangements 1, 9, or 10

Sizes 12 Through 29 – Standard Construction Classes 2, 3, 4, Maximum Temperature 800°F, with proper modifications. Rotatable Housing, Clockwise Rotation Shown. Counterclockwise Opposite.



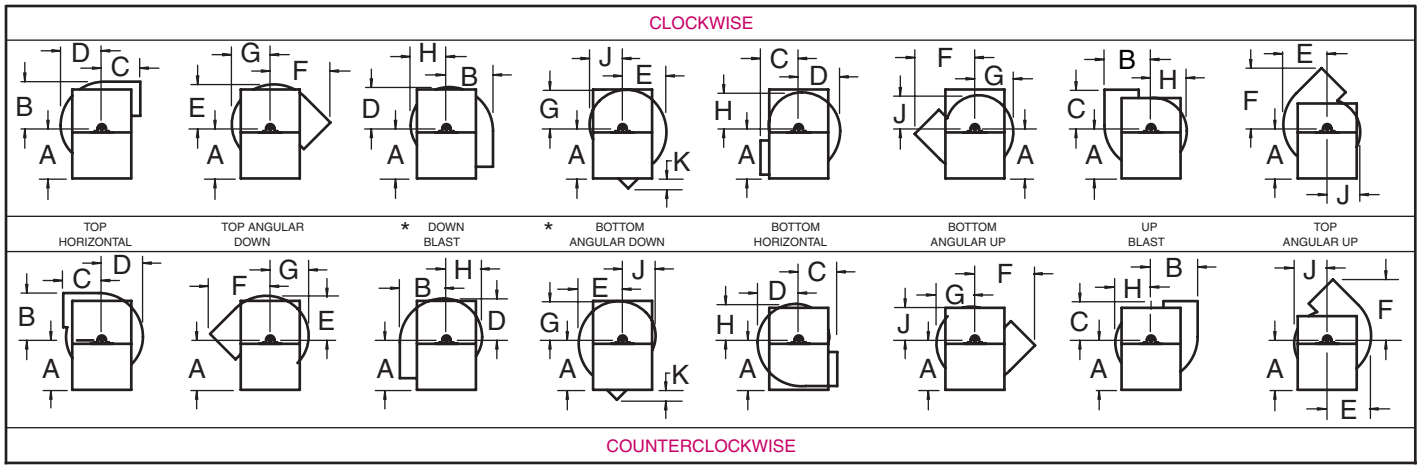
Principal Dimensions (Inches) – Sizes 12" - 29"

Fan Size	A	B	C	D	E	F	G	H	J	K	L	M	R	S
12	18 1/2	11 5/8	14 1/4	10 3/8	10 15/16	18 5/16	9 3/4	9 3/16	8 1/2	--	18 3/4	5 1/2	7	7 1/8
15	21 1/2	14 3/4	16 5/8	13 3/16	13 15/16	22 3/16	12 3/8	11 11/16	10 13/16	11/16	20 3/4	6 5/16	9	9
19	24 1/4	18 1/16	18 7/8	16 3/16	17 1/16	26 1/8	15 3/16	14 1/4	13 1/4	1 7/8	27 3/4	8 3/4	11	11
22	30	21 5/16	22	19 1/16	20 1/8	30 5/8	17 7/8	16 7/8	15 5/8	5/8	28 1/8	7 15/16	13	12 15/16
26	33 15/16	24 9/16	23 5/8	22	23 1/4	34 1/8	20 5/8	19 7/16	18 1/16	3/16	30	8 13/16	15	14 7/8
29	37	27 7/8	27 1/2	24 15/16	26 5/16	39 1/8	23 3/8	22	20 7/16	2 1/8	38 3/8	12 3/8	17	16 5/8

Fan Size	T	U	V	W	X	Y	Z	AA	BB	CC	DD	Max Motor Frame
12	16 1/4	18 1/4	11/16 x 1 1/16	6	24 3/4	12 3/4	--	9 3/4	30 3/4	6 3/16	7 3/16	184T
15	18 1/4	20 1/4	11/16 x 1 1/16	6	29 3/8	15 3/4	--	11 3/8	35 7/8	7 13/16	8	215T
19	25 3/8	27 1/4	11/16 x 1 1/16	8	35 11/16	18 3/4	9 3/8	14 11/16	42 11/16	9 9/16	8 7/8	256T
22	25 3/8	27 3/8	11/16 x 1 1/16	8	37 1/4	20 1/4	10 1/8	14 3/4	45 3/4	11 1/4	9 3/4	256T
26	25 3/8	27 3/8	11/16 x 1 1/16	8	41 3/16	22 1/2	11 1/4	16 7/16	50 11/16	12 15/16	10 9/16	286T
29	33 3/4	38	13/16 x 1 1/4	9	47 3/8	22 3/4	11 3/8	21 1/8	55 3/8	14 7/16	11 7/16	286T

NOTE: Dimensions and specifications are subject to change. Certified prints are available.

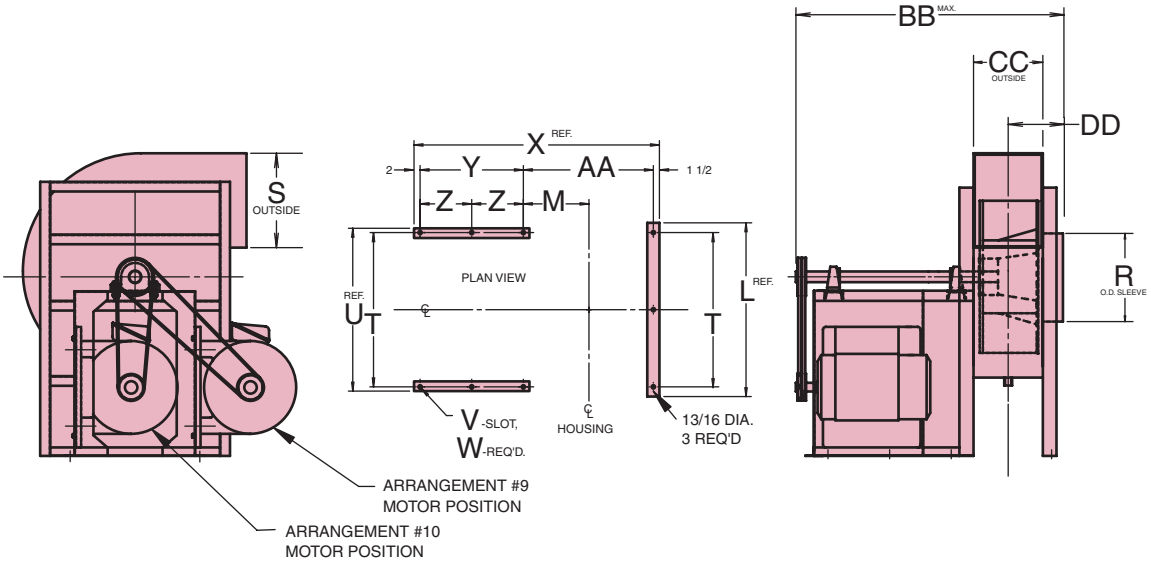
Fan Discharges



NOTE: For bottom angular down and/or down blast, contact factory when discharge flanges are required.

Dimensions Series 05- Arrangements 1, 9, or 10

Sizes 33 Through 57 – Standard Construction Classes 2, 3, 4, Maximum Temperature 800°F, with proper modifications. Fixed Housing, Clockwise Rotation Shown. Counterclockwise Opposite.



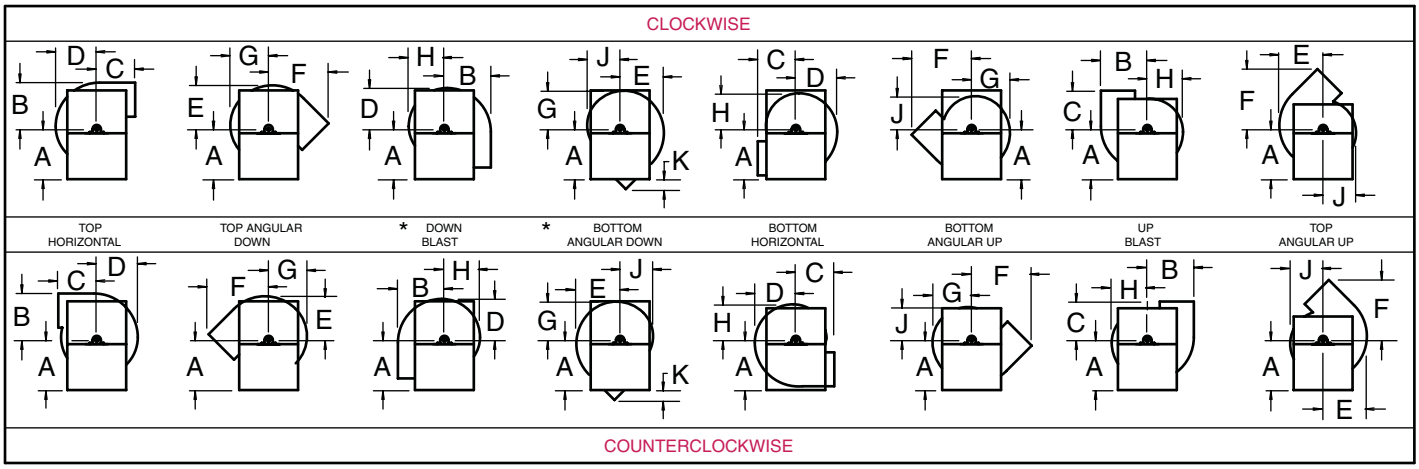
Principal Dimensions (Inches) – Sizes 33" - 57"

Fan Size	A	B	C	D	E	F	G	H	J	K	L	M	R	S
33	40	31	30	27 3/4	29 3/8	43 1/4	26 1/8	24 1/2	22 7/8	3 1/4	47 1/4	13 1/8	18 15/16	18 5/8
36	42	34 1/4	30	30 5/8	32 7/16	45 1/2	28 13/16	27 1/16	25 1/4	3 1/2	50 3/4	13 15/16	20 15/16	20 9/16
40	47	37 1/2	33	33 9/16	35 9/16	49 15/16	31 9/16	29 9/16	27 5/8	2 15/16	55 1/4	14 3/4	22 15/16	22 1/2
45	51 1/4	42 1/4	36 3/4	37 13/16	40 1/16	56	35 5/8	33 3/8	31 1/8	4 3/4	59 5/8	16	25 7/8	25 5/16
50	56	47 1/4	41 1/8	42 5/16	44 13/16	62 5/8	39 13/16	37 1/4	34 13/16	6 5/8	64 1/2	17 1/4	29	28 1/4
57	56 1/2	53 13/16	44 1/8	48 1/8	51	69 9/16	45 5/16	42 7/16	39 5/8	13 1/16	71 1/2	18 15/16	33	32 1/8

Fan Size	T	U	V	W	X	Y	Z	AA	BB	CC	DD	Max Motor Frame
33	33 3/4	38	13/16 x 1 1/4	6	51 15/16	25 3/4	12 7/8	22 11/16	60 7/16	16 3/16	12 1/8	326T
36	33 3/4	38	13/16 x 1 1/4	6	53 5/8	25 3/4	12 7/8	24 3/8	63 1/16	17 13/16	12 15/16	326T
40	44	48	13/16 x 1 1/4	6	57 1/4	27 3/4	13 7/8	26	66 3/4	19 1/2	13 3/4	364T
45	44	48	13/16 x 1 1/4	6	59 11/16	27 3/4	13 7/8	28 7/16	70 3/16	21 15/16	15	365T
50	44	48	13/16 x 1 1/4	6	62 1/4	27 3/4	13 7/8	31	73 3/4	24 1/2	16 1/4	365T
57	45	50	13/16 x 1 1/4	6	70 9/16	32 3/4	16 3/8	34 5/16	83 1/16	27 13/16	17 15/16	405T

NOTE: Dimensions and specifications are subject to change. Certified prints are available.

Fan Discharges



NOTE: For bottom angular down and/or down blast, contact factory when discharge flanges are required.

Series 05-, Direct Drive Centrifugal Arrangement 4



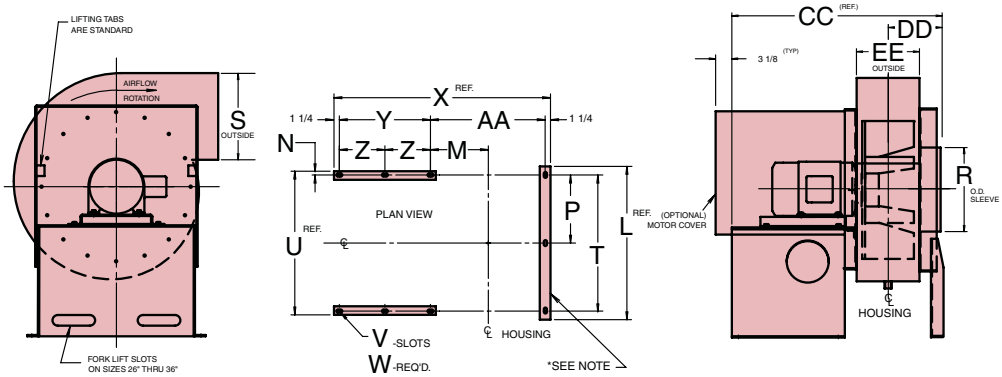
Series 05

Arrangement 4 Construction Shown with Optional Equipment

ABS Certificate of Design Assessment Received

Hartzell Fan, Inc. certifies that the Series 05, with the Air Wheel, (type AH), Open Wheel, (Type MH), and Open Paddle Wheel, (Type PW), shown on pages 5 through 24 are licensed to bear the AMCA Seal for Air Performance. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and comply with the requirements of the AMCA Certified Ratings Program.

- **Applications** – Compact direct drive fan for applications at higher pressures requiring performance from **800 CFM, (or lower with narrow width construction,) to 19,000 CFM** and pressures to **42" SP** at temperatures not exceeding 200°F,. These versatile and dependable units are suited for material conveying, dust and fume removal, and handling of industrial gases. Efficient airflow is provided at high pressure to flow ratios with lower sound levels than many other selections. Available in **sizes 12" to 36"**, in clockwise or counterclockwise rotations, and in all standard discharge positions. Housing discharge position can be changed on all sizes.
- **Standard Construction** – Motor pedestal and continuously welded housings built of heavy gauge hot rolled steel with blue industrial duty enamel finish are standard construction.
- **Wheels** – Three types of wheels are available. Type AH – Air handling wheel for light dust loading. Type MH – Material handling wheel for materials conveying. Type TH – Trim handling wheel for trim and long materials. See page 3 for additional information on wheel types. Fans are electronically statically and dynamically balanced to the requirements of Fan Application Category BV-3 of AMCA ANSI Std. 204-96 and whenever possible receive Operational test and inspection prior to shipment.
- **Motor Out of the Airstream** – Exterior motor mounting for easy electrical connection and lubrication of motor is standard. Motors can be furnished as Dripproof Protected, TEFC, Mill and Chemical Duty, or to specifications upon request.
- **Fan Inlets and Outlets** – Straight inlet and outlet connections are standard. Optional continuously welded flanges are available. Flange bolt holes are optional.
- **Special Features and Options** – Accessories including guards, companion flanges, dampers, louvers, inlet bells, sub-bases, vibration isolators, lifting lugs, special coatings, spark resistant Construction, leak resistant construction, and sound mufflers are available. See pages 26 and 27.



Principal Dimensions Series 05- Arrangement 4

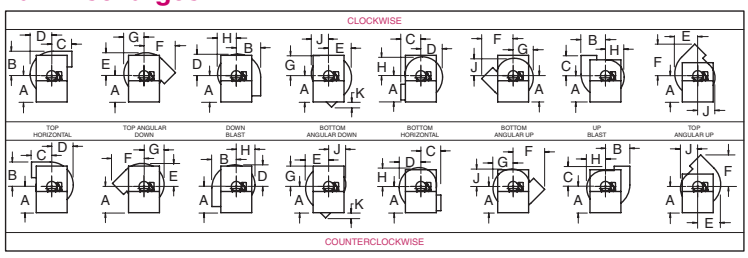
Principal Dimensions (Inches) – Sizes 12" - 36"

Fan Size	A	B	C	D	L	M	R	T	U	V	W	X	Y
12	16	11 5/8	14 1/4	10 3/8	*21 1/4	6 3/4	7	18 1/4	19 1/2	9/16 x 1 1/16	*6	*25 1/4	9 1/2
15	18 3/4	14 3/4	16 5/8	13 3/16	*24 1/2	7 9/16	9	21 1/2	22 3/4	9/16 x 1 1/16	*6	*33 13/16	16 1/2
19	22	18	18 7/8	16 1/8	27 3/4	8 7/16	11	24 3/4	26	9/16 x 1 1/16	6	38 1/16	19
22	26 3/4	21 5/16	22	19 1/16	32	9 5/16	13	29	30 1/4	9/16 x 1 1/16	7	39 13/16	19
26	28 1/2	24 9/16	23 5/8	22	35 3/4	10 1/8	15	31 3/4	33 1/2	11/16 x 1 3/16	7	41 1/2	19
29	34 3/4	27 7/8	27 1/2	24 15/16	41 3/4	11 1/8	17	37 3/4	39 1/2	11/16 x 1 3/16	9	45 3/4	21 1/2
33	38	31 1/8	30	27 7/8	45 1/4	11 15/16	18 15/16	41 1/4	43	11/16 x 1 3/16	9	49 3/4	23 3/4
36	38	34 3/8	30	30 3/4	45 1/4	12 13/16	20 15/16	41 1/4	43	11/16 x 1 3/16	9	51 7/16	23 3/4

NOTE: Dimensions and specifications are subject to change. Certified prints are available.

Fan Size	AA	CC	DD	EE	Motor Frame	
					Minimum	Maximum
12	*13 1/4	24 3/4	7 1/4	6 1/8	56	184T
15	*14 13/16	33 5/16	8	7 11/16	143T	256T
19	16 9/16	37 9/16	8 7/8	9 7/16	143T	286T
22	18 5/16	39 5/16	9 3/4	11 1/8	213T	286T
26	20	40 15/16	10 9/16	12 3/4	213T	286T
29	21 3/4	45 1/4	11 3/8	14 7/16	254T	326T
33	23 1/2	49 1/4	12 5/16	16 3/16	254T	365T
36	25 3/16	50 15/16	13 1/8	17 7/8	254T	365T

Fan Discharges



NOTE: Maximum Temp. 200°F. Rotatable Housing, Clockwise Rotation Shown. Counterclockwise Opposite. Dimensions and specifications are subject to change. Certified prints are available. Inlet support leg is optional on sizes 12 and 15. For bottom angular down and/or down blast, contact factory when discharge flanges are required.

Series 05F – Flange Mounted Industrial Exhauster



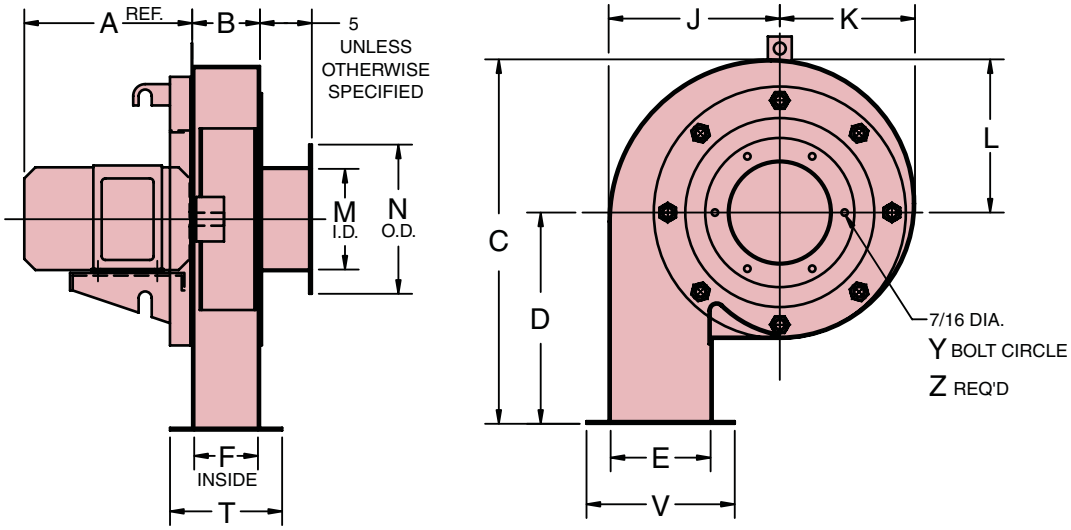
Series 05F

Hartzell Fan, Inc. certifies that the Series 05F shown on pages 5 through 12 are licensed to bear the AMCA Seal for Air Performance. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and comply with the requirements of the AMCA Certified Ratings Program.

- **Applications** – Compact direct drive fan for vertical mounting directly to dust collector or other applications at higher pressures requiring performance from **800 CFM (or lower with narrow width construction), to 15,000 CFM** and pressures to **18" SP** at temperatures not exceeding 200°F. These versatile and dependable units are suited for material conveying, dust and fume removal, and handling of industrial gases. Efficient airflow is provided at high pressure to flow ratios with lower sound levels than many other selections. Available in **sizes 12" to 33"** in clockwise or counterclockwise rotations.
- **Standard Construction** – Motor pedestal and continuously welded housings built of heavy gauge hot rolled steel with blue industrial duty enamel finish are standard construction.
- **Wheels** – Three types of wheels are available. Type AH – Air handling wheel for light dust loading. Type MH – Material handling wheel for materials conveying. Type TH – Trim handling wheel for trim and long materials. See page 3 for additional information on wheel types. Fans are electronically statically and dynamically balanced to the requirements of Fan Application Category BV-3 of AMCA ANSI Std. 204-96 and whenever possible receive Operational Test and Inspection prior to shipment.
- **Motor Out of the Airstream** – Exterior motor mounting for easy electrical connection and lubrication of motor is standard. Motors can be furnished as Dripproof Protected, TEFC, Mill and Chemical Duty, or to specifications upon request.
- **Fan Inlets and Outlets** – Flanged inlet and outlet connections with bolt holes are standard.
- **Special Features and Options** – Accessories including guards, companion flanges, dampers, inlet bells, lifting lugs, special coatings, spark resistant construction, leak resistant construction, and sound mufflers are available. See pages 26 and 27.

ABS Certificate of Design Assessment Received

Principal Dimensions Series 05F – Arrangement 4



Principal Dimensions (Inches) – Sizes 12" - 36"

Fan Size	A	B	C	D	E	F	J	K	L	M	N	T	V	Y	Z	Motor Frame	
																Minimum	Maximum
12	13 1/16	6 1/16	20 13/16	10 1/2	6 3/4	5 13/16	11 9/16	9 1/8	10 5/16	6 13/16	10 1/16	9 1/8	10	8 3/4	6	56	184T
15	20 3/4	7 11/16	25 15/16	12 13/16	8 5/8	7 7/16	14 11/16	11 19/32	13 1/8	8 3/4	12 1/16	10 11/16	11 7/8	10 3/4	6	143T	256T
19	23 1/16	9 7/16	31 3/8	15 1/4	10 1/2	9 1/16	18	14 7/32	16 1/8	10 3/4	14 1/16	12 1/2	13 7/8	12 3/4	6	143T	286T
22	23 1/16	11 1/8	36 11/16	17 11/16	12 7/16	10 3/4	21 1/4	16 25/32	19	12 3/4	16 1/16	14 1/8	15 13/16	14 3/4	6	213T	286T
26	26 1/16	12 3/4	42	20 1/16	14 3/8	12 7/16	24 1/2	19 11/32	21 15/16	14 3/4	18 1/16	15 13/16	17 3/4	16 3/4	6	213T	286T
29	25 7/16	14 7/16	47 5/16	22 7/16	16 5/16	14 1/16	27 3/4	21 29/32	24 7/8	16 5/8	20 1/16	17 7/16	19 11/16	18 3/4	8	254T	326T
33	27 13/16	16 3/16	52 9/16	24 13/16	18 3/16	15 11/16	31	24 15/32	27 3/4	18 9/16	22	19 3/16	21 11/16	20 3/4	8	254T	365T

NOTE: Clockwise rotation shown. Counterclockwise rotation opposite. For vertical, inlet down, installation only. For horizontal installation contact factory. Dimensions and specifications are subject to change. Certified prints are available.

Rating Table – Direct or Coupled Drive

Class II
Class III
Class IV

Series 05 & Series 05F Industrial Exhauster (Direct Drive, Wheel Type AH)

Size	Model	Class	Motor HP	Motor RPM	Peak Fan BHP	Cubic Feet Per Minute vs. Static Pressure 1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	12"	14"	16"	18"	Outlet Area sq. ft.	Wheel Diameter Inches
12	A05-4-122AH100_ _ _ F3	2	1/2	1750	0.47	800	534													0.27	12 1/4
12	A05-4-122AH100_ _ _ L2	2	5	3450	3.62	1907	1792	1680	1565	1444	1318	1179	1011	809						0.27	12 1/4
15	A05-4-152AH100_ _ _ I3	2	1 1/2	1750	1.60	1841	1549	1215	653											0.44	15 5/8
15	A05-4-152AH100_ _ _ O2	2	15	3450	12.2					3469	3323	3172	3018	2859	2695	2325	1852			0.44	15 5/8
19	A05-4-192AH100_ _ _ L3	2	5	1750	4.14	3832	3467	3088	2674	2205	1516									0.67	19 1/8
22	A05-4-222AH100_ _ _ N3	2	10	1750	9.42	6483	6082	5634	5135	4667	4172	3515	2428							0.93	22 5/8
26	A05-4-262AH100_ _ _ P3	2	20	1750	19.3		9680	9200	8673	8097	7542	7006	6423	5686	4769					1.24	26 1/8
29	A05-4-292AH100_ _ _ N4	2	10	1160	9.95	9689	8822	7870	7009	6041	4716									1.60	29 5/8
29	A05-4-292AH100_ _ _ R3	2	30	1750	34.2						12348	11775	11210	10635	10032	8651	6734			1.60	29 5/8
33	A05-4-332AH100_ _ _ O4	2	15	1160	17.1		12714	11597	10613	9651	8590	7277	5352							1.98	33
33	A05-4-332AH100_ _ _ U3	2	60	1750	58.6										15447	14145	12692	10906	8457	1.98	33
36	A05-4-362AH100_ _ _ R4	2	30	1160	28.2	18609	17660	16544	15310	14249	13187	12047	10730	9036	6291					2.42	36 1/2
40	A05-8-402AH100_ _ _ S4	2	40	1160	44.7			22565	21225	19918	18760	17601	16382	15037	13477	8341				2.91	40
45	A05-8-452AH100_ _ _ W4	2	100	1160	81.6						29082	27760	26462	25149	23776	20676	16465			3.70	45 1/8
50	A05-8-502AH100_ _ _ Y4	2	150	1160	143											34141	30875	26986	21750	4.64	50 1/2
57	A05-8-572AH100_ _ _ X5	2	125	870	116					46344	43951	41737	39520	37211	34735	28703	17945			6.01	57 1/2

Size	Model	Class	Motor HP	Motor RPM	Peak Fan BHP	Cubic Feet Per Minute vs. Static Pressure 16"	18"	20"	22"	24"	26"	28"	30"	32"	34"	36"	38"	40"	42"	Outlet Area sq. ft.	Wheel Diameter Inches
19	A05-4-193AH100_ _ _ R2	3	30	3450	31.7	5170	4708	4191	3552	2625										0.67	19 1/8
22	A05-4-224AH100_ _ _ V2	4	75	3450	72.2						7362	6617	5650	3240						0.93	22 5/8
26	A05-4-264AH100_ _ _ Y2	4	150	3450	148												9862	8698	6525	1.24	26 1/8
36	A05-4-363AH100_ _ _ W3	3	100	1750	97.0	18119	16385	14246	11479											2.42	36 1/2
57	A05-8-573AH100_ _ _ B4	3	300	1160	274		45875	41615	36351	29702										6.01	57 1/2

Series 05 & Series 05F Industrial Exhauster (Direct Drive, Wheel Type MH)

Size	Model	Class	Motor HP	Motor RPM	Peak Fan BHP	Cubic Feet Per Minute vs. Static Pressure 1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	12"	14"	16"	18"	Outlet Area sq. ft.	Wheel Diameter Inches
12	A05-4-122MH100_ _ _ G3	2	3/4	1750	0.61	840	484													0.273	12 1/4
12	A05-4-122MH100_ _ _ L2	2	5	3450	4.70	2011	1896	1775	1641	1491	1323	1132	898	638						0.273	12 1/4
15	A05-4-152MH100_ _ _ J3	2	2	1750	2.07	1948	1606	1154												0.444	15 5/8
15	A05-4-152MH100_ _ _ O2	2	15	3450	15.9						3495	3314	3121	2913	2690	2179	1542			0.444	15 5/8
19	A05-4-192MH100_ _ _ L3	2	5	1750	5.68		3435	3093	2694	2164	1497									0.665	19 1/8
22	A05-4-222MH100_ _ _ O3	2	15	1750	12.5	6584	6200	5787	5341	4842	4247	3502	2505							0.93	22 5/8
26	A05-4-262MH100_ _ _ Q3	2	25	1750	25.7		9846	9392	8909	8397	7859	7239	6539	5711	4682					1.24	26 1/8
29	A05-4-292MH100_ _ _ O4	2	15	1160	13.5	10100	9285	8384	7369	6196	4852	2717								1.595	29 5/8
29	A05-4-292MH100_ _ _ T3	2	50	1750	46.3							12539	11885	11192	10453	8833	6968	3783		1.595	29 5/8
33	A05-4-332MH100_ _ _ Q4	2	25	1160	23.1	14174	13277	12329	11290	10142	8844	7420	5720							1.979	33
36	A05-4-362MH100_ _ _ S4	2	40	1160	38.3		18413	17402	16316	15148	13879	12478	10956	9273	7277					2.421	36 1/2
40	A05-8-402MH100_ _ _ U4	2	60	1160	60.6				22444	21230	19943	18564	17071	15445	13733	9602				2.908	40
45	A05-8-452MH100_ _ _ W4	2	100	1160	111							29571	28082	26504	24826	21141	16965	11124		3.701	45 1/8
50	A05-8-502MH100_ _ _ Z4	2	200	1160	194											35799	31802	27498	22542	4.635	50 1/2
57	A05-8-572MH100_ _ _ Y5	2	150	870	157						46845	44365	41730	38914	35873	29278	21141			6.009	57 1/2

Size	Model	Class	Motor HP	Motor RPM	Peak Fan BHP	Cubic Feet Per Minute vs. Static Pressure 16"	18"	20"	22"	24"	26"	28"	30"	32"	34"	36"	38"	40"	42"	Outlet Area sq. ft.	Wheel Diameter Inches
19	A05-4-193MH100_ _ _ S2	3	40	3450	43.5	5204	4685	4097	3477	2607										0.665	19 1/8
22	A05-4-224MH100_ _ _ W2	4	100	3450	96.0						7407	6546	5558	4291						0.93	22 5/8
26	A05-4-264MH100_ _ _ Z2	4	200	3450	197												9716	8557	7201	1.24	26 1/8
36	A05-4-363MH100_ _ _ X3	3	125	1750	132	18757	16743	14563	12047	8364										2.421	36 1/2
57	A05-8-573MH100_ _ _ B4	3	300	1160	372		47303	42469	37204	31184	22880									6.009	57 1/2

Series 05 Industrial Exhauster (Coupled Drive, Wheel Type PW)

Size	Model	Class	Motor HP	Motor RPM	Peak Fan BHP	Cubic Feet Per Minute vs. Static Pressure 1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	12"	14"	16"	18"	Outlet Area sq. ft.	Wheel Diameter Inches
12	A05-8-122PW100_ _ _ G3	2	3/4	1750	0.54	752	441													0.273	12 1/4
12	A05-8-122PW100_ _ _ L2	2	5	3450	4.14	1762	1670	1573	1470	1354	1218	1048	813	527						0.273	12 1/4
15	A05-8-152PW100_ _ _ J3	2	2	1750	1.82	1719	1454	1067												0.444	15 5/8
15	A05-8-152PW100_ _ _ O2	2	15	3450	14.0			3496	3375	3249	3118	2981	2832	2667	2482	2008	1355			0.444	15 5/8
19	A05-8-192PW100_ _ _ L3	2	5	1750	5.24	3372	3095	2778	2392	1884	1087									0.665	19 1/8
22	A05-8-222PW100_ _ _ O3	2	15	1750	11.7	5939	5591	5210	4787	4327	3753	2931								0.93	22 5/8
26	A05-8-262PW100_ _ _ Q3	2	25	1750	24.1	9274	8881	8467	8021	7538	7027	6468	5777	4845	3744					1.24	26 1/8
29	A05-8-292PW100_ _ _ O4	2	15	1160	12.9	9060	8362	7567	6670	5593	3894									1.595	29 5/8
29	A05-8-292PW100_ _ _ T3	2	50	1750	44.4					12390	11869	11319	10740	10129	9471	7870	5403			1.595	29 5/8
33	A05-8-332PW100_ _ _ Q4	2	25	1160	22.2	12704	11942	11115	10195	9180	8008	6335	3974							1.979	33
36	A05-8-362PW100_ _ _ S4	2	40	1160	36.8	17378	16540	15673	14716	13681	12560	11310	9764	7547	4509					2.421	36 1/2
40	A05-8-402PW100_ _ _ U4	2	60	1160	58.1	23060	22139	21210	20222	19153	18012	16793	15468	13962	11969	5983				2.908	40
45	A05-8-452PW100_ _ _ W4	2	100	1160	106					29139	27947	26692	25371	23979	22489	18961	13519			3.701	45 1/8
50	A05-8-502PW100_ _ _ Z4	2	200	1160	186									37075	35590	32415	28801	23903	17278	4.635	50 1/2
57	A05-8-572PW100_ _ _ Y5	2	150	870	150				46313	44349	42268	40070	37741	35245	32508	24916	12824			6.009	57 1/2

Size	Model	Class	Motor HP	Motor RPM	Peak Fan BHP	Cubic Feet Per Minute vs. Static Pressure 16"	18"	20"	22"	24"	26"	28"	30"	32"	34"	36"	38"	40"	42"	Outlet Area sq. ft.	Wheel Diameter Inches
19	A05-8-193PW100_ _ _ S2	3	40	3450	40.1	4614	4122	3535	2795	1513										0.665	19 1/8
22	A05-8-224PW100_ _ _ W2	4	100	3450	90.0					7135	6304	5416	3929							0.93	22 5/8
26	A05-8-264PW100_ _ _ Z2	4	200	3450	185											9035	7954	6049		1.24	26 1/8
36	A05-8-363PW100_ _ _ X3	3	125	1750	126	17002	14987	12149	8705											2.421	36 1/2
57	A05-8-573PW100_ _ _ B4	3	300	1160	357	46993	42852	37720	30766	22505										6.009	57 1/2

Performance certified is for installation Type D: ducted inlet/ducted outlet. Power rating (BHP) excludes transmission losses. Performance data is based on standard air conditions (0.075 #/ft.³). Performance ratings do not include the effects of appurtenances (accessories). The AMCA Certified Ratings seal does not apply to type TH or PR wheel. MOST EFFICIENT FAN SELECTION APPEARS IN BOLD PRINT. **To complete model code, add arrangement, class of construction, motor enclosure code, motor horsepower code and motor speed code. Refer to page 2 for more information.**

Size 12 Rating Table

Class II | Class III | Class IV

Series 05 Type AH Industrial Exhauster A05-_-12_AH100_ _ _ _ _ _

Wheel Diameter – 12.25 in.
Outlet Area – 0.273 sq. ft.

	Outlet Velocity	STATIC PRESSURE															
		1"		2"		3"		4"		5"		6"		7"		8"	
CFM	FPM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
400	1465	1258	0.13	**1640**	**0.25**	1953	0.40	2232	0.57	2483	0.77	2711	0.97	2923	1.19	3121	1.42
600	2198	1485	0.24	1813	0.39	**2097**	**0.55**	**2345**	**0.74**	**2569**	**0.94**	2779	1.16	2978	1.40	3168	1.66
800	2930	1749	0.40	2040	0.61	2288	0.80	2516	1.01	**2728**	**1.24**	**2926**	**1.47**	**3108**	**1.72**	**3280**	**1.98**
1000	3663	2036	0.67	2296	0.89	2523	1.15	2727	1.39	2919	1.64	3101	1.91	**3275**	**2.18**	**3441**	**2.47**
1200	4396	2336	1.04	2570	1.30	2779	1.58	2969	1.89	3146	2.19	3312	2.47	3472	2.77	3626	3.09
1400	5128	2645	1.53	2858	1.85	3050	2.14	3227	2.48	3393	2.84	3550	3.20	3698	3.54	3841	3.87
1600	5861	2960	2.17	3156	2.55	3334	2.89	3499	3.22	3655	3.61	3803	4.02	3944	4.43	4079	4.85
1800	6593	3279	2.98	3462	3.41	3627	3.82	3781	4.19	3927	4.56	4067	4.99	4201	5.44	4330	5.91
2000	7326	3600	3.97	3772	4.45	3927	4.92	4072	5.37	4210	5.77	4341	6.18	4468	6.64	4591	7.14
		9"		10"		11"		12"		13"		14"		15"		16"	
CFM	OV FPM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
600	2198	3348	1.93	3520	2.22	3685	2.51	3842	2.81	3993	3.12	4140	3.44	4281	3.77	4419	4.10
900	3297	**3518**	**2.49**	**3671**	**2.79**	**3818**	**3.10**	3960	3.42	4100	3.75	4236	4.10	4370	4.46	4500	4.83
1200	4396	3775	3.42	**3919**	**3.75**	**4058**	**4.08**	**4193**	**4.43**	**4324**	**4.78**	**4451**	**5.14**	**4572**	**5.52**	**4691**	**5.90**
1500	5495	4091	4.69	4220	5.06	4347	5.44	4471	5.83	4593	6.24	4711	6.65	**4827**	**7.06**	**4941**	**7.48**
1800	6593	4454	6.38	4574	6.85	4690	7.27	4803	7.70	4914	8.13	5022	8.56				
2100	7692	4841	8.36	4954	8.90												

Series 05 Type MH or TH Industrial Exhauster A05-_-12_ _H100_ _ _ _ _ _

Wheel Diameter – 12.25 in.
Outlet Area – 0.273 sq. ft.

	Outlet Velocity	STATIC PRESSURE															
		1"		2"		3"		4"		5"		6"		7"		8"	
CFM	FPM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
400	1465	1281	0.14	1691	0.27	2011	0.42	2285	0.58	2532	0.74	2761	0.92	2974	1.12	3174	1.32
600	2198	1470	0.26	1840	0.41	**2149**	**0.59**	**2415**	**0.80**	2653	1.03	2867	1.25	3066	1.48	3252	1.71
800	2930	1700	0.45	2029	0.65	2311	0.86	2562	1.08	**2792**	**1.32**	**3004**	**1.57**	**3200**	**1.86**	3383	2.16
1000	3663	1958	0.73	2247	0.99	2505	1.24	2739	1.50	2954	1.76	3154	2.04	**3343**	**2.33**	**3523**	**2.63**
1200	4396	2236	1.14	2489	1.45	2724	1.75	2940	2.05	3142	2.35	3331	2.66	3510	2.98	3680	3.31
1400	5128	2527	1.72	2750	2.03	2962	2.41	3162	2.75	3350	3.09	3528	3.44	3698	3.80	3860	4.17
1600	5861	2825	2.47	3024	2.77	3216	3.19	3400	3.64	3575	4.03	3742	4.41	3903	4.81	4057	5.21
1800	6593	3127	3.40	3310	3.76	3484	4.16	3652	4.65	3815	5.15	3971	5.59	4123	6.02	4269	6.46
2000	7326	3433	4.54	3603	4.99	3761	5.36	3916	5.86	4067	6.41	4214	6.97	4356	7.47	4494	7.95
		9"		10"		11"		12"		13"		14"		15"		16"	
CFM	OV FPM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
600	2198	3428	1.95	3596	2.19	3758	2.44	3915	2.71	4067	2.98	4214	3.26	4357	3.55	4495	3.84
900	3297	3623	2.69	3786	3.03	3941	3.37	4089	3.71	4231	4.04	4368	4.38	4501	4.72	4630	5.07
1200	4396	3843	3.65	**4000**	**4.00**	**4151**	**4.35**	**4297**	**4.72**	**4438**	**5.11**	**4573**	**5.52**	**4704**	**5.94**	**4831**	**6.38**
1500	5495	4108	5.05	4254	5.45	4396	5.85	4533	6.26	4666	6.68	4796	7.10	**4922**	**7.54**		
1800	6593	4410	6.91	4547	7.36	4680	7.82	4809	8.28	4935	8.75						
2100	7692	4742	9.30	4870	9.80	4994	10.30										

Series 05 Type PW Industrial Exhauster A05-_-12_PW100_ _ _ _ _ _

Wheel Diameter – 12.25 in.
Outlet Area – 0.273 sq. ft.

	Outlet Velocity	STATIC PRESSURE															
		1"		2"		3"		4"		5"		6"		7"		8"	
CFM	FPM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
400	1465	1307	0.16	**1720**	**0.29**	**2046**	**0.44**	2326	0.61	2575	0.81	2803	1.02	3015	1.24	3213	1.48
600	2198	1535	0.29	1882	0.49	2187	0.68	**2458**	**0.86**	**2697**	**1.08**	**2916**	**1.30**	3118	1.55	3309	1.80
800	2930	1823	0.53	2108	0.75	2371	1.01	2615	1.28	2843	1.53	3056	1.77	**3256**	**2.02**	**3441**	**2.29**
1000	3663	2139	0.89	2382	1.14	2608	1.42	2823	1.74	3027	2.07	3222	2.41	3408	2.73	3587	3.04
1200	4396	2472	1.41	2684	1.70	2881	2.01	3071	2.35	3253	2.71	3429	3.10	3599	3.50	3763	3.91
1400	5128	2815	2.13	3003	2.45	3180	2.79	3348	3.16	3511	3.55	3670	3.95	3825	4.39	3976	4.84
1600	5861	3165	3.06	3332	3.43	3493	3.81	3646	4.20	3794	4.62	3938	5.05	4079	5.51	4217	5.98
1800	6593	3518	4.24	3671	4.66	3816	5.08	3958	5.51	4094	5.96	4225	6.42	4354	6.90	4481	7.40
2000	7326	3874	5.70	4016	6.18	4148	6.63	4279	7.10	4406	7.58	4528	8.08	4647	8.59	4764	9.12
		9"		10"		11"		12"		13"		14"		15"		16"	
CFM	OV FPM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
600	2198	3489	2.08	3660	2.36	3823	2.65	3980	2.96	4131	3.27	4277	3.60	4419	3.93	4556	4.28
900	3297	**3687**	**2.92**	**3851**	**3.23**	**4007**	**3.55**	**4158**	**3.88**	**4303**	**4.23**	**4443**	**4.58**	**4579**	**4.94**	4710	5.32
1200	4396	3922	4.31	4077	4.69	4228	5.06	4374	5.43	4515	5.79	**4653**	**6.16**	**4786**	**6.53**	**4916**	**6.91**
1500	5495	4234	5.86	4372	6.36	4507	6.86	4639	7.37	4769	7.88	4895	8.39	5020	8.87		
1800	6593	4606	7.92	4729	8.45	4850	9.00	4969	9.57								
2100	7692	5022	10.70														

Performance certified is for installation Type D: ducted inlet/ducted outlet. Power rating (BHP) excludes transmission losses. Performance data is based on standard air conditions (0.075 #/ft.³). Performance ratings do not include the effects of appurtenances (accessories). The AMCA Certified Ratings seal does not apply to type TH or PR wheel. MOST EFFICIENT FAN SELECTION APPEARS IN BOLD PRINT. **To complete model code, add arrangement, class of construction, motor enclosure code, motor horsepower code and motor speed code. Refer to page 2 for more information.**

Size 15 Rating Table

Class II | Class III | Class IV

Series 05 Type AH Industrial Exhauster A05-_-15_AH100_ _ _ _ _ _

Wheel Diameter – 15.625 in.
Outlet Area – 0.444 sq. ft.

	Outlet Velocity	STATIC PRESSURE															
		1"		2"		3"		4"		5"		6"		7"		8"	
CFM	FPM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
600	1351	**964**	**0.19**	1268	0.38	1521	0.62	1743	0.90	1941	1.21	2122	1.53	2289	1.88	2445	2.25
900	2027	1119	0.34	1386	0.57	**1614**	**0.83**	**1811**	**1.12**	1991	1.45	2161	1.81	2321	2.20	2472	2.61
1200	2703	1305	0.56	1540	0.86	1743	1.16	**1928**	**1.49**	**2098**	**1.84**	**2254**	**2.21**	**2399**	**2.61**	2537	3.03
1500	3378	1507	0.90	1719	1.25	1903	1.63	2070	1.99	2227	2.39	**2374**	**2.81**	**2515**	**3.23**	**2647**	**3.68**
1800	4054	1720	1.39	1913	1.77	2083	2.22	2237	2.68	2380	3.11	2516	3.56	2646	4.04	2772	4.53
2100	4730	1941	2.03	2116	2.49	2274	2.95	2418	3.48	2553	4.03	2679	4.53	2800	5.03	2916	5.56
2400	5405	2166	2.86	2328	3.41	2474	3.91	2609	4.45	2736	5.06	2856	5.68	2971	6.29	3080	6.86
2700	6081	2395	3.89	2545	4.53	2681	5.12	2808	5.67	2928	6.29	3042	6.97	3151	7.67	3256	8.38
3000	6757	2626	5.17	2767	5.89	2895	6.58	3014	7.21	3127	7.82	3235	8.51	3339	9.25	3439	10.00
		9"		10"		11"		12"		13"		14"		15"		16"	
CFM	OV FPM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
800	1802	2604	2.91	2741	3.34	2872	3.79	2997	4.25	3118	4.72	3234	5.21	3347	5.72	3456	6.23
1200	2703	2669	3.48	2798	3.96	2922	4.46	3042	4.97	3158	5.51	3271	6.06	3380	6.64	3487	7.22
1600	3604	**2811**	**4.41**	**2929**	**4.90**	**3042**	**5.42**	**3151**	**5.95**	**3257**	**6.50**	3360	7.06	3460	7.65	3559	8.26
2000	4505	2981	5.73	3093	6.28	**3202**	**6.84**	**3307**	**7.40**	**3409**	**7.98**	**3508**	**8.58**	**3604**	**9.19**	**3696**	**9.82**
2400	5405	3185	7.43	3288	8.02	3388	8.64	3486	9.28	3581	9.93	3675	10.60	**3767**	**11.30**	**3856**	**11.90**
2800	6306	3415	9.63	3511	10.30	3603	11.00	3694	11.60	3782	12.30	3869	13.00				

Series 05 Type MH or TH Industrial Exhauster A05-_-15_ _H100_ _ _ _ _ _

Wheel Diameter – 15.625 in.
Outlet Area – 0.444 sq. ft.

	Outlet Velocity	STATIC PRESSURE															
		1"		2"		3"		4"		5"		6"		7"		8"	
CFM	FPM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
600	1351	**985**	**0.20**	1310	0.41	1562	0.64	1779	0.88	1977	1.15	2158	1.44	2327	1.74	2484	2.06
900	2027	1115	0.36	1412	0.60	**1658**	**0.89**	1869	1.22	2055	1.56	2224	1.90	2381	2.25	2529	2.61
1200	2703	1274	0.62	1541	0.92	1768	1.24	**1971**	**1.59**	**2154**	**1.96**	**2321**	**2.39**	2475	2.84	2619	3.30
1500	3378	1454	1.00	1692	1.38	1902	1.75	2090	2.15	2263	2.56	**2425**	**2.99**	**2576**	**3.44**	**2718**	**3.93**
1800	4054	1649	1.51	1861	1.99	2053	2.43	2229	2.88	2392	3.35	2544	3.83	2688	4.32	2825	4.84
2100	4730	1855	2.24	2043	2.76	2218	3.31	2382	3.82	2535	4.34	2680	4.87	2817	5.42	2947	5.98
2400	5405	2068	3.21	2236	3.72	2396	4.37	2547	4.99	2691	5.56	2828	6.16	2958	6.76	3083	7.38
2700	6081	2285	4.43	2437	4.94	2583	5.63	2723	6.38	2858	7.06	2986	7.71	3110	8.37	3229	9.04
3000	6757	2504	5.91	2645	6.52	2778	7.16	2908	7.96	3033	8.81	3155	9.56	3272	10.30	3385	11.00
		9"		10"		11"		12"		13"		14"		15"		16"	
CFM	OV FPM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
800	1802	2651	2.77	2789	3.15	2921	3.54	3047	3.94	3169	4.35	3287	4.78	3401	5.21	3511	5.66
1200	2703	2754	3.74	2883	4.20	3006	4.65	3124	5.12	3237	5.59	3347	6.08	3454	6.57	3558	7.07
1600	3604	**2886**	**4.72**	**3013**	**5.28**	**3134**	**5.86**	3250	6.46	3362	7.08	3469	7.68	3572	8.28	3672	8.87
2000	4505	3032	6.13	**3153**	**6.70**	**3272**	**7.29**	**3386**	**7.89**	**3495**	**8.51**	**3601**	**9.17**	**3704**	**9.86**	**3803**	**10.60**
2400	5405	3202	8.00	3318	8.64	3429	9.29	3537	9.95	3642	10.60	3744	11.30	**3844**	**12.00**	**3941**	**12.70**
2800	6306	3393	10.40	3502	11.10	3608	11.80	3711	12.50	3811	13.30	3908	14.00				

Series 05 Type PW Industrial Exhauster A05-_-15_PW100_ _ _ _ _ _

Wheel Diameter – 15.625 in.
Outlet Area – 0.444 sq. ft.

	Outlet Velocity	STATIC PRESSURE															
		1"		2"		3"		4"		5"		6"		7"		8"	
CFM	FPM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
600	1351	1004	0.23	**1332**	**0.43**	1589	0.68	1810	0.96	2007	1.26	2188	1.60	2355	1.96	2511	2.34
900	2027	1157	0.41	1441	0.71	**1687**	**0.99**	**1900**	**1.29**	**2090**	**1.63**	2262	1.99	2423	2.38	2573	2.79
1200	2703	1356	0.72	1593	1.07	1809	1.47	2008	1.85	2192	2.22	**2362**	**2.59**	**2517**	**3.01**	**2663**	**3.45**
1500	3378	1579	1.19	1780	1.58	1968	2.02	2145	2.51	2312	3.02	2471	3.51	2622	3.97	2766	4.43
1800	4054	1814	1.86	1992	2.30	2156	2.79	2313	3.31	2464	3.89	2609	4.49	2748	5.10	2882	5.70
2100	4730	2059	2.78	2217	3.27	2363	3.80	2504	4.37	2640	4.98	2771	5.63	2899	6.31	3023	7.01
2400	5405	2310	3.99	2450	4.54	2584	5.12	2711	5.73	2834	6.38	2954	7.06	3071	7.77	3186	8.53
2700	6081	2563	5.51	2691	6.13	2813	6.76	2931	7.42	3043	8.12	3153	8.84	3260	9.59	3366	10.40
3000	6757	2819	7.38	2937	8.08	3049	8.77	3158	9.49	3263	10.20	3364	11.00	3463	11.80	3561	12.60
		9"		10"		11"		12"		13"		14"		15"		16"	
CFM	OV FPM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
800	1802	2692	3.04	2829	3.49	2960	3.95	3086	4.43	3207	4.92	3323	5.43	3436	5.96	3545	6.50
1200	2703	**2801**	**3.91**	**2932**	**4.39**	3058	4.89	3178	5.41	3294	5.94	3407	6.49	3515	7.06	3620	7.64
1600	3604	2937	5.32	**3066**	**5.81**	**3189**	**6.33**	**3306**	**6.88**	**3418**	**7.45**	**3527**	**8.04**	**3632**	**8.65**	**3735**	**9.27**
2000	4505	3097	7.24	3217	7.90	3334	8.52	3447	9.13	3557	9.74	3664	10.40	**3769**	**11.00**	**3870**	**11.60**
2400	5405	3298	9.31	3407	10.10	3514	10.90	3618	11.70	3720	12.50	3820	13.40	3919	14.10		
2800	6306	3531	11.90	3630	12.70	3728	13.60	3823	14.50	3918	15.50						

Performance certified is for installation Type D: ducted inlet/ducted outlet. Power rating (BHP) excludes transmission losses. Performance data is based on standard air conditions (0.075 #/ft.³). Performance ratings do not include the effects of appurtenances (accessories). The AMCA Certified Ratings seal does not apply to type TH or PR wheel. MOST EFFICIENT FAN SELECTION APPEARS IN BOLD PRINT. **To complete model code, add arrangement, class of construction, motor enclosure code, motor horsepower code and motor speed code. Refer to page 2 for more information.**

Size 19 Rating Table

Class II | Class III | Class IV

Series 05 Type AH Industrial Exhauster A05-_-19_AH100_ _ _ _ _ _

Wheel Diameter – 19.125 in.
Outlet Area – 0.665 sq. ft.

	Outlet Velocity	STATIC PRESSURE															
		1"		2"		3"		4"		5"		6"		7"		8"	
CFM	FPM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1000	1504	786	0.28	**1028**	**0.53**	**1228**	**0.80**	1401	1.10	1556	1.42	1698	1.76	1830	2.12	1955	2.50
1500	2256	923	0.50	1132	0.84	**1310**	**1.20**	**1469**	**1.59**	**1614**	**1.98**	**1748**	**2.39**	**1873**	**2.81**	1990	3.25
2000	3008	1082	0.86	1269	1.29	1429	1.74	1572	2.21	**1704**	**2.69**	**1828**	**3.19**	**1945**	**3.70**	**2057**	**4.22**
2500	3759	1255	1.40	1422	1.91	1569	2.46	1701	3.02	1823	3.58	1937	4.16	2046	4.76	**2149**	**5.37**
3000	4511	1437	2.13	1588	2.76	1722	3.38	1845	4.03	1960	4.70	2067	5.37	2168	6.05	2265	6.74
3500	5263	1624	3.13	1762	3.86	1885	4.58	2000	5.31	2107	6.06	2208	6.83	2305	7.61	2396	8.40
4000	6015	1815	4.41	1942	5.25	2057	6.09	2163	6.91	2263	7.74	2359	8.59	2450	9.46	2538	10.30
4500	6767	2009	6.04	2127	6.97	2234	7.91	2334	8.86	2428	9.78	2518	10.70	2604	11.70	2687	12.60
5000	7519	2206	8.04	2315	9.07	2416	10.10	2510	11.20	2598	12.20	2683	13.20	2765	14.30	2844	15.30
		9"		12"		15"		18"		21"		24"		27"		30"	
CFM	OV FPM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1400	2105	2092	3.53	2400	4.96	2677	6.50	2930	8.15								
2100	3158	**2178**	**4.99**	**2469**	**6.69**	**2730**	**8.50**	2970	10.40	3192	12.40	3401	14.60	3601	16.70	3790	19.00
2800	4211	2312	6.83	**2580**	**8.92**	**2826**	**11.10**	**3055**	**13.30**	**3269**	**15.60**	**3470**	**18.00**	**3661**	**20.40**		
3500	5263	2484	9.19	2731	11.60	**2959**	**14.10**	**3174**	**16.80**	**3376**	**19.40**	**3568**	**22.20**	**3752**	**24.90**		
4200	6316	2679	12.10	2911	15.00	3124	17.80	3324	20.80	**3514**	**23.80**	**3696**	**26.90**				
4900	7368	2889	15.80	3108	19.00	3311	22.30	3500	25.60	3679	29.00						

Series 05 Type MH or TH Industrial Exhauster A05-_-19_ _H100_ _ _ _ _ _

Wheel Diameter – 19.125 in.
Outlet Area – 0.665 sq. ft.

	Outlet Velocity	STATIC PRESSURE															
		1"		2"		3"		4"		5"		6"		7"		8"	
CFM	FPM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1000	1504	790	0.30	**1031**	**0.56**	**1230**	**0.83**	**1401**	**1.13**	1553	1.44	1693	1.77	1822	2.11	1943	2.47
1500	2256	919	0.59	1136	0.93	1317	1.30	**1474**	**1.68**	**1617**	**2.08**	**1750**	**2.49**	**1875**	**2.92**	**1991**	**3.36**
2000	3008	1084	1.07	1264	1.49	1429	1.94	1579	2.43	1714	2.92	1838	3.42	**1953**	**3.93**	**2063**	**4.45**
2500	3759	1263	1.82	1420	2.32	1563	2.84	1698	3.39	1825	3.98	1945	4.59	2058	5.21	2162	5.83
3000	4511	1449	2.88	1594	3.47	1719	4.08	1838	4.70	1953	5.35	2064	6.03	2170	6.73	2272	7.46
3500	5263	1641	4.32	1774	5.02	1890	5.71	1997	6.41	2099	7.14	2200	7.88	2298	8.65	2392	9.44
4000	6015	1837	6.19	1958	7.01	2069	7.79	2168	8.58	2261	9.39	2351	10.20	2441	11.10	2528	11.90
4500	6767	2038	8.55	2147	9.50	2250	10.40	2346	11.30	2434	12.20	2517	13.10	2598	14.00	2677	14.90
5000	7519	2240	11.50	2340	12.50	2436	13.60	2526	14.50	2612	15.50	2691	16.50	2767	17.50	2840	18.50
		9"		12"		15"		18"		21"		24"		27"		30"	
CFM	OV FPM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1400	2105	2090	3.59	2393	4.96	2663	6.44	2909	8.03	3137	9.73	3350	11.50				
2100	3158	**2184**	**5.25**	**2473**	**6.98**	**2732**	**8.79**	**2969**	**10.70**	3189	12.60	3395	14.70	3589	16.80	3774	18.90
2800	4211	2326	7.47	2593	9.56	**2836**	**11.70**	**3062**	**14.00**	**3274**	**16.30**	**3474**	**18.70**	**3664**	**21.10**		
3500	5263	2484	10.20	2743	12.80	2977	15.40	3191	18.00	**3390**	**20.70**	**3579**	**23.40**	**3761**	**26.20**		
4200	6316	2669	14.00	2908	16.80	3132	19.80	3341	22.90	3536	26.00	3717	29.10				
4900	7368	2880	18.80	3097	21.90	3304	25.10	3501	28.50	3689	32.10						

Series 05 Type PW Industrial Exhauster A05-_-19_ PW100_ _ _ _ _ _

Wheel Diameter – 19.125 in.
Outlet Area – 0.665 sq. ft.

	Outlet Velocity	STATIC PRESSURE															
		1"		2"		3"		4"		5"		6"		7"		8"	
CFM	FPM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1000	1504	820	0.34	**1068**	**0.61**	**1269**	**0.90**	**1442**	**1.21**	**1598**	**1.53**	1742	1.88	1875	2.25	2000	2.63
1500	2256	974	0.70	1183	1.07	1365	1.44	**1526**	**1.84**	**1673**	**2.27**	**1808**	**2.71**	**1934**	**3.16**	**2052**	**3.61**
2000	3008	1161	1.30	1335	1.77	1494	2.27	1641	2.76	1776	3.25	1903	3.75	**2022**	**4.29**	**2135**	**4.86**
2500	3759	1367	2.24	1514	2.79	1652	3.39	1783	4.00	1906	4.62	2023	5.23	2134	5.84	2240	6.46
3000	4511	1584	3.59	1711	4.23	1832	4.90	1947	5.62	2058	6.36	2164	7.09	2267	7.83	2366	8.57
3500	5263	1808	5.43	1919	6.16	2026	6.92	2128	7.71	2228	8.54	2325	9.40	2419	10.30	2510	11.10
4000	6015	2035	7.85	2134	8.68	2230	9.53	2322	10.40	2412	11.30	2501	12.20	2587	13.20	2671	14.20
4500	6767	2265	10.90	2355	11.90	2441	12.80	2525	13.80	2608	14.80	2688	15.80	2767	16.80	2845	17.90
5000	7519	2497	14.80	2579	15.80	2658	16.80	2735	17.90	2811	19.00	2885	20.00	2957	21.20	3029	22.30
		9"		12"		15"		18"		21"		24"		27"		30"	
CFM	OV FPM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1400	2105	**2151**	**3.84**	2462	5.28	2740	6.85	2993	8.53	3226	10.30	3443	12.20	3647	14.10		
2100	3158	**2261**	**5.73**	**2554**	**7.60**	**2816**	**9.48**	**3057**	**11.40**	**3281**	**13.50**	3493	15.60	3693	17.80		
2800	4211	2411	8.36	2685	10.50	**2936**	**12.80**	**3167**	**15.20**	**3382**	**17.70**	**3584**	**20.20**	**3776**	**22.80**		
3500	5263	2599	12.00	2851	14.60	3085	17.10	3304	19.80	**3510**	**22.60**	**3705**	**25.50**				
4200	6316	2818	16.60	3048	19.70	3265	22.80	3470	25.90	3665	29.00						
4900	7368	3063	22.50	3271	26.10	3470	29.70	3661	33.30								

Performance certified is for installation Type D: ducted inlet/ducted outlet. Power rating (BHP) excludes transmission losses. Performance data is based on standard air conditions (0.075 #/ft.³). Performance ratings do not include the effects of appurtenances (accessories). The AMCA Certified Ratings seal does not apply to type TH or PR wheel. MOST EFFICIENT FAN SELECTION APPEARS IN BOLD PRINT. **To complete model code, add arrangement, class of construction, motor enclosure code, motor horsepower code and motor speed code. Refer to page 2 for more information.**

Size 22 Rating Table

Class II | Class III | Class IV

Series 05 Type AH Industrial Exhauster A05-_-22_AH100_ _ _ _ _ _

Wheel Diameter – 22.625 in.
Outlet Area – 0.93 sq. ft.

	Outlet Velocity	STATIC PRESSURE															
		2"		4"		6"		8"		10"		12"		14"		16"	
CFM	FPM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1000	1075	867	0.58	1218	1.35												
1800	1935	**926**	**0.97**	**1242**	**1.96**	1504	3.08	1729	4.34	1928	5.70	2110	7.15				
2600	2796	1042	1.56	**1316**	**2.81**	**1549**	**4.17**	**1759**	**5.64**	1952	7.20	2129	8.85	2293	10.60	2446	12.40
3400	3656	1193	2.50	1428	3.93	**1639**	**5.57**	**1829**	**7.29**	**2004**	**9.09**	**2168**	**11.00**	**2325**	**12.90**	2473	15.00
4200	4516	1348	3.81	1570	5.50	1754	7.31	1930	9.31	**2092**	**11.40**	**2243**	**13.50**	**2388**	**15.70**	**2526**	**18.00**
5000	5376	1512	5.57	1724	7.62	1896	9.63	2050	11.80	2201	14.10	2344	16.50	**2479**	**19.00**	**2608**	**21.50**
5800	6237	1687	7.92	1879	10.30	2048	12.60	2194	14.90	2329	17.40	2459	20.00	2587	22.70	2710	25.60
6600	7097	1868	10.90	2040	13.50	2204	16.20	2346	18.90	2475	21.50	2595	24.30	2710	27.10	2825	30.20
7400	7957	2054	14.60	2209	17.50	2361	20.50	2502	23.60	2627	26.50	2743	29.50	2852	32.50	2957	35.70
		20"		24"		28"		32"		36"		40"		44"		48"	
CFM	OV FPM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2700	2903	2730	16.60	2986	20.80	3222	25.30										
3600	3871	2757	20.00	3008	24.70	3240	29.60	3457	34.70	3662	40.00	3857	45.60	4042	51.30		
4500	4839	**2808**	**24.20**	**3046**	**29.30**	3272	34.60	3486	40.20	3687	46.00	3878	51.90	4061	58.10		
5400	5806	**2894**	**29.00**	**3117**	**34.70**	**3328**	**40.50**	**3530**	**46.60**	**3725**	**52.90**	3912	59.30	4092	65.90		
6300	6774	**3005**	**34.50**	**3215**	**40.80**	**3414**	**47.30**	**3605**	**53.90**	**3789**	**60.70**	**3966**	**67.70**	**4138**	**74.80**		
7200	7742	3131	40.80	3332	47.70	**3522**	**54.80**	**3703**	**62.10**	**3878**	**69.50**	**4046**	**77.00**				

Series 05 Type MH or TH Industrial Exhauster A05-_-22_ _H100_ _ _ _ _ _

Wheel Diameter – 22.625 in.
Outlet Area – 0.93 sq. ft.

	Outlet Velocity	STATIC PRESSURE															
		2"		4"		6"		8"		10"		12"		14"		16"	
CFM	FPM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1000	1075	858	0.63	1196	1.48	1459	2.50										
1800	1935	**927**	**1.06**	**1240**	**2.13**	1490	3.37	1707	4.75	1899	6.24	2074	7.84	2236	9.53	2386	11.30
2600	2796	1032	1.85	**1318**	**3.08**	**1554**	**4.54**	**1758**	**6.14**	1941	7.86	2111	9.68	2269	11.60	2416	13.60
3400	3656	1166	2.94	1419	4.53	1638	6.13	**1834**	**7.96**	**2010**	**9.90**	**2172**	**11.90**	**2322**	**14.10**	2464	16.30
4200	4516	1321	4.59	1543	6.55	1743	8.45	1925	10.30	**2093**	**12.50**	**2250**	**14.80**	**2395**	**17.10**	**2533**	**19.60**
5000	5376	1487	6.83	1685	8.96	1867	11.50	2035	13.70	2192	15.80	2340	18.30	**2480**	**20.80**	**2613**	**23.50**
5800	6237	1661	9.80	1841	12.30	2004	14.80	2160	17.80	2307	20.50	2445	22.90	2578	25.50	2705	28.30
6600	7097	1840	13.60	2004	16.50	2155	19.30	2296	22.20	2433	25.60	2565	29.00	2690	31.70	2810	34.40
7400	7957	2024	18.30	2173	21.50	2314	24.80	2445	27.90	2571	31.20	2694	35.00	2813	38.90	2927	42.20
		20"		24"		28"		32"		36"		40"		44"		48"	
CFM	OV FPM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2700	2903	2692	18.20	2939	22.80	3166	27.70	3379	32.80	3579	38.20	3769	43.70	3950	49.50		
3600	3871	2740	21.90	2981	27.00	3204	32.40	3413	38.00	3611	43.90	3798	49.90	3977	56.20	4148	62.70
4500	4839	**2813**	**26.30**	**3044**	**31.90**	3259	37.80	3463	43.90	3656	50.30	3840	56.90	4016	63.70		
5400	5806	**2902**	**31.60**	**3127**	**37.70**	**3336**	**44.10**	**3533**	**50.80**	**3719**	**57.60**	3897	64.70	4069	72.00		
6300	6774	3002	38.00	**3220**	**44.60**	**3424**	**51.50**	**3617**	**58.70**	**3799**	**66.10**	**3973**	**73.70**	**4140**	**81.50**		
7200	7742	3117	46.10	3325	52.90	3522	60.30	**3710**	**67.90**	**3889**	**75.80**	**4059**	**83.90**				

Series 05 Type PW Industrial Exhauster A05-_-22_ PW100_ _ _ _ _ _

Wheel Diameter – 22.625 in.
Outlet Area – 0.93 sq. ft.

	Outlet Velocity	STATIC PRESSURE															
		2"		4"		6"		8"		10"		12"		14"		16"	
CFM	FPM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1000	1075	890	0.69	1247	1.61	1524	2.70	1759	3.93								
1800	1935	963	1.21	**1280**	**2.34**	1544	3.69	1773	5.20	1976	6.82	2161	8.55	2331	10.40	2490	12.30
2600	2796	1081	2.05	1369	3.52	**1607**	**5.07**	**1815**	**6.75**	**2007**	**8.59**	2186	10.60	2354	12.70	2510	14.90
3400	3656	1241	3.44	1481	5.09	1704	7.03	**1902**	**9.02**	**2080**	**11.10**	**2243**	**13.20**	**2397**	**15.50**	**2545**	**17.80**
4200	4516	1417	5.46	1629	7.40	1820	9.48	2003	11.80	2176	14.30	2334	16.80	**2481**	**19.30**	**2619**	**21.80**
5000	5376	1605	8.26	1795	10.60	1967	12.90	2127	15.40	2281	18.00	2434	20.90	2578	23.90	2713	26.80
5800	6237	1802	12.00	1972	14.60	2130	17.30	2277	20.00	2416	22.80	2550	25.80	2683	29.00	2814	32.40
6600	7097	2005	16.70	2157	19.80	2302	22.80	2439	25.80	2568	28.90	2692	32.10	2811	35.40	2928	38.90
7400	7957	2212	22.60	2350	26.10	2482	29.50	2610	32.90	2731	36.30	2847	39.70	2959	43.30	3067	46.90
		20"		24"		28"		32"		36"		40"		44"		48"	
CFM	OV FPM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2700	2903	2799	19.90	3059	24.90	3300	30.20	3524	35.70	3735	41.50	3936	47.40	4127	53.60		
3600	3871	2834	23.90	3089	29.50	3326	35.50	3547	41.60	3755	48.00	3952	54.50	4141	61.40		
4500	4839	**2908**	**29.10**	**3143**	**35.00**	**3367**	**41.30**	3582	48.00	3787	55.00	3982	62.30	4169	69.70		
5400	5806	3010	35.90	**3237**	**42.30**	**3448**	**49.00**	**3648**	**55.90**	**3840**	**63.20**	**4026**	**70.80**				
6300	6774	3122	43.60	3345	51.00	**3551**	**58.40**	**3745**	**65.90**	**3929**	**73.60**	**4105**	**81.60**				
7200	7742	3245	52.30	3459	60.60	3662	69.10	3853	77.50	**4033**	**86.00**						

Performance certified is for installation Type D: ducted inlet/ducted outlet. Power rating (BHP) excludes transmission losses. Performance data is based on standard air conditions (0.075 #/ft.³). Performance ratings do not include the effects of appurtenances (accessories). The AMCA Certified Ratings seal does not apply to type TH or PR wheel. MOST EFFICIENT FAN SELECTION APPEARS IN BOLD PRINT. **To complete model code, add arrangement, class of construction, motor enclosure code, motor horsepower code and motor speed code. Refer to page 2 for more information.**

Size 26 Rating Table

Class II | Class III | Class IV

Series 05 Type AH Industrial Exhauster A05-_-26_AH100_ _ _ _ _ _

Wheel Diameter – 26.125 in.
Outlet Area – 1.24 sq. ft.

CFM	Outlet Velocity FPM	STATIC PRESSURE 2" RPM	2" BHP	4" RPM	4" BHP	6" RPM	6" BHP	8" RPM	8" BHP	10" RPM	10" BHP	12" RPM	12" BHP	14" RPM	14" BHP	16" RPM	16" BHP
1500	1210	755	0.84	1056	1.91												
2500	2016	**810**	**1.35**	**1079**	**2.70**	1305	4.23	1499	5.92	1671	7.76	1828	9.73	1973	11.80		
3500	2823	907	2.11	**1142**	**3.79**	**1344**	**5.62**	**1525**	**7.58**	1691	9.67	1844	11.90	1986	14.20	2119	16.70
4500	3629	1029	3.28	1233	5.19	**1417**	**7.36**	**1581**	**9.64**	**1733**	**12.00**	**1876**	**14.50**	**2012**	**17.10**	2141	19.80
5500	4435	1155	4.90	1347	7.11	1509	9.50	1662	12.10	**1803**	**14.90**	**1936**	**17.70**	**2062**	**20.60**	**2182**	**23.60**
6500	5242	1287	7.01	1472	9.67	1622	12.30	1758	15.10	1890	18.20	**2015**	**21.30**	**2133**	**24.60**	**2246**	**27.90**
7500	6048	1427	9.80	1598	12.80	1745	15.90	1872	18.90	1990	22.10	2107	25.60	2219	29.20	**2326**	**32.80**
8500	6855	1573	13.30	1727	16.70	1871	20.20	1995	23.60	2107	27.00	2212	30.60	2315	34.40	2417	38.40
9500	7661	1723	17.60	1862	21.40	1997	25.30	2120	29.20	2230	32.90	2331	36.80	2426	40.80	2519	44.90
CFM	OV FPM	20" RPM	20" BHP	24" RPM	24" BHP	28" RPM	28" BHP	32" RPM	32" BHP	36" RPM	36" BHP	40" RPM	40" BHP	44" RPM	44" BHP	48" RPM	48" BHP
3600	2903	2364	22.20	2586	27.80	2791	33.70										
4800	3871	2388	26.70	2605	32.90	2806	39.40	2994	46.20	3172	53.40	3340	60.80	3501	68.40		
6000	4839	**2432**	**32.20**	**2638**	**39.00**	2834	46.20	3019	53.60	3193	61.30	3359	69.30	3517	77.50		
7200	5806	**2506**	**38.60**	**2699**	**46.20**	**2882**	**54.00**	**3057**	**62.10**	**3226**	**70.50**	3388	79.10	3544	87.90		
8400	6774	**2602**	**46.00**	**2784**	**54.40**	**2957**	**63.00**	**3122**	**71.90**	**3281**	**80.90**	**3435**	**90.20**	**3583**	**99.80**		
9600	7742	2712	54.40	2886	63.70	**3050**	**73.10**	**3207**	**82.70**	**3358**	**92.60**	**3504**	**103.00**				

Series 05 Type MH or TH Industrial Exhauster A05-_-26_ _H100_ _ _ _ _ _

Wheel Diameter – 26.125 in.
Outlet Area – 1.24 sq. ft.

CFM	Outlet Velocity FPM	STATIC PRESSURE 2" RPM	2" BHP	4" RPM	4" BHP	6" RPM	6" BHP	8" RPM	8" BHP	10" RPM	10" BHP	12" RPM	12" BHP	14" RPM	14" BHP	16" RPM	16" BHP
1500	1210	750	0.92	1040	2.09	1266	3.49	1458	5.07								
2500	2016	**810**	**1.49**	**1079**	**2.94**	1295	4.63	1481	6.49	1647	8.51	1798	10.70	1938	12.90	2068	15.30
3500	2823	897	2.50	**1144**	**4.15**	**1348**	**6.11**	**1524**	**8.26**	1683	10.60	1830	13.00	1966	15.60	2093	18.20
4500	3629	1006	3.86	1226	5.96	1416	8.10	**1586**	**10.50**	**1738**	**13.10**	**1879**	**15.80**	**2009**	**18.70**	2132	21.60
5500	4435	1131	5.88	1326	8.48	1500	10.90	1659	13.40	**1806**	**16.30**	**1941**	**19.30**	**2068**	**22.40**	**2187**	**25.70**
6500	5242	1265	8.58	1439	11.40	1599	14.70	1746	17.50	1884	20.30	2013	23.50	**2136**	**26.90**	**2252**	**30.50**
7500	6048	1405	12.10	1564	15.40	1708	18.70	1846	22.60	1975	25.90	2096	29.00	2213	32.50	2324	36.20
8500	6855	1550	16.60	1695	20.30	1828	23.90	1954	27.90	2076	32.30	2191	36.20	2301	39.70	2407	43.30
9500	7661	1698	22.10	1831	26.20	1956	30.40	2072	34.30	2184	38.90	2294	43.90	2399	48.60	2499	52.60
CFM	OV FPM	20" RPM	20" BHP	24" RPM	24" BHP	28" RPM	28" BHP	32" RPM	32" BHP	36" RPM	36" BHP	40" RPM	40" BHP	44" RPM	44" BHP	48" RPM	48" BHP
3600	2903	2331	24.30	2545	30.40	2742	36.90	2926	43.70	3100	50.90	3264	58.30	3421	66.00		
4800	3871	2373	29.20	2582	36.00	2775	43.20	2956	50.70	3127	58.50	3289	66.60	3444	74.90	3592	83.60
6000	4839	**2437**	**35.00**	**2637**	**42.50**	2823	50.40	2999	58.60	3166	67.10	3326	75.80	3478	84.90		
7200	5806	**2513**	**42.10**	**2708**	**50.30**	**2889**	**58.80**	**3059**	**67.70**	**3221**	**76.80**	3375	86.30	3524	96.00		
8400	6774	2600	50.70	**2789**	**59.50**	**2966**	**68.70**	**3132**	**78.30**	**3290**	**88.10**	**3441**	**98.20**	**3585**	**109.00**		
9600	7742	2699	61.40	2880	70.60	3051	80.30	**3213**	**90.50**	**3368**	**101.00**	**3515**	**112.00**				

Series 05 Type PW Industrial Exhauster A05-_-26_ PW100_ _ _ _ _ _

Wheel Diameter – 26.125 in.
Outlet Area – 1.24 sq. ft.

CFM	Outlet Velocity FPM	STATIC PRESSURE 2" RPM	2" BHP	4" RPM	4" BHP	6" RPM	6" BHP	8" RPM	8" BHP	10" RPM	10" BHP	12" RPM	12" BHP	14" RPM	14" BHP	16" RPM	16" BHP
1500	1210	775	1.00	1082	2.29	1321	3.80	1524	5.49	1703	7.35	1866	9.34				
2500	2016	842	1.70	**1114**	**3.24**	1340	5.06	1538	7.10	1713	9.30	1873	11.60	2020	14.10	2158	16.70
3500	2823	940	2.78	1188	4.75	**1394**	**6.83**	**1574**	**9.08**	**1739**	**11.50**	1894	14.20	2039	17.00	2174	20.00
4500	3629	1070	4.51	1279	6.71	1473	9.28	1645	**11.90**	**1799**	**14.60**	**1941**	**17.50**	**2074**	**20.50**	**2203**	**23.60**
5500	4435	1212	6.99	1398	9.53	1565	12.30	1726	15.40	1876	18.60	**2013**	**21.80**	**2141**	**25.10**	**2261**	**28.50**
6500	5242	1364	10.40	1532	13.30	1683	16.40	1823	19.60	1960	23.20	2094	27.00	2219	30.80	2337	34.60
7500	6048	1523	14.70	1673	18.20	1813	21.70	1942	25.20	2065	28.90	2184	32.80	2302	37.10	2417	41.50
8500	6855	1687	20.30	1822	24.30	1951	28.20	2072	32.10	2186	36.10	2295	40.30	2401	44.60	2505	49.20
9500	7661	1854	27.20	1977	31.70	2095	36.10	2209	40.50	2316	44.80	2418	49.30	2517	53.90	2613	58.60
CFM	OV FPM	20" RPM	20" BHP	24" RPM	24" BHP	28" RPM	28" BHP	32" RPM	32" BHP	36" RPM	36" BHP	40" RPM	40" BHP	44" RPM	44" BHP	48" RPM	48" BHP
3600	2903	2424	26.60	2649	33.20	2857	40.20	3052	47.60	3235	55.30	3408	63.20	3574	71.50		
4800	3871	2454	31.90	2675	39.40	2880	47.30	3071	55.50	3252	63.90	3423	72.70	3586	81.80		
6000	4839	**2518**	**38.90**	**2722**	**46.70**	**2916**	**55.10**	3102	64.00	3279	73.30	3449	83.00	3610	93.00		
7200	5806	2607	47.80	**2804**	**56.40**	**2986**	**65.30**	**3160**	**74.60**	**3326**	**84.20**	**3487**	**94.30**				
8400	6774	2704	58.10	2897	68.00	**3075**	**77.90**	**3244**	**87.90**	**3403**	**98.20**	**3555**	**109.00**				
9600	7742	2811	69.70	2995	80.80	3172	92.10	3337	103.00	**3493**	**115.00**						

Performance certified is for installation Type D: ducted inlet/ducted outlet. Power rating (BHP) excludes transmission losses. Performance data is based on standard air conditions (0.075 #/ft.³). Performance ratings do not include the effects of appurtenances (accessories). The AMCA Certified Ratings seal does not apply to type TH or PR wheel. MOST EFFICIENT FAN SELECTION APPEARS IN BOLD PRINT. **To complete model code, add arrangement, class of construction, motor enclosure code, motor horsepower code and motor speed code. Refer to page 2 for more information.**

Size 29 Rating Table

Class II | Class III | Class IV

Series 05 Type AH Industrial Exhauster A05-_-29_AH100_ _ _ _ _ _

Wheel Diameter – 29.625 in.
Outlet Area – 1.595 sq. ft.

CFM	Outlet Velocity FPM	STATIC PRESSURE 2" RPM	2" BHP	4" RPM	4" BHP	6" RPM	6" BHP	8" RPM	8" BHP	10" RPM	10" BHP	12" RPM	12" BHP	14" RPM	14" BHP	16" RPM	16" BHP
3000	1881	683	1.38	**912**	**2.63**	**1103**	**3.92**	**1264**	**5.30**	1407	6.75	1537	8.27				
4500	2821	784	2.42	980	4.19	1150	6.03	**1298**	**7.94**	**1436**	**9.84**	**1565**	**11.80**	**1683**	**13.70**	**1793**	**15.80**
6000	3762	909	4.03	1080	6.24	1230	8.59	1367	11.00	1493	13.50	**1610**	**16.00**	**1719**	**18.50**	**1825**	**21.10**
7500	4702	1044	6.33	1201	9.07	1335	11.80	1458	14.70	1573	17.70	1682	20.80	1786	23.80	1885	26.90
9000	5643	1176	9.49	1332	12.80	1455	16.10	1567	19.40	1673	22.80	1773	26.30	1869	29.90	1961	33.50
10500	6583	1316	13.70	1467	17.50	1585	21.30	1689	25.20	1787	29.00	1879	32.90	1968	37.00	2054	41.10
12000	7524	1466	19.20	1598	23.50	1719	27.80	1819	32.20	1911	36.60	1998	41.00	2081	45.40	2161	49.90

CFM	OV FPM	20" RPM	20" BHP	24" RPM	24" BHP	28" RPM	28" BHP	32" RPM	32" BHP	36" RPM	36" BHP	40" RPM	40" BHP	44" RPM	44" BHP	48" RPM	48" BHP
4000	2508	1986	18.20														
6000	3762	**2024**	**26.20**	**2206**	**31.30**	**2373**	**36.80**	**2528**	**42.40**	**2675**	**48.10**	2814	54.00	2947	60.00	3074	66.20
8000	5016	**2089**	**35.60**	**2256**	**42.40**	**2415**	**49.20**	**2568**	**56.00**	**2714**	**62.70**	**2853**	**69.60**	**2984**	**76.70**	**3109**	**83.90**
10000	6270	2189	46.50	2348	54.60	2497	62.80	**2637**	**71.20**	**2771**	**79.70**	**2900**	**88.20**	**3027**	**96.60**	**3150**	**105.00**
12000	7524	2314	59.20	2460	68.70	2599	78.40	2734	88.10	2863	97.90	2987	108.00	**3105**	**118.00**		

Series 05 Type MH or TH Industrial Exhauster A05-_-29_ _H100_ _ _ _ _ _

Wheel Diameter – 29.625 in.
Outlet Area – 1.595 sq. ft.

CFM	Outlet Velocity FPM	STATIC PRESSURE 2" RPM	2" BHP	4" RPM	4" BHP	6" RPM	6" BHP	8" RPM	8" BHP	10" RPM	10" BHP	12" RPM	12" BHP	14" RPM	14" BHP	16" RPM	16" BHP
3000	1881	680	1.49	**903**	**2.82**	**1084**	**4.26**	1242	5.81	1384	7.44	1513	9.15	1634	10.90	1746	12.70
4500	2821	771	2.71	976	4.54	1143	6.50	**1287**	**8.49**	**1418**	**10.50**	**1539**	**12.70**	**1653**	**14.90**	**1760**	**17.20**
6000	3762	879	4.60	1067	6.93	1223	9.36	1360	11.90	1484	14.50	**1599**	**17.20**	**1705**	**19.80**	**1805**	**22.50**
7500	4702	1002	7.36	1169	10.30	1316	13.20	1446	16.20	1564	19.30	1674	22.50	1776	25.70	1873	29.00
9000	5643	1134	11.20	1284	14.70	1419	18.20	1542	21.70	1655	25.10	1760	28.80	1858	32.50	1951	36.40
10500	6583	1273	16.30	1408	20.40	1532	24.40	1646	28.50	1753	32.60	1854	36.60	1949	40.80	2039	45.00
12000	7524	1417	22.90	1539	27.60	1652	32.20	1759	36.80	1859	41.50	1955	46.20	2046	50.80	2133	55.40

CFM	OV FPM	20" RPM	20" BHP	24" RPM	24" BHP	28" RPM	28" BHP	32" RPM	32" BHP	36" RPM	36" BHP	40" RPM	40" BHP	44" RPM	44" BHP	48" RPM	48" BHP
4000	2508	1955	20.20	2139	24.80	2310	29.60	2469	34.60								
6000	3762	**1993**	**28.20**	**2167**	**34.00**	**2330**	**40.20**	2483	46.50	2629	52.90	2767	59.50	2900	66.30	3027	73.20
8000	5016	**2076**	**38.30**	**2239**	**45.40**	**2391**	**52.60**	**2535**	**60.00**	**2672**	**67.60**	**2804**	**75.40**	**2931**	**83.40**	**3054**	**91.50**
10000	6270	2178	50.40	2335	59.00	2482	67.70	**2620**	**76.60**	**2751**	**85.40**	**2876**	**94.30**	**2996**	**103.00**	**3111**	**112.00**
12000	7524	2296	65.00	2446	74.90	2587	85.00	2720	95.30	2847	106.00	2969	116.00	**3085**	**127.00**		

Series 05 Type PW Industrial Exhauster A05-_-29_ PW100_ _ _ _ _ _

Wheel Diameter – 29.625 in.
Outlet Area – 1.595 sq. ft.

CFM	Outlet Velocity FPM	STATIC PRESSURE 2" RPM	2" BHP	4" RPM	4" BHP	6" RPM	6" BHP	8" RPM	8" BHP	10" RPM	10" BHP	12" RPM	12" BHP	14" RPM	14" BHP	16" RPM	16" BHP
3000	1881	704	1.65	**940**	**3.09**	**1126**	**4.61**	**1287**	**6.23**	1430	7.95	1560	9.74	1680	11.60	1792	13.50
4500	2821	803	3.11	1008	5.02	1186	7.17	**1340**	**9.33**	**1476**	**11.50**	**1601**	**13.80**	**1718**	**16.20**	**1827**	**18.60**
6000	3762	931	5.47	1108	7.92	1263	10.40	1407	13.20	1540	16.00	**1661**	**18.90**	**1774**	**21.80**	**1880**	**24.70**
7500	4702	1073	8.95	1229	12.00	1368	15.10	1495	18.10	1615	21.30	1731	24.80	1840	28.50	1944	32.00
9000	5643	1226	13.80	1364	17.60	1490	21.10	1606	24.90	1715	28.50	1819	32.20	1919	36.10	2016	40.20
10500	6583	1386	20.40	1507	24.70	1622	29.00	1729	33.20	1830	37.50	1927	41.90	2019	46.10	2107	50.40
12000	7524	1550	29.00	1658	33.80	1763	38.90	1862	43.70	1956	48.40	2046	53.30	2132	58.40	2215	63.30

CFM	OV FPM	20" RPM	20" BHP	24" RPM	24" BHP	28" RPM	28" BHP	32" RPM	32" BHP	36" RPM	36" BHP	40" RPM	40" BHP	44" RPM	44" BHP	48" RPM	48" BHP
4000	2508	2017	21.50	2201	26.30	2371	31.40	2529	36.60								
6000	3762	**2074**	**30.70**	**2252**	**36.90**	**2418**	**43.30**	**2573**	**49.90**								
8000	5016	2156	42.20	**2329**	**49.90**	**2489**	**57.70**										
10000	6270	2251	55.70	2418	65.40	2575	74.80										
12000	7524	2374	73.10	2525	83.20												

Series 05 Type PR Industrial Exhauster A05-_-294PR100_ _ _ _ _ _

Wheel Diameter – 29.625 in.
Outlet Area – 1.595 sq. ft.

CFM	Outlet Velocity FPM	STATIC PRESSURE 20" RPM	20" BHP	24" RPM	24" BHP	28" RPM	28" BHP	32" RPM	32" BHP	36" RPM	36" BHP	40" RPM	40" BHP	44" RPM	44" BHP	48" RPM	48" BHP
4000	2508	1995	21.40	2181	26.30	2354	31.40	2515	36.70	2666	42.20	2810	47.80	2946	53.50	3076	59.40
6000	3762	2045	30.50	2218	36.60	2383	43.00	2538	49.60	2685	56.40	2825	63.30	2959	70.40	3088	77.70
8000	5016	2125	41.70	2297	49.50	2456	57.40	2603	65.20	2741	73.20	2873	81.40	3000	89.70	3124	98.20
10000	6270	2220	55.00	2382	64.20	2537	73.60	2683	83.20	2821	93.00	2953	103.00	3078	113.00		
12000	7524	2338	71.60	2492	82.10	2636	92.90	2774	104.00	2906	115.00	3035	126.00	3158	138.00		

Performance certified is for installation Type D: ducted inlet/ducted outlet. Power rating (BHP) excludes transmission losses. Performance data is based on standard air conditions (0.075 #/ft.³). Performance ratings do not include the effects of appurtenances (accessories). The AMCA Certified Ratings seal does not apply to type TH or PR wheel. MOST EFFICIENT FAN SELECTION APPEARS IN BOLD PRINT. **To complete model code, add arrangement, class of construction, motor enclosure code, motor horsepower code and motor speed code. Refer to page 2 for more information.**

Size 33 Rating Table

Class II | Class III | Class IV

Series 05 Type AH Industrial Exhauster A05-_-33_AH100_ _ _ _ _ _

Wheel Diameter – 33.0 in.
Outlet Area – 1.979 sq. ft.

CFM	Outlet Velocity FPM	STATIC PRESSURE 2" RPM	2" BHP	4" RPM	4" BHP	6" RPM	6" BHP	8" RPM	8" BHP	10" RPM	10" BHP	12" RPM	12" BHP	14" RPM	14" BHP	16" RPM	16" BHP
2000	1011	**569**	**0.88**														
4000	2021	624	1.87	**825**	**3.53**	**994**	**5.23**	**1139**	**7.00**	**1267**	**8.88**	1383	10.80	1490	12.90		
6000	3032	728	3.39	898	5.71	1047	8.14	**1177**	**10.60**	**1297**	**13.20**	**1411**	**15.70**	**1517**	**18.30**	**1616**	**20.90**
8000	4042	852	5.75	1001	8.68	1130	11.80	1249	15.00	1360	18.20	1463	21.50	**1559**	**24.80**	**1651**	**28.30**
10000	5053	981	9.18	1121	12.80	1237	16.50	1344	20.30	1444	24.20	1538	28.20	1629	32.20	1716	36.30
12000	6064	1111	13.90	1249	18.30	1358	22.70	1455	27.10	1546	31.50	1633	36.10	1716	40.90	1796	45.60
14000	7074	1251	20.30	1378	25.40	1485	30.50	1577	35.60	1661	40.70	1742	45.90	1818	51.10	1893	56.50
CFM	OV FPM	20" RPM	20" BHP	24" RPM	24" BHP	28" RPM	28" BHP	32" RPM	32" BHP	36" RPM	36" BHP	40" RPM	40" BHP	44" RPM	44" BHP	48" RPM	48" BHP
5000	2527	1784	22.80														
7500	3790	**1818**	**32.70**	**1981**	**39.20**	**2131**	**46.00**	**2271**	**52.90**	**2402**	**60.10**	2527	67.40	2646	74.90	2760	82.50
10000	5053	**1878**	**44.60**	**2027**	**53.10**	**2170**	**61.50**	**2307**	**70.00**	**2438**	**78.50**	**2562**	**87.00**	**2680**	**95.80**	**2793**	**105.00**
12500	6316	1969	58.20	2111	68.40	2245	78.60	**2371**	**89.00**	**2490**	**99.60**	**2606**	**110.00**	**2719**	**121.00**	**2830**	**131.00**
15000	7580	2083	74.20	2213	86.10	2338	98.20	2459	110.00	2574	123.00	2685	135.00	2791	147.00		

Series 05 Type MH or TH Industrial Exhauster A05-_-33_ _H100_ _ _ _ _ _

Wheel Diameter – 33.0 in.
Outlet Area – 1.979 sq. ft.

CFM	Outlet Velocity FPM	STATIC PRESSURE 2" RPM	2" BHP	4" RPM	4" BHP	6" RPM	6" BHP	8" RPM	8" BHP	10" RPM	10" BHP	12" RPM	12" BHP	14" RPM	14" BHP	16" RPM	16" BHP
2000	1011	**559**	**0.96**	784	2.08												
4000	2021	621	2.03	**819**	**3.78**	**978**	**5.64**	**1118**	**7.64**	1244	9.76	1360	12.00	1467	14.30	1568	16.60
6000	3032	712	3.81	893	6.21	1041	8.78	**1169**	**11.40**	**1285**	**14.10**	**1391**	**16.90**	**1492**	**19.80**	**1587**	**22.70**
8000	4042	821	6.60	984	9.72	1122	12.90	1243	16.20	1353	19.70	1454	23.20	**1549**	**26.70**	**1638**	**30.20**
10000	5053	943	10.70	1087	14.60	1215	18.50	1330	22.40	1434	26.40	1530	30.60	1621	34.90	1707	39.20
12000	6064	1073	16.50	1202	21.10	1318	25.80	1425	30.50	1525	35.10	1617	39.80	1704	44.70	1786	49.70
14000	7074	1210	24.20	1325	29.70	1431	35.10	1530	40.50	1623	46.00	1711	51.40	1795	56.80	1874	62.30
CFM	OV FPM	20" RPM	20" BHP	24" RPM	24" BHP	28" RPM	28" BHP	32" RPM	32" BHP	36" RPM	36" BHP	40" RPM	40" BHP	44" RPM	44" BHP	48" RPM	48" BHP
5000	2527	1755	25.10	1920	30.90	2073	36.90	2216	43.10								
7500	3790	**1790**	**35.20**	**1947**	**42.50**	**2092**	**50.10**	2230	58.00	2360	66.10	2485	74.30	2603	82.70	2717	91.30
10000	5053	**1866**	**48.00**	**2012**	**56.80**	**2148**	**65.80**	**2277**	**75.00**	**2401**	**84.50**	**2519**	**94.20**	**2633**	**104.00**	**2742**	**114.00**
12500	6316	1959	63.10	2100	73.90	2231	84.80	**2355**	**95.80**	**2473**	**107.00**	**2585**	**118.00**	**2692**	**129.00**	**2796**	**141.00**
15000	7580	2066	81.50	2200	93.90	2326	107.00	2446	119.00	2560	132.00	2669	145.00	2774	159.00		

Series 05 Type PW Industrial Exhauster A05-_-33_ PW100_ _ _ _ _ _

Wheel Diameter – 33.0 in.
Outlet Area – 1.979 sq. ft.

CFM	Outlet Velocity FPM	STATIC PRESSURE 2" RPM	2" BHP	4" RPM	4" BHP	6" RPM	6" BHP	8" RPM	8" BHP	10" RPM	10" BHP	12" RPM	12" BHP	14" RPM	14" BHP	16" RPM	16" BHP
2000	1011	**580**	**1.03**	806	2.20	981	3.52	1130	4.96								
4000	2021	642	2.24	**852**	**4.15**	**1018**	**6.14**	**1161**	**8.24**	**1288**	**10.50**	1405	12.80	1512	15.20	1612	17.60
6000	3032	745	4.40	922	6.88	1078	9.72	**1215**	**12.60**	**1337**	**15.50**	**1449**	**18.50**	**1552**	**21.50**	**1649**	**24.60**
8000	4042	873	7.92	1025	11.20	1160	14.40	1284	17.90	1401	21.80	1509	25.60	**1610**	**29.40**	**1704**	**33.20**
10000	5053	1014	13.10	1147	17.20	1267	21.30	1378	25.40	1481	29.50	1580	33.80	1676	38.60	1768	43.40
12000	6064	1164	20.50	1281	25.50	1389	30.30	1490	35.20	1585	40.20	1674	45.00	1761	50.00	1844	55.10
14000	7074	1321	30.60	1423	36.20	1521	42.10	1614	47.60	1701	53.30	1784	59.10	1864	64.90		
CFM	OV FPM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
5000	2527	1811	26.80	1976	32.90	2129	39.20	2271	45.70								
7500	3790	**1864**	**38.40**	**2023**	**46.10**	**2172**	**54.00**	**2311**	**62.30**								
10000	5053	1938	52.90	**2093**	**62.50**	**2237**	**72.20**										
12500	6316	2024	69.80	2174	81.80	2314	93.70										
15000	7580	2137	91.80	2272	104.00												

Series 05 Type PR Industrial Exhauster A05-_-334PR100_ _ _ _ _ _

Wheel Diameter – 33.0 in.
Outlet Area – 1.979 sq. ft.

CFM	Outlet Velocity FPM	STATIC PRESSURE 20" RPM	20" BHP	24" RPM	24" BHP	28" RPM	28" BHP	32" RPM	32" BHP	36" RPM	36" BHP	40" RPM	40" BHP	44" RPM	44" BHP	48" RPM	48" BHP
5000	2527	1791	26.70	1958	32.80	2113	39.20	2258	45.80	2394	52.60	2523	59.50	2645	66.70	2761	74.00
7500	3790	1837	38.20	1993	45.80	2140	53.80	2279	62.00	2411	70.40	2537	79.00	2657	87.90	2773	96.90
10000	5053	1910	52.20	2064	61.90	2207	71.70	2339	81.60	2463	91.60	2581	102.00	2695	112.00	2806	123.00
12500	6316	1997	68.90	2142	80.30	2281	92.10	2412	104.00	2536	116.00	2653	129.00	2766	141.00		
15000	7580	2104	89.80	2242	103.00	2371	116.00	2495	130.00	2613	144.00	2728	158.00	2838	172.00		

Performance certified is for installation Type D: ducted inlet/ducted outlet. Power rating (BHP) excludes transmission losses. Performance data is based on standard air conditions (0.075 #/ft.³). Performance ratings do not include the effects of appurtenances (accessories). The AMCA Certified Ratings seal does not apply to type TH or PR wheel. MOST EFFICIENT FAN SELECTION APPEARS IN BOLD PRINT. **To complete model code, add arrangement, class of construction, motor enclosure code, motor horsepower code and motor speed code. Refer to page 2 for more information.**

Size 36 Rating Table

Class II | Class III | Class IV

Series 05 Type AH Industrial Exhauster A05-_-36_AH100_ _ _ _ _ _

Wheel Diameter – 36.5 in.
Outlet Area – 2.421 sq. ft.

CFM	Outlet Velocity FPM	STATIC PRESSURE 2" RPM	2" BHP	4" RPM	4" BHP	6" RPM	6" BHP	8" RPM	8" BHP	10" RPM	10" BHP	12" RPM	12" BHP	14" RPM	14" BHP	16" RPM	16" BHP
2500	1033	**515**	**1.09**														
5000	2065	568	2.35	**748**	**4.42**	**900**	**6.54**	**1031**	**8.74**	**1146**	**11.10**	1251	13.50	1348	16.00		
7500	3098	665	4.30	817	7.18	950	10.20	**1068**	**13.30**	**1175**	**16.50**	**1277**	**19.70**	**1373**	**22.90**	**1463**	**26.10**
10000	4131	781	7.34	914	11.00	1030	14.80	1136	18.80	1235	22.80	1328	26.90	**1415**	**31.10**	**1497**	**35.40**
12500	5163	899	11.80	1026	16.30	1130	20.90	1225	25.60	1315	30.50	1399	35.50	1481	40.50	1559	45.60
15000	6196	1021	17.90	1145	23.40	1242	28.90	1329	34.40	1411	39.90	1488	45.60	1563	51.50	1635	57.40
17500	7228	1151	26.30	1263	32.60	1360	38.90	1443	45.30	1519	51.80	1591	58.20	1659	64.60	1726	71.30

CFM	OV FPM	20" RPM	20" BHP	24" RPM	24" BHP	28" RPM	28" BHP	32" RPM	32" BHP	36" RPM	36" BHP	40" RPM	40" BHP	44" RPM	44" BHP	48" RPM	48" BHP
6000	2478	1612	27.40														
9000	3717	**1641**	**39.20**	**1789**	**47.10**	**1925**	**55.30**	**2051**	**63.70**	2170	72.40	2283	81.20	2391	90.30	2494	99.50
12000	4957	**1692**	**53.40**	**1828**	**63.60**	**1958**	**73.70**	**2083**	**83.90**	**2202**	**94.10**	**2314**	**104.00**	**2420**	**115.00**	**2522**	**126.00**
15000	6196	1771	69.50	1901	81.70	2022	94.00	**2136**	**107.00**	**2245**	**119.00**	**2351**	**132.00**	**2454**	**145.00**	**2555**	**157.00**
18000	7435	1871	88.40	1989	103.00	2103	117.00	2213	132.00	2318	146.00	2419	161.00	**2515**	**176.00**		

Series 05 Type MH or TH Industrial Exhauster A05-_-36_ _H100_ _ _ _ _ _

Wheel Diameter – 36.5 in.
Outlet Area – 2.421 sq. ft.

CFM	Outlet Velocity FPM	STATIC PRESSURE 2" RPM	2" BHP	4" RPM	4" BHP	6" RPM	6" BHP	8" RPM	8" BHP	10" RPM	10" BHP	12" RPM	12" BHP	14" RPM	14" BHP	16" RPM	16" BHP
2500	1033	**506**	**1.19**	709	2.58												
5000	2065	565	2.55	**743**	**4.74**	**886**	**7.04**	**1012**	**9.52**	1126	12.10	1230	14.90	1327	17.70	1418	20.60
7500	3098	650	4.84	812	7.83	945	11.00	**1061**	**14.30**	**1165**	**17.70**	**1261**	**21.10**	**1351**	**24.70**	**1437**	**28.30**
10000	4131	752	8.45	897	12.30	1021	16.30	1130	20.40	1229	24.70	1320	29.10	**1406**	**33.50**	**1486**	**37.90**
12500	5163	865	13.80	994	18.60	1108	23.50	1211	28.30	1305	33.40	1392	38.60	1473	43.90	1550	49.30
15000	6196	986	21.30	1101	27.10	1205	32.90	1300	38.70	1389	44.50	1473	50.40	1551	56.40	1625	62.60
17500	7228	1113	31.30	1215	38.10	1310	44.90	1398	51.60	1481	58.50	1560	65.30	1635	72.00	1707	78.80

CFM	OV FPM	20" RPM	20" BHP	24" RPM	24" BHP	28" RPM	28" BHP	32" RPM	32" BHP	36" RPM	36" BHP	40" RPM	40" BHP	44" RPM	44" BHP	48" RPM	48" BHP
6000	2478	1586	30.30	1736	37.30	1874	44.60	2004	52.10								
9000	3717	**1616**	**42.30**	**1758**	**51.10**	**1890**	**60.40**	2014	69.90	2133	79.60	2245	89.60	2353	99.80	2456	110.00
12000	4957	**1681**	**57.40**	**1814**	**68.00**	**1937**	**78.80**	**2054**	**90.00**	**2167**	**101.00**	**2274**	**113.00**	**2377**	**125.00**	**2477**	**138.00**
15000	6196	1763	75.30	1890	88.20	2010	101.00	**2122**	**115.00**	**2229**	**128.00**	**2330**	**141.00**	**2428**	**155.00**	**2522**	**169.00**
18000	7435	1856	96.90	1978	112.00	2093	127.00	2202	143.00	2305	158.00	2404	174.00	**2499**	**190.00**		

Series 05 Type PW Industrial Exhauster A05-_-36_ PW100_ _ _ _ _ _

Wheel Diameter – 36.5 in.
Outlet Area – 2.421 sq. ft.

CFM	Outlet Velocity FPM	STATIC PRESSURE 2" RPM	2" BHP	4" RPM	4" BHP	6" RPM	6" BHP	8" RPM	8" BHP	10" RPM	10" BHP	12" RPM	12" BHP	14" RPM	14" BHP	16" RPM	16" BHP
2500	1033	**526**	**1.28**	730	2.74	888	4.37	1022	6.15								
5000	2065	583	2.82	**773**	**5.21**	**922**	**7.68**	**1051**	**10.30**	**1166**	**13.00**	1271	15.90	1369	18.90	1459	21.90
7500	3098	681	5.60	839	8.70	979	12.20	1103	15.80	**1213**	**19.40**	**1313**	**23.10**	**1406**	**26.90**	**1494**	**30.70**
10000	4131	800	10.20	936	14.20	1056	18.30	1167	22.60	1272	27.40	1370	32.10	1460	36.80	1545	41.70
12500	5163	931	16.90	1050	22.00	1157	27.10	1256	32.20	1349	37.40	1437	42.70	1523	48.50	1605	54.60
15000	6196	1071	26.50	1175	32.70	1271	38.80	1361	44.80	1446	51.10	1526	57.20	1603	63.30	1678	69.60
17500	7228	1216	39.60	1307	46.70	1394	54.00	1477	61.00	1555	67.90	1629	75.20	1701	82.50	1769	89.60

CFM	OV FPM	20" RPM	20" BHP	24" RPM	24" BHP	28" RPM	28" BHP	32" RPM	32" BHP	36" RPM	36" BHP	40" RPM	40" BHP	44" RPM	44" BHP	48" RPM	48" BHP
6000	2478	1636	32.30	1786	39.60	1923	47.30	2052	55.20								
9000	3717	**1682**	**46.10**	**1826**	**55.40**	**1961**	**65.00**	**2087**	**74.90**								
12000	4957	1747	63.20	**1887**	**74.80**	**2017**	**86.50**										
15000	6196	1822	83.30	1958	97.70	2085	112.00										
18000	7435	1919	109.00	2043	124.00												

Series 05 Type PR Industrial Exhauster A05-_-364PR100_ _ _ _ _ _

Wheel Diameter – 36.5 in.
Outlet Area – 2.421 sq. ft.

CFM	Outlet Velocity FPM	STATIC PRESSURE 20" RPM	20" BHP	24" RPM	24" BHP	28" RPM	28" BHP	32" RPM	32" BHP	36" RPM	36" BHP	40" RPM	40" BHP	44" RPM	44" BHP	48" RPM	48" BHP
6000	2478	1618	32.2	1770	39.6	1910	47.3	2041	55.3	2164	63.5	2280	72.0	2391	80.6	2496	89.5
9000	3717	1657	45.8	1799	55.0	1933	64.6	2059	74.6	2179	84.8	2292	95.3	2401	106	2506	117
12000	4957	1722	62.4	1861	74.1	1990	86.0	2109	97.8	2222	110	2329	122	2433	135	2533	147
15000	6196	1797	82.1	1929	96.0	2055	110	2174	125	2286	139	2393	154	2494	169		
18000	7435	1890	107	2016	123	2134	139	2246	155	2354	172	2458	189	2558	206		

Performance certified is for installation Type D: ducted inlet/ducted outlet. Power rating (BHP) excludes transmission losses. Performance data is based on standard air conditions (0.075 #/ft.³). Performance ratings do not include the effects of appurtenances (accessories). The AMCA Certified Ratings seal does not apply to type TH or PR wheel. MOST EFFICIENT FAN SELECTION APPEARS IN BOLD PRINT. **To complete model code, add arrangement, class of construction, motor enclosure code, motor horsepower code and motor speed code. Refer to page 2 for more information.**

Size 40 Rating Table

Class II | Class III | Class IV

Series 05 Type AH Industrial Exhauster A05-_-40_AH100_ _ _ _ _ _

Wheel Diameter – 40.0 in.
Outlet Area – 2.908 sq. ft.

CFM	Outlet Velocity FPM	STATIC PRESSURE 2" RPM	2" BHP	4" RPM	4" BHP	6" RPM	6" BHP	8" RPM	8" BHP	10" RPM	10" BHP	12" RPM	12" BHP	14" RPM	14" BHP	16" RPM	16" BHP
3000	1032	**470**	**1.31**														
6000	2063	518	2.82	**683**	**5.31**	**821**	**7.85**	**941**	**10.50**	**1046**	**13.30**	1142	16.20	1230	19.20		
9000	3095	606	5.15	746	8.61	867	12.30	**975**	**16.00**	**1073**	**19.80**	**1165**	**23.60**	**1253**	**27.40**	**1335**	**31.30**
12000	4127	712	8.80	834	13.20	939	17.80	1036	22.60	1127	27.40	1212	32.30	**1291**	**37.30**	**1366**	**42.40**
15000	5158	820	14.10	936	19.60	1031	25.10	1118	30.70	1199	36.60	1277	42.60	1351	48.60	1422	54.70
18000	6190	931	21.50	1044	28.10	1133	34.60	1213	41.20	1287	47.90	1358	54.70	1426	61.80	1491	68.90
21000	7221	1050	31.50	1152	39.10	1241	46.70	1316	54.40	1385	62.10	1451	69.80	1513	77.50	1574	85.50

CFM	OV FPM	20" RPM	20" BHP	24" RPM	24" BHP	28" RPM	28" BHP	32" RPM	32" BHP	36" RPM	36" BHP	40" RPM	40" BHP	44" RPM	44" BHP	48" RPM	48" BHP
7000	2407	1469	32.20														
11000	3783	**1499**	**48.00**	**1634**	**57.50**	**1758**	**67.40**	**1873**	**77.60**	**1982**	**88.20**	2085	98.90	2183	110.00	2277	121.00
15000	5158	1555	67.00	**1678**	**79.70**	**1794**	**92.50**	**1906**	**105.00**	**2013**	**118.00**	**2116**	**131.00**	**2214**	**144.00**	**2306**	**157.00**
19000	6534	1639	89.40	1755	105.00	1864	120.00	1968	136.00	**2066**	**152.00**	**2160**	**168.00**	**2251**	**184.00**	**2341**	**200.00**
23000	7909	1746	116.00	1851	134.00	1952	152.00	2049	171.00	2143	190.00	2234	208.00	2321	227.00		

Series 05 Type MH or TH Industrial Exhauster A05-_-40_ _H100_ _ _ _ _ _

Wheel Diameter – 40.0 in.
Outlet Area – 2.908 sq. ft.

CFM	Outlet Velocity FPM	STATIC PRESSURE 2" RPM	2" BHP	4" RPM	4" BHP	6" RPM	6" BHP	8" RPM	8" BHP	10" RPM	10" BHP	12" RPM	12" BHP	14" RPM	14" BHP	16" RPM	16" BHP
3000	1032	462	1.43	647	3.09												
6000	2063	515	3.06	**678**	**5.68**	**809**	**8.45**	**924**	**11.40**	1027	14.60	1123	17.90	1211	21.30	1294	24.80
9000	3095	593	5.81	741	9.39	862	13.20	**968**	**17.20**	**1063**	**21.20**	**1150**	**25.30**	**1233**	**29.60**	**1311**	**34.00**
12000	4127	686	10.10	818	14.80	932	19.50	1031	24.50	1121	29.60	1205	34.90	**1283**	**40.20**	**1356**	**45.50**
15000	5158	789	16.50	906	22.30	1011	28.20	1105	34.00	1191	40.00	1270	46.30	1344	52.70	1415	59.10
18000	6190	899	25.50	1004	32.50	1099	39.40	1186	46.50	1268	53.40	1344	60.40	1415	67.70	1482	75.10
21000	7221	1015	37.50	1108	45.70	1195	53.80	1275	61.90	1351	70.10	1423	78.30	1492	86.40	1557	94.50

CFM	OV FPM	20" RPM	20" BHP	24" RPM	24" BHP	28" RPM	28" BHP	32" RPM	32" BHP	36" RPM	36" BHP	40" RPM	40" BHP	44" RPM	44" BHP	48" RPM	48" BHP
7000	2407	1447	35.70	1584	43.90	1710	52.50	1828	61.40								
11000	3783	**1477**	**51.60**	**1606**	**62.40**	**1726**	**73.60**	1839	85.10	1947	96.90	2050	109.00	2148	121.00	2242	134.00
15000	5158	1546	72.20	**1666**	**85.50**	**1778**	**98.80**	**1883**	**112.00**	**1985**	**127.00**	**2082**	**141.00**	**2175**	**156.00**	**2265**	**171.00**
19000	6534	1631	97.10	1746	113.00	1854	130.00	1955	146.00	**2052**	**163.00**	**2144**	**180.00**	**2232**	**197.00**	**2317**	**214.00**
23000	7909	1729	128.00	1839	147.00	1942	166.00	2039	185.00	2132	205.00	2222	225.00	2307	245.00		

Series 05 Type PW Industrial Exhauster A05-_-40_ PW100_ _ _ _ _ _

Wheel Diameter – 40.0 in.
Outlet Area – 2.908 sq. ft.

CFM	Outlet Velocity FPM	STATIC PRESSURE 2" RPM	2" BHP	4" RPM	4" BHP	6" RPM	6" BHP	8" RPM	8" BHP	10" RPM	10" BHP	12" RPM	12" BHP	14" RPM	14" BHP	16" RPM	16" BHP
3000	1032	**479**	**1.54**	666	3.29	810	5.24	932	7.38								
6000	2063	532	3.38	**705**	**6.25**	**842**	**9.22**	**959**	**12.30**	**1064**	**15.60**	1160	19.10	1249	22.60	1331	26.30
9000	3095	621	6.71	765	10.40	893	14.70	1006	18.90	**1106**	**23.30**	**1198**	**27.70**	**1283**	**32.30**	**1363**	**36.90**
12000	4127	729	12.20	854	17.00	963	21.90	1065	27.10	1161	32.80	1250	38.50	1332	44.20	**1410**	**50.00**
15000	5158	849	20.30	958	26.40	1056	32.50	1146	38.70	1230	44.80	1311	51.20	1389	58.20	1465	65.50
18000	6190	977	31.80	1071	39.20	1160	46.50	1242	53.70	1319	61.30	1392	68.60	1463	75.90	1531	83.50
21000	7221	1109	47.50	1192	55.90	1271	64.70	1347	73.10	1418	81.50	1486	90.20	1551	99.00	1614	107.00

CFM	OV FPM	20" RPM	20" BHP	24" RPM	24" BHP	28" RPM	28" BHP	32" RPM	32" BHP	36" RPM	36" BHP	40" RPM	40" BHP	44" RPM	44" BHP	48" RPM	48" BHP
7000	2407	1491	37.90	1628	46.60	1753	55.60	1871	65.00								
11000	3783	**1537**	**56.30**	**1669**	**67.60**	**1791**	**79.30**	**1906**	**91.40**								
15000	5158	1604	79.70	**1732**	**94.00**	**1850**	**109.00**										
19000	6534	1684	107.00	1806	125.00	1921	144.00										
23000	7909	1790	145.00	1900	164.00												

Series 05 Type PR Industrial Exhauster A05-_-404PR100_ _ _ _ _ _

Wheel Diameter – 40.0 in.
Outlet Area – 2.908 sq. ft.

CFM	Outlet Velocity FPM	STATIC PRESSURE 20" RPM	20" BHP	24" RPM	24" BHP	28" RPM	28" BHP	32" RPM	32" BHP	36" RPM	36" BHP	40" RPM	40" BHP	44" RPM	44" BHP	48" RPM	48" BHP
7000	2407	1476	37.80	1614	46.60	1742	55.70	1862	65.20	1974	74.90	2080	84.90	2181	95.20		
11000	3783	1515	56.00	1644	67.20	1766	78.90	1880	90.90	1989	103.00	2093	116.00	2192	129.00	2287	142.00
15000	5158	1581	78.50	1708	93.00	1826	108.00	1935	123.00	2037	137.00	2134	153.00	2227	168.00	2318	184.00
19000	6534	1662	106.00	1780	123.00	1893	141.00	2000	159.00	2102	177.00	2199	196.00	2292	215.00		
23000	7909	1760	141.00	1873	161.00	1978	182.00	2079	202.00	2175	223.00	2268	245.00	2358	266.00		

Performance certified is for installation Type D: ducted inlet/ducted outlet. Power rating (BHP) excludes transmission losses. Performance data is based on standard air conditions (0.075 #/ft.³). Performance ratings do not include the effects of appurtenances (accessories). The AMCA Certified Ratings seal does not apply to type TH or PR wheel. MOST EFFICIENT FAN SELECTION APPEARS IN BOLD PRINT. **To complete model code, add arrangement, class of construction, motor enclosure code, motor horsepower code and motor speed code. Refer to page 2 for more information.**

Size 45 Rating Table

Class II | Class III | Class IV

Series 05 Type AH Industrial Exhauster A05-_-45_AH100_ _ _ _ _ _

Wheel Diameter – 45.125 in.
Outlet Area – 3.701 sq. ft.

CFM	Outlet Velocity FPM	STATIC PRESSURE 2" RPM	2" BHP	4" RPM	4" BHP	6" RPM	6" BHP	8" RPM	8" BHP	10" RPM	10" BHP	12" RPM	12" BHP	14" RPM	14" BHP	16" RPM	16" BHP
4000	1081	**418**	**1.74**	583	3.68												
8000	2162	466	3.81	**610**	**7.10**	**730**	**10.50**	**836**	**13.90**	**929**	**17.60**	**1014**	**21.40**	1092	25.40	1165	29.40
12000	3242	550	7.12	671	11.70	776	16.50	871	21.40	**956**	**26.50**	**1037**	**31.60**	**1114**	**36.70**	**1186**	**41.80**
16000	4323	650	12.30	756	18.20	847	24.20	931	30.50	1010	37.00	1084	43.50	1154	50.10	**1219**	**56.80**
20000	5404	750	20.00	852	27.20	935	34.60	1010	42.00	1080	49.70	1148	57.60	1212	65.60	1274	73.70
24000	6485	854	30.60	954	39.40	1031	48.10	1101	56.90	1165	65.70	1226	74.70	1285	83.90	1342	93.40
28000	7566	967	45.10	1053	55.20	1132	65.40	1198	75.60	1258	85.80	1315	96.10	1370	106.00	1422	117.00

CFM	OV FPM	20" RPM	20" BHP	24" RPM	24" BHP	28" RPM	28" BHP	32" RPM	32" BHP	36" RPM	36" BHP	40" RPM	40" BHP	44" RPM	44" BHP	48" RPM	48" BHP
9000	2432	1303	41.30														
14000	3783	**1329**	**61.00**	**1449**	**73.10**	**1558**	**85.80**	**1660**	**98.80**	**1757**	**112.00**	1848	126.00	1935	140.00	2019	154.00
19000	5134	1378	84.90	**1486**	**101.00**	**1589**	**117.00**	**1689**	**133.00**	**1784**	**149.00**	**1875**	**165.00**	**1962**	**182.00**	**2044**	**199.00**
24000	6485	1450	113.00	1553	132.00	1650	152.00	1742	171.00	**1829**	**192.00**	**1912**	**212.00**	**1994**	**233.00**	**2074**	**253.00**
29000	7836	1542	146.00	1636	168.00	1726	192.00	1812	215.00	1896	239.00	1976	262.00	2054	286.00		

Series 05 Type MH or TH Industrial Exhauster A05-_-45_ _H100_ _ _ _ _ _

Wheel Diameter – 45.125 in.
Outlet Area – 3.701 sq. ft.

CFM	Outlet Velocity FPM	STATIC PRESSURE 2" RPM	2" BHP	4" RPM	4" BHP	6" RPM	6" BHP	8" RPM	8" BHP	10" RPM	10" BHP	12" RPM	12" BHP	14" RPM	14" BHP	16" RPM	16" BHP
4000	1081	**411**	**1.89**	574	4.07	702	6.49										
8000	2162	463	4.15	**606**	**7.63**	**720**	**11.20**	**821**	**15.10**	912	19.30	996	23.50	1074	28.00	1147	32.60
12000	3242	537	8.04	666	12.80	772	17.80	865	23.10	**949**	**28.40**	**1026**	**33.80**	**1098**	**39.40**	**1166**	**45.20**
16000	4323	625	14.20	740	20.40	839	26.70	926	33.20	1005	40.00	1078	46.90	1147	53.90	**1211**	**61.00**
20000	5404	722	23.50	823	31.20	914	39.00	996	46.70	1071	54.60	1141	62.80	1206	71.20	1267	79.80
24000	6485	826	36.40	916	45.70	998	54.90	1073	64.30	1144	73.70	1211	82.90	1273	92.40	1332	102.00
28000	7566	934	53.80	1014	64.80	1088	75.60	1158	86.30	1224	97.30	1287	108.00	1346	119.00	1403	130.00

CFM	OV FPM	20" RPM	20" BHP	24" RPM	24" BHP	28" RPM	28" BHP	32" RPM	32" BHP	36" RPM	36" BHP	40" RPM	40" BHP	44" RPM	44" BHP	48" RPM	48" BHP
9000	2432	1283	45.70	1404	56.30	1516	67.30	1621	78.60								
14000	3783	**1309**	**65.70**	**1423**	**79.40**	**1530**	**93.60**	1631	108.00	1726	123.00	1817	139.00	1904	154.00	1987	171.00
19000	5134	1369	91.40	**1475**	**108.00**	**1575**	**125.00**	**1668**	**142.00**	**1758**	**160.00**	**1845**	**179.00**	**1928**	**197.00**	**2007**	**217.00**
24000	6485	1443	122.00	1545	143.00	1641	164.00	1731	185.00	**1817**	**206.00**	**1898**	**227.00**	**1976**	**249.00**	**2051**	**270.00**
29000	7836	1527	160.00	1625	184.00	1717	208.00	1803	233.00	1886	258.00	1965	283.00	2041	308.00		

Series 05 Type PW Industrial Exhauster A05-_-45_ PW100_ _ _ _ _ _

Wheel Diameter – 45.125 in.
Outlet Area – 3.701 sq. ft.

CFM	Outlet Velocity FPM	STATIC PRESSURE 2" RPM	2" BHP	4" RPM	4" BHP	6" RPM	6" BHP	8" RPM	8" BHP	10" RPM	10" BHP	12" RPM	12" BHP	14" RPM	14" BHP	16" RPM	16" BHP
4000	1081	**427**	**2.05**	591	4.33	719	6.88	827	9.66								
8000	2162	478	4.61	**629**	**8.39**	**750**	**12.30**	**853**	**16.40**	**946**	**20.70**	**1031**	**25.20**	1109	29.90	1182	34.70
12000	3242	563	9.34	688	14.30	799	19.80	898	25.50	**987**	**31.20**	**1068**	**37.10**	**1143**	**43.10**	**1213**	**49.10**
16000	4323	666	17.20	774	23.60	869	30.20	956	36.90	1039	44.30	1117	52.00	1190	59.50	**1259**	**67.10**
20000	5404	779	28.80	872	37.10	957	45.10	1035	53.40	1108	61.50	1178	69.90	1245	78.70	1311	88.30
24000	6485	899	45.60	980	55.40	1056	65.20	1127	74.80	1193	84.70	1257	94.60	1318	104.00	1377	114.00
28000	7566	1023	68.40	1093	79.60	1161	91.30	1226	103.00	1288	114.00	1347	125.00	1403	137.00	1458	148.00

CFM	OV FPM	20" RPM	20" BHP	24" RPM	24" BHP	28" RPM	28" BHP	32" RPM	32" BHP	36" RPM	36" BHP	40" RPM	40" BHP	44" RPM	44" BHP	48" RPM	48" BHP
9000	2432	1322	48.70	1443	59.80	1555	71.30	1659	83.30								
14000	3783	**1363**	**71.70**	**1479**	**86.10**	**1588**	**101.00**	**1690**	**116.00**								
19000	5134	1421	101.00	**1534**	**119.00**	**1639**	**137.00**										
24000	6485	1490	135.00	1598	158.00	1701	181.00										
29000	7836	1582	182.00	1679	205.00												

Series 05 Type PR Industrial Exhauster A05-_-454PR100_ _ _ _ _ _

Wheel Diameter – 45.125 in.
Outlet Area – 3.701 sq. ft.

CFM	Outlet Velocity FPM	STATIC PRESSURE 20" RPM	20" BHP	24" RPM	24" BHP	28" RPM	28" BHP	32" RPM	32" BHP	36" RPM	36" BHP	40" RPM	40" BHP	44" RPM	44" BHP	48" RPM	48" BHP
9000	2432	1309	48.50	1431	59.70	1545	71.40	1651	83.50	1750	95.90	1844	109.00	1933	122.00	2019	135.00
14000	3783	1343	71.20	1457	85.50	1565	100.00	1667	116.00	1763	131.00	1855	148.00	1943	164.00	2027	181.00
19000	5134	1400	99.40	1513	118.00	1617	136.00	1714	155.00	1804	174.00	1891	193.00	1973	213.00	2054	233.00
24000	6485	1470	134.00	1576	155.00	1676	178.00	1771	201.00	1861	224.00	1947	247.00	2029	271.00		
29000	7836	1555	177.00	1655	202.00	1749	228.00	1839	254.00	1924	281.00	2007	308.00	2087	335.00		

Performance certified is for installation Type D: ducted inlet/ducted outlet. Power rating (BHP) excludes transmission losses. Performance data is based on standard air conditions (0.075 #/ft.^{3}). Performance ratings do not include the effects of appurtenances (accessories). The AMCA Certified Ratings seal does not apply to type TH or PR wheel. MOST EFFICIENT FAN SELECTION APPEARS IN BOLD PRINT. **To complete model code, add arrangement, class of construction, motor enclosure code, motor horsepower code and motor speed code. Refer to page 2 for more information.**

Size 50 Rating Table

Class II | Class III | Class IV

Series 05 Type AH Industrial Exhauster A05-_-50_AH100_ _ _ _ _ _

Wheel Diameter – 50.5 in.
Outlet Area – 4.635 sq. ft.

CFM	Outlet Velocity FPM	STATIC PRESSURE 2" RPM	2" BHP	4" RPM	4" BHP	6" RPM	6" BHP	8" RPM	8" BHP	10" RPM	10" BHP	12" RPM	12" BHP	14" RPM	14" BHP	16" RPM	16" BHP
5000	1079	**373**	**2.18**	521	4.60												
10000	2157	416	4.76	**545**	**8.87**	**652**	**13.10**	**747**	**17.40**	**830**	**22.00**	906	26.80	976	31.70	1041	36.80
15000	3236	491	8.88	599	14.60	693	20.60	778	26.80	**854**	**33.10**	**926**	**39.50**	**995**	**45.80**	**1060**	**52.20**
20000	4315	580	15.40	674	22.70	756	30.20	832	38.10	902	46.20	968	54.30	1031	62.60	**1089**	**71.00**
25000	5394	669	24.90	761	34.00	834	43.10	902	52.40	965	62.00	1025	71.90	1082	82.00	1138	92.10
30000	6472	762	38.20	851	49.10	921	60.00	982	71.10	1040	82.00	1095	93.30	1147	105.00	1198	117.00
35000	7551	863	56.20	940	68.80	1011	81.50	1069	94.30	1123	107.00	1174	120.00	1223	133.00	1270	146.00
CFM	OV FPM	20" RPM	20" BHP	24" RPM	24" BHP	28" RPM	28" BHP	32" RPM	32" BHP	36" RPM	36" BHP	40" RPM	40" BHP	44" RPM	44" BHP	48" RPM	48" BHP
12000	2589	1166	54.30														
18000	3883	**1189**	**78.60**	**1297**	**93.900**	**1394**	**110.00**	**1485**	**127.00**	**1571**	**144.00**	1653	161.00	1731	179.00	1805	197.00
24000	5178	1233	107.00	**1330**	**128.00**	**1421**	**148.00**	**1510**	**168.00**	**1595**	**189.00**	**1677**	**209.00**	**1754**	**230.00**	**1827**	**251.00.**
30000	6472	1295	141.00	1387	165.00	1474	189.00	1556	214.00	**1634**	**240.00**	**1708**	**265.00**	**1781**	**291.00**	**1853**	**316.00**
36000	7767	1374	180.00	1458	208.00	1538	237.00	1616	266.00	1691	296.00	1763	325.00	1832	355.00		

Series 05 Type MH or TH Industrial Exhauster A05-_-50_ _H100_ _ _ _ _ _

Wheel Diameter – 50.5 in.
Outlet Area – 4.635 sq. ft.

CFM	Outlet Velocity FPM	STATIC PRESSURE 2" RPM	2" BHP	4" RPM	4" BHP	6" RPM	6" BHP	8" RPM	8" BHP	10" RPM	10" BHP	12" RPM	12" BHP	14" RPM	14" BHP	16" RPM	16" BHP
5000	1079	**367**	**2.37**	513	5.09	627	8.12										
10000	2157	413	5.19	**541**	**9.53**	**643**	**14.10**	**734**	**18.90**	815	24.10	890	29.40	960	35.00	1025	40.70
15000	3236	479	10.00	595	15.90	690	22.30	773	28.80	**848**	**35.50**	**916**	**42.20**	**981**	**49.20**	**1042**	**56.50**
20000	4315	557	17.70	660	25.50	749	33.30	827	41.50	898	50.00	963	58.60	1024	67.40	**1082**	**76.30**
25000	5394	644	29.20	735	38.90	816	48.60	889	58.30	957	68.20	1019	78.50	1077	89.00	1132	99.70
30000	6472	737	45.40	817	57.00	890	68.60	958	80.30	1022	92.00	1081	104.00	1137	115.00	1190	128.00
35000	7551	834	67.10	905	80.80	972	94.30	1034	108.00	1093	121.00	1149	135.00	1202	149.00	1253	162.00
CFM	OV FPM	20" RPM	20" BHP	24" RPM	24" BHP	28" RPM	28" BHP	32" RPM	32" BHP	36" RPM	36" BHP	40" RPM	40" BHP	44" RPM	44" BHP	48" RPM	48" BHP
12000	2589	1147	60.00	1255	73.70	1355	88.00	1448	103.00	1536	118.00						
18000	3883	**1173**	**84.40**	**1274**	**102.00**	**1369**	**120.00**	1459	139.00	1543	158.00	1625	177.00	1702	197.00	1776	218.00
24000	5178	1225	116.00	**1320**	**137.00**	**1409**	**158.00**	**1492**	**180.00**	**1573**	**202.00**	**1649**	**226.00**	**1723**	**249.00**	**1795**	**273.00**
30000	6472	1288	153.00	1380	178.00	1465	204.00	1546	231.00	**1623**	**257.00**	**1695**	**284.00**	**1765**	**311.00**	**1833**	**338.00**
36000	7767	1361	198.00	1448	228.00	1530	258.00	1608	288.00	1682	319.00	1753	351.00	1821	382.00		

Series 05 Type PW Industrial Exhauster A05-_-50_ PW100_ _ _ _ _ _

Wheel Diameter – 50.5 in.
Outlet Area – 4.635 sq. ft.

CFM	Outlet Velocity FPM	STATIC PRESSURE 2" RPM	2" BHP	4" RPM	4" BHP	6" RPM	6" BHP	8" RPM	8" BHP	10" RPM	10" BHP	12" RPM	12" BHP	14" RPM	14" BHP	16" RPM	16" BHP
5000	1079	**381**	**2.56**	528	5.42	642	8.60	739	12.10								
10000	2157	427	5.76	**562**	**10.50**	**670**	**15.40**	**762**	**20.50**	**845**	**25.90**	921	31.50	991	37.30	1057	43.30
15000	3236	503	11.70	615	17.80	714	24.70	803	31.80	**882**	**39.00**	**954**	**46.30**	**1021**	**53.80**	**1084**	**61.40**
20000	4315	594	21.40	691	29.50	776	37.70	854	46.00	928	55.30	998	64.90	1063	74.40	**1124**	**83.90**
25000	5394	695	35.90	779	46.30	854	56.30	924	66.70	990	76.80	1052	87.20	1112	98.30	1171	110.00
30000	6472	802	56.80	874	69.10	942	81.40	1006	93.30	1065	106.00	1122	118.00	1177	130.00	1229	143.00
35000	7551	912	85.20	976	99.20	1037	114.00	1095	128.00	1150	142.00	1202	156.00	1253	171.00	1301	185.00
CFM	OV FPM	20" RPM	20" BHP	24" RPM	24" BHP	28" RPM	28" BHP	32" RPM	32" BHP	36" RPM	36" BHP	40" RPM	40" BHP	44" RPM	44" BHP	48" RPM	48" BHP
12000	2589	1185	63.90	1293	78.40	1392	93.30	1485	109.00								
18000	3883	**1221**	**92.30**	**1325**	**111.00**	**1422**	**129.00**	**1513**	**149.00**								
24000	5178	1271	128.00	**1373**	**150.00**	**1466**	**174.00**										
30000	6472	1331	169.00	1428	198.00	1519	226.00										
36000	7767	1409	224.00	1496	254.00												

Series 05 Type PR Industrial Exhauster A05-_-504PR100_ _ _ _ _ _

Wheel Diameter – 50.5 in.
Outlet Area – 4.635 sq. ft.

CFM	Outlet Velocity FPM	STATIC PRESSURE 20" RPM	20" BHP	24" RPM	24" BHP	28" RPM	28" BHP	32" RPM	32" BHP	36" RPM	36" BHP	40" RPM	40" BHP	44" RPM	44" BHP	48" RPM	48" BHP
12000	2589	1171	63.70	1280	78.20	1381	93.30	1476	109.00	1564	125.00	1649	142.00	1729	159.00	1805	176.00
18000	3883	1204	91.70	1305	110.00	1401	129.00	1491	148.00	1577	168.00	1659	189.00	1738	210.00	1813	231.00
24000	5178	1253	126.00	1354	149.00	1447	172.00	1533	196.00	1614	220.00	1691	244.00	1765	269.00	1837	294.00
30000	6472	1313	167.00	1407	194.00	1497	222.00	1582	251.00	1663	280.00	1740	309.00	1813	339.00		
36000	7767	1386	219.00	1475	250.00	1559	282.00	1639	315.00	1716	348.00	1790	381.00				

Performance certified is for installation Type D: ducted inlet/ducted outlet. Power rating (BHP) excludes transmission losses. Performance data is based on standard air conditions (0.075 #/ft.³). Performance ratings do not include the effects of appurtenances (accessories). The AMCA Certified Ratings seal does not apply to type TH or PR wheel. MOST EFFICIENT FAN SELECTION APPEARS IN BOLD PRINT. **To complete model code, add arrangement, class of construction, motor enclosure code, motor horsepower code and motor speed code. Refer to page 2 for more information.**

Size 57 Rating Table

Class II | Class III | Class IV

Series 05 Type AH Industrial Exhauster A05-_-57_AH100_ _ _ _ _ _

Wheel Diameter – 57.5 in.
Outlet Area – 6.009 sq. ft.

CFM	Outlet Velocity FPM	STATIC PRESSURE 2" RPM	2" BHP	4" RPM	4" BHP	6" RPM	6" BHP	8" RPM	8" BHP	10" RPM	10" BHP	12" RPM	12" BHP	14" RPM	14" BHP	16" RPM	16" BHP
8000	1331	**332**	**3.51**	**461**	**7.06**	560	11.00										
14000	2330	374	6.85	485	12.50	**576**	**18.50**	**659**	**24.40**	**732**	**30.60**	**798**	**37.00**	859	43.70	916	50.60
20000	3328	438	12.10	531	19.70	613	27.70	687	35.90	**753**	**44.30**	**816**	**52.80**	**875**	**61.20**	**932**	**69.70**
26000	4327	510	20.00	593	29.50	665	39.30	731	49.60	793	60.10	851	70.60	906	81.40	**957**	**92.30**
32000	5325	583	31.30	663	43.00	728	54.70	788	66.60	843	79.00	897	91.70	947	105.00	996	117.00
38000	6324	658	46.80	736	60.70	798	74.50	853	88.40	904	102.00	953	117.00	999	132.00	1044	147.00
44000	7322	739	67.40	809	83.20	871	99.20	923	115.00	971	131.00	1016	148.00	1059	164.00	1101	180.00

CFM	OV FPM	20" RPM	20" BHP	24" RPM	24" BHP	28" RPM	28" BHP	32" RPM	32" BHP	36" RPM	36" BHP	40" RPM	40" BHP	44" RPM	44" BHP	48" RPM	48" BHP
15000	2496	1023	68.50														
22500	3744	**1042**	**98.00**	**1136**	**118.00**	**1222**	**138.00**	**1302**	**159.00**	**1378**	**181.00**	1450	203.00	1518	225.00	1584	248.00
30000	4993	**1076**	**134.00**	**1162**	**159.00**	**1244**	**184.00**	**1323**	**210.00**	**1398**	**235.00**	**1470**	**261.00**	**1537**	**288.00**	**1602**	**315.00**
37500	6241	1126	174.00	1208	205.00	1285	235.00	**1358**	**267.00**	**1427**	**299.00**	**1494**	**331.00**	**1559**	**362.00**	**1622**	**394.00**
45000	7489	1190	222.00	1266	257.00	1338	294.00	1407	330.00	1474	367.00						

Series 05 Type MH or TH Industrial Exhauster A05-_-57_ _H100_ _ _ _ _ _

Wheel Diameter – 57.5 in.
Outlet Area – 6.009 sq. ft.

CFM	Outlet Velocity FPM	STATIC PRESSURE 2" RPM	2" BHP	4" RPM	4" BHP	6" RPM	6" BHP	8" RPM	8" BHP	10" RPM	10" BHP	12" RPM	12" BHP	14" RPM	14" BHP	16" RPM	16" BHP
8000	1331	**329**	**3.76**	452	7.74	551	12.20	636	17.00								
14000	2330	372	7.50	482	13.50	**570**	**19.70**	**648**	**26.30**	**719**	**33.30**	784	40.60	844	48.10	901	55.90
20000	3328	426	13.70	527	21.50	610	30.00	683	38.70	**748**	**47.50**	**808**	**56.40**	**864**	**65.60**	**918**	**75.10**
26000	4327	490	23.10	581	33.20	658	43.30	727	54.00	789	65.00	846	76.30	900	87.70	**951**	**99.20**
32000	5325	561	36.80	641	49.10	713	61.60	777	74.00	837	86.70	891	99.90	943	113.00	991	127.00
38000	6324	636	55.50	708	70.30	773	84.90	833	99.80	889	115.00	942	129.00	991	144.00	1038	160.00
44000	7322	714	80.30	778	97.50	838	114.00	893	131.00	946	149.00	996	166.00	1043	183.00	1088	200.00

CFM	OV FPM	20" RPM	20" BHP	24" RPM	24" BHP	28" RPM	28" BHP	32" RPM	32" BHP	36" RPM	36" BHP	40" RPM	40" BHP	44" RPM	44" BHP	48" RPM	48" BHP
15000	2496	1007	75.70	1102	93.20	1190	111.00	1272	130.00								
22500	3744	**1026**	**106.00**	**1116**	**128.00**	**1200**	**151.00**	1279	174.00	1354	199.00	1426	224.00	1494	249.00	1559	275.00
30000	4993	**1069**	**144.00**	**1153**	**170.00**	**1231**	**197.00**	**1305**	**225.00**	**1376**	**254.00**	**1444**	**283.00**	**1510**	**313.00**	**1573**	**343.00**
37500	6241	1121	189.00	1202	221.00	1278	254.00	**1349**	**287.00**	**1416**	**320.00**	**1481**	**353.00**	**1542**	**387.00**		
45000	7489	1181	243.00	1258	280.00	1331	318.00	1400	357.00	1466	396.00						

Series 05 Type PW Industrial Exhauster A05-_-57_ PW100_ _ _ _ _ _

Wheel Diameter – 57.5 in.
Outlet Area – 6.009 sq. ft.

CFM	Outlet Velocity FPM	STATIC PRESSURE 2" RPM	2" BHP	4" RPM	4" BHP	6" RPM	6" BHP	8" RPM	8" BHP	10" RPM	10" BHP	12" RPM	12" BHP	14" RPM	14" BHP	16" RPM	16" BHP
8000	1331	**342**	**4.12**	**469**	**8.31**	568	13.00	653	18.00	727	23.30	795	28.90	858	34.80		
14000	2330	384	8.41	500	14.90	**594**	**21.70**	**674**	**28.70**	**746**	**36.00**	**812**	**43.60**	874	51.50	931	59.60
20000	3328	448	16.00	545	24.20	631	33.10	708	42.70	**778**	**52.20**	**841**	**61.90**	**900**	**71.80**	**955**	**81.90**
26000	4327	523	27.90	607	38.40	682	49.10	750	59.90	816	71.90	877	84.40	934	96.70	**988**	**109.00**
32000	5325	605	45.20	679	58.40	746	71.20	807	84.50	865	97.50	920	111.00	974	125.00	1025	141.00
38000	6324	691	69.40	756	85.10	816	100.00	873	116.00	926	131.00	977	147.00	1025	162.00	1072	178.00
44000	7322	781	102.00	838	119.00	892	138.00	944	156.00	994	173.00	1040	191.00	1086	210.00	1129	227.00

CFM	OV FPM	20" RPM	20" BHP	24" RPM	24" BHP	28" RPM	28" BHP	32" RPM	32" BHP	36" RPM	36" BHP	40" RPM	40" BHP	44" RPM	44" BHP	48" RPM	48" BHP
15000	2496	1039	80.60	1134	98.90	1221	118.00	1303	138.00								
22500	3744	**1068**	**115.00**	**1160**	**138.00**	**1245**	**162.00**	**1325**	**187.00**								
30000	4993	1110	158.00	**1199**	**187.00**	**1282**	**216.00**										
37500	6241	1158	209.00	1245	245.00	1325	280.00										
45000	7489	1221	273.00	1299	311.00												

Series 05 Type PR Industrial Exhauster A05-_-574PR100_ _ _ _ _ _

Wheel Diameter – 57.5 in.
Outlet Area – 6.009 sq. ft.

CFM	Outlet Velocity FPM	STATIC PRESSURE 20" RPM	20" BHP	24" RPM	24" BHP	28" RPM	28" BHP	32" RPM	32" BHP	36" RPM	36" BHP	40" RPM	40" BHP	44" RPM	44" BHP	48" RPM	48" BHP
15000	2496	1028	80.30	1124	98.80	1213	118.00	1296	138.00	1374	158.00	1448	179.00	1518	201.00	1585	223.00
22500	3744	1053	114.00	1143	137.00	1227	161.00	1307	186.00	1383	212.00	1455	238.00	1525	264.00	1591	292.00
30000	4993	1094	156.00	1183	185.00	1265	215.00	1340	245.00	1412	275.00	1479	305.00	1545	336.00	1609	368.00
37500	6241	1143	206.00	1226	240.00	1306	276.00	1381	312.00	1453	348.00	1520	385.00				
45000	7489	1203	268.00	1282	307.00	1357	348.00	1428	389.00								

Performance certified is for installation Type D: ducted inlet/ducted outlet. Power rating (BHP) excludes transmission losses. Performance data is based on standard air conditions (0.075 #/ft.³). Performance ratings do not include the effects of appurtenances (accessories). The AMCA Certified Ratings seal does not apply to type TH or PR wheel. MOST EFFICIENT FAN SELECTION APPEARS IN BOLD PRINT. **To complete model code, add arrangement, class of construction, motor enclosure code, motor horsepower code and motor speed code. Refer to page 2 for more information.**

Specifications

Series 05- Industrial Exhauster Centrifugal Fan (Belt Drive)

The belt drive Industrial Centrifugal Fan, Single Width, shall be manufactured by Hartzell Fan, Inc.®, Series 05, ARRG. 1, 4, 8, 9, 9M, or 10. Four wheel styles, air handling type (AH, 12" – 57"), material handling type (MH, 12" – 57"), trim handling type (TH, 12" – 57"), and paddle wheel type (PW, 12" – 57", PR, 29" – 57") are available. Rotation, as determined by the drive side of the fan, shall be clockwise or counter-clockwise. Fan housing, for sizes 12" through 29", shall be field rotatable and the discharge shall be any of the eight AMCA standard positions. Sizes 33" through 57" shall be a fixed construction for the rotation and discharge specified. The fan shall be packaged, completely assembled and ready to install (except ARRG. 1, which is less motor and drive).

The fan housing and base shall be a heavy gauge hot rolled steel suitable for temperatures up to 300° F., and with modifications up to 800° F. (ARRG. 10 is standard at 250° F. but is suitable for temperatures up to 600° F., and ARRG. 4 maximum temperature is 200° F.). The housing and wheels have continuous welds. The wheels shall be hot rolled steel with non-clogging and self-cleaning characteristics. The wheel shall be mounted to the fan shaft with a straight bore, keyway, and setscrews. The shafts shall be ground and polished. The fan bearings shall be heavy duty, self-aligning ball or roller type (depending on fan size, motor horsepower, and performance) and are relubricatable for continuous service. They shall have a minimum L10 life of 50,000 hours. The belts shall be an oil, heat, and static resistant type oversized for continuous duty.

The fan assembly shall be dynamically balanced at the Hartzell factory prior to shipping. Fans shall be balanced in accordance with AMCA Standard 204-96, fan application category BV-3 (comparable to Grade G6.3). Fans shall be manufactured in accordance with Hartzell's standard quality assurance procedures.

Fans shall be licensed to bear the AMCA Certified Air Performance Rating Seal. Type TH and PR are not AMCA Certified.

Series 05F- Flange Mount Industrial Exhauster Centrifugal Fan (Direct Drive)

The direct drive Industrial Centrifugal Fan, Flange Mounted Type, Single Width shall be manufactured by Hartzell Fan, Inc.®, Series 05F, ARRG. 4, Class II, III, or IV. Rotation, as determined by the drive side of the fan, shall be clockwise or counter-clockwise. Fan shall be field rotatable and the discharge shall be any of the eight AMCA standard positions by rotation of the entire fan. Standard sizes are 12" through 33". The fan shall be packaged, completely assembled and ready to install. Fan shall be used in vertical inlet installations only.

The fan housing and base shall be a heavy gauge commercial quality carbon steel suitable for temperatures up to 200* F. The housing and wheels shall be continuously welded in compliance with AWS D1.1 standard. The wheels shall be commercial quality carbon steel, mounted to the motor shaft by a straight bore. Lifting lugs shall be standard, for ease of handling and installation.

The fan assembly shall be dynamically balanced at the Hartzell factory prior to shipping. Fans shall be balanced in accordance with AMCA Standard 204-96, fan application category BV-3 (comparable to Grade G6.3). Fans shall be manufactured in accordance with Hartzell's standard quality assurance procedures.

Options and Accessories

Drain Pipe Coupling
A standard pipe coupling welded to housing at its lowest point; female pipe has threaded plug.

Access Door
For maintenance and clean-out of internal fan housing. Bolted and gasketed. A hinged, quick release type also available for Class I only.



Vibration Isolator
Rubber-in-shear or spring-type isolators are available.

Combination Drive Guard and Weather Cover
Covers motor and shaft sheaves as well as belts. Combines guarding of the drive as well as protection from the weather.



Arrangement 4



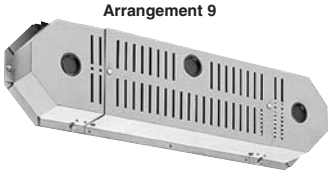
Arrangement 9

Drive Guards
Encloses the drive assembly while permitting circulation of ambient air. Standard features include: tach opening, belt tension openings and adjustable length.



Shaft Guard
Arrangement 9 or 1

Belt Drive Guard
Arrangement 9



Inlet and Outlet Guards
Spiral ring guard offers protection on inlet side and a wire mesh guard can be furnished for the outlet side.



Inlet Guard



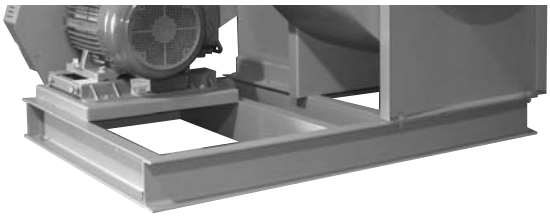
Outlet Guard

Flanged Inlet and Outlet
Welded flanges. Drilled flanges can be furnished, if specified.

Ceramic Shaft Seal and Neoprene Slinger
Shaft seal provides contaminants from the airstream passing through shaft hole in the housing. Seals are not gas tight. Required when stainless steel shaft and hardware are specified. For temperatures to 300°F.

Arrangements
Arrangement 8 and other arrangements not shown are available, (see page 4). Contact factory.

Arrangement 1 Sub-Base
Common structural support for Arrangement 1 fan and motor. Specify motor mounting position (See page 4).



Arrangement 9M Motor Base
Accommodates a larger frame size motor than the standard arrangement 9 base.



Heat Fan Accessories – Heat Slinger
Draws cool air over inboard bearing and reduces heat conduction from wheel through shaft. Heat slinger guard included.



Inlet Box
This special elbow accommodates improved inlet conditions for turning the air into the fan inlet using limited extra space.



Motor Heat Shield (Arr. 9 Fans)
Aluminum plate attached to base between fan scroll and motor assists in heat deflection and dissipation.

High Temperature Shaft Seal
Shaft seal encased between housing drive side and metal retaining plate. Required for temperatures from 300°F to 800°F.

CAUTION: The drive assembly or the periphery of the wheel of a fan less than seven (7) feet above the floor or working level must be guarded to be in accordance with OSHA regulations.

Corrosive Applications

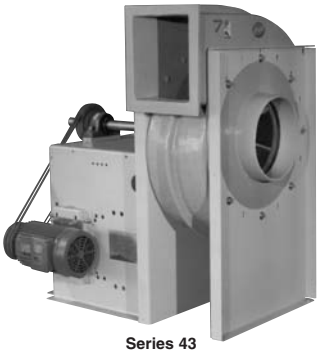
Protective Coatings

An epoxy coating is available for mildly corrosive atmospheres. The finish is chemical, moisture and abrasion resistant, providing a very tough and durable coating. Surfaces are phosphatized prior to coating. Finish air dries to 6 mils. Temperatures range up to 250°F.

Inorganic zinc coating is also available. This finish is a very hard coating with exceptional abrasion resistance. Offers excellent weathering characteristics and resistance to alcohols, solvents, and petroleum products. Also, resistant to temperatures up to 600°F. Surfaces are sandblasted prior to application. Finish air dries to 2½ mil thickness.

Fiberglass Units

Where extreme corrosive fumes are encountered, Hartzell Fiberglass Radial Blowers, Series 43, give unsurpassed resistance to a wide variety of corrosive elements at a cost substantially below that of corrosive resistant metals. Size range of 16" to 33" wheel diameter. For complete details on Hartzell Fiberglass Radial Blowers, see Bulletin A-140.



Series 43
Arrangement 9

Spark Resistant Construction

For safely handling fumes and vapors, Hartzell offers three types of spark resistant construction. Types A, B, and C as outlined in AMCA Standard 99-0401-86.

Type A – All aluminum fan housing, inlet cone and wheel with a ground and polished steel shaft covered with an aluminum sleeve. Temperature limitation of 350°F, with high temperature construction. Material Code AA.

Type B – Aluminum wheel and aluminum wear plate where the shaft passes through the housing. Temperature limitation of 350°F, with high temperature construction. Material Code AB.

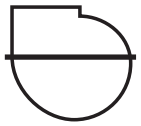
Type C – Aluminum inlet cone and aluminum wear plate where the shaft passes through the housing. Temperature limitation of 350°F, with high temperature construction. Material Code AC.

NOTES: No bearings, drive components, or electrical devices shall be placed in the air or gas stream.

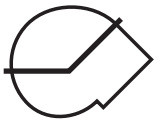
The user shall electrically ground all fan parts.

The use of the above standard in no way implies a guarantee of safety for any level of spark resistance. Spark resistant construction also does not protect against any airstream material that may be present in a system which might cause ignition of explosive gases.

Split Housing



Type 1 – Available on top angular up, down blast, bottom horizontal, upblast, bottom angular down fans. Allows removal of section without disturbing inlet.



Type 2 – Available top horizontal, top angular down and bottom angular up fans. Allows removal of pie-shaped section without disturbing inlet or outlet.

Heavy-Duty Control Dampers

Inlet Control Damper

Increases the efficiency of the blower and permits control of air volume.

Outlet Dampers

Dampers are mounted directly on the blower outlet to control the volume of air delivered to the system. Opposed and parallel blades are available constructed of standard gauge steel; and available with a variety of finishes.

Parallel Blade Type

Best suited for applications requiring accurate air volume in a range from wide open to 75% of wide open. Usually used for balancing the system or for modulated control when pressure drop is variable.

Opposed Blade Type

Best suited for control over a broad range of air volume with more precise control.

Both types of outlet control dampers are available in three classifications:

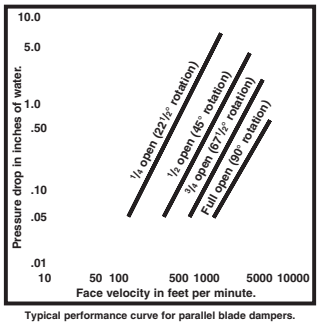
Classification:

Class I – Maximum static pressure: 5" SP
Maximum velocity: 3900 FPM

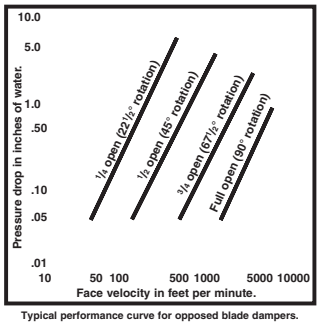
Class II – Maximum static pressure: 8-1/2" SP
Maximum velocity: 5100 FPM

Class III – Maximum static pressure: 20" SP
Maximum velocity: 6000 FPM

NOTE: Class III dampers must be used on installation with temperatures above 250°F.



Typical performance curve for parallel blade dampers.



Typical performance curve for opposed blade dampers.

SAFETY ACCESSORIES, APPLICATION AND USE WARNING

The safe application and use of equipment supplied by Hartzell Fan, Inc. is the responsibility of the installer, the user, the owner, and the employer. Since the application and use of its equipment can vary greatly, Hartzell Fan, Inc. offers various product types, optional safety accessories, and sound performance data per laboratory tests. Hartzell Fan, Inc. sells its equipment with and without safety accessories, and accordingly, it can supply such safety accessories only upon receipt of an order. The need for safety accessories will frequently depend upon the type of system, fan location and operating procedures being employed. The proper protective safety accessories to meet company standards, local codes, and the requirements of the Occupation Safety and Health Act must be determined by the user since safety requirements vary depending on the location and use of the equipment. If applicable local conditions, standards, codes or OSHA rules require the addition of the safety accessories, the user should specify and obtain the required safety accessories from Hartzell Fan, Inc. and should not allow the operation of the equipment without them.

Owners, employers, users and installers should read "RECOMMENDED SAFETY PRACTICES FOR USERS AND INSTALLERS OF INDUSTRIAL AND COMMERCIAL FANS" published by the Air Movement and Control Association International, Inc., 30 West University Drive, Arlington Heights, Illinois 60004. A copy of this publication is enclosed with each fan shipped from Hartzell Fan, Inc., and is available upon request at Hartzell's office in Piqua, Ohio 45356.

Please contact Hartzell Fan, Inc. or your local Hartzell representative for more information on product types, safety accessories, and sound performance estimates.

Remember, the selection of safety accessories and the safe application and use of equipment supplied by Hartzell Fan, Inc. is **your** responsibility.

Hartzell Warranty

LIMITED WARRANTIES

Hartzell represents to Buyer that any goods to be delivered hereunder will be produced in compliance with the requirements of the Fair Labor Standards Act of 1938 as amended.

Hartzell also warrants to Buyer its goods to be free from defects in workmanship and material under normal use and service for one (1) year after tender of delivery by Hartzell, plus six (6) months allowance for shipment to approved stocking dealers & distributors. No warranty extends to future performance of goods and any claims for breach of warranty or otherwise accrues upon tender of delivery.

The foregoing constitute Hartzell's sole and exclusive warranties in lieu of all other warranties, whether written, oral, express, implied or statutory.

LIMITATION OF LIABILITY FOR BREACH OF WARRANTY

Hartzell's obligation for any breach of warranty is limited to repairing or replacing, at its option, without cost to Buyer at its factory any goods which shall, within such a warranty period, be returned to it with transportation charges prepaid, and which its examination shall disclose to its satisfaction to have been defective. Any request for repair or replacement should be directed to Hartzell Fan, Inc., P.O. Box 919, Piqua, Ohio 45356. Hartzell will not pay for any repairs made outside its factory without its prior written consent. This does not apply to any such Hartzell goods which have failed as a result of faulty installation or abuse, or incorrect electrical connections or alterations, made by others, or use under abnormal operating conditions or misapplication of the goods.

LIMITATION OF LIABILITY

To the extent the above limitation of liability for breach of warranty is not applicable, the liability of Hartzell on any claim of any kind, including negligence, for any loss or damage arising out of or connected with, or resulting from the sale and purchase of the goods or services covered by these Terms and Conditions of Sale or from the performance or breach of any contract pertaining to such sale or purchase or from the design manufacture, sale, delivery, resale, installation, technical direction installation, inspection repair, operation or use of any goods or services covered by these Terms and Conditions shall, in no case exceed the price allocable to the goods or services which gave rise to the claim and shall terminate one year after tender of delivery of said goods or services.

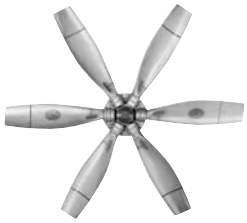
In no event whether as a result of breach of contract, or warranty or alleged negligence, defects incorrect advice or other causes, shall Hartzell be liable for special or consequential damages, including, but not limited to, loss of profits or revenue, loss of use of the equipment or any associated equipment, cost of substitute equipment, facilities or services, down time costs, or claims of customers of the Buyer for such damages. Hartzell neither assumes nor authorizes any person to assume for it any other liability in connection with the sale of its goods or services.

NO IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS.

HARTZELL DOES NOT WARRANT THAT SAID GOODS ARE OF MERCHANTABLE QUALITY OR THAT THEY ARE FIT FOR ANY PARTICULAR PURPOSE. THERE IS NO IMPLIED WARRANTY OF MERCHANTABILITY AND THERE IS NO IMPLIED WARRANTY OF FITNESS.



Propeller Fans



Cooling Tower & Heat Exchanger Fans



Duct Fans



Duct Axial Fans



Vaneaxial Blowers



Cool Blast & Utility Fans



Steel Centrifugal Blowers



Roof Ventilators – Steel & Fiberglass



Heating Equipment – Gas & Steam



Fiberglass Axial Flow Fans



Fiberglass Centrifugal Blowers



Marine – Mine Duty Blowers

Hartzell Fan, Inc., Piqua, Ohio 45356 • Plants in Piqua, Ohio and Portland, Indiana.

www.hartzellfan.com

Litho in U.S.A. A-155-I October 2007 2.5M

AirPro Fan & Blower Company * 4858 Hwy 17 North * PO Box 543 * Rhinelander * WI 54501 * Tel 715-365-FANS * Fax 715-365-3268

AirPro Contact Information

Name AirPro Fan & Blower Co.
Address: PO Box 543
Rhinelander, WI 54501

Email: sales@airprofan.com
Tel: 715-365-3267
Fax: 715-365-3268

Quotation

Customer: Envent Corporation
Attention:
Address:

email:

Quotation No: Q29513
Ref:
Date: 4/13/2016
Validity: 30 days
Tel:
Fax:

Fan Details

Fan Type: HPSM
Size: 297
Class: 100
Width: 98 %
BHP: 75.0 hp
Speed: 3504 rpm

Arrangement: 8
Discharge: 360
Rotation: CW
Cold Start BHP: 81.1 hp
Cold Start Temp: 30 F
Max. Design Speed*: 3600 rpm

* Estimated max. design speed based on carbon steel construction, 150F max. design temperature, standard product design and clean air applications. Actual max. design speeds to be stated on certified drawing for each order.

General Conditions of Sale

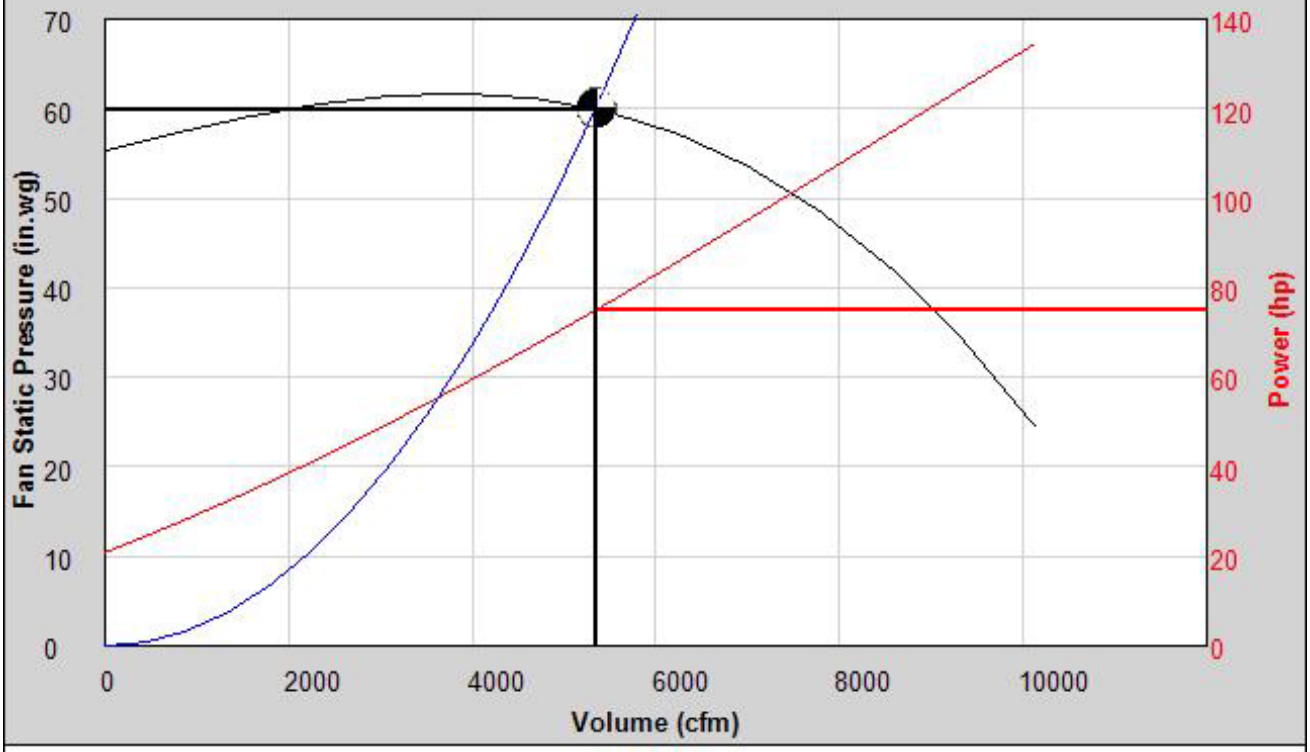
Estimated Lead time: 6 weeks (see price page for expedite options).
Shipping Instructions: Best way collect FOB Rhinelander, WI USA.
Pricing Terms: Prices do not include freight or taxes.
Payment Terms: Net 30 (pending credit approval).
Engineering Drawings: General Arrangement drawing (AutoCAD format) 2 weeks after receipt of purchase order. (please specify contact name and email address).

Fan Performance Curve

Fan Type: HPSM

Size:	297	**Volume:**	5341.5 cfm
Width:	98 %	**Fan Static Pressure:**	60 in.wg
Speed:	3504 rpm	**Density:**	0.069 lb/ft3
Brake Horsepower:	75 hp	**Inlet Pressure:**	-30 in.wg
Static Efficiency:	64 %	**Temperature:**	70 F
Class:	Class 100	**Elevation:**	0 ft

Performance and Power indicated does not include drive losses.



--------- Static Pressure --------- Power --------- System Resistance

Sound Data

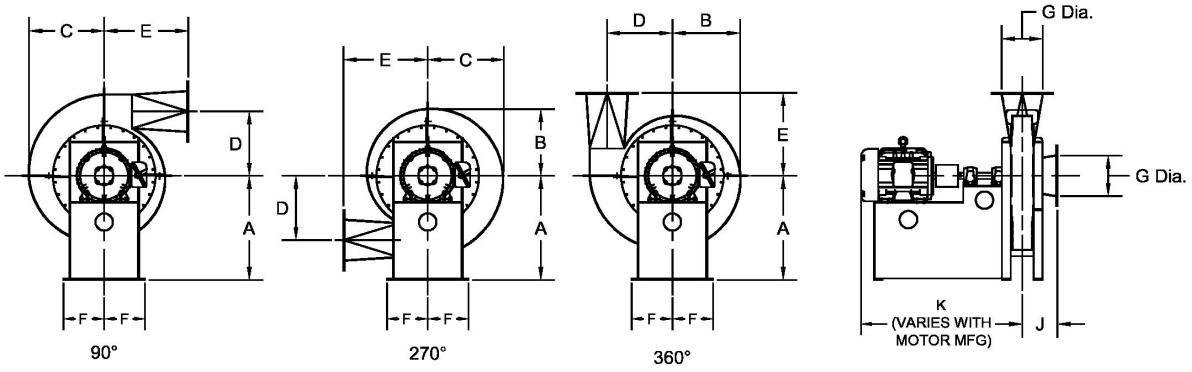
Noise levels based on Hemispherical Free Field conditions.
(Directivity = 2, Measurement Distance = 5ft)

Octave Band	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Lw dB	106	104	110	108	106	102	98	95
Lp dB	94	92	98	96	94	90	86	83

Overall Predicted Noise Level = 99 dBA (Open Inlet)

SIZES 19-37 HP FANS

ARRANGEMENT 8
CLASS 100
TYPE HPRL, HPSL, HPRM, & HPSM
DIMENSIONAL DATA



HPRL HPSL FAN SIZE	A	B	C	D	E	F	G	J	K_max	HPRL HPSL FAN SIZE
19	22.00	14.62	15.69	14.00	17.50	9.88	6	6.13	39.00	19
21	23.00	16.06	17.25	15.44	19.50	10.25	6	6.38	46.00	21
23	25.00	17.63	18.94	16.88	21.25	11.25	6	6.63	51.00	23
25	27.00	19.19	20.56	18.38	23.13	12.25	8	6.88	52.00	25
27	29.00	20.69	22.19	19.81	25.00	12.75	8	7.13	57.00	27
29	30.00	22.19	23.81	21.25	26.88	13.50	8	7.38	57.00	29
31	33.00	23.75	25.44	22.75	28.69	14.75	10	7.50	66.00	31
33	35.00	25.13	27.00	24.25	30.50	15.25	10	7.75	70.00	33
35	37.00	26.81	28.81	25.75	32.38	15.75	12	8.00	72.00	35
37	39.00	28.38	30.44	27.12	34.25	16.38	12	8.25	72.00	37

HPRM HPSM FAN SIZE	A	B	C	D	E	F	G	J	K_max	HPRM HPSM FAN SIZE
19	22.00	14.31	15.81	13.63	17.50	9.88	8	6.88	41.00	19
21	23.00	15.75	17.44	15.00	19.50	10.25	8	7.19	49.00	21
23	25.00	17.31	19.19	16.50	21.25	11.25	8	7.50	52.00	23
25	27.00	18.81	20.81	17.94	23.13	12.25	10	7.81	54.00	25
27	29.00	20.31	22.50	19.38	25.00	12.75	10	8.13	59.00	27
29	30.00	21.81	24.13	20.75	26.88	13.50	10	8.44	59.00	29
31	33.00	23.31	25.81	22.25	28.69	14.75	12	8.69	68.00	31
33	35.00	24.88	27.50	23.69	30.50	15.25	12	9.00	72.00	33
35	37.00	26.38	29.13	25.13	32.38	15.75	14	9.31	74.00	35
37	39.00	27.88	30.81	26.56	34.25	16.38	14	9.63	74.00	37

All dimensions shown are for general information only and should not be used for construction/installation purposes. Only prints marked certified should be used for this purpose. All dimensions are in inches, apply to 100% width fans, and are for NEMA frame motors.

All fans are shown in clockwise rotation and are viewed from the drive side of the fan (side opposite fan inlet) Counter clockwise fans are dimensionally equal but viewed in a mirror image.

Due to continuing product development and improvement, dimensions are subject to change without notice.

Figure B-1

Tent Excavation Locations

54th Avenue

E 12th St.

International Blvd.

FORMER BUILDING 6

BUILDING 4

BUILDING 1

BUILDING 2

BUILDING 8

BUILDING 20

BUILDING 21

FORMER BUILDING 7

BUILDING 17

BUILDING 18

G-121 G-118 W-736 G-119

5GP4, 5GP5, 5GP7, 5GP10, 5GP11, 5GP12

S-626, W-792, W-613, W-793

S-712

SB-25

W-022

S-012

S-610 S-609 S-604 S-702 G-004 W-791 S-611 SB-21 S-014 S-015 S-606 S-602 W-619

S-703, G-002 S-704 G-114 G-001

S-506 S-020 S-005 S-047 W-035A S-040 W-018 S-045

W-030 Trench 1 S-010 S-008

W 625, Trench 2

S-528

W-016

W-622

Legend

- Hotspot PCB Excavation
- PCB Excavation
- VOC Excavation
- Former Building
- Existing Building
- Site Property Boundary
- S-602 Tented Excavation Location

Abbreviations

PCB = Polychlorinated biphenyl
VOC = Volatile organic compound

Notes

1. EKI proposed excavation limits shown in blue, grey, and tan.
2. Excavation labels represent sampling locations shown on Table 2 and Figures 4 and 5 of the RDIP Addendum main text.

0 125 250
Feet

Tented Excavation Locations

DRAFT
FINAL

eki environment & water

5441 International Blvd.
Oakland, CA
August 2019
B70123.01

Figure B-1

Path: X:\B70123\Maps_01\2019\08\FigB1_TentedExcavLocs.mxd

APPENDIX C

RESULTS OF SCREENING LEVEL SOIL SAMPLING FOR PCBS

5441 International Boulevard
Oakland, California

Draft Final - August 2019

(EKI B70123.01)

DRAFT FINAL - August 2019

MEMORANDUM

To: Brendan Kotler (Bridge)

From: Deepa Gandhi, P.E. (EKI)
Michelle King, Ph.D. (EKI)

cc: Pam Andes, Esq. (Allen Matkins)
Lance Hauer (GE)

Subject: Results of Screening Level Soil Sampling for PCBs
5441 International Boulevard, Oakland, California
(EKI B70123.01)

This memorandum has been prepared by EKI Environment & Water, Inc. ("EKI") to summarize the results of screening level soil sampling for polychlorinated biphenyls ("PCBs") conducted in September 2018 on the property located at 5441 International Boulevard in Oakland, California ("site"). This memorandum was prepared on behalf of Bridge Acquisition, LLC ("Bridge" or "Developer"), who is considering purchasing the site. The soil sampling was performed as a screening level assessment to guide due diligence and targeted locations under existing and former buildings that (a) have known high PCB concentrations in concrete or (b) are proximate to other known locations with significant PCB impacts in soil (Figures 1 and 2). The work was completed with United States Environmental Protection Agency ("EPA") concurrence and in general accordance with EKI's 11 September 2018 memorandum describing the proposed work.

1 SUBSURFACE SAMPLING INVESTIGATION OVERVIEW

EKI implemented the subsurface soil sampling investigation at the site on 13 and 14 September 2018. The work is described below, with sampling locations shown on Figures 1 and 2.

- Eleven (11) boreholes were advanced within buildings to 5 feet below bottom of slab ("bbs") (E01 to E08 and E10 to E12A), one (1) borehole was advanced to 25.5 feet bbs within Building 2 (E09), and one (1) companion borehole to E12A was advanced to 10 feet below ground surface ("bgs"), approximately 5 feet outside of the southwest wall of Building 21 (E12B).
- Borings to 5 feet bbs were generally sampled at the following three depth intervals, except where subsurface obstructions were encountered (see Table 1 for actual sampling intervals):
    - 0 to 0.5 feet bbs;
    - 2.5 to 3 feet bbs; and
    - 4.5 to 5 feet bbs.

- Boring E09, inside Building 2, was sampled at the intervals described above and at the following additional intervals: 15 to 15.5, 20 to 20.5, and 25 to 25.5 feet bbs.
- Boring E12B, companion boring to E12A, was sampled at 9.5 to 10 feet bgs, adjacent to Building 21.
- Where present beneath the slab, samples of baserock were collected.
- Forty-two (42) soil samples were analyzed for PCBs using EPA Method 8082 after extraction by EPA Method 3540C ("Soxhlet") and for moisture content by ASTM D-2216.
- Four (4) baserock samples from boreholes E03, E08, E11, and E12A were analyzed for PCBs using EPA Method 8082 after Soxhlet extraction and for moisture content by ASTM D-2216. The baserock sample from E12A was crushed by the laboratory before extraction and analysis.
- Six (6) soil samples were analyzed for volatile organic compounds ("VOCs") using EPA Method 8260B, for total petroleum hydrocarbons as gasoline ("TPHg") using EPA Method 8015B, and for moisture content by ASTM D-2216.

A description of the sampling procedures and results of this investigation are presented below.

2 PREPARATION FOR FIELD WORK

EKI performed field preparation tasks prior to drilling and sampling, as described below.

- Completed and submitted a Drilling Permit Application to the Alameda County Public Works Agency ("ACPWA"), which is included in Attachment A.
- Prepared a site Health and Safety Plan ("HSP") for EKI field personnel.
- Coordinated with Bridge and with General Electric Company ("GE" or "Owner") regarding field project schedule, timing, and access.
- Conducted a pre-sampling site visit on 7 September 2018 to mark proposed borehole locations for Underground Service Alert ("USA").
- Retained a private utility locating company, Subdynamic Locating Services ("SLS") of San Jose, California, to screen for the presence of buried utilities in the planned sampling locations on 12 September 2018.
- Coordinated with the drilling subcontractor, Penecore Drilling ("Penecore"), and with the analytical laboratory, Enthalpy Analytical ("Enthalpy") of Berkeley, California, regarding scope of work, site conditions, objectives, delivery of services, and schedule.
- Coordinated with Penecore for coring concrete and pavement surfaces at each borehole location and specialty concrete coring subcontractor, Osborne's Concrete Coring ("Osborne"), for coring the buried concrete slab encountered at borehole location E06.
- Coordinated with EPA and California Department of Toxic Substances Control ("DTSC") for observation of drilling and sampling activities at borehole location E09 on 19 September 2018 at 12:45 pm.
- Coordinated with ACPWA in accordance with the Drilling Permit requirements for the sampling event.

3 COLLECTION OF SOIL SAMPLES

On 13 and 14 September 2018, EKI collected shallow soil samples from the site at 11 locations (E01 to E08 and E10 to E12A), as shown on Figures 1 and 2. Pavement coring was performed at 12 of the planned soil sampling locations to provide access to underlying soils. Following completion of coring activities, EKI utilized a hand-auger to advance boreholes to 5 feet bbs to collect soil samples.

Deeper soil samples were collected from borehole locations E09 and E12B. At these locations, the upper 5 feet of boreholes E09 and E12B were advanced using a hand auger. Below 5 feet, boreholes were advanced using direct push technology with a GeoProbe 6610DT rig. Boreholes E09 and E12B were advanced to a total depth of 25 feet bgs and 10 feet bgs, respectively.

For locations with concrete at the ground surfaces, samples of baserock were collected from immediately below the slab, if present. Soil sample depth intervals for these locations are referred to as "feet bbs," indicating the distance measured from below the concrete slab and baserock layers (when present) to the sampling interval.

EKI encountered a second, buried slab at approximately 4 feet bgs at borehole E05 and at approximately 2.5 feet bgs at borehole E06. The second slab was cored by Osborne at borehole location E06 to access underlying soils. Because of limitations of coring equipment, Osborne was not able to core through the second slab at borehole location E05; therefore, the proposed 4.5 to 5 feet bbs soil sample was shifted to immediately above the second slab at 2.8 to 3.3 feet bbs (3.5 to 4 feet bgs).

A total of 37 discrete shallow soil samples, 5 discrete deep soil samples, and 4 baserock samples were collected from the boreholes for PCB analysis by Enthalpy. Enthalpy subcontracted PCB analysis of some samples to Eurofins Cal Science ("Eurofins") of Garden Grove, California as indicated on Table 1.

Six shallow soil samples were also analyzed for VOCs and TPHg by Enthalpy. These soil samples were collected and placed in En Core® ("Encore") samplers. The soil samples were placed in pre-cleaned, laboratory-supplied containers appropriate for the method of analysis. The containers were sealed, labeled, and placed in a cooled ice chest for transport via courier to the laboratory. Chain of custody forms accompanied the soil samples to the laboratory.

The analytical results for the soil samples are presented in Table 1 and Table 2 and discussed in Section 7.

4 GROUTING OF BOREHOLES

Following completion of soil sampling activities, the boreholes were grouted in accordance with the requirements of the ACPWA Drilling Permit. Grout was allowed to settle and topped off as

needed prior to restoring the ground surface to match existing conditions with either quickset concrete or asphalt. The ACPWA inspector was on-site on 19 September 2018 during field activities to observe grouting. ACPWA approved the backfill grouting procedures.

5 INVESTIGATION-DERIVED WASTE

Investigation-derived waste ("IDW") generated from the investigation included pavement cores, soil cuttings from the boreholes, and water used to decontaminate equipment. IDW was placed in two Department of Transportation ("DOT")-approved 55-gallon metal drums, which were sampled for disposal characterization, labeled, and placed on-site for temporary storage, pending arrangements for disposal. Based on laboratory analysis, it is likely the IDW can be classified as non-hazardous.

6 FIELD OBSERVATIONS

Subsurface soils encountered during sampling at the site were mostly fine sand, silt, and silty clay. Grayish-green soil with a strong petroleum-like odor, indicative of degraded petroleum hydrocarbons, was noted in borehole E04 from approximately 0 to 5 feet bbs. A hand-held organic vapor meter with photoionization detector ("OVM") was used to screen soils at all locations, and the following concentrations of total VOCs in soil were measured at borehole E04 at the indicated depth intervals: 350 parts per million by volume ("ppmv") at 0 to 0.5 feet bbs; 1,462 ppmv at 2.5 to 3 feet bbs; and 3,280 ppmv at 4.5 to 5 feet bbs. Based on these OVM readings, soil samples in Encore samplers were collected from these three intervals at borehole E04 for VOC and TPHg analysis.

At borehole E05, brown soil with OVM readings of 1.3 ppmv at 1.5 feet bbs and 25.0 ppmv at 2.7 feet bbs were measured. A change in soil color and lithology was observed above the second concrete slab at borehole E05, where the soil changed to well graded medium-sized sand indicative of backfill material. Therefore, an Encore sample for VOC and TPHg analysis was collected from borehole E05 at 2.7 feet bbs.[1]

Below the second, buried slab of concrete at borehole E06, grayish-brown soil with OVM readings of 23 ppmv at 3 to 3.5 feet bbs and 16 ppmv at 4.5 to 5 feet bbs was encountered. Encore soil samples were collected at these depth intervals for VOC and TPHg analysis.

7 ANALYTICAL RESULTS FOR SOIL SAMPLES

The analytical results for the soil samples collected during this investigation are shown in Tables 1 and 2 and are discussed below. The analytical laboratory data reports for the samples provided by Enthalpy and Eurofins are included in Attachment B.

[1] For consistency with PCB sampling intervals, the depth interval for the Encore sample from borehole E05 is shown as 2.5-3 feet bbs in Table 2.

7.1 PCBs

Aroclor 1260 was the only PCB detected above laboratory reporting limits, at concentrations ranging from 0.031 milligrams per kilogram on a dry weight basis ("mg/kg") (borehole E09, 2.5 to 3 feet bbs) to 73 mg/kg (borehole E09, 15 to 15.5 feet bbs) (Table 1).

7.2 VOCs and TPHg

As shown in Table 2, TPHg was detected above laboratory reporting limits in 5 of the 6 soil samples submitted for analysis collected beneath Building 1, at concentrations ranging from 1.3 Y mg/kg (borehole E06, 4.5-5 feet bbs) to 670 Y mg/kg (borehole E04, 2.5 to 3 feet bbs). The Y flag was added by the laboratory to indicate that the results exhibit a chromatographic pattern which does not resemble the gasoline standard and that TPH outside of the gasoline range may have been present but was not quantified by the laboratory. Based on inspection of the chromatogram, results indicate the presence of a TPH between the gasoline and diesel ranges.

Acetone (0.067 mg/kg), sec-butylbenzene (0.86 mg/kg), 1,2,4-trimethylbenzene (3.2 mg/kg), and 1,3,5-trimethylbenzene (1.5 mg/kg) were the only VOCs detected in the soil samples submitted for analysis (maximum concentrations shown parenthetically, all results provided in Table 2). No other VOCs were detected in soil samples above their respective laboratory reporting limits.

8 CONCLUSIONS AND RECOMMENDATIONS

PCB samples were collected beneath the building slabs of existing Buildings 1, 2, 20, and 21 and former Building 7. In Building 1, the oldest building on-site with PCBs in concrete as high as 1,600 mg/kg, samples were collected immediately beneath concrete where the highest concentrations of PCBs were previously detected. The maximum PCB concentration detected in samples beneath Building 1 was 12 mg/kg, reported in the baserock sample from borehole E03 (Figure 2). Overall, PCBs concentrations beneath Building 1 were at least one order of magnitude lower than overlying concrete; high PCB concentrations in the concrete did not correlate with high PCB concentrations in underlying soil. PCB results were similar for other buildings beneath which samples were collected during the September 2018 sampling event, with the maximum concentration detected in shallow soil samples (up to 5 feet bbs) of 12 mg/kg. Shallow soil results were below the hazardous waste level for PCBs of 50 mg/kg.

Deeper sampling results from borehole location E09, inside Building 2 and adjacent to the PCB hotspot associated with location of the former Pyranol tanks, indicated that PCBs in soil do not extend significantly beneath Building 2. The highest PCB concentration at borehole location E09 (73 mg/kg) was detected in the sample collected at 15 and 15.5 feet bbs, where a change in lithology to finer-grained materials was observed. However, this result is much lower than the maximum concentration detected in the adjacent PCB hotspot of 11,000 mg/kg. Similarly, PCB results from boreholes E12A and E12B, below and near Building 21, were much lower than the

adjacent hotspot with a maximum PCB concentration of 13,000 mg/kg.

These results indicate that PCB hotspots underneath building slabs are not expected at the site, even where adjacent PCB hotspots have been identified or where high PCB concentrations in overlying concrete were previously detected. Therefore, the data gap in PCB soil characterization beneath buildings has been addressed and additional PCB soil sampling is not warranted prior to redevelopment.

VOC and TPHg results for soil beneath Building 1 are consistent with the historical use of Building 1, where petroleum-based 10C transformer oil was used by GE.

Additional discussion of the data is included in the main text of the RDIP Addendum.

LIST OF TABLES

Table 1 Summary of Soil Analytical Results for PCBs
Table 2 Summary of Soil Analytical Results for VOCs and TPHg

LIST OF FIGURES

Figure 1 Summary of PCB Soil Data
Figure 2 2018 Soil and Previous Concrete Sampling Results for PCBs

LIST OF ATTACHMENTS

Attachment A Alameda County Public Works Agency Drilling Permit
Attachment B Enthalpy and Eurofins Laboratory Reports

TABLE 1
Summary of Soil Analytical Results for PCBs
5441 International Blvd., Oakland, California

Location ID (c)	Sample Date	Sample Interval (feet bbs)	Sample Interval (feet bgs)	Analytical Results in mg/kg (a)(b)	
				Aroclor 1260	Other Aroclors
E01 (Bldg 1)	9/13/2018	0 - 0.5	1 - 1.5	3.5	ND
	9/13/2018	2.5 - 3	3.5 - 4	0.47	ND
	9/13/2018	4.5 - 5	5.5 - 6	1.9	ND
E02 (Bldg 1)	9/13/2018	0 - 0.5	0.8 - 1.3	0.4	ND
	9/13/2018	2.5 - 3	3.3 - 3.8	<0.025	ND
	9/13/2018	4.5 - 5	5.3 - 5.8	<0.024	ND
E03 (Bldg 1)	9/13/2018	Baserock (d)	0.7 - 0.8	12	ND
	9/13/2018	0 - 0.5	0.8 - 1.3	4.1	ND
	9/13/2018	2.5 - 3	3.3 - 3.8	<0.023	ND
	9/13/2018	4.5 - 5	5.3 - 5.8	<0.025	ND
E04 (Bldg 1)	9/14/2018	0 - 0.5	0.5 - 1	1.4	ND
	9/14/2018	2.5 - 3	3 - 3.5	<0.18	ND
	9/14/2018	4.5 - 5	5 - 5.5	1.4	ND
E05 (Bldg 1)	9/13/2018	0 - 0.5	0.7 - 1.2	<0.15	ND
	9/13/2018	2.5 - 3	3.2 - 3.7	5.3	ND
	9/13/2018	2.8 - 3.3	3.5 - 4	3.7	ND
E06 (Bldg 1)	9/13/2018	0 - 0.5	0.5 - 1	0.65	ND
	9/13/2018	2 - 2.5	2.5 - 3	0.66	ND
	9/14/2018	3 - 3.5	3.5 - 4	<0.16	ND
	9/14/2018	4.5 - 5	5 - 5.5	<0.16	ND
E07 (Bldg 1)	9/14/2018	0 - 0.5	0.8 - 1.3	0.34	ND
	9/14/2018	2.5 - 3	3.3 - 3.8	<0.16	ND
	9/14/2018	4.5 - 5	5.3 - 5.8	<0.15	ND
E08 (Bldg 20)	9/14/2018	Baserock (d)	0.4 - 0.5	0.077	ND
	9/14/2018	0 - 0.5	0.5 - 1	8.1	ND
	9/14/2018	2.5 - 3	3 - 3.5	<0.19	ND
	9/14/2018	4.5 - 5	5 - 5.5	<0.16	ND
E09 (Bldg 2)	9/13/2018	0 - 0.5	0.6 - 1.1	0.6	ND
	9/13/2018	2.5 - 3	3.1 - 3.6	0.031	ND
	9/13/2018	4.5 - 5	5.1 - 5.6	<0.025	ND
	9/13/2018	9.5 - 10	10.1 - 10.6	1.1	ND
	9/13/2018	15 - 15.5	15.6 - 16.1	73	ND
	9/13/2018	20 - 20.5	20.6 - 21.1	0.26	ND
	9/13/2018	25 - 25.5	25.6 - 26.1	<0.024	ND

TABLE 1
Summary of Soil Analytical Results for PCBs
5441 International Blvd., Oakland, California

Location ID (c)	Sample Date	Sample Interval (feet bbs)	Sample Interval (feet bgs)	Analytical Results in mg/kg (a)(b)	
				Aroclor 1260	Other Aroclors
E10 (Former Bldg 7)	9/14/2018	0 - 0.5	0.6 - 1.1	<0.14	ND
	9/14/2018	2.5 - 3	3.1 - 3.6	<0.18	ND
	9/14/2018	4.5 - 5	5.1 - 5.6	<0.17	ND
E11 (near Former Bldg 7)	9/14/2018	Baserock (d)	0.3 - 0.8	1.0	ND
	9/14/2018	0 - 0.5	0.8 - 1.3	5.5	ND
	9/14/2018	2.5 - 3	3.3 - 3.8	<0.2	ND
	9/14/2018	4.5 - 5	5.3 - 5.8	<0.16	ND
E12A (Bldg 21)	9/14/2018	Baserock (d)	0.2 - 0.5	0.21	ND
	9/14/2018	0 - 0.5	0.5 - 1	12	ND
	9/14/2018	2.5 - 3	3 - 3.5	1.8	ND
	9/14/2018	4.5 - 5	5 - 5.5	1.2	ND
E12B	9/14/2018	--	9.5 - 10	0.37	ND

Abbreviations:

"<" = not detected above the indicated RL
"--" = no slab present at ground surface
bbs = below bottom of slab+baserock, if present
bgs = below ground surface
Bldg = building
EPA = Environmental Protection Agency
mg/kg = milligrams per kilogram dry weight
ND = not detected above the laboratory RL
PCBs = polychlorinated biphenyls
RL = reporting limit

Notes:

(a) Samples were collected by EKI and analyzed for PCBs by EPA Method 8082 after extraction by EPA Method 3540C (Soxhlet). Samples collected on 9/14/18, baserock samples, and location E05 were analyzed by Eurofins Cal Science of Garden Grove, California. Other samples were analyzed by Enthalpy Analytical of Berkeley, California. In addition to seven common Aroclors, Eurofins reported results for Aroclor 1262 and 1268, while Enthalpy did not.

(b) Results are reported on a dry weight basis.

(c) Associated building location shown parenthetically.

(d) Baserock samples were collected immediately below the slab. Baserock sample for location E12A was crushed by the laboratory before extraction and analysis.

TABLE 2
Summary of Soil Analytical Results for VOCs and TPHg
5441 International Blvd., Oakland, California

Location ID	Sample Date	Sample Interval (feet bbs)	Sample Interval (feet bgs)	Analytical Results (a)(b)(c) (ug/kg) Acetone	sec-Butylbenzene	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	Other VOCs	(mg/kg) TPHg (d)
E04	9/14/2018	0 - 0.5	0.5 - 1	<3300	860	3200	1500	ND	500 Y
	9/14/2018	2.5 - 3	3 - 3.5	<9000	<2200	<2200	<2200	ND	670 Y
	9/14/2018	4.5 - 5	5 - 5.5	<6200	<1500	<1500	<1500	ND	400 Y
E05 (e)	9/13/2018	2.5 - 3	3.2 - 3.7	19	<4.0	<4.0	<4.0	ND	<0.16
E06	9/14/2018	3 - 3.5	3.5 - 4	<830	<210	<210	<210	ND	44 Y
	9/14/2018	4.5 - 5	5 - 5.5	67	<5.2	<5.2	<5.2	ND	1.3 Y

Abbreviations:

<3300 = not detected above the indicated laboratory reporting limit
bbs = below bottom of slab
bgs = below ground surface
EPA = Environmental Protection Agency
mg/kg = milligrams per kilogram
ND = not detected above laboratory reporting limit
PCBs = polychlorinated biphenyls
TPH = total petroleum hydrocarbons
TPHg = TPH, gasoline range
ug/kg = micrograms per kilogram
VOCs = volatile organic compounds

Notes:

(a) Samples were collected by EKI and analyzed for VOCs by EPA Method 5035/8260B and for TPHg by EPA Method 5035/8015B by Enthalpy Analytical of Berkeley, California.
(b) Results are reported on a wet weight basis
(c) Laboratory reporting limits were elevated in some samples due to the presence of high concentrations of TPH.
(d) Y flag from laboratory denotes that sample exhibits chromatographic pattern which does not resemble gasoline standard. TPH outside of the gasoline range may be present in sample and was not quantified by the laboratory.
(e) Sample E05 was collected at 2.7 feet bbs, but is shown with a sample interval of 2.5-3 feet bbs for consistency with PCB results.

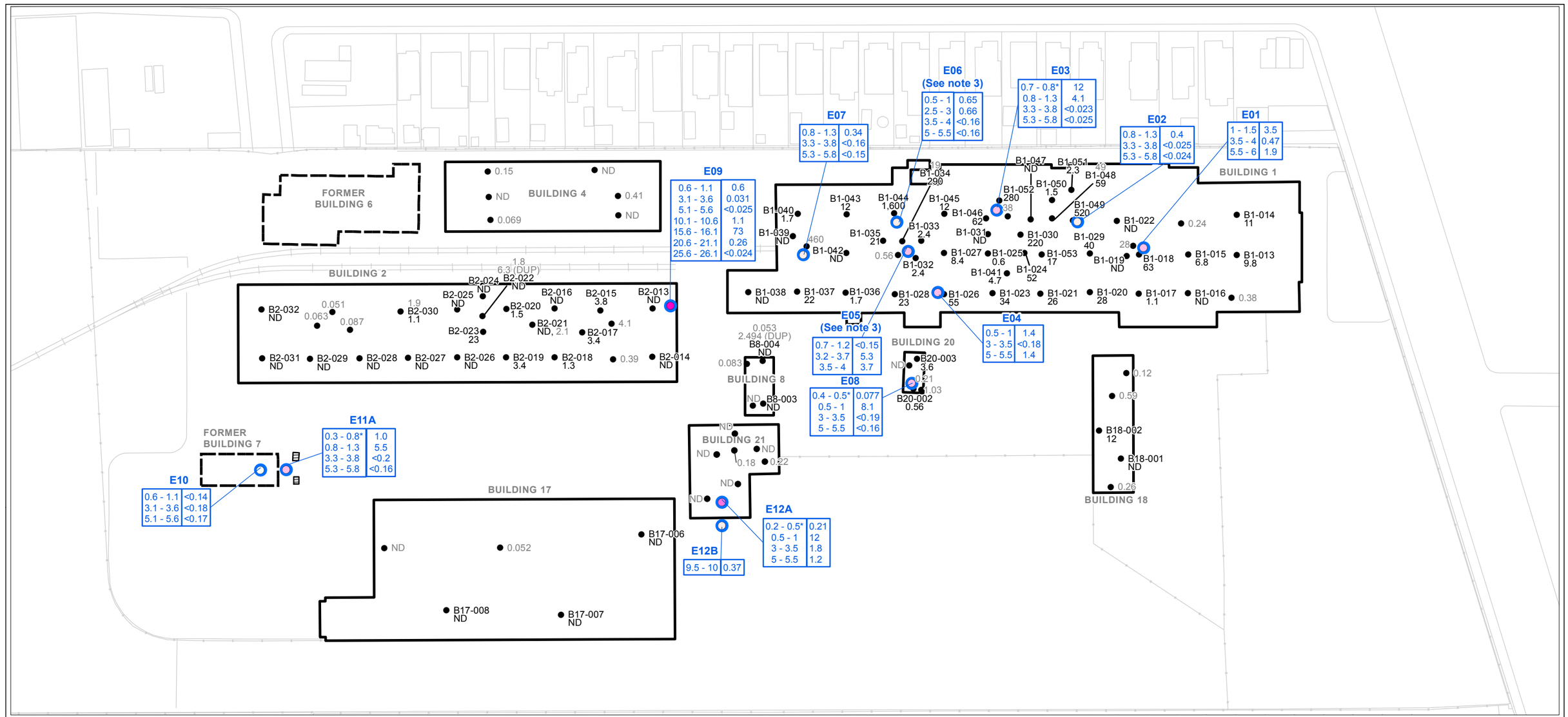


Sources:
Geomatrix Consultants, Inc., 2001, Report of Soil Removal Activities, General Electric Company, 5441 International Boulevard, Oakland, California, May.
URS, 2005. Completion Report for the North Property Line Soil Removal Action, December 19.
ARCADIS, 2009. Phase I Building Assessment Report, January.
SCA, 2010. Summary Report: Phase 2 Hazardous Materials Survey, June 2010.
GeoSyntec, 2011. Final Remedial Action Plan, June 30.
GeoSyntec, 2015. Remedial Action Implementation Completion Report – Phase 1, November 24.
Adapted from Figure 3 in Wood, 2018, Draft Five Year Status Report for the Period August 2013 through December 2017, June.

Summary of PCB Soil Data

5441 International Blvd
Oakland, CA
August 2019
EKI B70123.01
Figure 1

eki environment & water



Legend for 2018 Data

- Not Detected
- >0 and <1 mg/kg
- >1 and <=10 mg/kg
- >10 and <=25 mg/kg
- >26 and <50 mg/kg
- >50 and <100 mg/kg
- >100 and <1,000 mg/kg
- >1,000 mg/kg
- Soil Sample Location by EKI in 2018
- Existing Concrete Sample Location
- Former UST
- Former Building
- Existing Building

Result Key

ND	Total PCB data (ppm) from ARCADIS 2009 Report (USEPA Method 8082)
B2-022	Partial Sample ID from SCA 2010 Report
ND	Total PCB data (ppm) from SCA 2010 Report (USEPA Method 8082)

Soil Sample Depth Range in Feet Below Ground Surface

0.5 - 1	1.4
3 - 3.5	<0.18
5 - 5.5	1.4

PCB Concentration in Soil (mg/kg)

Abbreviations

* = baserock sample
ND = non-detect
UST = underground storage tank
mg/kg = milligrams per kilogram
PCBs = polychlorinated biphenyls
ppm = parts per million

Notes

1. 2018 data collected by EKI and analyzed for PCBs by EPA Method 8082 after extraction by EPA Method 3540C (Soxhlet). Results are reported on a dry weight basis as total PCBs. Baserock samples were collected immediately below slab.
2. Concrete sampling was completed prior to the finalization of the "Standard Operating Procedure (SOP) for Sampling Porous Surfaces for PCBs" (USEPA, 2011).
3. A buried slab was encountered at E06 at a depth of 3-3.5 feet below ground surface and at E05 at a depth of 4 feet below ground surface.

Sources

1. Adapted from Figure 1, PCB Concrete Core Sample Results, by Geosyntec Consultants dated April 2013.
2. ARCADIS, 2009. Phase I Building Assessment Report, January 2009.
3. SCA, 2010. Summary Report: Phase 2 Hazardous Materials Survey, June 2010.

0 100 200
Feet

DRAFT FINAL

2018 Soil and Previous Concrete Sampling Results for PCBs

5441 International Blvd.
Oakland, CA
August 2019
EKI B70123.01
Figure 2

eki environment & water

Path: X:\B70123\Maps_01\2019\08\Fig2_SoilPreviousConcreteResults.mxd

ATTACHMENT A

ALAMEDA COUNTY PUBLIC WORKS AGENCY
DRILLING PERMIT

5441 International Boulevard
Oakland, California

Alameda County Public Works Agency - Water Resources Well Permit

Public Works Agency
Alameda County

399 Elmhurst Street
Hayward, CA 94544-1395
Telephone: (510)670-6633 Fax:(510)782-1939

Application Approved on: 09/07/2018 By jamesy

Permit Numbers: W2018-0811
Permits Valid from 09/13/2018 to 09/17/2018

Application Id:	1536098328437	**City of Project Site:**	Oakland
Site Location:	5441 International Blvd, Oakland, CA 94601, USA		
Project Start Date:	09/13/2018	**Completion Date:**	09/17/2018
Assigned Inspector:	Contact Eneyew Amberber at (510) 670-5759 or eneyew@acpwa.org		

Applicant:	EKI Environment & Water - Deepa Gandhi 577 Airport Blvd, Suite 500, Burlingame, CA 94010	**Phone:** 650-292-9100
Property Owner:	Lance Hauer 475 Creamery Way, 2nd Floor, Exton, PA 19341	**Phone:** --
Client:	Thomas Ashcraft 1600 Franklin Ave, Suite D, El Segundo, CA 90245	**Phone:** --

	Total Due:	$265.00
Receipt Number: WR2018-0507	**Total Amount Paid:**	$265.00
Payer Name : Deepa Gandhi	Paid By: VISA	**PAID IN FULL**

Works Requesting Permits:

Borehole(s) for Investigation-Contamination Study - 12 Boreholes
Driller: PeneCore Drilling - Lic #: 906899 - Method: DP **Work Total: $265.00**

Specifications

Permit Number	Issued Dt	Expire Dt	# Boreholes	Hole Diam	Max Depth
W2018-0811	09/07/2018	12/12/2018	12	2.00 in.	26.00 ft

Specific Work Permit Conditions

1. Backfill bore hole by tremie with cement grout or cement grout/sand mixture. Upper two-three feet replaced in kind or with compacted cuttings. All cuttings remaining or unused shall be containerized and hauled off site. The containers shall be clearly labeled to the ownership of the container and labeled hazardous or non-hazardous.

2. Boreholes shall not be left open for a period of more than 24 hours. All boreholes left open more than 24 hours will need approval from Alameda County Public Works Agency, Water Resources Section. All boreholes shall be backfilled according to permit destruction requirements and all concrete material and asphalt material shall be to Caltrans Spec or County/City Codes. No borehole(s) shall be left in a manner to act as a conduit at any time.

3. Permittee shall assume entire responsibility for all activities and uses under this permit and shall indemnify, defend and save the Alameda County Public Works Agency, its officers, agents, and employees free and harmless from any and all expense, cost, liability in connection with or resulting from the exercise of this Permit including, but not limited to, properly damage, personal injury and wrongful death.

4. Prior to any drilling activities, it shall be the applicant's responsibility to contact and coordinate an Underground Service Alert (USA), obtain encroachment permit(s), excavation permit(s) or any other permits or agreements required for that Federal, State, County or City, and follow all City or County Ordinances. No work shall begin until all the permits and requirements have been approved or obtained. It shall also be the applicants responsibilities to provide to the Cities or to Alameda County an Traffic Safety Plan for any lane closures or detours planned.

5. Applicant shall contact assigned inspector listed on the top of the permit at least five (5) working days prior to starting, once the permit has been approved. Confirm the scheduled date(s) at least 24 hours prior to drilling.

6. Copy of approved drilling permit must be on site at all times. Failure to present or show proof of the approved permit application on site shall result in a fine of $500.00.

7. Electronic Reporting Regulations (Chapter 30, Division 3 of Title 23 & Division 3 of Title 27, CCR) require electronic submission of any report or data required by a regulatory agency from a cleanup site. Submission dates are set by a Regional Water Board or by a regulatory agency. Once a report/data is successfully uploaded, as required, you have met the reporting requirement (i.e. the compliance measure for electronic submittals is the actual upload itself). The upload date should be on or prior to the regulatory due date.

8. NOTE:
Under California laws, the owner/operator are responsible for reporting the contamination to the governmental regulatory agencies under Section 25295(a). The owner/operator is liable for civil penalties under Section 25299(a)(4) and criminal penalties under Section 25299(d) for failure to report a leak. The owner/operator is liable for civil penalties under Section 25299(b)(4) for knowing failure to ensure compliance with the law by the operator. These penalty provisions do not apply to a potential buyer.

9. Permit is valid only for the purpose specified herein. No changes in construction procedures, as described on this permit application. Boreholes shall not be converted to monitoring wells, without a permit application process.

ATTACHMENT B

ENTHALPY AND EUROFINS LABORATORY REPORTS

5441 International Boulevard
Oakland, California



ENTHALPY

ANALYTICAL

Enthalpy Analytical

2323 Fifth Street, Berkeley, CA 94710, Phone (510) 486-0900

Laboratory Job Number 303217
ANALYTICAL REPORT

EKI Environment & Water, Inc.
577 Airport Boulevard, Suite 500
Burlingame, CA 94010-5306

Project : B70123.01
Location : Bridge Point Oakland
Level : II

Sample ID	Lab ID
E01 (0-0.5)	303217-001
E01 (2.5-3)	303217-002
E01 (4.5-5)	303217-003
E02 (0-0.5)	303217-004
E02 (2.5-3)	303217-005
E02 (4.5-5)	303217-006
E03 (0-0.5)	303217-007
E03 (2.5-3)	303217-008
E03 (4.5-5)	303217-009
E06 (0-0.5)	303217-010
E06 (2-2.5)	303217-011
E09 (0-0.5)	303217-012
E09 (2.5-3)	303217-013
E09 (4.5-5)	303217-014
E09 (9.5-10)	303217-015
E09 (15-15.5)	303217-016
E09 (20-20.5)	303217-017
E09 (25-25.5)	303217-018

This data package has been reviewed for technical correctness and completeness. Release of this data has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature which applies to this PDF file as well as any associated electronic data deliverable files. The results contained in this report meet all requirements of NELAP and pertain only to those samples which were submitted for analysis. This report may be reproduced only in its entirety.

Signature: Tracy Babjar Date: 09/26/2018

Tracy Babjar
Project Manager
tracy.babjar@enthalpy.com
(510) 204-2226 Ext 13107

CA ELAP# 2896, NELAP# 4044-001

ENTHALPY ANALYTICAL

CASE NARRATIVE

Laboratory number:	**303217**
Client:	**EKI Environment & Water, Inc.**
Project:	**B70123.01**
Location:	**Bridge Point Oakland**
Request Date:	**09/14/18**
Samples Received:	**09/13/18**

This data package contains sample and QC results for eighteen soil samples, requested for the above referenced project on 09/14/18. The samples were received cold and intact.

PCBs (EPA 8082):
All samples underwent sulfuric acid cleanup using EPA Method 3665A. All samples underwent sulfur cleanup using the copper option in EPA Method 3660B. Matrix spikes were not performed for this analysis in batch 263777 due to insufficient sample amount. No other analytical problems were encountered.

Moisture (ASTM D2216-98/CLP):
No analytical problems were encountered.

303217

EKI Environment & Water, Inc.

CHAIN OF CUSTODY RECORD

CONSULTING ENGINEERS AND SCIENTISTS 577 Airport Boulevard, Suite 500, Burlingame CA 94010 PHONE: 650-292-9100 http://www.ekiconsult.com

Project Name: Bridge Point Oakland

Project No.: B70123.01

Location: 5441 International Boulevard, Oakland, CA

Sampled By: Priscilla De Jesus

Reporting:
Electronic Format: EDF Hard Copy Format: PDF
EPA Data Report Level:
Please report results to the following people:
(1) Data Archive: labs@ekiconsult.com
(2) Priscilla De Jesus: pdejesus@ekiconsult.com
(3) Deepa Gandhi: dgandhi@ekiconsult.com
(4)

Laboratory:
Enthalpy Analytical
2323 5th Street
Berkeley, CA, USA 94710
(510) 204-2221

EKI COC No.: (YYYYMMDD-#)

Revision: _____ (A, B, C, D, etc.) Date: By:

Field Sample ID	Lab Sample No.	Date	Time	Matrix	Container Count & Type	Method No. 3540C/ 8082 Analyte / Group Soxhlet Extraction/ PCBs	ASTM D2216 Moisture Content	Extract and HOLD	HOLD	EXPECTED TURNAROUND TIME	Remarks
E01 (0-0.5)		09/13/2018	0845	SL	1, 4oz. jar	x	x			5-DAY	
E01 (2.5-3)		09/13/2018	0849	SL	1, 4oz. jar	x	x			5-DAY	
E01 (4.5-5)		09/13/2018	0857	SL	1, 4oz. jar	x	x			5-DAY	
E02 (0-0.5)		09/13/218	0924	SL	1, 4oz. jar	x	x			5-DAY	
E02 (2.5-3)		09/13/2018	0931	SL	1, 4oz. jar	x	x			5-DAY	
E02 (4.5-5)		09/13/2018	0935	SL	1, 4oz. jar	x	x			5-DAY	
E03 (0-0.5)		09/13/2018	1029	SL	1, 4oz. jar	x	x			5-DAY	
E03 (2.5-3)		09/13/2018	1041	SL	1, 4oz. jar	x	x			5-DAY	
E03 (4.5-5)		09/13/2018	1056	SL	1, 4oz. jar	x	x			5-DAY	
~~E04 (0-0.5)~~		~~09/ /2018~~		~~SL~~	~~1, 4oz. jar~~	x	x			~~5-DAY~~	NO sample
~~E04 (2.5-3)~~		~~09/ /2018~~		~~SL~~	~~1, 4oz. jar~~	x	x			~~5-DAY~~	NO sample
~~E04 (4.5-5)~~		~~09/ /2018~~		~~SL~~	~~1, 4oz. jar~~	x	x			~~5-DAY~~	NO sample

Special Instructions:
5-DAY TAT SOXHLET METHOD

Relinquished by: (Signature/Affiliation) Dua Lipa / EKI	Date & Time 09/13/2018 / 1414	**Received by:** (Signature/Affiliation or Carrier/Air Bill No.) 9-13 14614
Relinquished by: (Signature/Affiliation)	Date & Time 9-13 1721	**Received by:** (Signature/Affiliation) 9-13-18 1724
Relinquished by: (Signature/Affiliation)	Date & Time	**Received by:** (Signature/Affiliation)

303217

EKI Environment & Water, Inc.

CONSULTING ENGINEERS AND SCIENTISTS

CHAIN OF CUSTODY RECORD

577 Airport Boulevard, Suite 500, Burlingame CA 94010 PHONE: 650-292-9100 http://www.ekiconsult.com

Project Name: Bridge Point Oakland

Project No.: B70123.01

Location: 5441 International Boulevard, Oakland, CA

Sampled By: Priscilla De Jesus

Reporting:
Electronic Format: EDF Hard Copy Format: PDF
EPA Data Report Level:
Please report results to the following people:
(1) Data Archive: labs@ekiconsult.com
(2) Priscilla De Jesus: pdejesus@ekiconsult.com
(3) Deepa Gandhi: dgandhi@ekiconsult.com
(4)

Laboratory:
Enthalpy Analytical
2323 5th Street
Berkeley, CA, USA 94710
(510) 204-2221

ANALYSES REQUESTED

EKI COC No.: (YYYYMMDD-#)

Revision: _____ (A, B, C, D, etc.) Date: By:

Field Sample ID	Lab Sample No.	Date	Time	Matrix	Container Count & Type	Method No. / Analyte / Group: 3540C/ 8082 Soxhlet Extraction/ PCBs	ASTM D2216 Moisture Content	Extract and HOLD	HOLD	EXPECTED TURNAROUND TIME	Remarks
~~E05 (0-0.5)~~		~~09/ /2018~~		~~SL~~		x	x			~~5-DAY~~	No Sample
~~E05 (2.5-3)~~		~~09/ /2018~~		~~SL~~		x	x			~~5-DAY~~	No Sample
~~E05 (4.5-5)~~		~~09/ /2018~~		~~SL~~		x	x			~~5-DAY~~	No Sample
E06 (0-0.5)		09/13 /218	1121	SL	1, 4oz. jar	x	x			5-DAY	
E06 (~~2.5-5~~)(2-2.5)		09/13 /2018	1139	SL	1, 4oz. jar	x	x			5-DAY	
~~E06 (4.5-5)~~		~~09/ /2018~~		~~SL~~		x	x			~~5-DAY~~	No Sample
~~E07 (0-0.5)~~		~~09/ /2018~~		~~SL~~		x	x			~~5-DAY~~	No sample
~~E07 (2.5-3)~~		~~09/ /2018~~		~~SL~~		x	x			~~5-DAY~~	No sample
~~E07 (4.5-5)~~		~~09/ /2018~~		~~SL~~		x	x			~~5-DAY~~	No sample
~~E08 (0-0.5)~~		~~09/ /2018~~		~~SL~~		x	x			~~5-DAY~~	No Sample
~~E08 (2.5-3)~~		~~09/ /2018~~		~~SL~~		x	x			~~5-DAY~~	No Sample
~~E08 (4.5-5)~~		~~09/ /2018~~		~~SL~~		x	x			~~5-DAY~~	No Sample

Special Instructions:
5-DAY TAT SOXHLET METHOD

Relinquished by: (Signature/Affiliation)	Date & Time	Received by: (Signature/Affiliation or Carrier/Air Bill No.)
[signature] / EKI	09/13/2018/ 1414	[signature] 9-13 1614
Relinquished by: (Signature/Affiliation)	Date & Time	Received by: (Signature/Affiliation)
[signature]	9-13 1721	[signature] 9-13 18 1724
Relinquished by: (Signature/Affiliation)	Date & Time	Received by: (Signature/Affiliation)

303217

EKI Environment & Water, Inc.

CHAIN OF CUSTODY RECORD

CONSULTING ENGINEERS AND SCIENTISTS 577 Airport Boulevard, Suite 500, Burlingame CA 94010 PHONE: 650-292-9100 http://www.ekiconsult.com

Project Name: Bridge Point Oakland

Project No.: B70123.01

Location: 5441 International Boulevard, Oakland, CA

Sampled By: Priscilla De Jesus

Reporting:
Electronic Format: EDF Hard Copy Format: PDF
EPA Data Report Level:
Please report results to the following people:
(1) Data Archive: labs@ekiconsult.com
(2) Priscilla De Jesus: pdejesus@ekiconsult.com
(3) Deepa Gandhi: dgandhi@ekiconsult.com
(4)

Laboratory:
Enthalpy Analytical
2323 5th Street
Berkeley, CA, USA 94710
(510) 204-2221

ANALYSES REQUESTED

EKI COC No.: (YYYYMMDD-#)

Revision: _____ (A, B, C, D, etc.) Date: By:

Field Sample ID	Lab Sample No.	Date	Time	Matrix	Container Count & Type	Method No. / Analyte / Group: 3540C/8082 Soxhlet Extraction/PCBs	ASTM D2216 Moisture Content	Extract and HOLD	HOLD	EXPECTED TURNAROUND TIME	Remarks
E09 (0-0.5)		09/13/2018	1257	SL	1, 4oz. jar	x	x			5-DAY	
E09 (2.5-3)		09/13/2018	1303	SL	1, 4oz. jar	x	x			5-DAY	
E09 (4.5-5)		09/13/2018	1311	SL	1, 4oz. jar	x	x			5-DAY	
E09 (9.5-10)		09/13/218	1326	SL	1, 4oz. jar	x	x			5-DAY	
E09 (15-15.5)		09/13/218	1348	SL	1, 4oz. jar	x	x			5-DAY	
E09 (20-20.5)		09/13/2018	1416	SL	1, 4oz. jar	x	x			5-DAY	
E09 (25-25.5)		09/13/2018	1445	SL	1, 4oz. jar	x	x			5-DAY	
~~E10 (0-0.5)~~		~~09/ /2018~~		~~SL~~	~~1, 4oz. jar~~	x	x			~~5-DAY~~	NO Sample
~~E10 (2.5-3)~~		~~09/ /2018~~		~~SL~~	~~1, 4oz. jar~~	x	x			~~5-DAY~~	NO Sample
~~E10 (4.5-5)~~		~~09/ /2018~~		~~SL~~	~~1, 4oz. jar~~	x	x			~~5-DAY~~	NO Sample
~~E11 (0-0.5)~~		~~09/ /2018~~		~~SL~~	~~1, 4oz. jar~~	x	x			~~5-DAY~~	NO Sample
~~E11 (2.5-3)~~		~~09/ /2018~~		~~SL~~	~~1, 4oz. jar~~	x	x			~~5-DAY~~	NO Sample

Special Instructions:
5-DAY TAT SOXHLET METHOD

Relinquished by: (Signature/Affiliation)	Date & Time	Received by: (Signature/Affiliation or Carrier/Air Bill No.)
[signature] / EKI	09/13/2018 / 1414	[signature] 9.13 1614
Relinquished by: (Signature/Affiliation)	Date & Time	Received by: (Signature/Affiliation)
[signature] 9	9-13 1721	[signature] 9-13-18 1724
Relinquished by: (Signature/Affiliation)	Date & Time	Received by: (Signature/Affiliation)

SAMPLE RECEIPT CHECKLIST

Section 1: Login # 303217 Client: EKI

Date Received: 9-13-18 Project: Bridge Boat Ramp

Section 2: Samples received in a cooler? ☒ Yes, how many? 1 ☐ No (**skip Section 3 below**)

If no cooler Sample Temp (°C): _____ using IR Gun # ☐ A, or ☐ B

☐ Samples received on ice directly from the field. Cooling process had begun

If in cooler: Date Opened 9-13-18 By (print) TKH (sign) TKH

Shipping info (if applicable) _____

Are custody seals present? ☒ No, or ☐ Yes. If yes, where? ☐ on cooler, ☐ on samples, ☐ on package

☐ Date: _____ How many _____ ☐ Signature, ☐ Initials, ☐ None

Were custody seals intact upon arrival? ☐ Yes ☐ No ☒ N/A

Section 3: ***Important*: Notify PM if temperature exceeds 6°C or arrive frozen.**

Packing in cooler: (if other, describe) _____

☐ Bubble Wrap, ☐ Foam blocks, ☒ Bags, ☐ None, ☐ Cloth material, ☐ Cardboard, ☐ Styrofoam, ☐ Paper towels

☐ Samples received on ice directly from the field. Cooling process had begun

Type of ice used : ☒ Wet, ☐ Blue/Gel, ☐ None Temperature blank(s) included? ☐ Yes, ☒ No

Temperature measured using ☐ Thermometer ID: _____, or IR Gun # ☐ A ☒ B

Cooler Temp (°C): #1: 3.5, #2: _____, #3: _____, #4: _____, #5: _____, #6: _____, #7: _____

Section 4:	YES	NO	N/A
Were custody papers dry, filled out properly, and the project identifiable	X		
Were Method 5035 sampling containers present?		X	
If YES, what time were they transferred to freezer?			
Did all bottles arrive unbroken/unopened?	X		
Are there any missing / extra samples?		X	
Are samples in the appropriate containers for indicated tests?	X		
Are sample labels present, in good condition and complete?		X	
Does the container count match the COC?	X		
Do the sample labels agree with custody papers?	X		
Was sufficient amount of sample sent for tests requested?	X		
Did you change the hold time in LIMS for unpreserved VOAs?			X
Did you change the hold time in LIMS for preserved terracores?			X
Are bubbles > 6mm absent in VOA samples?			X
Was the client contacted concerning this sample delivery?	X		
If YES, who was called? Tracy Babcock By Priscilla Date: 9/14/18			

Section 5:	YES	NO	N/A
Are the samples appropriately preserved? (if N/A, skip the rest of section 5)			
Did you check preservatives for all bottles for each sample?			
Did you document your preservative check?			

pH strip lot# _____, pH strip lot# _____, pH strip lot# _____

Preservative added:

☐ H2SO4 lot# _____ added to samples _____ on/at _____

☐ HCL lot# _____ added to samples _____ on/at _____

☐ HNO3 lot# _____ added to samples _____ on/at _____

☐ NaOH lot# _____ added to samples _____ on/at _____

Section 6:

Explanations/Comments: All of EO9 samples do not have labels on jars. Go by caps on top of jars for sample ID. Per P.J 516-547-0523

Date Logged in 9/14/18 **By (print)** D.O. **(sign)** _____

Date Labeled 9/14/18 **By (print)** D.O. **(sign)** _____

ENTHALPY ANALYTICAL

Detections Summary for 303217

Results for any subcontracted analyses are not included in this summary.

Client : EKI Environment & Water, Inc.
Project : B70123.01
Location : Bridge Point Oakland

Client Sample ID : E01 (0-0.5) Laboratory Sample ID : 303217-001

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Aroclor-1260	3,500		230	ug/Kg	Dry	10.00	EPA 8082	EPA 3540C
Moisture, Percent	13		1	%	As Recd	1.000	ASTM D2216-98/CLP	METHOD

Client Sample ID : E01 (2.5-3) Laboratory Sample ID : 303217-002

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Aroclor-1260	470		24	ug/Kg	Dry	1.000	EPA 8082	EPA 3540C
Moisture, Percent	16		1	%	As Recd	1.000	ASTM D2216-98/CLP	METHOD

Client Sample ID : E01 (4.5-5) Laboratory Sample ID : 303217-003

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Aroclor-1260	1,900		23	ug/Kg	Dry	1.000	EPA 8082	EPA 3540C
Moisture, Percent	14		1	%	As Recd	1.000	ASTM D2216-98/CLP	METHOD

Client Sample ID : E02 (0-0.5) Laboratory Sample ID : 303217-004

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Aroclor-1260	400		23	ug/Kg	Dry	1.000	EPA 8082	EPA 3540C
Moisture, Percent	12		1	%	As Recd	1.000	ASTM D2216-98/CLP	METHOD

Client Sample ID : E02 (2.5-3) Laboratory Sample ID : 303217-005

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Moisture, Percent	20		1	%	As Recd	1.000	ASTM D2216-98/CLP	METHOD

Client Sample ID : E02 (4.5-5) Laboratory Sample ID : 303217-006

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Moisture, Percent	18		1	%	As Recd	1.000	ASTM D2216-98/CLP	METHOD

Client Sample ID : E03 (0-0.5) Laboratory Sample ID : 303217-007

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Aroclor-1260	4,100		240	ug/Kg	Dry	10.00	EPA 8082	EPA 3540C
Moisture, Percent	15		1	%	As Recd	1.000	ASTM D2216-98/CLP	METHOD

Client Sample ID : E03 (2.5-3) Laboratory Sample ID : 303217-008

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Moisture, Percent	15		1	%	As Recd	1.000	ASTM D2216-98/CLP	METHOD

Client Sample ID : E03 (4.5-5) Laboratory Sample ID : 303217-009

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Moisture, Percent	19		1	%	As Recd	1.000	ASTM D2216-98/CLP	METHOD

Client Sample ID : E06 (0-0.5) Laboratory Sample ID : 303217-010

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Aroclor-1260	650		23	ug/Kg	Dry	1.000	EPA 8082	EPA 3540C
Moisture, Percent	14		1	%	As Recd	1.000	ASTM D2216-98/CLP	METHOD

Client Sample ID : E06 (2-2.5) Laboratory Sample ID : 303217-011

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Aroclor-1260	660		23	ug/Kg	Dry	1.000	EPA 8082	EPA 3540C
Moisture, Percent	13		1	%	As Recd	1.000	ASTM D2216-98/CLP	METHOD

Client Sample ID : E09 (0-0.5) Laboratory Sample ID : 303217-012

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Aroclor-1260	600		24	ug/Kg	Dry	1.000	EPA 8082	EPA 3540C
Moisture, Percent	17		1	%	As Recd	1.000	ASTM D2216-98/CLP	METHOD

Client Sample ID : E09 (2.5-3) Laboratory Sample ID : 303217-013

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Aroclor-1260	31		23	ug/Kg	Dry	1.000	EPA 8082	EPA 3540C
Moisture, Percent	17		1	%	As Recd	1.000	ASTM D2216-98/CLP	METHOD

Client Sample ID : E09 (4.5-5) Laboratory Sample ID : 303217-014

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Moisture, Percent	19		1	%	As Recd	1.000	ASTM D2216-98/CLP	METHOD

Client Sample ID : E09 (9.5-10) Laboratory Sample ID : 303217-015

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Aroclor-1260	1,100		23	ug/Kg	Dry	1.000	EPA 8082	EPA 3540C
Moisture, Percent	14		1	%	As Recd	1.000	ASTM D2216-98/CLP	METHOD

Client Sample ID : E09 (15-15.5) Laboratory Sample ID : 303217-016

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Aroclor-1260	73,000		2,400	ug/Kg	Dry	100.0	EPA 8082	EPA 3540C
Moisture, Percent	16		1	%	As Recd	1.000	ASTM D2216-98/CLP	METHOD

Client Sample ID : E09 (20-20.5) Laboratory Sample ID : 303217-017

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Aroclor-1260	260		23	ug/Kg	Dry	1.000	EPA 8082	EPA 3540C
Moisture, Percent	15		1	%	As Recd	1.000	ASTM D2216-98/CLP	METHOD

Client Sample ID : E09 (25-25.5) Laboratory Sample ID : 303217-018

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Moisture, Percent	18		1	%	As Recd	1.000	ASTM D2216-98/CLP	METHOD

ENTHALPY ANALYTICAL

Polychlorinated Biphenyls (PCBs)

Lab #:	303217	Location:	Bridge Point Oakland
Client:	EKI Environment & Water, Inc.	Prep:	EPA 3540C
Project#:	B70123.01	Analysis:	EPA 8082
Matrix:	Soil	Sampled:	09/13/18
Units:	ug/Kg	Received:	09/13/18
Basis:	dry	Prepared:	09/21/18
Batch#:	263777		

Field ID:	E01 (0-0.5)	Moisture:	13%
Type:	SAMPLE	Diln Fac:	10.00
Lab ID:	303217-001	Analyzed:	09/25/18

Analyte	Result	RL
Aroclor-1016	ND	230
Aroclor-1221	ND	460
Aroclor-1232	ND	230
Aroclor-1242	ND	230
Aroclor-1248	ND	230
Aroclor-1254	ND	230
Aroclor-1260	3,500	230

Surrogate	%REC	Limits
Decachlorobiphenyl	138	37-170

Field ID:	E01 (2.5-3)	Moisture:	16%
Type:	SAMPLE	Diln Fac:	1.000
Lab ID:	303217-002	Analyzed:	09/25/18

Analyte	Result	RL
Aroclor-1016	ND	24
Aroclor-1221	ND	48
Aroclor-1232	ND	24
Aroclor-1242	ND	24
Aroclor-1248	ND	24
Aroclor-1254	ND	24
Aroclor-1260	470	24

Surrogate	%REC	Limits
Decachlorobiphenyl	131	37-170

Field ID:	E01 (4.5-5)	Moisture:	14%
Type:	SAMPLE	Diln Fac:	1.000
Lab ID:	303217-003	Analyzed:	09/25/18

Analyte	Result	RL
Aroclor-1016	ND	23
Aroclor-1221	ND	46
Aroclor-1232	ND	23
Aroclor-1242	ND	23
Aroclor-1248	ND	23
Aroclor-1254	ND	23
Aroclor-1260	1,900	23

Surrogate	%REC	Limits
Decachlorobiphenyl	109	37-170

DO= Diluted Out
ND= Not Detected
RL= Reporting Limit

Polychlorinated Biphenyls (PCBs)

Lab #:	303217	Location:	Bridge Point Oakland
Client:	EKI Environment & Water, Inc.	Prep:	EPA 3540C
Project#:	B70123.01	Analysis:	EPA 8082
Matrix:	Soil	Sampled:	09/13/18
Units:	ug/Kg	Received:	09/13/18
Basis:	dry	Prepared:	09/21/18
Batch#:	263777		

Field ID:	E02 (0-0.5)	Moisture:	12%
Type:	SAMPLE	Diln Fac:	1.000
Lab ID:	303217-004	Analyzed:	09/25/18

Analyte	Result	RL
Aroclor-1016	ND	23
Aroclor-1221	ND	46
Aroclor-1232	ND	23
Aroclor-1242	ND	23
Aroclor-1248	ND	23
Aroclor-1254	ND	23
Aroclor-1260	400	23

Surrogate	%REC	Limits
Decachlorobiphenyl	120	37-170

Field ID:	E02 (2.5-3)	Moisture:	20%
Type:	SAMPLE	Diln Fac:	1.000
Lab ID:	303217-005	Analyzed:	09/25/18

Analyte	Result	RL
Aroclor-1016	ND	25
Aroclor-1221	ND	51
Aroclor-1232	ND	25
Aroclor-1242	ND	25
Aroclor-1248	ND	25
Aroclor-1254	ND	25
Aroclor-1260	ND	25

Surrogate	%REC	Limits
Decachlorobiphenyl	132	37-170

Field ID:	E02 (4.5-5)	Moisture:	18%
Type:	SAMPLE	Diln Fac:	1.000
Lab ID:	303217-006	Analyzed:	09/25/18

Analyte	Result	RL
Aroclor-1016	ND	24
Aroclor-1221	ND	49
Aroclor-1232	ND	24
Aroclor-1242	ND	24
Aroclor-1248	ND	24
Aroclor-1254	ND	24
Aroclor-1260	ND	24

Surrogate	%REC	Limits
Decachlorobiphenyl	123	37-170

DO= Diluted Out
ND= Not Detected
RL= Reporting Limit

Polychlorinated Biphenyls (PCBs)

Lab #:	303217	Location:	Bridge Point Oakland
Client:	EKI Environment & Water, Inc.	Prep:	EPA 3540C
Project#:	B70123.01	Analysis:	EPA 8082
Matrix:	Soil	Sampled:	09/13/18
Units:	ug/Kg	Received:	09/13/18
Basis:	dry	Prepared:	09/21/18
Batch#:	263777		

Field ID:	E03 (0-0.5)	Moisture:	15%
Type:	SAMPLE	Diln Fac:	10.00
Lab ID:	303217-007	Analyzed:	09/25/18

Analyte	Result	RL
Aroclor-1016	ND	240
Aroclor-1221	ND	470
Aroclor-1232	ND	240
Aroclor-1242	ND	240
Aroclor-1248	ND	240
Aroclor-1254	ND	240
Aroclor-1260	4,100	240

Surrogate	%REC	Limits
Decachlorobiphenyl	125	37-170

Field ID:	E03 (2.5-3)	Moisture:	15%
Type:	SAMPLE	Diln Fac:	1.000
Lab ID:	303217-008	Analyzed:	09/25/18

Analyte	Result	RL
Aroclor-1016	ND	23
Aroclor-1221	ND	47
Aroclor-1232	ND	23
Aroclor-1242	ND	23
Aroclor-1248	ND	23
Aroclor-1254	ND	23
Aroclor-1260	ND	23

Surrogate	%REC	Limits
Decachlorobiphenyl	91	37-170

Field ID:	E03 (4.5-5)	Moisture:	19%
Type:	SAMPLE	Diln Fac:	1.000
Lab ID:	303217-009	Analyzed:	09/25/18

Analyte	Result	RL
Aroclor-1016	ND	25
Aroclor-1221	ND	50
Aroclor-1232	ND	25
Aroclor-1242	ND	25
Aroclor-1248	ND	25
Aroclor-1254	ND	25
Aroclor-1260	ND	25

Surrogate	%REC	Limits
Decachlorobiphenyl	129	37-170

DO= Diluted Out
ND= Not Detected
RL= Reporting Limit

Polychlorinated Biphenyls (PCBs)

Lab #:	303217	Location:	Bridge Point Oakland
Client:	EKI Environment & Water, Inc.	Prep:	EPA 3540C
Project#:	B70123.01	Analysis:	EPA 8082
Matrix:	Soil	Sampled:	09/13/18
Units:	ug/Kg	Received:	09/13/18
Basis:	dry	Prepared:	09/21/18
Batch#:	263777		

Field ID:	E06 (0-0.5)	Moisture:	14%
Type:	SAMPLE	Diln Fac:	1.000
Lab ID:	303217-010	Analyzed:	09/25/18

Analyte	Result	RL
Aroclor-1016	ND	23
Aroclor-1221	ND	47
Aroclor-1232	ND	23
Aroclor-1242	ND	23
Aroclor-1248	ND	23
Aroclor-1254	ND	23
Aroclor-1260	650	23

Surrogate	%REC	Limits
Decachlorobiphenyl	116	37-170

Field ID:	E06 (2-2.5)	Moisture:	13%
Type:	SAMPLE	Diln Fac:	1.000
Lab ID:	303217-011	Analyzed:	09/26/18

Analyte	Result	RL
Aroclor-1016	ND	23
Aroclor-1221	ND	47
Aroclor-1232	ND	23
Aroclor-1242	ND	23
Aroclor-1248	ND	23
Aroclor-1254	ND	23
Aroclor-1260	660	23

Surrogate	%REC	Limits
Decachlorobiphenyl	126	37-170

Field ID:	E09 (0-0.5)	Moisture:	17%
Type:	SAMPLE	Diln Fac:	1.000
Lab ID:	303217-012	Analyzed:	09/26/18

Analyte	Result	RL
Aroclor-1016	ND	24
Aroclor-1221	ND	48
Aroclor-1232	ND	24
Aroclor-1242	ND	24
Aroclor-1248	ND	24
Aroclor-1254	ND	24
Aroclor-1260	600	24

Surrogate	%REC	Limits
Decachlorobiphenyl	121	37-170

DO= Diluted Out
ND= Not Detected
RL= Reporting Limit

Polychlorinated Biphenyls (PCBs)

Lab #:	303217	Location:	Bridge Point Oakland
Client:	EKI Environment & Water, Inc.	Prep:	EPA 3540C
Project#:	B70123.01	Analysis:	EPA 8082
Matrix:	Soil	Sampled:	09/13/18
Units:	ug/Kg	Received:	09/13/18
Basis:	dry	Prepared:	09/21/18
Batch#:	263777		

Field ID:	E09 (2.5-3)	Moisture:	17%
Type:	SAMPLE	Diln Fac:	1.000
Lab ID:	303217-013	Analyzed:	09/26/18

Analyte	Result	RL
Aroclor-1016	ND	23
Aroclor-1221	ND	47
Aroclor-1232	ND	23
Aroclor-1242	ND	23
Aroclor-1248	ND	23
Aroclor-1254	ND	23
Aroclor-1260	31	23

Surrogate	%REC	Limits
Decachlorobiphenyl	97	37-170

Field ID:	E09 (4.5-5)	Moisture:	19%
Type:	SAMPLE	Diln Fac:	1.000
Lab ID:	303217-014	Analyzed:	09/26/18

Analyte	Result	RL
Aroclor-1016	ND	25
Aroclor-1221	ND	50
Aroclor-1232	ND	25
Aroclor-1242	ND	25
Aroclor-1248	ND	25
Aroclor-1254	ND	25
Aroclor-1260	ND	25

Surrogate	%REC	Limits
Decachlorobiphenyl	123	37-170

Field ID:	E09 (9.5-10)	Moisture:	14%
Type:	SAMPLE	Diln Fac:	1.000
Lab ID:	303217-015	Analyzed:	09/26/18

Analyte	Result	RL
Aroclor-1016	ND	23
Aroclor-1221	ND	45
Aroclor-1232	ND	23
Aroclor-1242	ND	23
Aroclor-1248	ND	23
Aroclor-1254	ND	23
Aroclor-1260	1,100	23

Surrogate	%REC	Limits
Decachlorobiphenyl	119	37-170

DO= Diluted Out
ND= Not Detected
RL= Reporting Limit

Polychlorinated Biphenyls (PCBs)

Lab #:	303217	Location:	Bridge Point Oakland
Client:	EKI Environment & Water, Inc.	Prep:	EPA 3540C
Project#:	B70123.01	Analysis:	EPA 8082
Matrix:	Soil	Sampled:	09/13/18
Units:	ug/Kg	Received:	09/13/18
Basis:	dry	Prepared:	09/21/18
Batch#:	263777		

Field ID:	E09 (15-15.5)	Moisture:	16%
Type:	SAMPLE	Diln Fac:	100.0
Lab ID:	303217-016	Analyzed:	09/26/18

Analyte	Result	RL
Aroclor-1016	ND	2,400
Aroclor-1221	ND	4,700
Aroclor-1232	ND	2,400
Aroclor-1242	ND	2,400
Aroclor-1248	ND	2,400
Aroclor-1254	ND	2,400
Aroclor-1260	73,000	2,400

Surrogate	%REC	Limits
Decachlorobiphenyl	DO	37-170

Field ID:	E09 (20-20.5)	Moisture:	15%
Type:	SAMPLE	Diln Fac:	1.000
Lab ID:	303217-017	Analyzed:	09/26/18

Analyte	Result	RL
Aroclor-1016	ND	23
Aroclor-1221	ND	47
Aroclor-1232	ND	23
Aroclor-1242	ND	23
Aroclor-1248	ND	23
Aroclor-1254	ND	23
Aroclor-1260	260	23

Surrogate	%REC	Limits
Decachlorobiphenyl	104	37-170

Field ID:	E09 (25-25.5)	Moisture:	18%
Type:	SAMPLE	Diln Fac:	1.000
Lab ID:	303217-018	Analyzed:	09/26/18

Analyte	Result	RL
Aroclor-1016	ND	24
Aroclor-1221	ND	47
Aroclor-1232	ND	24
Aroclor-1242	ND	24
Aroclor-1248	ND	24
Aroclor-1254	ND	24
Aroclor-1260	ND	24

Surrogate	%REC	Limits
Decachlorobiphenyl	99	37-170

DO= Diluted Out
ND= Not Detected
RL= Reporting Limit

ENTHALPY ANALYTICAL

Polychlorinated Biphenyls (PCBs)

Lab #:	303217	Location:	Bridge Point Oakland
Client:	EKI Environment & Water, Inc.	Prep:	EPA 3540C
Project#:	B70123.01	Analysis:	EPA 8082
Matrix:	Soil	Sampled:	09/13/18
Units:	ug/Kg	Received:	09/13/18
Basis:	dry	Prepared:	09/21/18
Batch#:	263777		

Type:	BLANK	Diln Fac:	1.000
Lab ID:	QC948736	Analyzed:	09/24/18

Analyte	Result	RL
Aroclor-1016	ND	20
Aroclor-1221	ND	40
Aroclor-1232	ND	20
Aroclor-1242	ND	20
Aroclor-1248	ND	20
Aroclor-1254	ND	20
Aroclor-1260	ND	20

Surrogate	%REC	Limits
Decachlorobiphenyl	134	37-170

DO= Diluted Out
ND= Not Detected
RL= Reporting Limit

ENTHALPY ANALYTICAL

Batch QC Report

Polychlorinated Biphenyls (PCBs)

Lab #:	303217	Location:	Bridge Point Oakland
Client:	EKI Environment & Water, Inc.	Prep:	EPA 3540C
Project#:	B70123.01	Analysis:	EPA 8082
Matrix:	Soil	Batch#:	263777
Units:	ug/Kg	Prepared:	09/21/18
Diln Fac:	1.000	Analyzed:	09/24/18

Type: BS Lab ID: QC948737

Analyte	Spiked	Result	%REC	Limits
Aroclor-1016	500.0	515.8	103	59-160
Aroclor-1260	500.0	482.2	96	59-170

Surrogate	%REC	Limits
Decachlorobiphenyl	106	37-170

Type: BSD Lab ID: QC948738

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Aroclor-1016	500.0	634.8	127	59-160	21	35
Aroclor-1260	500.0	637.4	127	59-170	28	42

Surrogate	%REC	Limits
Decachlorobiphenyl	130	37-170

RPD= Relative Percent Difference

ENTHALPY ANALYTICAL

Moisture

Lab #:	303217	Location:	Bridge Point Oakland
Client:	EKI Environment & Water, Inc.	Prep:	METHOD
Project#:	B70123.01	Analysis:	ASTM D2216-98/CLP
Analyte:	Moisture, Percent	Batch#:	263559
Matrix:	Soil	Sampled:	09/13/18
Units:	%	Received:	09/13/18
Diln Fac:	1.000	Analyzed:	09/17/18

Field ID	Lab ID	Result	RL
E01 (0-0.5)	303217-001	13	1
E01 (2.5-3)	303217-002	16	1
E01 (4.5-5)	303217-003	14	1
E02 (0-0.5)	303217-004	12	1
E02 (2.5-3)	303217-005	20	1
E02 (4.5-5)	303217-006	18	1
E03 (0-0.5)	303217-007	15	1
E03 (2.5-3)	303217-008	15	1
E03 (4.5-5)	303217-009	19	1
E06 (0-0.5)	303217-010	14	1
E06 (2-2.5)	303217-011	13	1
E09 (0-0.5)	303217-012	17	1
E09 (2.5-3)	303217-013	17	1
E09 (4.5-5)	303217-014	19	1
E09 (9.5-10)	303217-015	14	1
E09 (15-15.5)	303217-016	16	1
E09 (20-20.5)	303217-017	15	1
E09 (25-25.5)	303217-018	18	1

RL= Reporting Limit

ENTHALPY ANALYTICAL

Batch QC Report

Moisture

Lab #:	303217	Location:	Bridge Point Oakland
Client:	EKI Environment & Water, Inc.	Prep:	METHOD
Project#:	B70123.01	Analysis:	ASTM D2216-98/CLP
Analyte:	Moisture, Percent	Units:	%
Field ID:	E09 (25-25.5)	Diln Fac:	1.000
Type:	SDUP	Batch#:	263559
MSS Lab ID:	303217-018	Sampled:	09/13/18
Lab ID:	QC947879	Received:	09/13/18
Matrix:	Soil	Analyzed:	09/17/18

MSS Result	Result	RL	RPD	Lim
17.99	18.17	1.000	1	26

RL= Reporting Limit
RPD= Relative Percent Difference



ENTHALPY

ANALYTICAL

Enthalpy Analytical

2323 Fifth Street, Berkeley, CA 94710, Phone (510) 486-0900

Laboratory Job Number 303241
ANALYTICAL REPORT

EKI Environment & Water, Inc.
577 Airport Boulevard, Suite 500
Burlingame, CA 94010-5306

Project : B70123.01
Location : 5441 Boulevard, Oakland, CA
Level : II

Sample ID	Lab ID
E05(2.7')	303241-001
E04(0-0.5')	303241-002
E04(2.5-3')	303241-003
E04(4.5-5')	303241-004
E06(3-3.5')	303241-005
E06(4.5-5')	303241-006

This data package has been reviewed for technical correctness and completeness. Release of this data has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature which applies to this PDF file as well as any associated electronic data deliverable files. The results contained in this report meet all requirements of NELAP and pertain only to those samples which were submitted for analysis. This report may be reproduced only in its entirety.

Signature: Tracy Babjar Date: 09/24/2018

Tracy Babjar
Project Manager
tracy.babjar@enthalpy.com
(510) 204-2226 Ext 13107

CA ELAP# 2896, NELAP# 4044-001

ENTHALPY ANALYTICAL

CASE NARRATIVE

Laboratory number:	**303241**
Client:	**EKI Environment & Water, Inc.**
Project:	**B70123.01**
Location:	**5441 Boulevard, Oakland, CA**
Request Date:	**09/18/18, 09/19/18**
Samples Received:	**09/14/18**

This data package contains sample and QC results for six soil samples, requested for the above referenced project on 09/18/18 and 09/19/18. The samples were received cold and intact.

TPH-Purgeables and/or BTXE by GC (EPA 8015B):
High surrogate recoveries were observed for bromofluorobenzene (FID) in a number of samples. No other analytical problems were encountered.

Volatile Organics by GC/MS (EPA 8260B):
High recoveries were observed for trichloroethene in the MS/MSD for batch 263651; the parent sample was not a project sample, the LCS was within limits, the associated RPD was within limits, and this analyte was not detected at or above the RL in the associated samples. High surrogate recovery was observed for bromofluorobenzene in E04(0-0.5') (lab # 303241-002). E04(0-0.5') (lab # 303241-002), E04(2.5-3') (lab # 303241-003), and E06(3-3.5') (lab # 303241-005) were diluted due to high hydrocarbons. E04(4.5-5') (lab # 303241-004) was diluted due to high non-target analytes. No other analytical problems were encountered.

MONTROSE

Tracy Babjar <tbabjar@montrose-env.com>

RE: B70123.01 - Enthalpy (Berkeley) Login Summary (303241)

Deepa Gandhi <dgandhi@ekiconsult.com> Tue, Sep 18, 2018 at 11:55 AM
To: Tracy Babjar <tracy.babjar@enthalpy.com>

Tracy,

Please proceed with analysis of all these samples below for VOCs full list (8260), TPHg (8015), and moisture on a 5-day TAT.

Thank you!

[Quoted text hidden]

303241

EKI Environment & Water, Inc.

CONSULTING ENGINEERS AND SCIENTISTS

CHAIN OF CUSTODY RECORD

PAGE _____ OF _____

577 Airport Boulevard, Suite 500, Burlingame CA 94010 PHONE: 650-292-9100 http://www.ekiconsult.com

Project Name: Bridge Point Oakland

Project No.: B70123.01

Location: 5441 International Boulevard, Oakland, CA

Sampled By: Priscilla De Jesus

Reporting:
Electronic Format: EDF Hard Copy Format: PDF
EPA Data Report Level:
Please report results to the following people:
(1) Data Archive: labs@ekiconsult.com
(2) Priscilla De Jesus: pdejesus@ekiconsult.com
(3) Deepa Gandhi: dgandhi@ekiconsult.com
(4)

Laboratory:
Enthalpy Analytical
2323 5th Street
Berkeley, CA, USA 94710
(510) 204-2221

ANALYSES REQUESTED

EKI COC No.: (YYYYMMDD-#)

Revision: _____ (A, B, C, D, etc.)
Date: By:

Field Sample ID	Lab Sample No.	Date	Time	Matrix	Container Count & Type	Method No. / Analyte / Group: 8082 PCBs (low RLs)	ASTM D2216 Moisture Content	3540C Soxhlet	8260 VOCs	Extract and HOLD	HOLD	EXPECTED TURNAROUND TIME	Remarks
E05 (2.7')		09/13/2018	1717	SL	3 Encores					X	X		
E04 (0-0.5)		09/14/2018	0750	SL	3 Encores					X	X		
E04 (2.5-3')		09/14/2018	0805	SL	3 Encores					X	/		
E04 (4.5-5')		09/14/2018	0820	SL	3 Encores					X			
E06 (3-3.5')		09/14/2018	1148	SL	3 Encores					X			
E06 (4.5-5')		09/14/2018	1157	SL	3 Encores					X			

Special Instructions: Please extract and hold

Relinquished by: (Signature/Affiliation)	Date & Time	Received by: (Signature/Affiliation or Carrier/Air Bill No.)
[signature] / EKI	09/14/18	[signature] 9-14 1600
[signature]	9.14 1651	[signature] 9-14-18 1649

SAMPLE RECEIPT CHECKLIST

Section 1: Login # 303241 Client: EKI

Date Received: 9-14-18 Project: B70123 01

ENTHALPY

Section 2: Samples received in a cooler? ☒ Yes, how many? 1 ☐ No (skip Section 3 below)

If no cooler Sample Temp (°C): _____ using IR Gun # ☐ A, or ☐ B

☐ Samples received on ice directly from the field. Cooling process had begun

If in cooler: Date Opened 9-14-18 By (print) TKM (sign) TKM

Shipping info (if applicable) _____

Are custody seals present? ☒ No, or ☐ Yes. If yes, where? ☐ on cooler, ☐ on samples, ☐ on package

☐ Date: _____ How many _____ ☐ Signature, ☐ Initials, ☐ None

Were custody seals intact upon arrival? ☐ Yes ☐ No ☒ N/A

Section 3: ***Important*: Notify PM if temperature exceeds 6°C or arrive frozen.**

Packing in cooler: (if other, describe) _____

☐ Bubble Wrap, ☐ Foam blocks, ☒ Bags, ☐ None, ☐ Cloth material, ☐ Cardboard, ☐ Styrofoam, ☐ Paper towels

☐ Samples received on ice directly from the field. Cooling process had begun

Type of ice used: ☒ Wet, ☐ Blue/Gel, ☐ None Temperature blank(s) included? ☐ Yes, ☒ No

Temperature measured using ☐ Thermometer ID: _____, or IR Gun # ☒ A ☐ B

Cooler Temp (°C): #1: 3.6, #2: _____, #3: _____, #4: _____, #5: _____, #6: _____, #7: _____

Section 4:	YES	NO	N/A
Were custody papers dry, filled out properly, and the project identifiable	✓		
Were Method 5035 sampling containers present?	✓		
If YES, what time were they transferred to freezer? 17:55 9/14			
Did all bottles arrive unbroken/unopened?	✓		
Are there any missing / extra samples?		✓	
Are samples in the appropriate containers for indicated tests?	✓		
Are sample labels present, in good condition and complete?	✓		
Does the container count match the COC?	✓		
Do the sample labels agree with custody papers?	✓		
Was sufficient amount of sample sent for tests requested?	✓		
Did you change the hold time in LIMS for unpreserved VOAs?			✓
Did you change the hold time in LIMS for preserved terracores?			✓
Are bubbles > 6mm absent in VOA samples?			✓
Was the client contacted concerning this sample delivery?		✓	
If YES, who was called? _____ By _____ Date: _____			

Section 5:	YES	NO	N/A
Are the samples appropriately preserved? (If N/A, skip the rest of section 5)			✓
Did you check preservatives for all bottles for each sample?			
Did you document your preservative check?			

pH strip lot# _____, pH strip lot# _____, pH strip lot# _____

Preservative added:

☐ H2SO4 lot# _____ added to samples _____ on/at _____

☐ HCL lot# _____ added to samples _____ on/at _____

☐ HNO3 lot# _____ added to samples _____ on/at _____

☐ NaOH lot# _____ added to samples _____ on/at _____

Section 6:

Explanations/Comments: _____

Date Logged in 9-14-18 **By (print)** TKM **(sign)** TKM

Date Labeled 9-14-18 **By (print)** TKM **(sign)** TKM

ENTHALPY ANALYTICAL

Detections Summary for 303241

Results for any subcontracted analyses are not included in this summary.

Client : EKI Environment & Water, Inc.
Project : B70123.01
Location : 5441 Boulevard, Oakland, CA

Client Sample ID : E05(2.7') Laboratory Sample ID : 303241-001

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Acetone	19		16	ug/Kg	As Recd	0.7987	EPA 8260B	EPA 5035

Client Sample ID : E04(0-0.5') Laboratory Sample ID : 303241-002

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Gasoline C7-C12	500	Y	27	mg/Kg	As Recd	166.7	EPA 8015B	EPA 5035
1,3,5-Trimethylbenzene	1,500		820	ug/Kg	As Recd	164.7	EPA 8260B	EPA 5035
1,2,4-Trimethylbenzene	3,200		820	ug/Kg	As Recd	164.7	EPA 8260B	EPA 5035
sec-Butylbenzene	860		820	ug/Kg	As Recd	164.7	EPA 8260B	EPA 5035

Client Sample ID : E04(2.5-3') Laboratory Sample ID : 303241-003

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Gasoline C7-C12	670	Y	30	mg/Kg	As Recd	166.7	EPA 8015B	EPA 5035

Client Sample ID : E04(4.5-5') Laboratory Sample ID : 303241-004

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Gasoline C7-C12	400	Y	27	mg/Kg	As Recd	142.9	EPA 8015B	EPA 5035

Client Sample ID : E06(3-3.5') Laboratory Sample ID : 303241-005

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Gasoline C7-C12	44	Y	4.2	mg/Kg	As Recd	25.00	EPA 8015B	EPA 5035

Client Sample ID : E06(4.5-5') Laboratory Sample ID : 303241-006

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Gasoline C7-C12	1.3	Y	0.18	mg/Kg	As Recd	1.000	EPA 8015B	EPA 5035
Acetone	67		21	ug/Kg	As Recd	1.048	EPA 8260B	EPA 5035

Y = Sample exhibits chromatographic pattern which does not resemble standard

ENTHALPY ANALYTICAL

Gasoline by GC/FID (5035 Prep)

Lab #:	303241	Location:	5441 Boulevard, Oakland, CA
Client:	EKI Environment & Water, Inc.	Prep:	EPA 5035
Project#:	B70123.01	Analysis:	EPA 8015B
Matrix:	Soil	Batch#:	263719
Units:	mg/Kg	Received:	09/14/18
Basis:	as received	Analyzed:	09/20/18

Field ID: E05(2.7') | Diln Fac: 1.000
Type: SAMPLE | Sampled: 09/13/18
Lab ID: 303241-001

Analyte	Result	RL
Gasoline C7-C12	ND	0.16

Surrogate	%REC	Limits
Bromofluorobenzene (FID)	101	64-134

Field ID: E04(0-0.5') | Diln Fac: 166.7
Type: SAMPLE | Sampled: 09/14/18
Lab ID: 303241-002

Analyte	Result	RL
Gasoline C7-C12	500 Y	27

Surrogate	%REC	Limits
Bromofluorobenzene (FID)	180 *	64-134

Field ID: E04(2.5-3') | Diln Fac: 166.7
Type: SAMPLE | Sampled: 09/14/18
Lab ID: 303241-003

Analyte	Result	RL
Gasoline C7-C12	670 Y	30

Surrogate	%REC	Limits
Bromofluorobenzene (FID)	168 *	64-134

Field ID: E04(4.5-5') | Diln Fac: 142.9
Type: SAMPLE | Sampled: 09/14/18
Lab ID: 303241-004

Analyte	Result	RL
Gasoline C7-C12	400 Y	27

Surrogate	%REC	Limits
Bromofluorobenzene (FID)	144 *	64-134

*= Value outside of QC limits; see narrative
Y= Sample exhibits chromatographic pattern which does not resemble standard
ND= Not Detected
RL= Reporting Limit

ENTHALPY ANALYTICAL

Gasoline by GC/FID (5035 Prep)

Lab #:	303241	Location:	5441 Boulevard, Oakland, CA
Client:	EKI Environment & Water, Inc.	Prep:	EPA 5035
Project#:	B70123.01	Analysis:	EPA 8015B
Matrix:	Soil	Batch#:	263719
Units:	mg/Kg	Received:	09/14/18
Basis:	as received	Analyzed:	09/20/18

Field ID: E06(3-3.5') Diln Fac: 25.00
Type: SAMPLE Sampled: 09/14/18
Lab ID: 303241-005

Analyte	Result	RL
Gasoline C7-C12	44 Y	4.2

Surrogate	%REC	Limits
Bromofluorobenzene (FID)	155 *	64-134

Field ID: E06(4.5-5') Diln Fac: 1.000
Type: SAMPLE Sampled: 09/14/18
Lab ID: 303241-006

Analyte	Result	RL
Gasoline C7-C12	1.3 Y	0.18

Surrogate	%REC	Limits
Bromofluorobenzene (FID)	160 *	64-134

Type: BLANK Diln Fac: 1.000
Lab ID: QC948496

Analyte	Result	RL
Gasoline C7-C12	ND	0.20

Surrogate	%REC	Limits
Bromofluorobenzene (FID)	84	64-134

*= Value outside of QC limits; see narrative
Y= Sample exhibits chromatographic pattern which does not resemble standard
ND= Not Detected
RL= Reporting Limit

ENTHALPY ANALYTICAL

Batch QC Report

Gasoline by GC/FID (5035 Prep)

Lab #:	303241	Location:	5441 Boulevard, Oakland, CA
Client:	EKI Environment & Water, Inc.	Prep:	EPA 5035
Project#:	B70123.01	Analysis:	EPA 8015B
Matrix:	Soil	Batch#:	263719
Units:	mg/Kg	Analyzed:	09/20/18
Diln Fac:	1.000		

Type: BS Lab ID: QC948492

Analyte	Spiked	Result	%REC	Limits
Gasoline C7-C12	1.000	0.9807	98	80-120

Surrogate	%REC	Limits
Bromofluorobenzene (FID)	102	64-134

Type: BSD Lab ID: QC948493

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Gasoline C7-C12	1.000	0.9714	97	80-120	1	20

Surrogate	%REC	Limits
Bromofluorobenzene (FID)	98	64-134

RPD= Relative Percent Difference

ENTHALPY ANALYTICAL

Batch QC Report

Gasoline by GC/FID (5035 Prep)

Lab #:	303241	Location:	5441 Boulevard, Oakland, CA
Client:	EKI Environment & Water, Inc.	Prep:	EPA 5030B
Project#:	B70123.01	Analysis:	EPA 8015B
Field ID:	ZZZZZZZZZZ	Diln Fac:	1.000
MSS Lab ID:	303406-001	Batch#:	263719
Matrix:	Miscell.	Sampled:	09/19/18
Units:	mg/Kg	Received:	09/19/18
Basis:	as received	Analyzed:	09/20/18

Type: MS Lab ID: QC948494

Analyte	MSS Result	Spiked	Result	%REC	Limits
Gasoline C7-C12	3.220	10.64	10.80	71	46-120

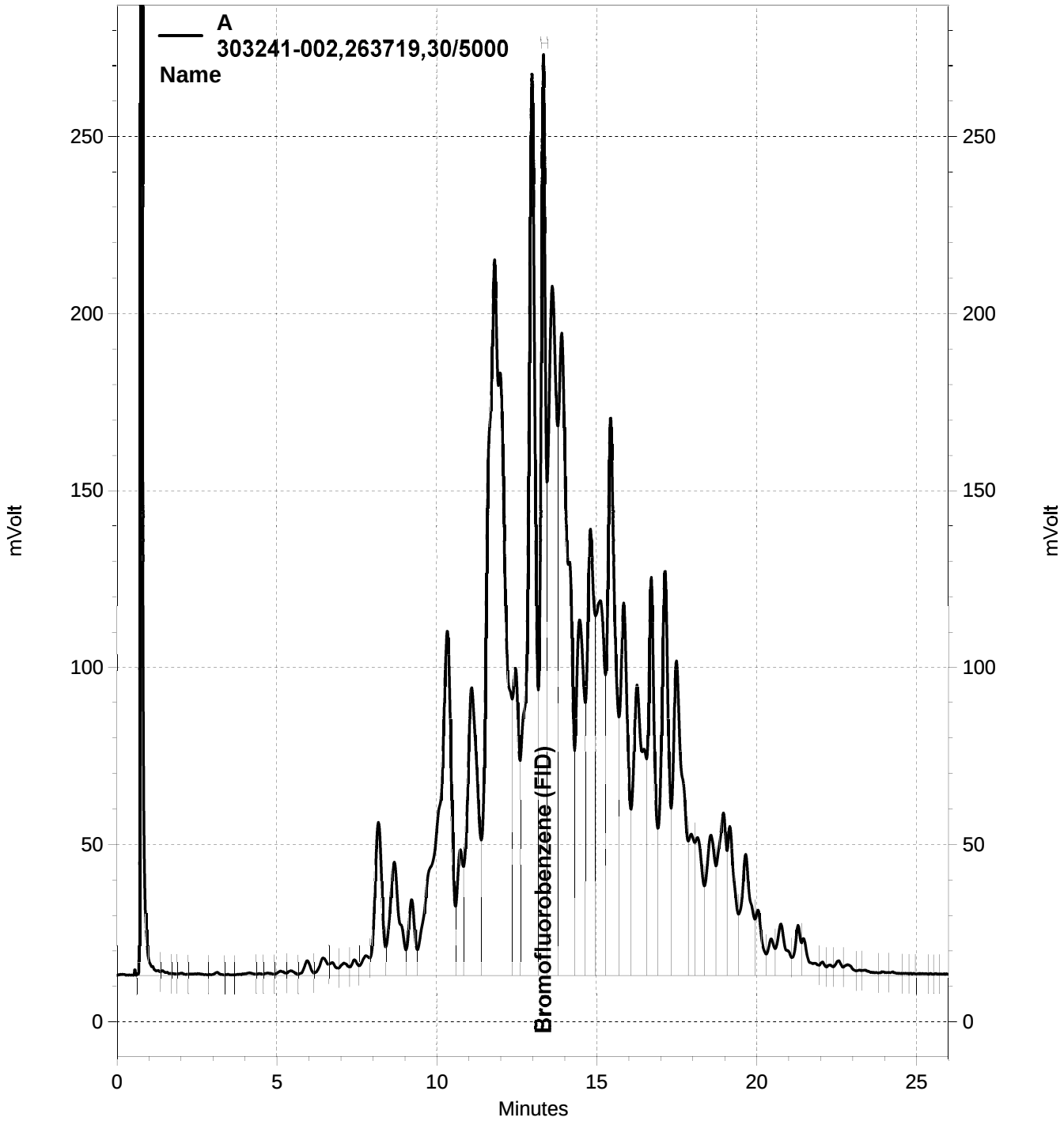
Surrogate	%REC	Limits
Bromofluorobenzene (FID)	116	64-134

Type: MSD Lab ID: QC948495

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Gasoline C7-C12	11.11	11.74	77	46-120	5	33

Surrogate	%REC	Limits
Bromofluorobenzene (FID)	118	64-134

RPD= Relative Percent Difference



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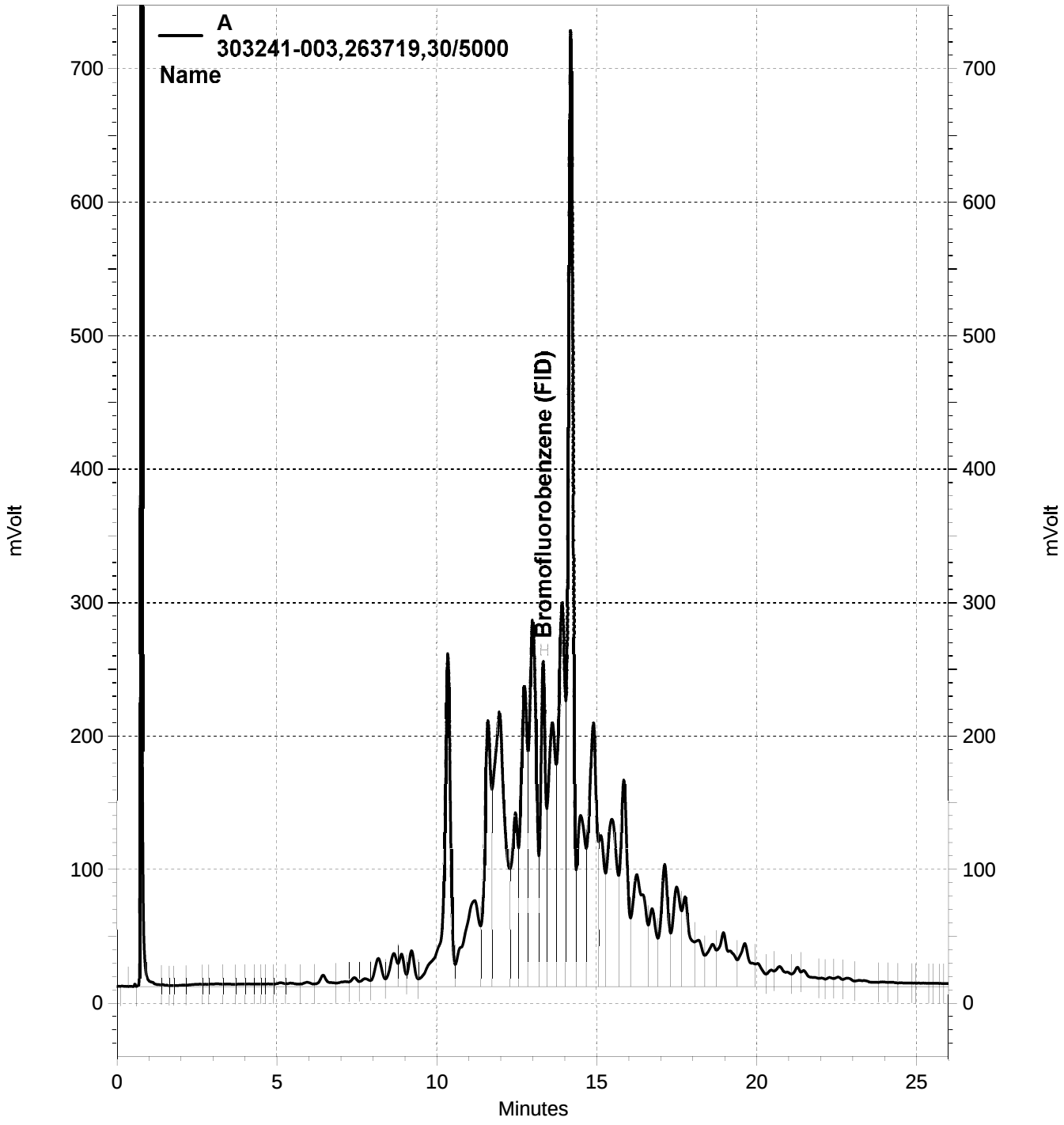

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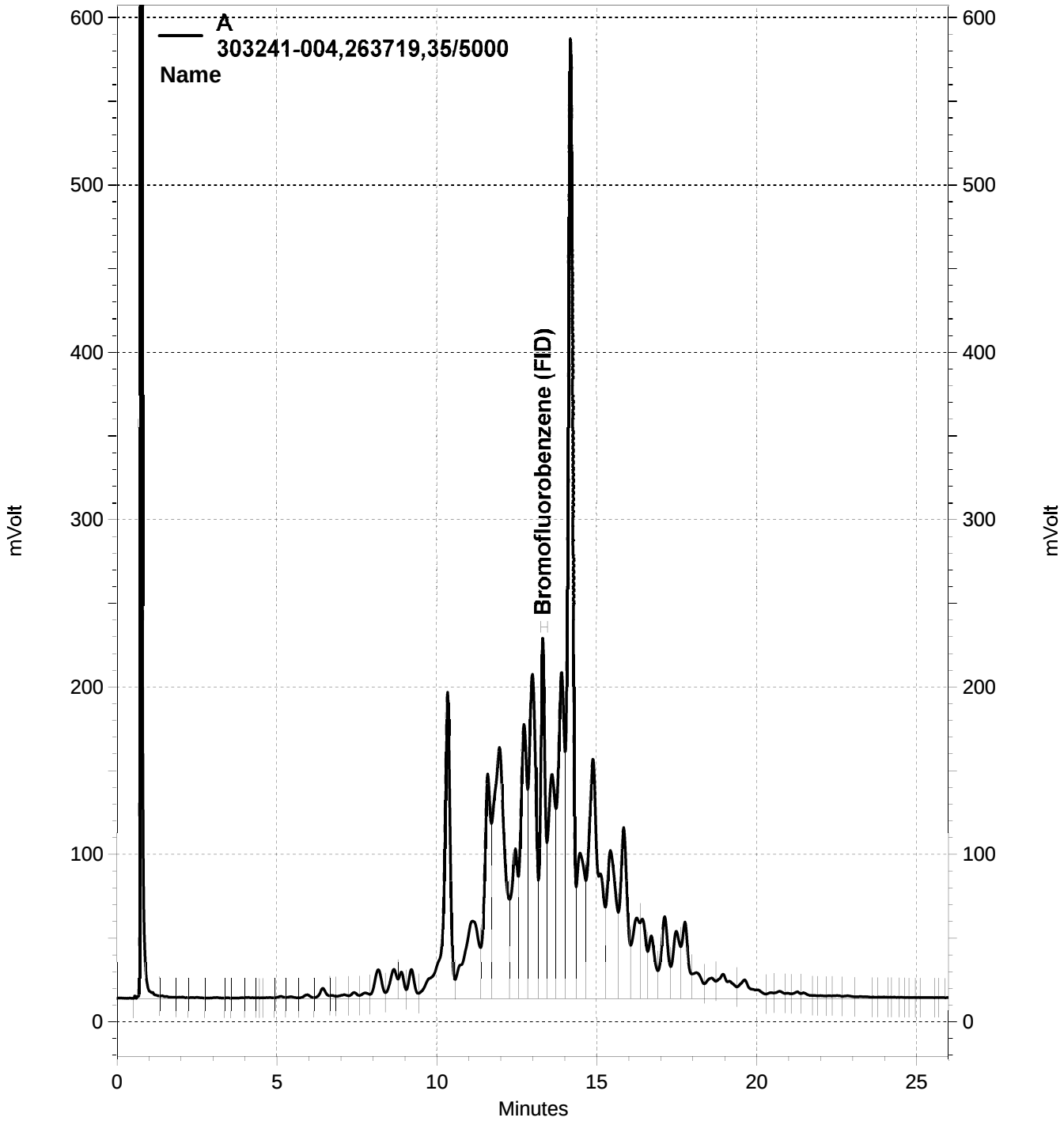

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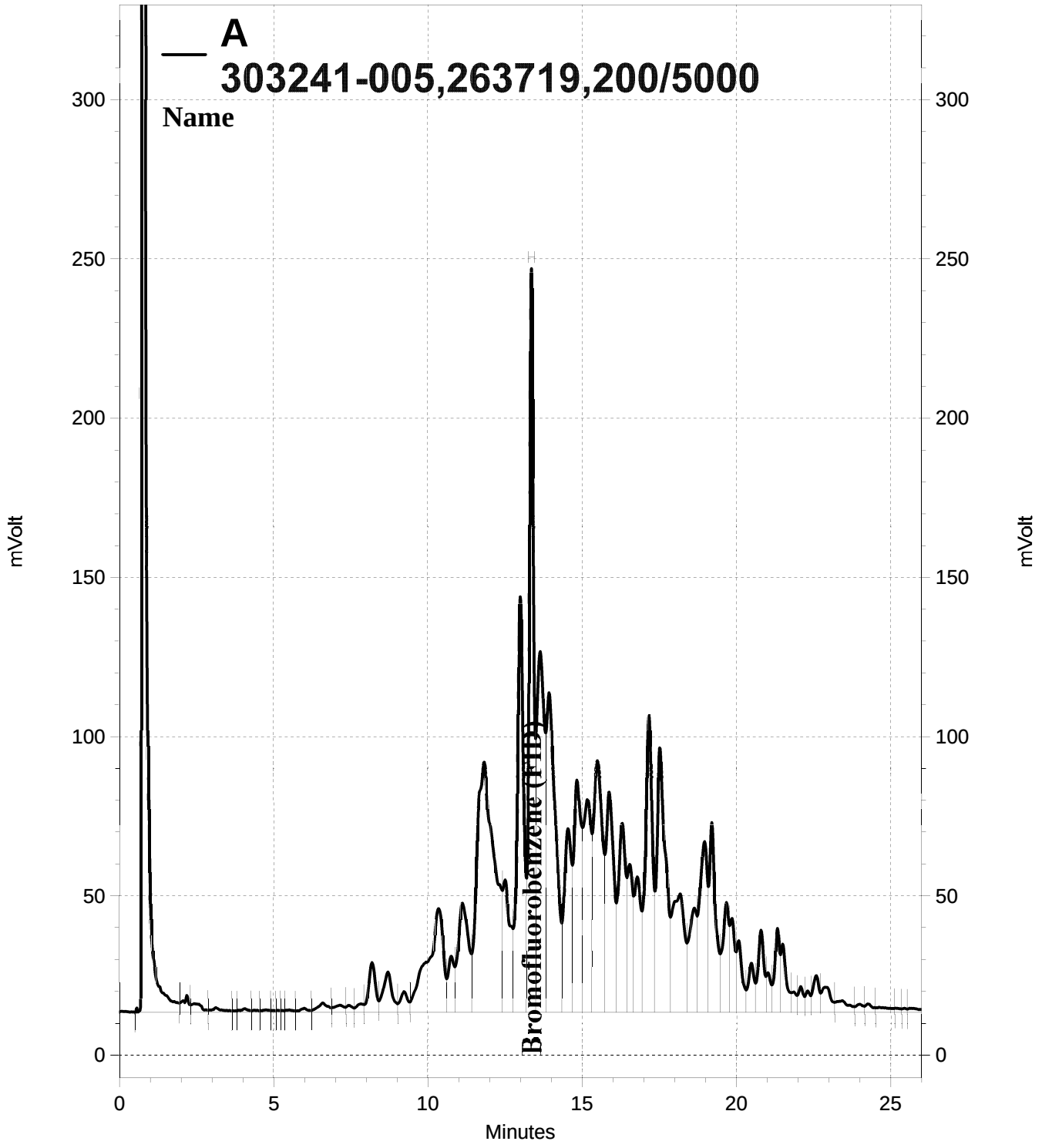

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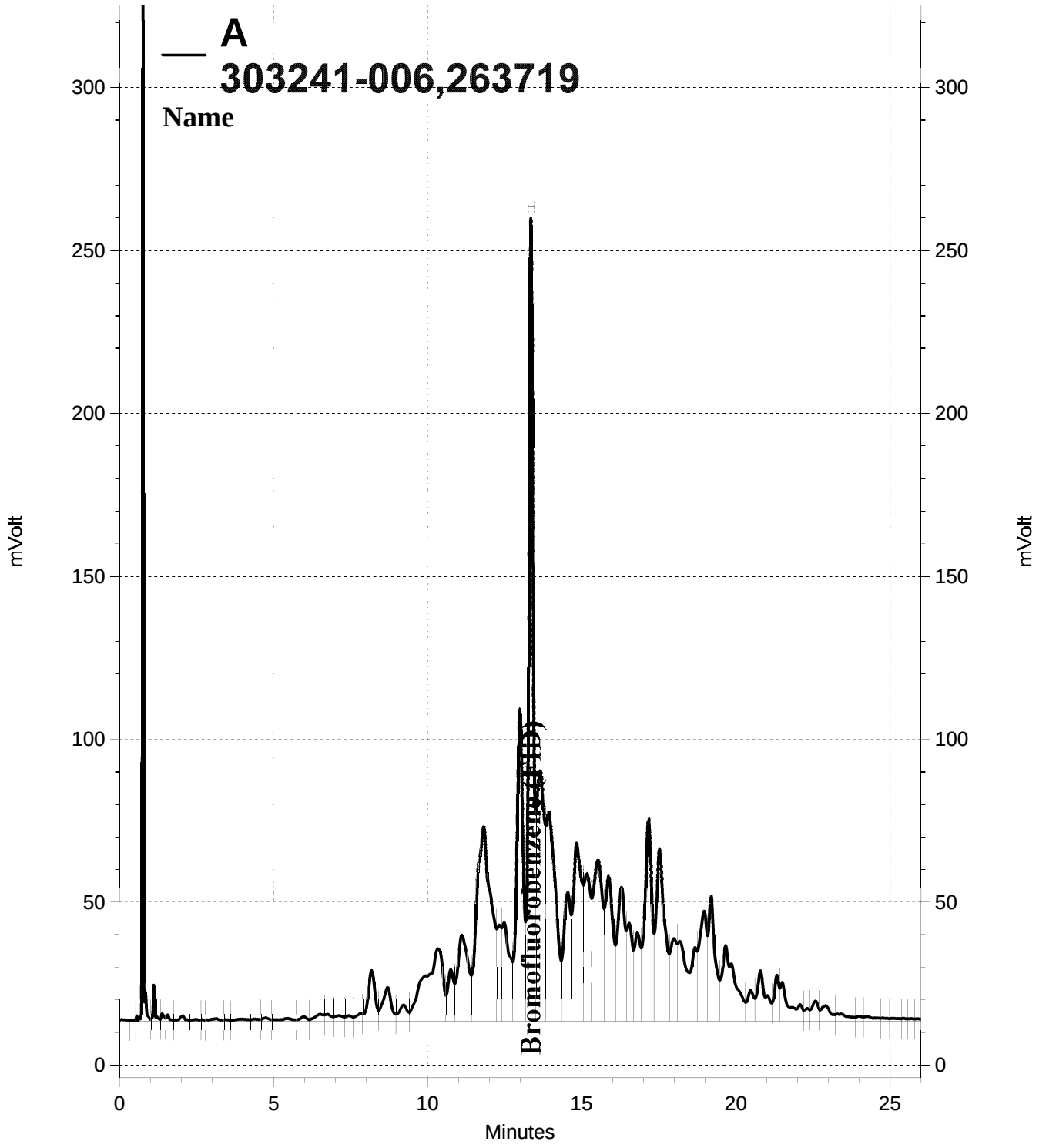

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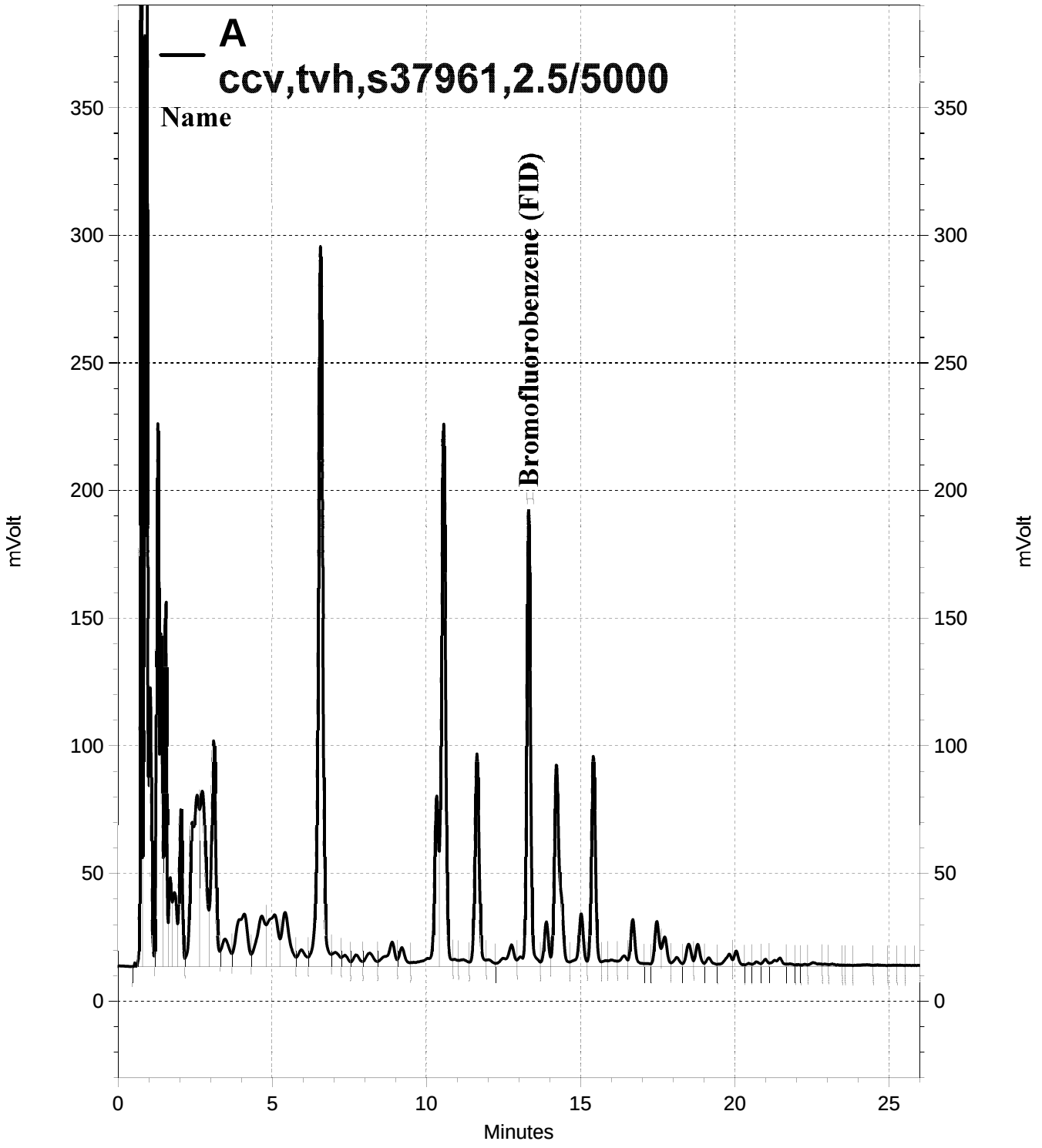

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ENTHALPY ANALYTICAL

Purgeable Organics by GC/MS

Lab #:	303241	Location:	5441 Boulevard, Oakland, CA
Client:	EKI Environment & Water, Inc.	Prep:	EPA 5035
Project#:	B70123.01	Analysis:	EPA 8260B
Field ID:	E05(2.7')	Diln Fac:	0.7987
Lab ID:	303241-001	Batch#:	263651
Matrix:	Soil	Sampled:	09/13/18
Units:	ug/Kg	Received:	09/14/18
Basis:	as received	Analyzed:	09/19/18

Analyte	Result	RL
Freon 12	ND	8.0
Chloromethane	ND	8.0
Vinyl Chloride	ND	8.0
Bromomethane	ND	8.0
Chloroethane	ND	8.0
Trichlorofluoromethane	ND	4.0
Acetone	19	16
Freon 113	ND	4.0
1,1-Dichloroethene	ND	4.0
Methylene Chloride	ND	16
Carbon Disulfide	ND	4.0
MTBE	ND	4.0
trans-1,2-Dichloroethene	ND	4.0
Vinyl Acetate	ND	40
1,1-Dichloroethane	ND	4.0
2-Butanone	ND	8.0
cis-1,2-Dichloroethene	ND	4.0
2,2-Dichloropropane	ND	4.0
Chloroform	ND	4.0
Bromochloromethane	ND	4.0
1,1,1-Trichloroethane	ND	4.0
1,1-Dichloropropene	ND	4.0
Carbon Tetrachloride	ND	4.0
1,2-Dichloroethane	ND	4.0
Benzene	ND	4.0
Trichloroethene	ND	4.0
1,2-Dichloropropane	ND	4.0
Bromodichloromethane	ND	4.0
Dibromomethane	ND	4.0
4-Methyl-2-Pentanone	ND	8.0
cis-1,3-Dichloropropene	ND	4.0
Toluene	ND	4.0
trans-1,3-Dichloropropene	ND	4.0
1,1,2-Trichloroethane	ND	4.0
2-Hexanone	ND	8.0
1,3-Dichloropropane	ND	4.0
Tetrachloroethene	ND	4.0

ND= Not Detected
RL= Reporting Limit

ENTHALPY ANALYTICAL

Purgeable Organics by GC/MS

Lab #:	303241	Location:	5441 Boulevard, Oakland, CA
Client:	EKI Environment & Water, Inc.	Prep:	EPA 5035
Project#:	B70123.01	Analysis:	EPA 8260B
Field ID:	E05(2.7')	Diln Fac:	0.7987
Lab ID:	303241-001	Batch#:	263651
Matrix:	Soil	Sampled:	09/13/18
Units:	ug/Kg	Received:	09/14/18
Basis:	as received	Analyzed:	09/19/18

Analyte	Result	RL
Dibromochloromethane	ND	4.0
1,2-Dibromoethane	ND	4.0
Chlorobenzene	ND	4.0
1,1,1,2-Tetrachloroethane	ND	4.0
Ethylbenzene	ND	4.0
m,p-Xylenes	ND	4.0
o-Xylene	ND	4.0
Styrene	ND	4.0
Bromoform	ND	4.0
Isopropylbenzene	ND	4.0
1,1,2,2-Tetrachloroethane	ND	4.0
1,2,3-Trichloropropane	ND	4.0
Propylbenzene	ND	4.0
Bromobenzene	ND	4.0
1,3,5-Trimethylbenzene	ND	4.0
2-Chlorotoluene	ND	4.0
4-Chlorotoluene	ND	4.0
tert-Butylbenzene	ND	4.0
1,2,4-Trimethylbenzene	ND	4.0
sec-Butylbenzene	ND	4.0
para-Isopropyl Toluene	ND	4.0
1,3-Dichlorobenzene	ND	4.0
1,4-Dichlorobenzene	ND	4.0
n-Butylbenzene	ND	4.0
1,2-Dichlorobenzene	ND	4.0
1,2-Dibromo-3-Chloropropane	ND	4.0
1,2,4-Trichlorobenzene	ND	4.0
Hexachlorobutadiene	ND	4.0
Naphthalene	ND	4.0
1,2,3-Trichlorobenzene	ND	4.0

Surrogate	%REC	Limits
Dibromofluoromethane	116	79-127
1,2-Dichloroethane-d4	109	73-139
Toluene-d8	95	80-120
Bromofluorobenzene	105	80-127

ND= Not Detected
RL= Reporting Limit

ENTHALPY ANALYTICAL

Purgeable Organics by GC/MS

Lab #:	303241	Location:	5441 Boulevard, Oakland, CA
Client:	EKI Environment & Water, Inc.	Prep:	EPA 5035
Project#:	B70123.01	Analysis:	EPA 8260B
Field ID:	E04(0-0.5')	Diln Fac:	164.7
Lab ID:	303241-002	Batch#:	263630
Matrix:	Soil	Sampled:	09/14/18
Units:	ug/Kg	Received:	09/14/18
Basis:	as received	Analyzed:	09/18/18

Analyte	Result	RL
Freon 12	ND	1,600
Chloromethane	ND	1,600
Vinyl Chloride	ND	1,600
Bromomethane	ND	1,600
Chloroethane	ND	1,600
Trichlorofluoromethane	ND	820
Acetone	ND	3,300
Freon 113	ND	820
1,1-Dichloroethene	ND	820
Methylene Chloride	ND	3,300
Carbon Disulfide	ND	820
MTBE	ND	820
trans-1,2-Dichloroethene	ND	820
Vinyl Acetate	ND	8,200
1,1-Dichloroethane	ND	820
2-Butanone	ND	1,600
cis-1,2-Dichloroethene	ND	820
2,2-Dichloropropane	ND	820
Chloroform	ND	820
Bromochloromethane	ND	820
1,1,1-Trichloroethane	ND	820
1,1-Dichloropropene	ND	820
Carbon Tetrachloride	ND	820
1,2-Dichloroethane	ND	820
Benzene	ND	820
Trichloroethene	ND	820
1,2-Dichloropropane	ND	820
Bromodichloromethane	ND	820
Dibromomethane	ND	820
4-Methyl-2-Pentanone	ND	1,600
cis-1,3-Dichloropropene	ND	820
Toluene	ND	820
trans-1,3-Dichloropropene	ND	820
1,1,2-Trichloroethane	ND	820
2-Hexanone	ND	1,600
1,3-Dichloropropane	ND	820
Tetrachloroethene	ND	820
Dibromochloromethane	ND	820
1,2-Dibromoethane	ND	820
Chlorobenzene	ND	820
1,1,1,2-Tetrachloroethane	ND	820
Ethylbenzene	ND	820
m,p-Xylenes	ND	820
o-Xylene	ND	820
Styrene	ND	820
Bromoform	ND	820
Isopropylbenzene	ND	820
1,1,2,2-Tetrachloroethane	ND	820
1,2,3-Trichloropropane	ND	820
Propylbenzene	ND	820
Bromobenzene	ND	820
1,3,5-Trimethylbenzene	1,500	820
2-Chlorotoluene	ND	820

*= Value outside of QC limits; see narrative
ND= Not Detected
RL= Reporting Limit

ENTHALPY ANALYTICAL

Purgeable Organics by GC/MS

Lab #:	303241	Location:	5441 Boulevard, Oakland, CA
Client:	EKI Environment & Water, Inc.	Prep:	EPA 5035
Project#:	B70123.01	Analysis:	EPA 8260B
Field ID:	E04(0-0.5')	Dln Fac:	164.7
Lab ID:	303241-002	Batch#:	263630
Matrix:	Soil	Sampled:	09/14/18
Units:	ug/Kg	Received:	09/14/18
Basis:	as received	Analyzed:	09/18/18

Analyte	Result	RL
4-Chlorotoluene	ND	820
tert-Butylbenzene	ND	820
1,2,4-Trimethylbenzene	3,200	820
sec-Butylbenzene	860	820
para-Isopropyl Toluene	ND	820
1,3-Dichlorobenzene	ND	820
1,4-Dichlorobenzene	ND	820
n-Butylbenzene	ND	820
1,2-Dichlorobenzene	ND	820
1,2-Dibromo-3-Chloropropane	ND	820
1,2,4-Trichlorobenzene	ND	820
Hexachlorobutadiene	ND	820
Naphthalene	ND	820
1,2,3-Trichlorobenzene	ND	820

Surrogate	%REC	Limits
Dibromofluoromethane	83	79-127
1,2-Dichloroethane-d4	99	73-139
Toluene-d8	87	80-120
Bromofluorobenzene	129 *	80-127

*= Value outside of QC limits; see narrative
ND= Not Detected
RL= Reporting Limit

ENTHALPY ANALYTICAL

Purgeable Organics by GC/MS

Lab #:	303241	Location:	5441 Boulevard, Oakland, CA
Client:	EKI Environment & Water, Inc.	Prep:	EPA 5035
Project#:	B70123.01	Analysis:	EPA 8260B
Field ID:	E04(2.5-3')	Diln Fac:	448.9
Lab ID:	303241-003	Batch#:	263651
Matrix:	Soil	Sampled:	09/14/18
Units:	ug/Kg	Received:	09/14/18
Basis:	as received	Analyzed:	09/19/18

Analyte	Result	RL
Freon 12	ND	4,500
Chloromethane	ND	4,500
Vinyl Chloride	ND	4,500
Bromomethane	ND	4,500
Chloroethane	ND	4,500
Trichlorofluoromethane	ND	2,200
Acetone	ND	9,000
Freon 113	ND	2,200
1,1-Dichloroethene	ND	2,200
Methylene Chloride	ND	9,000
Carbon Disulfide	ND	2,200
MTBE	ND	2,200
trans-1,2-Dichloroethene	ND	2,200
Vinyl Acetate	ND	22,000
1,1-Dichloroethane	ND	2,200
2-Butanone	ND	4,500
cis-1,2-Dichloroethene	ND	2,200
2,2-Dichloropropane	ND	2,200
Chloroform	ND	2,200
Bromochloromethane	ND	2,200
1,1,1-Trichloroethane	ND	2,200
1,1-Dichloropropene	ND	2,200
Carbon Tetrachloride	ND	2,200
1,2-Dichloroethane	ND	2,200
Benzene	ND	2,200
Trichloroethene	ND	2,200
1,2-Dichloropropane	ND	2,200
Bromodichloromethane	ND	2,200
Dibromomethane	ND	2,200
4-Methyl-2-Pentanone	ND	4,500
cis-1,3-Dichloropropene	ND	2,200
Toluene	ND	2,200
trans-1,3-Dichloropropene	ND	2,200
1,1,2-Trichloroethane	ND	2,200
2-Hexanone	ND	4,500
1,3-Dichloropropane	ND	2,200
Tetrachloroethene	ND	2,200

ND= Not Detected
RL= Reporting Limit

ENTHALPY ANALYTICAL

Purgeable Organics by GC/MS

Lab #:	303241	Location:	5441 Boulevard, Oakland, CA
Client:	EKI Environment & Water, Inc.	Prep:	EPA 5035
Project#:	B70123.01	Analysis:	EPA 8260B
Field ID:	E04(2.5-3')	Diln Fac:	448.9
Lab ID:	303241-003	Batch#:	263651
Matrix:	Soil	Sampled:	09/14/18
Units:	ug/Kg	Received:	09/14/18
Basis:	as received	Analyzed:	09/19/18

Analyte	Result	RL
Dibromochloromethane	ND	2,200
1,2-Dibromoethane	ND	2,200
Chlorobenzene	ND	2,200
1,1,1,2-Tetrachloroethane	ND	2,200
Ethylbenzene	ND	2,200
m,p-Xylenes	ND	2,200
o-Xylene	ND	2,200
Styrene	ND	2,200
Bromoform	ND	2,200
Isopropylbenzene	ND	2,200
1,1,2,2-Tetrachloroethane	ND	2,200
1,2,3-Trichloropropane	ND	2,200
Propylbenzene	ND	2,200
Bromobenzene	ND	2,200
1,3,5-Trimethylbenzene	ND	2,200
2-Chlorotoluene	ND	2,200
4-Chlorotoluene	ND	2,200
tert-Butylbenzene	ND	2,200
1,2,4-Trimethylbenzene	ND	2,200
sec-Butylbenzene	ND	2,200
para-Isopropyl Toluene	ND	2,200
1,3-Dichlorobenzene	ND	2,200
1,4-Dichlorobenzene	ND	2,200
n-Butylbenzene	ND	2,200
1,2-Dichlorobenzene	ND	2,200
1,2-Dibromo-3-Chloropropane	ND	2,200
1,2,4-Trichlorobenzene	ND	2,200
Hexachlorobutadiene	ND	2,200
Naphthalene	ND	2,200
1,2,3-Trichlorobenzene	ND	2,200

Surrogate	%REC	Limits
Dibromofluoromethane	112	79-127
1,2-Dichloroethane-d4	104	73-139
Toluene-d8	93	80-120
Bromofluorobenzene	110	80-127

ND= Not Detected
RL= Reporting Limit

ENTHALPY ANALYTICAL

Purgeable Organics by GC/MS

Lab #:	303241	Location:	5441 Boulevard, Oakland, CA
Client:	EKI Environment & Water, Inc.	Prep:	EPA 5035
Project#:	B70123.01	Analysis:	EPA 8260B
Field ID:	E04(4.5-5')	Diln Fac:	309.8
Lab ID:	303241-004	Batch#:	263630
Matrix:	Soil	Sampled:	09/14/18
Units:	ug/Kg	Received:	09/14/18
Basis:	as received	Analyzed:	09/18/18

Analyte	Result	RL
Freon 12	ND	3,100
Chloromethane	ND	3,100
Vinyl Chloride	ND	3,100
Bromomethane	ND	3,100
Chloroethane	ND	3,100
Trichlorofluoromethane	ND	1,500
Acetone	ND	6,200
Freon 113	ND	1,500
1,1-Dichloroethene	ND	1,500
Methylene Chloride	ND	6,200
Carbon Disulfide	ND	1,500
MTBE	ND	1,500
trans-1,2-Dichloroethene	ND	1,500
Vinyl Acetate	ND	15,000
1,1-Dichloroethane	ND	1,500
2-Butanone	ND	3,100
cis-1,2-Dichloroethene	ND	1,500
2,2-Dichloropropane	ND	1,500
Chloroform	ND	1,500
Bromochloromethane	ND	1,500
1,1,1-Trichloroethane	ND	1,500
1,1-Dichloropropene	ND	1,500
Carbon Tetrachloride	ND	1,500
1,2-Dichloroethane	ND	1,500
Benzene	ND	1,500
Trichloroethene	ND	1,500
1,2-Dichloropropane	ND	1,500
Bromodichloromethane	ND	1,500
Dibromomethane	ND	1,500
4-Methyl-2-Pentanone	ND	3,100
cis-1,3-Dichloropropene	ND	1,500
Toluene	ND	1,500
trans-1,3-Dichloropropene	ND	1,500
1,1,2-Trichloroethane	ND	1,500
2-Hexanone	ND	3,100
1,3-Dichloropropane	ND	1,500
Tetrachloroethene	ND	1,500

ND= Not Detected
RL= Reporting Limit

ENTHALPY ANALYTICAL

Purgeable Organics by GC/MS

Lab #:	303241	Location:	5441 Boulevard, Oakland, CA
Client:	EKI Environment & Water, Inc.	Prep:	EPA 5035
Project#:	B70123.01	Analysis:	EPA 8260B
Field ID:	E04(4.5-5')	Diln Fac:	309.8
Lab ID:	303241-004	Batch#:	263630
Matrix:	Soil	Sampled:	09/14/18
Units:	ug/Kg	Received:	09/14/18
Basis:	as received	Analyzed:	09/18/18

Analyte	Result	RL
Dibromochloromethane	ND	1,500
1,2-Dibromoethane	ND	1,500
Chlorobenzene	ND	1,500
1,1,1,2-Tetrachloroethane	ND	1,500
Ethylbenzene	ND	1,500
m,p-Xylenes	ND	1,500
o-Xylene	ND	1,500
Styrene	ND	1,500
Bromoform	ND	1,500
Isopropylbenzene	ND	1,500
1,1,2,2-Tetrachloroethane	ND	1,500
1,2,3-Trichloropropane	ND	1,500
Propylbenzene	ND	1,500
Bromobenzene	ND	1,500
1,3,5-Trimethylbenzene	ND	1,500
2-Chlorotoluene	ND	1,500
4-Chlorotoluene	ND	1,500
tert-Butylbenzene	ND	1,500
1,2,4-Trimethylbenzene	ND	1,500
sec-Butylbenzene	ND	1,500
para-Isopropyl Toluene	ND	1,500
1,3-Dichlorobenzene	ND	1,500
1,4-Dichlorobenzene	ND	1,500
n-Butylbenzene	ND	1,500
1,2-Dichlorobenzene	ND	1,500
1,2-Dibromo-3-Chloropropane	ND	1,500
1,2,4-Trichlorobenzene	ND	1,500
Hexachlorobutadiene	ND	1,500
Naphthalene	ND	1,500
1,2,3-Trichlorobenzene	ND	1,500

Surrogate	%REC	Limits
Dibromofluoromethane	86	79-127
1,2-Dichloroethane-d4	101	73-139
Toluene-d8	87	80-120
Bromofluorobenzene	112	80-127

ND= Not Detected
RL= Reporting Limit

ENTHALPY ANALYTICAL

Purgeable Organics by GC/MS

Lab #:	303241	Location:	5441 Boulevard, Oakland, CA
Client:	EKI Environment & Water, Inc.	Prep:	EPA 5035
Project#:	B70123.01	Analysis:	EPA 8260B
Field ID:	E06(3-3.5')	Diln Fac:	41.60
Lab ID:	303241-005	Batch#:	263630
Matrix:	Soil	Sampled:	09/14/18
Units:	ug/Kg	Received:	09/14/18
Basis:	as received	Analyzed:	09/18/18

Analyte	Result	RL
Freon 12	ND	420
Chloromethane	ND	420
Vinyl Chloride	ND	420
Bromomethane	ND	420
Chloroethane	ND	420
Trichlorofluoromethane	ND	210
Acetone	ND	830
Freon 113	ND	210
1,1-Dichloroethene	ND	210
Methylene Chloride	ND	830
Carbon Disulfide	ND	210
MTBE	ND	210
trans-1,2-Dichloroethene	ND	210
Vinyl Acetate	ND	2,100
1,1-Dichloroethane	ND	210
2-Butanone	ND	420
cis-1,2-Dichloroethene	ND	210
2,2-Dichloropropane	ND	210
Chloroform	ND	210
Bromochloromethane	ND	210
1,1,1-Trichloroethane	ND	210
1,1-Dichloropropene	ND	210
Carbon Tetrachloride	ND	210
1,2-Dichloroethane	ND	210
Benzene	ND	210
Trichloroethene	ND	210
1,2-Dichloropropane	ND	210
Bromodichloromethane	ND	210
Dibromomethane	ND	210
4-Methyl-2-Pentanone	ND	420
cis-1,3-Dichloropropene	ND	210
Toluene	ND	210
trans-1,3-Dichloropropene	ND	210
1,1,2-Trichloroethane	ND	210
2-Hexanone	ND	420
1,3-Dichloropropane	ND	210
Tetrachloroethene	ND	210

ND= Not Detected
RL= Reporting Limit

ENTHALPY ANALYTICAL

Purgeable Organics by GC/MS

Lab #:	303241	Location:	5441 Boulevard, Oakland, CA
Client:	EKI Environment & Water, Inc.	Prep:	EPA 5035
Project#:	B70123.01	Analysis:	EPA 8260B
Field ID:	E06(3-3.5')	Diln Fac:	41.60
Lab ID:	303241-005	Batch#:	263630
Matrix:	Soil	Sampled:	09/14/18
Units:	ug/Kg	Received:	09/14/18
Basis:	as received	Analyzed:	09/18/18

Analyte	Result	RL
Dibromochloromethane	ND	210
1,2-Dibromoethane	ND	210
Chlorobenzene	ND	210
1,1,1,2-Tetrachloroethane	ND	210
Ethylbenzene	ND	210
m,p-Xylenes	ND	210
o-Xylene	ND	210
Styrene	ND	210
Bromoform	ND	210
Isopropylbenzene	ND	210
1,1,2,2-Tetrachloroethane	ND	210
1,2,3-Trichloropropane	ND	210
Propylbenzene	ND	210
Bromobenzene	ND	210
1,3,5-Trimethylbenzene	ND	210
2-Chlorotoluene	ND	210
4-Chlorotoluene	ND	210
tert-Butylbenzene	ND	210
1,2,4-Trimethylbenzene	ND	210
sec-Butylbenzene	ND	210
para-Isopropyl Toluene	ND	210
1,3-Dichlorobenzene	ND	210
1,4-Dichlorobenzene	ND	210
n-Butylbenzene	ND	210
1,2-Dichlorobenzene	ND	210
1,2-Dibromo-3-Chloropropane	ND	210
1,2,4-Trichlorobenzene	ND	210
Hexachlorobutadiene	ND	210
Naphthalene	ND	210
1,2,3-Trichlorobenzene	ND	210

Surrogate	%REC	Limits
Dibromofluoromethane	85	79-127
1,2-Dichloroethane-d4	102	73-139
Toluene-d8	90	80-120
Bromofluorobenzene	108	80-127

ND= Not Detected
RL= Reporting Limit

ENTHALPY ANALYTICAL

Purgeable Organics by GC/MS

Lab #:	303241	Location:	5441 Boulevard, Oakland, CA
Client:	EKI Environment & Water, Inc.	Prep:	EPA 5035
Project#:	B70123.01	Analysis:	EPA 8260B
Field ID:	E06(4.5-5')	Diln Fac:	1.048
Lab ID:	303241-006	Batch#:	263651
Matrix:	Soil	Sampled:	09/14/18
Units:	ug/Kg	Received:	09/14/18
Basis:	as received	Analyzed:	09/19/18

Analyte	Result	RL
Freon 12	ND	10
Chloromethane	ND	10
Vinyl Chloride	ND	10
Bromomethane	ND	10
Chloroethane	ND	10
Trichlorofluoromethane	ND	5.2
Acetone	67	21
Freon 113	ND	5.2
1,1-Dichloroethene	ND	5.2
Methylene Chloride	ND	21
Carbon Disulfide	ND	5.2
MTBE	ND	5.2
trans-1,2-Dichloroethene	ND	5.2
Vinyl Acetate	ND	52
1,1-Dichloroethane	ND	5.2
2-Butanone	ND	10
cis-1,2-Dichloroethene	ND	5.2
2,2-Dichloropropane	ND	5.2
Chloroform	ND	5.2
Bromochloromethane	ND	5.2
1,1,1-Trichloroethane	ND	5.2
1,1-Dichloropropene	ND	5.2
Carbon Tetrachloride	ND	5.2
1,2-Dichloroethane	ND	5.2
Benzene	ND	5.2
Trichloroethene	ND	5.2
1,2-Dichloropropane	ND	5.2
Bromodichloromethane	ND	5.2
Dibromomethane	ND	5.2
4-Methyl-2-Pentanone	ND	10
cis-1,3-Dichloropropene	ND	5.2
Toluene	ND	5.2
trans-1,3-Dichloropropene	ND	5.2
1,1,2-Trichloroethane	ND	5.2
2-Hexanone	ND	10
1,3-Dichloropropane	ND	5.2
Tetrachloroethene	ND	5.2

ND= Not Detected
RL= Reporting Limit

ENTHALPY ANALYTICAL

Purgeable Organics by GC/MS

Lab #:	303241	Location:	5441 Boulevard, Oakland, CA
Client:	EKI Environment & Water, Inc.	Prep:	EPA 5035
Project#:	B70123.01	Analysis:	EPA 8260B
Field ID:	E06(4.5-5')	Diln Fac:	1.048
Lab ID:	303241-006	Batch#:	263651
Matrix:	Soil	Sampled:	09/14/18
Units:	ug/Kg	Received:	09/14/18
Basis:	as received	Analyzed:	09/19/18

Analyte	Result	RL
Dibromochloromethane	ND	5.2
1,2-Dibromoethane	ND	5.2
Chlorobenzene	ND	5.2
1,1,1,2-Tetrachloroethane	ND	5.2
Ethylbenzene	ND	5.2
m,p-Xylenes	ND	5.2
o-Xylene	ND	5.2
Styrene	ND	5.2
Bromoform	ND	5.2
Isopropylbenzene	ND	5.2
1,1,2,2-Tetrachloroethane	ND	5.2
1,2,3-Trichloropropane	ND	5.2
Propylbenzene	ND	5.2
Bromobenzene	ND	5.2
1,3,5-Trimethylbenzene	ND	5.2
2-Chlorotoluene	ND	5.2
4-Chlorotoluene	ND	5.2
tert-Butylbenzene	ND	5.2
1,2,4-Trimethylbenzene	ND	5.2
sec-Butylbenzene	ND	5.2
para-Isopropyl Toluene	ND	5.2
1,3-Dichlorobenzene	ND	5.2
1,4-Dichlorobenzene	ND	5.2
n-Butylbenzene	ND	5.2
1,2-Dichlorobenzene	ND	5.2
1,2-Dibromo-3-Chloropropane	ND	5.2
1,2,4-Trichlorobenzene	ND	5.2
Hexachlorobutadiene	ND	5.2
Naphthalene	ND	5.2
1,2,3-Trichlorobenzene	ND	5.2

Surrogate	%REC	Limits
Dibromofluoromethane	116	79-127
1,2-Dichloroethane-d4	106	73-139
Toluene-d8	91	80-120
Bromofluorobenzene	115	80-127

ND= Not Detected
RL= Reporting Limit

ENTHALPY ANALYTICAL

Batch QC Report

Purgeable Organics by GC/MS

Lab #:	303241	Location:	5441 Boulevard, Oakland, CA
Client:	EKI Environment & Water, Inc.	Prep:	EPA 5035
Project#:	B70123.01	Analysis:	EPA 8260B
Matrix:	Soil	Batch#:	263630
Units:	ug/Kg	Analyzed:	09/18/18
Diln Fac:	1.000		

Type: BS Lab ID: QC948163

Analyte	Spiked	Result	%REC	Limits
1,1-Dichloroethene	25.00	25.15	101	68-140
Benzene	25.00	23.38	94	74-123
Trichloroethene	25.00	25.23	101	72-125
Toluene	25.00	24.57	98	73-121
Chlorobenzene	25.00	24.48	98	76-123

Surrogate	%REC	Limits
Dibromofluoromethane	91	79-127
1,2-Dichloroethane-d4	97	73-139
Toluene-d8	90	80-120
Bromofluorobenzene	104	80-127

Type: BSD Lab ID: QC948164

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
1,1-Dichloroethene	25.00	25.48	102	68-140	1	25
Benzene	25.00	23.63	95	74-123	1	22
Trichloroethene	25.00	26.24	105	72-125	4	23
Toluene	25.00	23.55	94	73-121	4	22
Chlorobenzene	25.00	25.32	101	76-123	3	20

Surrogate	%REC	Limits
Dibromofluoromethane	90	79-127
1,2-Dichloroethane-d4	93	73-139
Toluene-d8	84	80-120
Bromofluorobenzene	97	80-127

RPD= Relative Percent Difference

ENTHALPY ANALYTICAL

Batch QC Report

Purgeable Organics by GC/MS

Lab #:	303241	Location:	5441 Boulevard, Oakland, CA
Client:	EKI Environment & Water, Inc.	Prep:	EPA 5035
Project#:	B70123.01	Analysis:	EPA 8260B
Type:	BLANK	Diln Fac:	1.000
Lab ID:	QC948165	Batch#:	263630
Matrix:	Soil	Analyzed:	09/18/18
Units:	ug/Kg		

Analyte	Result	RL
Freon 12	ND	10
Chloromethane	ND	10
Vinyl Chloride	ND	10
Bromomethane	ND	10
Chloroethane	ND	10
Trichlorofluoromethane	ND	5.0
Acetone	ND	20
Freon 113	ND	5.0
1,1-Dichloroethene	ND	5.0
Methylene Chloride	ND	20
Carbon Disulfide	ND	5.0
MTBE	ND	5.0
trans-1,2-Dichloroethene	ND	5.0
Vinyl Acetate	ND	50
1,1-Dichloroethane	ND	5.0
2-Butanone	ND	10
cis-1,2-Dichloroethene	ND	5.0
2,2-Dichloropropane	ND	5.0
Chloroform	ND	5.0
Bromochloromethane	ND	5.0
1,1,1-Trichloroethane	ND	5.0
1,1-Dichloropropene	ND	5.0
Carbon Tetrachloride	ND	5.0
1,2-Dichloroethane	ND	5.0
Benzene	ND	5.0
Trichloroethene	ND	5.0
1,2-Dichloropropane	ND	5.0
Bromodichloromethane	ND	5.0
Dibromomethane	ND	5.0
4-Methyl-2-Pentanone	ND	10
cis-1,3-Dichloropropene	ND	5.0
Toluene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
1,1,2-Trichloroethane	ND	5.0
2-Hexanone	ND	10
1,3-Dichloropropane	ND	5.0
Tetrachloroethene	ND	5.0

ND= Not Detected
RL= Reporting Limit

ENTHALPY ANALYTICAL

Batch QC Report

Purgeable Organics by GC/MS

Lab #:	303241	Location:	5441 Boulevard, Oakland, CA
Client:	EKI Environment & Water, Inc.	Prep:	EPA 5035
Project#:	B70123.01	Analysis:	EPA 8260B
Type:	BLANK	Diln Fac:	1.000
Lab ID:	QC948165	Batch#:	263630
Matrix:	Soil	Analyzed:	09/18/18
Units:	ug/Kg		

Analyte	Result	RL
Dibromochloromethane	ND	5.0
1,2-Dibromoethane	ND	5.0
Chlorobenzene	ND	5.0
1,1,1,2-Tetrachloroethane	ND	5.0
Ethylbenzene	ND	5.0
m,p-Xylenes	ND	5.0
o-Xylene	ND	5.0
Styrene	ND	5.0
Bromoform	ND	5.0
Isopropylbenzene	ND	5.0
1,1,2,2-Tetrachloroethane	ND	5.0
1,2,3-Trichloropropane	ND	5.0
Propylbenzene	ND	5.0
Bromobenzene	ND	5.0
1,3,5-Trimethylbenzene	ND	5.0
2-Chlorotoluene	ND	5.0
4-Chlorotoluene	ND	5.0
tert-Butylbenzene	ND	5.0
1,2,4-Trimethylbenzene	ND	5.0
sec-Butylbenzene	ND	5.0
para-Isopropyl Toluene	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
n-Butylbenzene	ND	5.0
1,2-Dichlorobenzene	ND	5.0
1,2-Dibromo-3-Chloropropane	ND	5.0
1,2,4-Trichlorobenzene	ND	5.0
Hexachlorobutadiene	ND	5.0
Naphthalene	ND	5.0
1,2,3-Trichlorobenzene	ND	5.0

Surrogate	%REC	Limits
Dibromofluoromethane	88	79-127
1,2-Dichloroethane-d4	91	73-139
Toluene-d8	88	80-120
Bromofluorobenzene	105	80-127

ND= Not Detected
RL= Reporting Limit

ENTHALPY ANALYTICAL

Batch QC Report

Purgeable Organics by GC/MS

Lab #:	303241	Location:	5441 Boulevard, Oakland, CA
Client:	EKI Environment & Water, Inc.	Prep:	EPA 5030B
Project#:	B70123.01	Analysis:	EPA 8260B
Field ID:	ZZZZZZZZZZ	Batch#:	263651
MSS Lab ID:	303279-001	Sampled:	09/17/18
Matrix:	Soil	Received:	09/17/18
Units:	ug/Kg	Analyzed:	09/19/18
Basis:	as received		

Type: MS Diln Fac: 0.9434
Lab ID: QC948245

Analyte	MSS Result	Spiked	Result	%REC	Limits
1,1-Dichloroethene	<0.8435	47.17	58.94	125	67-137
Benzene	<0.8100	47.17	46.16	98	60-123
Trichloroethene	<0.7497	47.17	69.43	147 *	51-143
Toluene	<0.6385	47.17	44.84	95	53-120
Chlorobenzene	<0.6159	47.17	44.49	94	48-120

Surrogate	%REC	Limits
Dibromofluoromethane	110	79-127
1,2-Dichloroethane-d4	102	73-139
Toluene-d8	97	80-120
Bromofluorobenzene	104	80-127

Type: MSD Diln Fac: 0.9579
Lab ID: QC948246

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
1,1-Dichloroethene	47.89	62.65	131	67-137	5	36
Benzene	47.89	47.89	100	60-123	2	34
Trichloroethene	47.89	73.47	153 *	51-143	4	37
Toluene	47.89	48.73	102	53-120	7	34
Chlorobenzene	47.89	47.37	99	48-120	5	36

Surrogate	%REC	Limits
Dibromofluoromethane	108	79-127
1,2-Dichloroethane-d4	97	73-139
Toluene-d8	99	80-120
Bromofluorobenzene	104	80-127

*= Value outside of QC limits; see narrative
RPD= Relative Percent Difference

ENTHALPY ANALYTICAL

Batch QC Report

Purgeable Organics by GC/MS

Lab #:	303241	Location:	5441 Boulevard, Oakland, CA
Client:	EKI Environment & Water, Inc.	Prep:	EPA 5035
Project#:	B70123.01	Analysis:	EPA 8260B
Type:	BLANK	Diln Fac:	1.000
Lab ID:	QC948247	Batch#:	263651
Matrix:	Soil	Analyzed:	09/19/18
Units:	ug/Kg		

Analyte	Result	RL
Freon 12	ND	10
Chloromethane	ND	10
Vinyl Chloride	ND	10
Bromomethane	ND	10
Chloroethane	ND	10
Trichlorofluoromethane	ND	5.0
Acetone	ND	20
Freon 113	ND	5.0
1,1-Dichloroethene	ND	5.0
Methylene Chloride	ND	20
Carbon Disulfide	ND	5.0
MTBE	ND	5.0
trans-1,2-Dichloroethene	ND	5.0
Vinyl Acetate	ND	50
1,1-Dichloroethane	ND	5.0
2-Butanone	ND	10
cis-1,2-Dichloroethene	ND	5.0
2,2-Dichloropropane	ND	5.0
Chloroform	ND	5.0
Bromochloromethane	ND	5.0
1,1,1-Trichloroethane	ND	5.0
1,1-Dichloropropene	ND	5.0
Carbon Tetrachloride	ND	5.0
1,2-Dichloroethane	ND	5.0
Benzene	ND	5.0
Trichloroethene	ND	5.0
1,2-Dichloropropane	ND	5.0
Bromodichloromethane	ND	5.0
Dibromomethane	ND	5.0
4-Methyl-2-Pentanone	ND	10
cis-1,3-Dichloropropene	ND	5.0
Toluene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
1,1,2-Trichloroethane	ND	5.0
2-Hexanone	ND	10
1,3-Dichloropropane	ND	5.0
Tetrachloroethene	ND	5.0

ND= Not Detected
RL= Reporting Limit

ENTHALPY ANALYTICAL

Batch QC Report

Purgeable Organics by GC/MS

Lab #:	303241	Location:	5441 Boulevard, Oakland, CA
Client:	EKI Environment & Water, Inc.	Prep:	EPA 5035
Project#:	B70123.01	Analysis:	EPA 8260B
Type:	BLANK	Diln Fac:	1.000
Lab ID:	QC948247	Batch#:	263651
Matrix:	Soil	Analyzed:	09/19/18
Units:	ug/Kg		

Analyte	Result	RL
Dibromochloromethane	ND	5.0
1,2-Dibromoethane	ND	5.0
Chlorobenzene	ND	5.0
1,1,1,2-Tetrachloroethane	ND	5.0
Ethylbenzene	ND	5.0
m,p-Xylenes	ND	5.0
o-Xylene	ND	5.0
Styrene	ND	5.0
Bromoform	ND	5.0
Isopropylbenzene	ND	5.0
1,1,2,2-Tetrachloroethane	ND	5.0
1,2,3-Trichloropropane	ND	5.0
Propylbenzene	ND	5.0
Bromobenzene	ND	5.0
1,3,5-Trimethylbenzene	ND	5.0
2-Chlorotoluene	ND	5.0
4-Chlorotoluene	ND	5.0
tert-Butylbenzene	ND	5.0
1,2,4-Trimethylbenzene	ND	5.0
sec-Butylbenzene	ND	5.0
para-Isopropyl Toluene	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
n-Butylbenzene	ND	5.0
1,2-Dichlorobenzene	ND	5.0
1,2-Dibromo-3-Chloropropane	ND	5.0
1,2,4-Trichlorobenzene	ND	5.0
Hexachlorobutadiene	ND	5.0
Naphthalene	ND	5.0
1,2,3-Trichlorobenzene	ND	5.0

Surrogate	%REC	Limits
Dibromofluoromethane	109	79-127
1,2-Dichloroethane-d4	103	73-139
Toluene-d8	98	80-120
Bromofluorobenzene	105	80-127

ND= Not Detected
RL= Reporting Limit

ENTHALPY ANALYTICAL

Batch QC Report

Purgeable Organics by GC/MS

Lab #:	303241	Location:	5441 Boulevard, Oakland, CA
Client:	EKI Environment & Water, Inc.	Prep:	EPA 5035
Project#:	B70123.01	Analysis:	EPA 8260B
Type:	LCS	Diln Fac:	1.000
Lab ID:	QC948365	Batch#:	263651
Matrix:	Soil	Analyzed:	09/19/18
Units:	ug/Kg		

Analyte	Spiked	Result	%REC	Limits
1,1-Dichloroethene	25.00	29.37	117	68-140
Benzene	25.00	25.41	102	74-123
Trichloroethene	25.00	25.10	100	72-125
Toluene	25.00	25.05	100	73-121
Chlorobenzene	25.00	25.54	102	76-123

Surrogate	%REC	Limits
Dibromofluoromethane	108	79-127
1,2-Dichloroethane-d4	99	73-139
Toluene-d8	98	80-120
Bromofluorobenzene	102	80-127



ENTHALPY

ANALYTICAL

Enthalpy Analytical

2323 Fifth Street, Berkeley, CA 94710, Phone (510) 486-0900

Laboratory Job Number 303268
ANALYTICAL REPORT

EKI Environment & Water, Inc.
577 Airport Boulevard, Suite 500
Burlingame, CA 94010-5306

Project : B70123.01
Location : Bridge Point Oakland
Level : II

Sample ID	Lab ID	Sample ID	Lab ID
E01 (BASE)	303268-001	E11 (0-0.5)	303268-017
E02 (BASE)	303268-002	E11 (2.5-3)	303268-018
E03 (BASE)	303268-003	E05 (0-0.5)	303268-019
E08 (BASE)	303268-004	E05 (2.5-3)	303268-020
E11 (BASE)	303268-005	E05 (2.8-3.3)	303268-021
E12A (BASE)	303268-006	E07 (0-0.5)	303268-022
E11 (4.5-5)	303268-007	E07 (2.5-3)	303268-023
E12A (0-0.5)	303268-008	E07 (4.5-5)	303268-024
E12A (2.5-3)	303268-009	E08 (0-0.5)	303268-025
E12A (4.5-5)	303268-010	E08 (2.5-3)	303268-026
E12B (9.5-10)	303268-011	E08 (4.5-5)	303268-027
E06 (4.5-5)	303268-012	E04 (0-0.5)	303268-028
E06 (3-3.5)	303268-013	E04 (2.5-3)	303268-029
E10 (0-0.5)	303268-014	E04 (4.5-5)	303268-030
E10 (2.5-3)	303268-015	E09 CUTTINGS	303268-031
E10 (4.5-5)	303268-016		

This data package has been reviewed for technical correctness and completeness. Release of this data has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature which applies to this PDF file as well as any associated electronic data deliverable files. The results contained in this report meet all requirements of NELAP and pertain only to those samples which were submitted for analysis. This report may be reproduced only in its entirety.

Signature: Tracy Babjar Date: 09/26/2018

Tracy Babjar
Project Manager
tracy.babjar@enthalpy.com
(510) 204-2226 Ext 13107

CA ELAP# 2896, NELAP# 4044-001

ENTHALPY ANALYTICAL

CASE NARRATIVE

Laboratory number:	**303268**
Client:	**EKI Environment & Water, Inc.**
Project:	**B70123.01**
Location:	**Bridge Point Oakland**
Request Date:	**09/17/18**
Samples Received:	**09/14/18**

This data package contains sample and QC results for twenty four soil samples, requested for the above referenced project on 09/17/18. The samples were received cold and intact.

Moisture (ASTM D2216-98/CLP):
No analytical problems were encountered.

PCBs (EPA 8082):
Eurofins (CalScience) in Garden Grove, CA performed the analysis (not NELAP certified). Please see the Eurofins (CalScience) case narrative.

MONTROSE

Tracy Babjar <tbabjar@montrose-env.com>

RE: B70123.01 - Enthalpy (Berkeley) Login Summary (303268)

3 messages

Deepa Gandhi <dgandhi@ekiconsult.com>
To: Tracy Babjar <tracy.babjar@enthalpy.com>

Tracy, please proceed with analysis of this sample for Soxhlet extraction/PCBs (3540C/8082) and moisture. Let me know if yo

E06 (3-3.5) 013 09/14/18 11:48 09/14/18 N

Deepa Gandhi, PE

EKI Environment & Water, Inc.

DL: (650) 292-9090

dgandhi@ekiconsult.com

From: C&T Sample Control <sample.control@ctberk.com>
Sent: Tuesday, September 18, 2018 8:23 AM
To: Deepa Gandhi <dgandhi@ekiconsult.com>; Labs <Labs@ekiconsult.com>; Priscilla De Jesus <pdejesus@ekiconsult.com
Subject: B70123.01 - Enthalpy (Berkeley) Login Summary (303268)

E09 CUTTINGS has been placed on hold and we will dispose of the sample.

ENTHALPY ANALYTICAL

Enthalpy (Berkeley) Login Summary for 303268

Project:	B70123.01	**Report To:**	EKI Environment & Water, Inc.	**Bill To:**	EKI Environment & We
Site:	Bridge Point Oakland		577 Airport Boulevard, Suite 500		577 Airport Boulevard,

MONTROSE

Tracy Babjar <tbabjar@montrose-env.com>

Fwd: EXTRA SAMPLE

303266

Priscilla De Jesus <pdejesus@ekiconsult.com>
To: Mike Dahlquist <mike.dahlquist@enthalpy.com>
Cc: Tracy Babjar <tracy.babjar@enthalpy.com>

Mike/ Tracy,

My apologies, I must've left a ziplock bag in there by accident. It definitely wasn't meant to be taken as a sample. Let me know

Thank you,
Priscilla

On Sep 17, 2018, at 5:54 PM, Mike Dahlquist <mike.dahlquist@enthalpy.com> wrote:

> Please let Tracy know how you'd like to proceed, but I can't imagine you want us to analyze this for anything.
>
> ENTHALPY ANALYTICAL
>
> **Mike Dahlquist**
> Project Manager
> Enthalpy Analytical LLC
> 2323 Fifth St., Berkeley, CA 94710
> D: (510) 204-2225
>
> On Mon, Sep 17, 2018 at 5:54 PM, Mike Dahlquist <mike.dahlquist@enthalpy.com> wrote:
> > Also worth adding that the soil is wet because it's full of ice water from inside the cooler.
> >
> > ENTHALPY ANALYTICAL
> >
> > **Mike Dahlquist**
> > Project Manager
> > Enthalpy Analytical LLC
> > 2323 Fifth St., Berkeley, CA 94710
> > D: (510) 204-2225
> >
> > On Mon, Sep 17, 2018 at 5:47 PM, Mike Dahlquist <mike.dahlquist@enthalpy.com> wrote:
> > > There was wet soil in the bag, it wasn't empty.
> > >
> > > ENTHALPY ANALYTICAL
> > >
> > > **Mike Dahlquist**
> > > Project Manager
> > > Enthalpy Analytical LLC

303268

EKI Environment & Water, Inc.

CONSULTING ENGINEERS AND SCIENTISTS

CHAIN OF CUSTODY RECORD

577 Airport Boulevard, Suite 500, Burlingame CA 94010 PHONE: 650-292-9100 http://www.ekiconsult.com

Project Name: Bridge Point Oakland

Project No.: B70123.01

Location: 5441 International Boulevard, Oakland, CA

Sampled By: Priscilla De Jesus

Reporting:
Electronic Format: EDF Hard Copy Format: PDF
EPA Data Report Level:
Please report results to the following people:
(1) Data Archive: labs@ekiconsult.com
(2) Priscilla De Jesus: pdejesus@ekiconsult.com
(3) Deepa Gandhi: dgandhi@ekiconsult.com
(4)

Laboratory:
Enthalpy Analytical
2323 5th Street
Berkeley, CA, USA 94710
(510) 204-2221

ANALYSES REQUESTED

EKI COC No.: (YYYYMMDD-#)

Field Sample ID	Lab Sample No.	Date	Time	Matrix	Container Count & Type	Method No. / Analyte / Group: 3540C/ 8082 SoxNet Extraction/ PCBs	ASTM D2216 Moisture Content	Extract and HOLD	HOLD	EXPECTED TURNAROUND TIME	Remarks
E01 (base)		09/13/2018	0841	SL	1, 4oz. jar				X		
E02 (base)		09/13/2018	0921	SL	1, 4oz. jar				X		
E03 (base)		09/13/2018	1027	SL	1, 4oz. jar				X		
~~E04 (base)~~		~~09/ /218~~		SL	1, 4oz. jar						NO Sample
~~E05 (base)~~		~~09/ /218~~		SL	1, 4oz. jar						NO sample
~~E06 (base)~~		~~09/ /2018~~		SL	1, 4oz. jar						NO sample
~~E07 (base)~~		~~09/ /2018~~		SL	1, 4oz. jar						NO sample
E08 (base)		09/14/2018	0932	SL	1, 4oz. jar				X		
~~E09 (base)~~		~~09/ /2018~~		SL	1, 4oz. jar						NO sample
~~E10 (base)~~		~~09/ /2018~~		SL	1, 4oz. jar						NO sample
E11 (base)		09/14/2018		SL	1, 4oz. jar				X		
E12A (base)		09/14/2018	1101	SL	1, 4oz. jar				X		
~~E12B (base)~~		~~09/ /2019~~		SL	1, 4oz. jar						NO sample

Special Instructions:
E11 (Base) *1412

Relinquished by: (Signature/Affiliation)	Date & Time	Received by: (Signature/Affiliation or Carrier/Air Bill No.)
EKI	09/14/18 1600	9-14 1600
	9-14 1651	9-14-18 1649

303263

EKI Environment & Water, Inc.

CONSULTING ENGINEERS AND SCIENTISTS

CHAIN OF CUSTODY RECORD

577 Airport Boulevard, Suite 580, Burlingame CA 94010 PHONE: 650-292-9100 http://www.ekiconsult.com

Project Name: Bridge Point Oakland

Project No.: B70123.01

Location: 5441 International Boulevard, Oakland, CA

Sampled by: Priscilla De Jesus

Reporting:
Electronic Format: EDF Hard Copy Format: PDF
EPA Data Report Level:
Please report results to the following people:
(1) Data Archive: labs@ekiconsult.com
(2) Priscilla De Jesus: pdejesus@ekiconsult.com
(3) Deepa Gandhi: dgandhi@ekiconsult.com
(4)

Laboratory:
Enthalpy Analytical
2323 5th Street
Berkeley, CA, USA 94710
(510) 204-2221

ANALYSES REQUESTED

Field Sample ID	Lab Sample No.	Date	Time	Matrix	Container Count & Type	Method No. / Analyte / Group: 3540C/ 8082 Soxhlet Extraction/ PCBs	ASTM D2216 Moisture Content	Extract and HOLD	HOLD	EXPECTED TURNAROUND TIME	Remarks
E11 (4.5-5)		09/14/2018	1423	SL	1, 4oz jar	x	x			5-DAY	
E12A (0-0.5)		09/14/2018	1115	SL	1, 4oz jar	x	x			5-DAY	
E12A (2.5-3)		09/14/2018	1124	SL	1, 4oz jar	x	x			5-DAY	
E12A (4.5-5)		09/14/2018	1131	SL	1, 4oz jar	x	x			5-DAY	
E12B (9.5-10)		09/14/2018	1353	SL	1, 4oz jar	x	x			5-DAY	
~~E06 (3-3.5')~~		~~09/14/2018~~	~~1148~~	~~SL~~	~~1, 4oz jar~~	~~X~~	~~X~~			~~5-DAY~~	~~NO sample~~
E06 (4.5-5')		09/14/2018	1157	SL	1, 4oz jar	X	X			5-DAY	
E06 (3-3.5')		09/14/2018	1148	SL	1, 4oz jar			X			

Special Instructions:
5-DAY TAT SOXHLET METHOD

EKI COC No.: (YYYYMMDD-#)

Revision: _____ (A, B, C, D, etc.)
Date: By:

Relinquished by: (Signature/Affiliation)	Date & Time	Received by: (Signature/Affiliation or Carrier/Air Bill No.)
[signature] EKI	09/14/18 1600	[signature] 9-14 1600
[signature]	9-14 1651	[signature] 9-14-18 1649

303268

EKI Environment & Water, Inc.
CONSULTING ENGINEERS AND SCIENTISTS

CHAIN OF CUSTODY RECORD

577 Airport Boulevard, Suite 500, Burlingame CA 94010 PHONE: 650-292-9100 http://www.ekiconsult.com

Project Name: Bridge Point Oakland

Project No.: B70123.01

Location: 5441 International Boulevard, Oakland, CA

Sampled By: Priscilla De Jesus

Reporting:
Electronic Format: EDF Hard Copy Format: PDF
EPA Data Report Level:
Please report results to the following people:
(1) Data Archive: labs@ekiconsult.com
(2) Priscilla De Jesus: pdejesus@ekiconsult.com
(3) Deepa Gandhi: dgandhi@ekiconsult.com
(4)

Laboratory:
Enthalpy Analytical
2323 5th Street
Berkeley, CA, USA 94710
(510) 204-2221

EKI CDC No.: (YYYYMMDD-#)

Revision: _____ (A, B, C, D, etc.)
Date: By:

ANALYSES REQUESTED

Field Sample ID	Lab Sample No.	Date	Time	Matrix	Container Count & Type	Method No. / Analyte / Group	3540C/ 8082 Soxhlet Extraction/ PCBs	ASTM D2216 Moisture Content	Extract and HOLD	HOLD	EXPECTED TURNAROUND TIME	Remarks
~~E09 (0-0.5)~~		~~09/ /2018~~		~~SL~~							~~5-DAY~~	
~~E09 (2.5-3)~~		~~09/ /2018~~		~~SL~~							~~5-DAY~~	
~~E09 (4.5-5)~~		~~09/ /2018~~		~~SL~~							~~5-DAY~~	
~~E09 (9.5-10)~~		~~09/ /218~~		~~SL~~							~~5-DAY~~	
~~E09 (15-15.5)~~		~~09/ /218~~		~~SL~~							~~5-DAY~~	
~~E09 (20-20.5)~~		~~09/ /2018~~		~~SL~~							~~5-DAY~~	
~~E09 (25-25.5)~~		~~09/ /2018~~		~~SL~~							~~5-DAY~~	
E10 (0-0.5)		09/14/2018	1442	SL	1, 4oz jar		x	x			5-DAY	
E10 (2.5-3)		09/14/2018	1448	SL	1, 4oz. jar		x	x			5-DAY	
E10 (4.5-5)		09/14/2018	1502	SL	1, 4oz. jar		x	x			5-DAY	
E11 (0-0.5)		09/14/2018	1413	SL	1, 4oz. jar		x	x			5-DAY	
E11 (2.5-3)		09/14/2018	1419	SL	1, 4oz. jar		x	x			5-DAY	

Special Instructions:
5-DAY TAT SOXHLET METHOD

Relinquished by: (Signature/Affiliation)	Date & Time	Received by: (Signature/Affiliation or Carrier/Air Bill No.)
[signature] / EKI	09/14/18 1600	[signature] 9-14 1600
[signature]	9-14 1651	[signature] 9-14-18 1649

303268

EKI Environment & Water, Inc.

CONSULTING ENGINEERS AND SCIENTISTS

CHAIN OF CUSTODY RECORD

577 Airport Boulevard, Suite 500, Burlingame CA 94010 PHONE: 650-292-9100 http://www.ekiconsult.com

Project Name: Bridge Point Oakland

Project No.: B70123.01

Location: 5441 International Boulevard, Oakland, CA

Sampled By: Priscilla De Jesus

Reporting:
Electronic Format: EDF Hard Copy Format: PDF
EPA Data Report Level:
Please report results to the following people:
(1) Data Archive: labs@ekiconsult.com
(2) Priscilla De Jesus: pdejesus@ekiconsult.com
(3) Deepa Gandhi: dgandhi@ekiconsult.com
(4)

Laboratory:
Enthalpy Analytical
2323 5th Street
Berkeley, CA, USA 94710
(510) 204-2221

ANALYSES REQUESTED

Field Sample ID	Lab Sample No.	Date	Time	Matrix	Container Count & Type	Method No. / Analyte / Group: 3540C/ 8082 Soxhlet Extraction/ PCBs	ASTM D2216 Moisture Content	Extract and HOLD	HOLD	EDF EDOC No.: (YYYYMMDD-#) EXPECTED TURNAROUND TIME	Remarks
E05 (0-0.5)		09/13/2018	1621	SL	1, 4oz. jar	x	x			5-DAY	
E05 (2.5-3)		09/13/2018	1634	SL	1, 4oz. jar	x	x			5-DAY	
E05 (~~4.5-5~~ 2833)		09/13/2018	1650	SL	1, 4oz. jar	x	x			5-DAY	
~~E06 (0-0.5)~~		~~09/ /218~~		SL	1, 4oz. jar	x	x			5-DAY	
~~E06 (2.5-3)~~		~~09/ /2018~~		SL	1, 4oz. jar	x	x			5-DAY	No Sample
~~E06 (4.5-5)~~		~~09/ /2018~~		SL	1, 4oz. jar	x	x			5-DAY	No Sample
E07 (0-0.5)		09/14/2018	0851	SL	1, 4oz. jar	x	x			5-DAY	No Sample
E07 (2.5-3)		09/14/2018	0858	SL	1, 4oz. jar	x	x			5-DAY	
E07 (4.5-5)		09/14/2018	0906	SL	1, 4oz. jar	x	x			5-DAY	
E08 (0-0.5)		09/14/2018	0943	SL	1, 4oz. jar	x	x			5-DAY	
E08 (2.5-3)		09/14/2018	0957	SL	1, 4oz. jar	x	x			5-DAY	
E08 (4.5-5)		09/14/2018	1033	SL	1, 4oz. jar	x	x			5-DAY	

Special Instructions:
5-DAY TAT SOXHLET METHOD

Relinquished by: (Signature/Affiliation)	Date & Time	Received by: (Signature/Affiliation or Carrier/Air Bill No.)
PDJ Deepa / EKI	09/14/2018 1600	9.14 1600
Relinquished by: (Signature/Affiliation)	Date & Time	Received by: (Signature/Affiliation)
	9-14 1651	9-14-18 1649
Relinquished by: (Signature/Affiliation)	Date & Time	Received by: (Signature/Affiliation)

303268

EKI Environment & Water, Inc.

CONSULTING ENGINEERS AND SCIENTISTS

CHAIN OF CUSTODY RECORD

577 Airport Boulevard, Suite 500, Burlingame CA 94010 PHONE: 650-292-9100 http://www.ekiconsult.com

Project Name: Bridge Point Oakland

Project No.: B70123.01

Location: 5441 International Boulevard, Oakland, CA

Sampled By: Priscilla De Jesus

Reporting:
Electronic Format: EDF Hard Copy Format: PDF
EPA Data Report Level:
Please report results to the following people:
(1) Data Archive: labs@ekiconsult.com
(2) Priscilla De Jesus: pdejesus@ekiconsult.com
(3) Deepa Gandhi: dgandhi@ekiconsult.com
(4)

Laboratory:
Enthalpy Analytical
2323 5th Street
Berkeley, CA, USA 94710
(510) 204-2221

ANALYSES REQUESTED

Field Sample ID	Lab Sample No.	Date	Time	Matrix	Container Count & Type	Method No. / Analyte / Group: 3540C/ 8082 / Soxhlet Extraction/ PCBs	ASTM D2216 / Moisture Content	Extract and HOLD	HOLD	EKI COC No.: (YYYYMMDD-#) EXPECTED TURNAROUND TIME	Remarks
~~E01 (0-0.5)~~		~~09/ /2018~~		~~SL~~		~~x~~	~~x~~			~~5-DAY~~	~~No Sample~~
~~E01 (2.5-3)~~		~~09/ /2018~~		~~SL~~		~~x~~	~~x~~			~~5-DAY~~	~~No Sample~~
~~E01 (4.5-5)~~		~~09/ /2018~~		~~SL~~		~~x~~	~~x~~			~~5-DAY~~	~~No Sample~~
~~E02 (0-0.5)~~		~~09/ /218~~		~~SL~~		~~x~~	~~x~~			~~5-DAY~~	~~No Sample~~
~~E02 (2.5-3)~~		~~09/ /2018~~		~~SL~~		~~x~~	~~x~~			~~5-DAY~~	~~No Sample~~
~~E02 (4.5-5)~~		~~09/ /2018~~		~~SL~~		~~x~~	~~x~~			~~5-DAY~~	~~No Sample~~
~~E03 (0-0.5)~~		~~09/ /2018~~		~~SL~~		~~x~~	~~x~~			~~5-DAY~~	~~No Sample~~
~~E03 (2.5-3)~~		~~09/ /2018~~		~~SL~~		~~x~~	~~x~~			~~5-DAY~~	~~No Sample~~
~~E03 (4.5-5)~~		~~09/ /2018~~		~~SL~~		~~x~~	~~x~~			~~5-DAY~~	~~No Sample~~
E04 (0-0.5)		09/14/2018	0750	SL	1, 402 jar	x	x			5-DAY	
E04 (2.5-3)		09/14/2018	0805	SL	1, 402 jar	x	x			5-DAY	
E04 (4.5-5)		09/14/2018	0820	SL	1, 402 jar	x	x			5-DAY	

EKI COC No.: (YYYYMMDD-#) Revision: _____ (A, B, C, D, etc.) Date: By:

Special Instructions:
5-DAY TAT SOXHLET METHOD

Relinquished by: (Signature/Affiliation)	Date & Time	Received by: (Signature/Affiliation or Carrier/Air Bill No.)
[signature] EKI	09/14/2018 1600	[signature] 9-14 1600
[signature]	9.14 1651	[signature] 9-14-18 1649

SAMPLE RECEIPT CHECKLIST

Section 1: Login # 303268 Client: EKI

Date Received: 9-14-18 Project:

ENTHALPY

Section 2: Samples received in a cooler? ☒ Yes, how many? 2 ☐ No (skip Section 3 below)

If no cooler Sample Temp (°C): _____ using IR Gun # ☐ A, or ☐ B

☐ Samples received on ice directly from the field. Cooling process had begun

If in cooler: Date Opened 9-14-18 By (print) Tien (sign) Tien

Shipping info (if applicable) _____

Are custody seals present? ☒ No, or ☐ Yes. If yes, where? ☐ on cooler, ☐ on samples, ☐ on package

☐ Date: _____ How many _____ ☐ Signature, ☐ Initials, ☐ None

Were custody seals intact upon arrival? ☐ Yes ☐ No ☒ N/A

Section 3: *Important*: Notify PM if temperature exceeds 6°C or arrive frozen.

Packing in cooler: (If other, describe) _____

☒ Bubble Wrap, ☐ Foam blocks, ☒ Bags, ☐ None, ☐ Cloth material, ☐ Cardboard, ☐ Styrofoam, ☐ Paper towels

☐ Samples received on ice directly from the field. Cooling process had begun

Type of ice used: ☒ Wet, ☐ Blue/Gel, ☐ None Temperature blank(s) included? ☐ Yes, ☒ No

Temperature measured using ☐ Thermometer ID: _____, or IR Gun # ☐ A ☒ B

Cooler Temp (°C): #1: 2.1, #2: 3.6, #3: _____, #4: _____, #5: _____, #6: _____, #7: _____

Section 4:	YES	NO	N/A
Were custody papers dry, filled out properly, and the project identifiable	✓		
Were Method 5035 sampling containers present?		✓	
If YES, what time were they transferred to freezer?			
Did all bottles arrive unbroken/unopened?	✓		
* Are there any missing / extra samples?	✓		
Are samples in the appropriate containers for indicated tests?	✓		
Are sample labels present, in good condition and complete?	✓		
Does the container count match the COC?	✓		
Do the sample labels agree with custody papers?	✓		
Was sufficient amount of sample sent for tests requested?	✓		
Did you change the hold time in LIMS for unpreserved VOAs?			✓
Did you change the hold time in LIMS for preserved terracores?			✓
Are bubbles > 6mm absent in VOA samples?			✓
Was the client contacted concerning this sample delivery?			✓
If YES, who was called? By Date:			

Section 5:	YES	NO	N/A
Are the samples appropriately preserved? (If N/A, skip the rest of section 5)			✓
Did you check preservatives for all bottles for each sample?			
Did you document your preservative check?			

pH strip lot# _____, pH strip lot# _____, pH strip lot# _____

Preservative added:

☐ H2SO4 lot# _____ added to samples _____ on/at _____

☐ HCL lot# _____ added to samples _____ on/at _____

☐ HNO3 lot# _____ added to samples _____ on/at _____

☐ NaOH lot# _____ added to samples _____ on/at _____

* **Section 6:**

Explanations/Comments: Received EDD client's sample in plastic bag. All EDD samples are crossed off on COC. Created this sample. 303268-031A and put on hold.

Date Logged In 9/17/18 By (print) DDC (sign) DDC

Date Labeled 9/17/18 By (print) AC (sign) AC

ENTHALPY ANALYTICAL

Detections Summary for 303268

Results for any subcontracted analyses are not included in this summary.

Client : EKI Environment & Water, Inc.
Project : B70123.01
Location : Bridge Point Oakland

Client Sample ID : E11 (4.5-5) Laboratory Sample ID : 303268-007

No Detections

Client Sample ID : E12A (0-0.5) Laboratory Sample ID : 303268-008

No Detections

Client Sample ID : E12A (2.5-3) Laboratory Sample ID : 303268-009

No Detections

Client Sample ID : E12A (4.5-5) Laboratory Sample ID : 303268-010

No Detections

Client Sample ID : E12B (9.5-10) Laboratory Sample ID : 303268-011

No Detections

Client Sample ID : E06 (4.5-5) Laboratory Sample ID : 303268-012

No Detections

Client Sample ID : E06 (3-3.5) Laboratory Sample ID : 303268-013

No Detections

Client Sample ID : E10 (0-0.5) Laboratory Sample ID : 303268-014

No Detections

Client Sample ID : E10 (2.5-3) Laboratory Sample ID : 303268-015

No Detections

Client Sample ID : E10 (4.5-5) Laboratory Sample ID : 303268-016

No Detections

Client Sample ID : E11 (0-0.5) Laboratory Sample ID : 303268-017

No Detections

Client Sample ID : E11 (2.5-3) Laboratory Sample ID : 303268-018

No Detections

Client Sample ID : E05 (0-0.5) Laboratory Sample ID : 303268-019

No Detections

Client Sample ID : E05 (2.5-3) Laboratory Sample ID : 303268-020

No Detections

Client Sample ID : E05 (2.8-3.3) Laboratory Sample ID : 303268-021

No Detections

Client Sample ID : E07 (0-0.5) Laboratory Sample ID : 303268-022

No Detections

Client Sample ID : E07 (2.5-3) Laboratory Sample ID : 303268-023

No Detections

Client Sample ID : E07 (4.5-5) Laboratory Sample ID : 303268-024

No Detections

Client Sample ID : E08 (0-0.5) Laboratory Sample ID : 303268-025

No Detections

Client Sample ID : E08 (2.5-3) Laboratory Sample ID : 303268-026

No Detections

Client Sample ID : E08 (4.5-5) Laboratory Sample ID : 303268-027

No Detections

Client Sample ID : E04 (0-0.5) Laboratory Sample ID : 303268-028

No Detections

Client Sample ID : E04 (2.5-3) Laboratory Sample ID : 303268-029

No Detections

Client Sample ID : E04 (4.5-5) Laboratory Sample ID : 303268-030

No Detections

Laboratory Job Number 303268

Subcontracted Products

Eurofins (CalScience)

eurofins | Calscience

Supplemental Report 1

The original report has been revised/corrected.

WORK ORDER NUMBER: 18-09-1449

The difference is service



AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For

Client: Enthalpy Analytical

Client Project Name: 303268

Attention: Tracy Babjar
2323 Fifth Street
Berkeley, CA 94710-2407

Vikas Patel

Approved for release on 09/27/2018 by:
Vikas Patel
Project Manager

ResultLink

Email your PM

Eurofins Calscience (Calscience) certifies that the test results provided in this report meet all NELAC Institute requirements for parameters for which accreditation is required or available. Any exceptions to NELAC Institute requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is attached to this report. The results in this report are limited to the sample(s) tested and any reproduction thereof must be made in its entirety. The client or recipient of this report is specifically prohibited from making material changes to said report and, to the extent that such changes are made, Calscience is not responsible, legally or otherwise. The client or recipient agrees to indemnify Calscience for any defense to any litigation which may arise.

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Work Order Number: 18-09-1449

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Work Order Narrative

Condition Upon Receipt:

Samples were received under Chain-of-Custody (COC) on 09/20/18. They were assigned to Work Order 18-09-1449.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

Holding Times:

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

Quality Control:

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

Subcontractor Information:

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

Additional Comments:

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.

DoD Projects:

The test results contained in this report are accredited under the laboratory's ISO/IEC 17025:2005 and DoD-ELAP accreditation issued by the ANSI-ASQ National Accreditation Board. Refer to certificate and scope of accreditation ADE-1864.

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Sample Summary

Client:	Enthalpy Analytical	Work Order:	18-09-1449
	2323 Fifth Street	Project Name:	303268
	Berkeley, CA 94710-2407	PO Number:	
		Date/Time Received:	09/20/18 10:00
		Number of Containers:	24
Attn:	Tracy Babjar		

Sample Identification	Lab Number	Collection Date and Time	Number of Containers	Matrix
E11 (4.5-5)	18-09-1449-1	09/14/18 14:23	1	Solid
E12A (0-0.5)	18-09-1449-2	09/14/18 11:15	1	Solid
E12A (2.5-3)	18-09-1449-3	09/14/18 11:24	1	Solid
E12A (4.5-5)	18-09-1449-4	09/14/18 11:31	1	Solid
E12B (9.5-10)	18-09-1449-5	09/14/18 13:53	1	Solid
E06 (4.5-5)	18-09-1449-6	09/14/18 11:57	1	Solid
E06 (3-3.5)	18-09-1449-7	09/14/18 11:48	1	Solid
E10 (0-0.5)	18-09-1449-8	09/14/18 14:42	1	Solid
E10 (2.5-3)	18-09-1449-9	09/14/18 14:48	1	Solid
E10 (4.5-5)	18-09-1449-10	09/14/18 15:02	1	Solid
E11 (0-0.5)	18-09-1449-11	09/14/18 14:13	1	Solid
E11 (2.5-3)	18-09-1449-12	09/14/18 14:19	1	Solid
E05 (0-0.5)	18-09-1449-13	09/13/18 16:21	1	Solid
E05 (2.5-3)	18-09-1449-14	09/13/18 16:34	1	Solid
E05 (2.8-3.3)	18-09-1449-15	09/13/18 16:50	1	Solid
E07 (0-0.5)	18-09-1449-16	09/14/18 08:51	1	Solid
E07 (2.5-3)	18-09-1449-17	09/14/18 08:58	1	Solid
E07 (4.5-5)	18-09-1449-18	09/14/18 09:06	1	Solid
E08 (0-0.5)	18-09-1449-19	09/14/18 09:43	1	Solid
E08 (2.5-3)	18-09-1449-20	09/14/18 10:26	1	Solid
E08 (4.5-5)	18-09-1449-21	09/14/18 10:33	1	Solid
E04 (0-0.5)	18-09-1449-22	09/14/18 07:50	1	Solid
E04 (2.5-3)	18-09-1449-23	09/14/18 08:05	1	Solid
E04 (4.5-5)	18-09-1449-24	09/14/18 08:20	1	Solid

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Detections Summary

Client:	Enthalpy Analytical	Work Order:	18-09-1449
	2323 Fifth Street	Project Name:	303268
	Berkeley, CA 94710-2407	Received:	09/20/18
Attn:	Tracy Babjar		

Client SampleID

Analyte	Result	Qualifiers	RL	Units	Method	Extraction
E11 (4.5-5) (18-09-1449-1)						
Moisture	69		0.10	%	ASTM D-2216 (M)	N/A
E12A (0-0.5) (18-09-1449-2)						
Moisture	64		0.10	%	ASTM D-2216 (M)	N/A
Aroclor-1260	12000		680	ug/kg	EPA 8082	EPA 3540C
E12A (2.5-3) (18-09-1449-3)						
Moisture	70		0.10	%	ASTM D-2216 (M)	N/A
Aroclor-1260	1800		170	ug/kg	EPA 8082	EPA 3540C
E12A (4.5-5) (18-09-1449-4)						
Moisture	67		0.10	%	ASTM D-2216 (M)	N/A
Aroclor-1260	1200		150	ug/kg	EPA 8082	EPA 3540C
E12B (9.5-10) (18-09-1449-5)						
Moisture	68		0.10	%	ASTM D-2216 (M)	N/A
Aroclor-1260	370		150	ug/kg	EPA 8082	EPA 3540C
E06 (4.5-5) (18-09-1449-6)						
Moisture	69		0.10	%	ASTM D-2216 (M)	N/A
E06 (3-3.5) (18-09-1449-7)						
Moisture	68		0.10	%	ASTM D-2216 (M)	N/A
E10 (0-0.5) (18-09-1449-8)						
Moisture	64		0.10	%	ASTM D-2216 (M)	N/A
E10 (2.5-3) (18-09-1449-9)						
Moisture	73		0.10	%	ASTM D-2216 (M)	N/A
E10 (4.5-5) (18-09-1449-10)						
Moisture	71		0.10	%	ASTM D-2216 (M)	N/A
E11 (0-0.5) (18-09-1449-11)						
Moisture	74		0.10	%	ASTM D-2216 (M)	N/A
Aroclor-1260	5500		950	ug/kg	EPA 8082	EPA 3540C
E11 (2.5-3) (18-09-1449-12)						
Moisture	75		0.10	%	ASTM D-2216 (M)	N/A
E05 (0-0.5) (18-09-1449-13)						
Moisture	66		0.10	%	ASTM D-2216 (M)	N/A
E05 (2.5-3) (18-09-1449-14)						
Moisture	67		0.10	%	ASTM D-2216 (M)	N/A
Aroclor-1260	5300		740	ug/kg	EPA 8082	EPA 3540C
E05 (2.8-3.3) (18-09-1449-15)						
Moisture	69		0.10	%	ASTM D-2216 (M)	N/A
Aroclor-1260	3700		780	ug/kg	EPA 8082	EPA 3540C

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* MDL is shown

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Detections Summary

Client:	Enthalpy Analytical	Work Order:	18-09-1449
	2323 Fifth Street	Project Name:	303268
	Berkeley, CA 94710-2407	Received:	09/20/18
Attn:	Tracy Babjar		

Client SampleID

Analyte	Result	Qualifiers	RL	Units	Method	Extraction
E07 (0-0.5) (18-09-1449-16)						
Moisture	74		0.10	%	ASTM D-2216 (M)	N/A
Aroclor-1260	340		190	ug/kg	EPA 8082	EPA 3540C
E07 (2.5-3) (18-09-1449-17)						
Moisture	70		0.10	%	ASTM D-2216 (M)	N/A
E07 (4.5-5) (18-09-1449-18)						
Moisture	68		0.10	%	ASTM D-2216 (M)	N/A
E08 (0-0.5) (18-09-1449-19)						
Moisture	72		0.10	%	ASTM D-2216 (M)	N/A
Aroclor-1260	8100		880	ug/kg	EPA 8082	EPA 3540C
E08 (2.5-3) (18-09-1449-20)						
Moisture	74		0.10	%	ASTM D-2216 (M)	N/A
E08 (4.5-5) (18-09-1449-21)						
Moisture	69		0.10	%	ASTM D-2216 (M)	N/A
E04 (0-0.5) (18-09-1449-22)						
Moisture	74		0.10	%	ASTM D-2216 (M)	N/A
Aroclor-1260	1400		190	ug/kg	EPA 8082	EPA 3540C
E04 (2.5-3) (18-09-1449-23)						
Moisture	72		0.10	%	ASTM D-2216 (M)	N/A
E04 (4.5-5) (18-09-1449-24)						
Moisture	76		0.10	%	ASTM D-2216 (M)	N/A
Aroclor-1260	1400		200	ug/kg	EPA 8082	EPA 3540C

Subcontracted analyses, if any, are not included in this summary.

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Analytical Report

Enthalpy Analytical
2323 Fifth Street
Berkeley, CA 94710-2407

Project: 303268

Date Received: 09/20/18
Work Order: 18-09-1449
Preparation: N/A
Method: ASTM D-2216 (M)
Units: %

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E11 (4.5-5)	**18-09-1449-1-A**	**09/14/18 14:23**	**Solid**	**N/A**	**09/21/18**	**09/21/18 14:30**	**I0921MOIB4**

Parameter	Result	RL	DF	Qualifiers
Moisture	69	0.10	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E12A (0-0.5)	**18-09-1449-2-A**	**09/14/18 11:15**	**Solid**	**N/A**	**09/21/18**	**09/21/18 14:30**	**I0921MOIB4**

Parameter	Result	RL	DF	Qualifiers
Moisture	64	0.10	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E12A (2.5-3)	**18-09-1449-3-A**	**09/14/18 11:24**	**Solid**	**N/A**	**09/21/18**	**09/21/18 14:30**	**I0921MOIB4**

Parameter	Result	RL	DF	Qualifiers
Moisture	70	0.10	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E12A (4.5-5)	**18-09-1449-4-A**	**09/14/18 11:31**	**Solid**	**N/A**	**09/21/18**	**09/21/18 14:30**	**I0921MOIB4**

Parameter	Result	RL	DF	Qualifiers
Moisture	67	0.10	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E12B (9.5-10)	**18-09-1449-5-A**	**09/14/18 13:53**	**Solid**	**N/A**	**09/21/18**	**09/21/18 14:30**	**I0921MOIB4**

Parameter	Result	RL	DF	Qualifiers
Moisture	68	0.10	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E06 (4.5-5)	**18-09-1449-6-A**	**09/14/18 11:57**	**Solid**	**N/A**	**09/21/18**	**09/21/18 14:30**	**I0921MOIB4**

Parameter	Result	RL	DF	Qualifiers
Moisture	69	0.10	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E06 (3-3.5)	**18-09-1449-7-A**	**09/14/18 11:48**	**Solid**	**N/A**	**09/21/18**	**09/21/18 14:30**	**I0921MOIB4**

Parameter	Result	RL	DF	Qualifiers
Moisture	68	0.10	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E10 (0-0.5)	**18-09-1449-8-A**	**09/14/18 14:42**	**Solid**	**N/A**	**09/21/18**	**09/21/18 14:30**	**I0921MOIB4**

Parameter	Result	RL	DF	Qualifiers
Moisture	64	0.10	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

Enthalpy Analytical
2323 Fifth Street
Berkeley, CA 94710-2407

Project: 303268

Date Received: 09/20/18
Work Order: 18-09-1449
Preparation: N/A
Method: ASTM D-2216 (M)
Units: %

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E10 (2.5-3)	**18-09-1449-9-A**	**09/14/18 14:48**	**Solid**	**N/A**	**09/21/18**	**09/21/18 14:30**	**I0921MOIB4**

Parameter	Result	RL	DF	Qualifiers
Moisture	73	0.10	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E10 (4.5-5)	**18-09-1449-10-A**	**09/14/18 15:02**	**Solid**	**N/A**	**09/21/18**	**09/21/18 14:30**	**I0921MOIB4**

Parameter	Result	RL	DF	Qualifiers
Moisture	71	0.10	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E11 (0-0.5)	**18-09-1449-11-A**	**09/14/18 14:13**	**Solid**	**N/A**	**09/21/18**	**09/21/18 14:30**	**I0921MOIB4**

Parameter	Result	RL	DF	Qualifiers
Moisture	74	0.10	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E11 (2.5-3)	**18-09-1449-12-A**	**09/14/18 14:19**	**Solid**	**N/A**	**09/21/18**	**09/21/18 14:30**	**I0921MOIB4**

Parameter	Result	RL	DF	Qualifiers
Moisture	75	0.10	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E05 (0-0.5)	**18-09-1449-13-A**	**09/13/18 16:21**	**Solid**	**N/A**	**09/21/18**	**09/21/18 14:30**	**I0921MOIB4**

Parameter	Result	RL	DF	Qualifiers
Moisture	66	0.10	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E05 (2.5-3)	**18-09-1449-14-A**	**09/13/18 16:34**	**Solid**	**N/A**	**09/21/18**	**09/21/18 14:30**	**I0921MOIB4**

Parameter	Result	RL	DF	Qualifiers
Moisture	67	0.10	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E05 (2.8-3.3)	**18-09-1449-15-A**	**09/13/18 16:50**	**Solid**	**N/A**	**09/21/18**	**09/21/18 14:30**	**I0921MOIB4**

Parameter	Result	RL	DF	Qualifiers
Moisture	69	0.10	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E07 (0-0.5)	**18-09-1449-16-A**	**09/14/18 08:51**	**Solid**	**N/A**	**09/21/18**	**09/21/18 14:30**	**I0921MOIB4**

Parameter	Result	RL	DF	Qualifiers
Moisture	74	0.10	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

Enthalpy Analytical		Date Received:	09/20/18
2323 Fifth Street		Work Order:	18-09-1449
Berkeley, CA 94710-2407		Preparation:	N/A
		Method:	ASTM D-2216 (M)
		Units:	%
Project: 303268		Page 3 of 4	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E07 (2.5-3)	**18-09-1449-17-A**	**09/14/18 08:58**	**Solid**	**N/A**	**09/21/18**	**09/21/18 14:30**	**I0921MOIB4**

Parameter	Result	RL	DF	Qualifiers
Moisture	70	0.10	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E07 (4.5-5)	**18-09-1449-18-A**	**09/14/18 09:06**	**Solid**	**N/A**	**09/21/18**	**09/21/18 14:30**	**I0921MOIB4**

Parameter	Result	RL	DF	Qualifiers
Moisture	68	0.10	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E08 (0-0.5)	**18-09-1449-19-A**	**09/14/18 09:43**	**Solid**	**N/A**	**09/21/18**	**09/21/18 14:30**	**I0921MOIB4**

Parameter	Result	RL	DF	Qualifiers
Moisture	72	0.10	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E08 (2.5-3)	**18-09-1449-20-A**	**09/14/18 10:26**	**Solid**	**N/A**	**09/21/18**	**09/21/18 14:30**	**I0921MOIB4**

Parameter	Result	RL	DF	Qualifiers
Moisture	74	0.10	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E08 (4.5-5)	**18-09-1449-21-A**	**09/14/18 10:33**	**Solid**	**N/A**	**09/21/18**	**09/21/18 14:30**	**I0921MOIB5**

Parameter	Result	RL	DF	Qualifiers
Moisture	69	0.10	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E04 (0-0.5)	**18-09-1449-22-A**	**09/14/18 07:50**	**Solid**	**N/A**	**09/21/18**	**09/21/18 14:30**	**I0921MOIB5**

Parameter	Result	RL	DF	Qualifiers
Moisture	74	0.10	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E04 (2.5-3)	**18-09-1449-23-A**	**09/14/18 08:05**	**Solid**	**N/A**	**09/21/18**	**09/21/18 14:30**	**I0921MOIB5**

Parameter	Result	RL	DF	Qualifiers
Moisture	72	0.10	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E04 (4.5-5)	**18-09-1449-24-A**	**09/14/18 08:20**	**Solid**	**N/A**	**09/21/18**	**09/21/18 14:30**	**I0921MOIB5**

Parameter	Result	RL	DF	Qualifiers
Moisture	76	0.10	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

Enthalpy Analytical		Date Received:	09/20/18
2323 Fifth Street		Work Order:	18-09-1449
Berkeley, CA 94710-2407		Preparation:	N/A
		Method:	ASTM D-2216 (M)
		Units:	%
Project: 303268			Page 4 of 4

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-05-014-8119**	**N/A**	**Solid**	**N/A**	**09/21/18**	**09/21/18 14:30**	**I0921MOIB4**

Parameter	Result	RL	DF	Qualifiers
Moisture	ND	0.10	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-05-014-8117**	**N/A**	**Solid**	**N/A**	**09/21/18**	**09/21/18 14:30**	**I0921MOIB5**

Parameter	Result	RL	DF	Qualifiers
Moisture	ND	0.10	1.00	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

Enthalpy Analytical		Date Received:	09/20/18
2323 Fifth Street		Work Order:	18-09-1449
Berkeley, CA 94710-2407		Preparation:	EPA 3540C
		Method:	EPA 8082
		Units:	ug/kg
Project: 303268			Page 1 of 15

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E11 (4.5-5)	**18-09-1449-1-AA**	**09/14/18 14:23**	**Solid**	**GC 58**	**09/21/18**	**09/24/18 20:48**	**180921L11**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	160	1.00	
Aroclor-1221	ND	160	1.00	
Aroclor-1232	ND	160	1.00	
Aroclor-1242	ND	160	1.00	
Aroclor-1248	ND	160	1.00	
Aroclor-1254	ND	160	1.00	
Aroclor-1260	ND	160	1.00	
Aroclor-1262	ND	160	1.00	
Aroclor-1268	ND	160	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	62	24-168	
2,4,5,6-Tetrachloro-m-Xylene	63	25-145	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E12A (0-0.5)	**18-09-1449-2-AA**	**09/14/18 11:15**	**Solid**	**GC 58**	**09/21/18**	**09/24/18 21:06**	**180921L11**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	140	1.00	
Aroclor-1221	ND	140	1.00	
Aroclor-1232	ND	140	1.00	
Aroclor-1242	ND	140	1.00	
Aroclor-1248	ND	140	1.00	
Aroclor-1254	ND	140	1.00	
Aroclor-1262	ND	140	1.00	
Aroclor-1268	ND	140	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	99	24-168	
2,4,5,6-Tetrachloro-m-Xylene	40	25-145	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

Enthalpy Analytical
2323 Fifth Street
Berkeley, CA 94710-2407

Project: 303268

Date Received: 09/20/18
Work Order: 18-09-1449
Preparation: EPA 3540C
Method: EPA 8082
Units: ug/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E12A (0-0.5)	**18-09-1449-2-AA**	**09/14/18 11:15**	**Solid**	**GC 58**	**09/21/18**	**09/25/18 15:40**	**180921L11**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Aroclor-1260	12000	680	5.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	104	24-168	
2,4,5,6-Tetrachloro-m-Xylene	140	25-145	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E12A (2.5-3)	**18-09-1449-3-AA**	**09/14/18 11:24**	**Solid**	**GC 58**	**09/21/18**	**09/24/18 21:24**	**180921L11**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	170	1.00	
Aroclor-1221	ND	170	1.00	
Aroclor-1232	ND	170	1.00	
Aroclor-1242	ND	170	1.00	
Aroclor-1248	ND	170	1.00	
Aroclor-1254	ND	170	1.00	
Aroclor-1260	1800	170	1.00	
Aroclor-1262	ND	170	1.00	
Aroclor-1268	ND	170	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	96	24-168	
2,4,5,6-Tetrachloro-m-Xylene	96	25-145	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

Enthalpy Analytical		Date Received:	09/20/18
2323 Fifth Street		Work Order:	18-09-1449
Berkeley, CA 94710-2407		Preparation:	EPA 3540C
		Method:	EPA 8082
		Units:	ug/kg
Project: 303268			Page 3 of 15

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E12A (4.5-5)	**18-09-1449-4-AA**	**09/14/18 11:31**	**Solid**	**GC 58**	**09/21/18**	**09/24/18 21:42**	**180921L11**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	150	1.00	
Aroclor-1221	ND	150	1.00	
Aroclor-1232	ND	150	1.00	
Aroclor-1242	ND	150	1.00	
Aroclor-1248	ND	150	1.00	
Aroclor-1254	ND	150	1.00	
Aroclor-1260	1200	150	1.00	
Aroclor-1262	ND	150	1.00	
Aroclor-1268	ND	150	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	84	24-168	
2,4,5,6-Tetrachloro-m-Xylene	84	25-145	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E12B (9.5-10)	**18-09-1449-5-AA**	**09/14/18 13:53**	**Solid**	**GC 58**	**09/21/18**	**09/24/18 22:00**	**180921L11**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	150	1.00	
Aroclor-1221	ND	150	1.00	
Aroclor-1232	ND	150	1.00	
Aroclor-1242	ND	150	1.00	
Aroclor-1248	ND	150	1.00	
Aroclor-1254	ND	150	1.00	
Aroclor-1260	370	150	1.00	
Aroclor-1262	ND	150	1.00	
Aroclor-1268	ND	150	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	89	24-168	
2,4,5,6-Tetrachloro-m-Xylene	91	25-145	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

Enthalpy Analytical
2323 Fifth Street
Berkeley, CA 94710-2407

Project: 303268

Date Received: 09/20/18
Work Order: 18-09-1449
Preparation: EPA 3540C
Method: EPA 8082
Units: ug/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E06 (4.5-5)	**18-09-1449-6-AA**	**09/14/18 11:57**	**Solid**	**GC 58**	**09/21/18**	**09/24/18 22:18**	**180921L11**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	160	1.00	
Aroclor-1221	ND	160	1.00	
Aroclor-1232	ND	160	1.00	
Aroclor-1242	ND	160	1.00	
Aroclor-1248	ND	160	1.00	
Aroclor-1254	ND	160	1.00	
Aroclor-1260	ND	160	1.00	
Aroclor-1262	ND	160	1.00	
Aroclor-1268	ND	160	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	96	24-168	
2,4,5,6-Tetrachloro-m-Xylene	103	25-145	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E06 (3-3.5)	**18-09-1449-7-AA**	**09/14/18 11:48**	**Solid**	**GC 58**	**09/21/18**	**09/24/18 22:36**	**180921L11**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	160	1.00	
Aroclor-1221	ND	160	1.00	
Aroclor-1232	ND	160	1.00	
Aroclor-1242	ND	160	1.00	
Aroclor-1248	ND	160	1.00	
Aroclor-1254	ND	160	1.00	
Aroclor-1260	ND	160	1.00	
Aroclor-1262	ND	160	1.00	
Aroclor-1268	ND	160	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	92	24-168	
2,4,5,6-Tetrachloro-m-Xylene	103	25-145	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

Enthalpy Analytical
2323 Fifth Street
Berkeley, CA 94710-2407

Project: 303268

Date Received: 09/20/18
Work Order: 18-09-1449
Preparation: EPA 3540C
Method: EPA 8082
Units: ug/kg

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E10 (0-0.5)	**18-09-1449-8-AA**	**09/14/18 14:42**	**Solid**	**GC 58**	**09/21/18**	**09/24/18 23:12**	**180921L11**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	140	1.00	
Aroclor-1221	ND	140	1.00	
Aroclor-1232	ND	140	1.00	
Aroclor-1242	ND	140	1.00	
Aroclor-1248	ND	140	1.00	
Aroclor-1254	ND	140	1.00	
Aroclor-1260	ND	140	1.00	
Aroclor-1262	ND	140	1.00	
Aroclor-1268	ND	140	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	77	24-168	
2,4,5,6-Tetrachloro-m-Xylene	88	25-145	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E10 (2.5-3)	**18-09-1449-9-AA**	**09/14/18 14:48**	**Solid**	**GC 58**	**09/21/18**	**09/24/18 23:30**	**180921L11**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	180	1.00	
Aroclor-1221	ND	180	1.00	
Aroclor-1232	ND	180	1.00	
Aroclor-1242	ND	180	1.00	
Aroclor-1248	ND	180	1.00	
Aroclor-1254	ND	180	1.00	
Aroclor-1260	ND	180	1.00	
Aroclor-1262	ND	180	1.00	
Aroclor-1268	ND	180	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	71	24-168	
2,4,5,6-Tetrachloro-m-Xylene	80	25-145	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

Enthalpy Analytical		Date Received:	09/20/18
2323 Fifth Street		Work Order:	18-09-1449
Berkeley, CA 94710-2407		Preparation:	EPA 3540C
		Method:	EPA 8082
		Units:	ug/kg
Project: 303268			Page 6 of 15

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E10 (4.5-5)	**18-09-1449-10-AA**	**09/14/18 15:02**	**Solid**	**GC 58**	**09/21/18**	**09/24/18 23:48**	**180921L11**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	170	1.00	
Aroclor-1221	ND	170	1.00	
Aroclor-1232	ND	170	1.00	
Aroclor-1242	ND	170	1.00	
Aroclor-1248	ND	170	1.00	
Aroclor-1254	ND	170	1.00	
Aroclor-1260	ND	170	1.00	
Aroclor-1262	ND	170	1.00	
Aroclor-1268	ND	170	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	91	24-168	
2,4,5,6-Tetrachloro-m-Xylene	99	25-145	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E11 (0-0.5)	**18-09-1449-11-AA**	**09/14/18 14:13**	**Solid**	**GC 58**	**09/21/18**	**09/25/18 00:06**	**180921L11**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	190	1.00	
Aroclor-1221	ND	190	1.00	
Aroclor-1232	ND	190	1.00	
Aroclor-1242	ND	190	1.00	
Aroclor-1248	ND	190	1.00	
Aroclor-1254	ND	190	1.00	
Aroclor-1262	ND	190	1.00	
Aroclor-1268	ND	190	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	65	24-168	
2,4,5,6-Tetrachloro-m-Xylene	68	25-145	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

Enthalpy Analytical		Date Received:	09/20/18
2323 Fifth Street		Work Order:	18-09-1449
Berkeley, CA 94710-2407		Preparation:	EPA 3540C
		Method:	EPA 8082
		Units:	ug/kg
Project: 303268			Page 7 of 15

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E11 (0-0.5)	**18-09-1449-11-AA**	**09/14/18 14:13**	**Solid**	**GC 58**	**09/21/18**	**09/25/18 15:58**	**180921L11**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Aroclor-1260	5500	950	5.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	66	24-168	
2,4,5,6-Tetrachloro-m-Xylene	70	25-145	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E11 (2.5-3)	**18-09-1449-12-AA**	**09/14/18 14:19**	**Solid**	**GC 58**	**09/21/18**	**09/25/18 00:24**	**180921L11**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	200	1.00	
Aroclor-1221	ND	200	1.00	
Aroclor-1232	ND	200	1.00	
Aroclor-1242	ND	200	1.00	
Aroclor-1248	ND	200	1.00	
Aroclor-1254	ND	200	1.00	
Aroclor-1260	ND	200	1.00	
Aroclor-1262	ND	200	1.00	
Aroclor-1268	ND	200	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	76	24-168	
2,4,5,6-Tetrachloro-m-Xylene	82	25-145	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

Enthalpy Analytical		Date Received:	09/20/18
2323 Fifth Street		Work Order:	18-09-1449
Berkeley, CA 94710-2407		Preparation:	EPA 3540C
		Method:	EPA 8082
		Units:	ug/kg
Project: 303268			Page 8 of 15

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E05 (0-0.5)	**18-09-1449-13-AA**	**09/13/18 16:21**	**Solid**	**GC 58**	**09/21/18**	**09/25/18 00:42**	**180921L11**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	150	1.00	
Aroclor-1221	ND	150	1.00	
Aroclor-1232	ND	150	1.00	
Aroclor-1242	ND	150	1.00	
Aroclor-1248	ND	150	1.00	
Aroclor-1254	ND	150	1.00	
Aroclor-1260	ND	150	1.00	
Aroclor-1262	ND	150	1.00	
Aroclor-1268	ND	150	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	57	24-168	
2,4,5,6-Tetrachloro-m-Xylene	59	25-145	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E05 (2.5-3)	**18-09-1449-14-AA**	**09/13/18 16:34**	**Solid**	**GC 58**	**09/21/18**	**09/25/18 01:00**	**180921L11**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	150	1.00	
Aroclor-1221	ND	150	1.00	
Aroclor-1232	ND	150	1.00	
Aroclor-1242	ND	150	1.00	
Aroclor-1248	ND	150	1.00	
Aroclor-1254	ND	150	1.00	
Aroclor-1262	ND	150	1.00	
Aroclor-1268	ND	150	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	63	24-168	
2,4,5,6-Tetrachloro-m-Xylene	68	25-145	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

Enthalpy Analytical		Date Received:	09/20/18
2323 Fifth Street		Work Order:	18-09-1449
Berkeley, CA 94710-2407		Preparation:	EPA 3540C
		Method:	EPA 8082
		Units:	ug/kg
Project: 303268			Page 9 of 15

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E05 (2.5-3)	**18-09-1449-14-AA**	**09/13/18 16:34**	**Solid**	**GC 58**	**09/21/18**	**09/25/18 16:16**	**180921L11**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Aroclor-1260	5300	740	5.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	64	24-168	
2,4,5,6-Tetrachloro-m-Xylene	71	25-145	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E05 (2.8-3.3)	**18-09-1449-15-AA**	**09/13/18 16:50**	**Solid**	**GC 58**	**09/21/18**	**09/25/18 01:18**	**180921L11**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	160	1.00	
Aroclor-1221	ND	160	1.00	
Aroclor-1232	ND	160	1.00	
Aroclor-1242	ND	160	1.00	
Aroclor-1248	ND	160	1.00	
Aroclor-1254	ND	160	1.00	
Aroclor-1262	ND	160	1.00	
Aroclor-1268	ND	160	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	82	24-168	
2,4,5,6-Tetrachloro-m-Xylene	92	25-145	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E05 (2.8-3.3)	**18-09-1449-15-AA**	**09/13/18 16:50**	**Solid**	**GC 58**	**09/21/18**	**09/25/18 16:34**	**180921L11**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Aroclor-1260	3700	780	5.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	86	24-168	
2,4,5,6-Tetrachloro-m-Xylene	98	25-145	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

Enthalpy Analytical		Date Received:	09/20/18
2323 Fifth Street		Work Order:	18-09-1449
Berkeley, CA 94710-2407		Preparation:	EPA 3540C
		Method:	EPA 8082
		Units:	ug/kg
Project: 303268			Page 10 of 15

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E07 (0-0.5)	**18-09-1449-16-AA**	**09/14/18 08:51**	**Solid**	**GC 58**	**09/21/18**	**09/25/18 01:36**	**180921L11**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	190	1.00	
Aroclor-1221	ND	190	1.00	
Aroclor-1232	ND	190	1.00	
Aroclor-1242	ND	190	1.00	
Aroclor-1248	ND	190	1.00	
Aroclor-1254	ND	190	1.00	
Aroclor-1260	340	190	1.00	
Aroclor-1262	ND	190	1.00	
Aroclor-1268	ND	190	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	86	24-168	
2,4,5,6-Tetrachloro-m-Xylene	94	25-145	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E07 (2.5-3)	**18-09-1449-17-AA**	**09/14/18 08:58**	**Solid**	**GC 58**	**09/21/18**	**09/25/18 01:54**	**180921L11**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	160	1.00	
Aroclor-1221	ND	160	1.00	
Aroclor-1232	ND	160	1.00	
Aroclor-1242	ND	160	1.00	
Aroclor-1248	ND	160	1.00	
Aroclor-1254	ND	160	1.00	
Aroclor-1260	ND	160	1.00	
Aroclor-1262	ND	160	1.00	
Aroclor-1268	ND	160	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	94	24-168	
2,4,5,6-Tetrachloro-m-Xylene	98	25-145	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

Enthalpy Analytical		Date Received:	09/20/18
2323 Fifth Street		Work Order:	18-09-1449
Berkeley, CA 94710-2407		Preparation:	EPA 3540C
		Method:	EPA 8082
		Units:	ug/kg
Project: 303268			Page 11 of 15

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E07 (4.5-5)	**18-09-1449-18-AA**	**09/14/18 09:06**	**Solid**	**GC 58**	**09/21/18**	**09/25/18 02:11**	**180921L11**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	150	1.00	
Aroclor-1221	ND	150	1.00	
Aroclor-1232	ND	150	1.00	
Aroclor-1242	ND	150	1.00	
Aroclor-1248	ND	150	1.00	
Aroclor-1254	ND	150	1.00	
Aroclor-1260	ND	150	1.00	
Aroclor-1262	ND	150	1.00	
Aroclor-1268	ND	150	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	90	24-168	
2,4,5,6-Tetrachloro-m-Xylene	92	25-145	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E08 (0-0.5)	**18-09-1449-19-AA**	**09/14/18 09:43**	**Solid**	**GC 58**	**09/21/18**	**09/25/18 02:29**	**180921L11**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	180	1.00	
Aroclor-1221	ND	180	1.00	
Aroclor-1232	ND	180	1.00	
Aroclor-1242	ND	180	1.00	
Aroclor-1248	ND	180	1.00	
Aroclor-1254	ND	180	1.00	
Aroclor-1262	ND	180	1.00	
Aroclor-1268	ND	180	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	91	24-168	
2,4,5,6-Tetrachloro-m-Xylene	94	25-145	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

Enthalpy Analytical		Date Received:	09/20/18
2323 Fifth Street		Work Order:	18-09-1449
Berkeley, CA 94710-2407		Preparation:	EPA 3540C
		Method:	EPA 8082
		Units:	ug/kg
Project: 303268			Page 12 of 15

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E08 (0-0.5)	**18-09-1449-19-AA**	**09/14/18 09:43**	**Solid**	**GC 58**	**09/21/18**	**09/25/18 16:52**	**180921L11**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Aroclor-1260	8100	880	5.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	91	24-168	
2,4,5,6-Tetrachloro-m-Xylene	94	25-145	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E08 (2.5-3)	**18-09-1449-20-AA**	**09/14/18 10:26**	**Solid**	**GC 58**	**09/21/18**	**09/25/18 02:48**	**180921L11**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	190	1.00	
Aroclor-1221	ND	190	1.00	
Aroclor-1232	ND	190	1.00	
Aroclor-1242	ND	190	1.00	
Aroclor-1248	ND	190	1.00	
Aroclor-1254	ND	190	1.00	
Aroclor-1260	ND	190	1.00	
Aroclor-1262	ND	190	1.00	
Aroclor-1268	ND	190	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	93	24-168	
2,4,5,6-Tetrachloro-m-Xylene	96	25-145	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

Enthalpy Analytical		Date Received:	09/20/18
2323 Fifth Street		Work Order:	18-09-1449
Berkeley, CA 94710-2407		Preparation:	EPA 3540C
		Method:	EPA 8082
		Units:	ug/kg
Project: 303268			Page 13 of 15

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E08 (4.5-5)	**18-09-1449-21-AA**	**09/14/18 10:33**	**Solid**	**GC 31**	**09/20/18**	**09/25/18 11:53**	**180920L12**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	160	1.00	
Aroclor-1221	ND	160	1.00	
Aroclor-1232	ND	160	1.00	
Aroclor-1242	ND	160	1.00	
Aroclor-1248	ND	160	1.00	
Aroclor-1254	ND	160	1.00	
Aroclor-1260	ND	160	1.00	
Aroclor-1262	ND	160	1.00	
Aroclor-1268	ND	160	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	110	24-168	
2,4,5,6-Tetrachloro-m-Xylene	100	25-145	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E04 (0-0.5)	**18-09-1449-22-AA**	**09/14/18 07:50**	**Solid**	**GC 31**	**09/20/18**	**09/25/18 12:13**	**180920L12**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	190	1.00	
Aroclor-1221	ND	190	1.00	
Aroclor-1232	ND	190	1.00	
Aroclor-1242	ND	190	1.00	
Aroclor-1248	ND	190	1.00	
Aroclor-1254	ND	190	1.00	
Aroclor-1260	1400	190	1.00	
Aroclor-1262	ND	190	1.00	
Aroclor-1268	ND	190	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	95	24-168	
2,4,5,6-Tetrachloro-m-Xylene	84	25-145	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

Enthalpy Analytical		Date Received:	09/20/18
2323 Fifth Street		Work Order:	18-09-1449
Berkeley, CA 94710-2407		Preparation:	EPA 3540C
		Method:	EPA 8082
		Units:	ug/kg
Project: 303268			Page 14 of 15

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E04 (2.5-3)	**18-09-1449-23-AA**	**09/14/18 08:05**	**Solid**	**GC 31**	**09/20/18**	**09/25/18 12:32**	**180920L12**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	180	1.00	
Aroclor-1221	ND	180	1.00	
Aroclor-1232	ND	180	1.00	
Aroclor-1242	ND	180	1.00	
Aroclor-1248	ND	180	1.00	
Aroclor-1254	ND	180	1.00	
Aroclor-1260	ND	180	1.00	
Aroclor-1262	ND	180	1.00	
Aroclor-1268	ND	180	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	86	24-168	
2,4,5,6-Tetrachloro-m-Xylene	82	25-145	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
E04 (4.5-5)	**18-09-1449-24-AA**	**09/14/18 08:20**	**Solid**	**GC 31**	**09/20/18**	**09/25/18 12:51**	**180920L12**

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	200	1.00	
Aroclor-1221	ND	200	1.00	
Aroclor-1232	ND	200	1.00	
Aroclor-1242	ND	200	1.00	
Aroclor-1248	ND	200	1.00	
Aroclor-1254	ND	200	1.00	
Aroclor-1260	1400	200	1.00	
Aroclor-1262	ND	200	1.00	
Aroclor-1268	ND	200	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	91	24-168	
2,4,5,6-Tetrachloro-m-Xylene	84	25-145	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

Enthalpy Analytical		Date Received:	09/20/18
2323 Fifth Street		Work Order:	18-09-1449
Berkeley, CA 94710-2407		Preparation:	EPA 3540C
		Method:	EPA 8082
		Units:	ug/kg
Project: 303268			Page 15 of 15

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-12-535-4895**	**N/A**	**Solid**	**GC 31**	**09/20/18**	**09/24/18 13:57**	**180920L12**

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	50	1.00	
Aroclor-1221	ND	50	1.00	
Aroclor-1232	ND	50	1.00	
Aroclor-1242	ND	50	1.00	
Aroclor-1248	ND	50	1.00	
Aroclor-1254	ND	50	1.00	
Aroclor-1260	ND	50	1.00	
Aroclor-1262	ND	50	1.00	
Aroclor-1268	ND	50	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	86	24-168	
2,4,5,6-Tetrachloro-m-Xylene	78	25-145	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-12-535-4897**	**N/A**	**Solid**	**GC 58**	**09/21/18**	**09/24/18 20:30**	**180921L11**

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	50	1.00	
Aroclor-1221	ND	50	1.00	
Aroclor-1232	ND	50	1.00	
Aroclor-1242	ND	50	1.00	
Aroclor-1248	ND	50	1.00	
Aroclor-1254	ND	50	1.00	
Aroclor-1260	ND	50	1.00	
Aroclor-1262	ND	50	1.00	
Aroclor-1268	ND	50	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	55	24-168	
2,4,5,6-Tetrachloro-m-Xylene	50	25-145	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Quality Control - Spike/Spike Duplicate

Enthalpy Analytical		Date Received:	09/20/18
2323 Fifth Street		Work Order:	18-09-1449
Berkeley, CA 94710-2407		Preparation:	EPA 3540C
		Method:	EPA 8082
Project: 303268			Page 1 of 2

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
18-09-1339-23	**Sample**	**Solid**	**GC 31**	**09/20/18**	**09/24/18 15:51**	**180920S12**
18-09-1339-23	**Matrix Spike**	**Solid**	**GC 31**	**09/20/18**	**09/24/18 14:35**	**180920S12**
18-09-1339-23	**Matrix Spike Duplicate**	**Solid**	**GC 31**	**09/20/18**	**09/24/18 14:54**	**180920S12**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Aroclor-1016	ND	100.0	97.50	98	99.50	100	50-135	2	0-20	
Aroclor-1260	ND	100.0	94.50	94	95.00	95	50-135	1	0-20	

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - Spike/Spike Duplicate

Enthalpy Analytical		Date Received:	09/20/18
2323 Fifth Street		Work Order:	18-09-1449
Berkeley, CA 94710-2407		Preparation:	EPA 3540C
		Method:	EPA 8082
Project: 303268			Page 2 of 2

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
E05 (0-0.5)	**Sample**	**Solid**	**GC 58**	**09/21/18**	**09/25/18 00:42**	**180921S11**
E05 (0-0.5)	**Matrix Spike**	**Solid**	**GC 58**	**09/21/18**	**09/25/18 03:05**	**180921S11**
E05 (0-0.5)	**Matrix Spike Duplicate**	**Solid**	**GC 58**	**09/21/18**	**09/25/18 03:23**	**180921S11**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Aroclor-1016	ND	100.0	134.5	134	115.0	115	50-135	16	0-20	
Aroclor-1260	ND	100.0	113.5	114	122.0	122	50-135	7	0-20	

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - Sample Duplicate

Enthalpy Analytical		Date Received:	09/20/18
2323 Fifth Street		Work Order:	18-09-1449
Berkeley, CA 94710-2407		Preparation:	N/A
		Method:	ASTM D-2216 (M)
Project: 303268			Page 1 of 2

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	Duplicate Batch Number
E11 (4.5-5)	**Sample**	**Solid**	**N/A**	**09/21/18 00:00**	**09/21/18 14:30**	**I0921MOID4**
E11 (4.5-5)	**Sample Duplicate**	**Solid**	**N/A**	**09/21/18 00:00**	**09/21/18 14:30**	**I0921MOID4**

Parameter	Sample Conc.	DUP Conc.	RPD	RPD CL	Qualifiers
Moisture	69.00	69.10	0	0-10	

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - Sample Duplicate

Enthalpy Analytical		Date Received:	09/20/18
2323 Fifth Street		Work Order:	18-09-1449
Berkeley, CA 94710-2407		Preparation:	N/A
		Method:	ASTM D-2216 (M)
Project: 303268			Page 2 of 2

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	Duplicate Batch Number
E08 (4.5-5)	**Sample**	**Solid**	**N/A**	**09/21/18 00:00**	**09/21/18 14:30**	**I0921MOID5**
E08 (4.5-5)	**Sample Duplicate**	**Solid**	**N/A**	**09/21/18 00:00**	**09/21/18 14:30**	**I0921MOID5**

Parameter	Sample Conc.	DUP Conc.	RPD	RPD CL	Qualifiers
Moisture	68.80	68.80	0	0-10	

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - LCS

Enthalpy Analytical		Date Received:	09/20/18
2323 Fifth Street		Work Order:	18-09-1449
Berkeley, CA 94710-2407		Preparation:	EPA 3540C
		Method:	EPA 8082
Project: 303268			Page 1 of 2

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-12-535-4895	**LCS**	**Solid**	**GC 31**	**09/20/18**	**09/24/18 14:16**	**180920L12**

Parameter	Spike Added	Conc. Recovered	LCS %Rec.	%Rec. CL	Qualifiers
Aroclor-1016	100.0	90.50	90	50-135	
Aroclor-1260	100.0	89.50	90	50-135	

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - LCS

Enthalpy Analytical		Date Received:	09/20/18
2323 Fifth Street		Work Order:	18-09-1449
Berkeley, CA 94710-2407		Preparation:	EPA 3540C
		Method:	EPA 8082
Project: 303268			Page 2 of 2

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-12-535-4897	**LCS**	**Solid**	**GC 58**	**09/21/18**	**09/25/18 03:41**	**180921L11**

Parameter	Spike Added	Conc. Recovered	LCS %Rec.	%Rec. CL	Qualifiers
Aroclor-1016	100.0	118.5	118	50-135	
Aroclor-1260	100.0	65.00	65	50-135	

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RPD: Relative Percent Difference. CL: Control Limits

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Sample Analysis Summary Report

Work Order: 18-09-1449 Page 1 of 1

Method	Extraction	Chemist ID	Instrument	Analytical Location
ASTM D-2216 (M)	N/A	1136	N/A	1
EPA 8082	EPA 3540C	669	GC 31	1
EPA 8082	EPA 3540C	669	GC 58	1

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Glossary of Terms and Qualifiers

Work Order: 18-09-1449 Page 1 of 1

Qualifiers	Definition
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
CI	See case narrative.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
ME	LCS Recovery Percentage is within Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean).
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.
	Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
	Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.
	A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.

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Enthalpy Berkeley

2323 Fifth Street
Berkeley, CA 94710
(510) 486-0900
(510) 486-0532

18-09-1449

Project Number: 303268
Site: Bridge Point Oakland

RUSH

Subcontract Laboratory:
Eurofins (CalScience)
7440 Lincoln Way
Garden Grove, CA 92841-1432
(714) 895-5494
ATTN: Vik Patel

Results due: 09/26/18 Report Level: II

Please send report to: Tracy Babjar (tracy.babjar@enthalpy.com)
*** Please report using Sample ID rather than Enthalpy (Berkeley) Lab #.

Sample ID		Sampled	Matrix	Analysis	Lab #	Comments
E11 (4.5-5)	1	09/14 14:23	Soil	PCB-SUB	303268-007	Please do mositure
E12A (0-0.5)	2	09/14 11:15	Soil	PCB-SUB	303268-008	Please do mositure
E12A (2.5-3)	3	09/14 11:24	Soil	PCB-SUB	303268-009	Please do mositure
E12A (4.5-5)	4	09/14 11:31	Soil	PCB-SUB	303268-010	Please do mositure
E12B (9.5-10)	5	09/14 13:53	Soil	PCB-SUB	303268-011	Please do mositure
E06 (4.5-5)	6	09/14 11:57	Soil	PCB-SUB	303268-012	Please do mositure
E06 (3-3.5)	7	09/14 11:48	Soil	PCB-SUB	303268-013	Please do mositure
E10 (0-0.5)	8	09/14 14:42	Soil	PCB-SUB	303268-014	Please do mositure
E10 (2.5-3)	9	09/14 14:48	Soil	PCB-SUB	303268-015	Please do mositure
E10 (4.5-5)	10	09/14 15:02	Soil	PCB-SUB	303268-016	Please do mositure
E11 (0-0.5)	11	09/14 14:13	Soil	PCB-SUB	303268-017	Please do mositure
E11 (2.5-3)	12	09/14 14:19	Soil	PCB-SUB	303268-018	Please do mositure
E05 (0-0.5)	13	09/13 16:21	Soil	PCB-SUB	303268-019	Please do mositure
E05 (2.5-3)	14	09/13 16:34	Soil	PCB-SUB	303268-020	Please do mositure
E05 (2.8-3.3)	15	09/13 16:50	Soil	PCB-SUB	303268-021	Please do mositure
E07 (0-0.5)	16	09/14 08:51	Soil	PCB-SUB	303268-022	Please do mositure
E07 (2.5-3)	17	09/14 08:58	Soil	PCB-SUB	303268-023	Please do mositure
E07 (4.5-5)	18	09/14 09:06	Soil	PCB-SUB	303268-024	Please do mositure
E08 (0-0.5)	19	09/14 09:43	Soil	PCB-SUB	303268-025	Please do mositure
E08 (2.5-3)	20	09/14 10:26	Soil	PCB-SUB	303268-026	Please do mositure
E08 (4.5-5)	21	09/14 10:33	Soil	PCB-SUB	303268-027	Please do mositure
E04 (0-0.5)	22	09/14 07:50	Soil	PCB-SUB	303268-028	Please do mositure
E04 (2.5-3)	23	09/14 08:05	Soil	PCB-SUB	303268-029	Please do mositure
E04 (4.5-5)	24	09/14 08:20	Soil	PCB-SUB	303268-030	Please do mositure

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Enthalpy Berkeley

2323 Fifth Street
Berkeley, CA 94710
(510) 486-0900
(510) 486-0532

1449

Notes:	Relinquished By:	Received By:
	Date/Time: 1-19-18 15:05	Date/Time: 9/20/18 10:00
	Date/Time:	Date/Time:

Signature on this form constitutes a firm Purchase Order for the services requested above.

Page 2 of 2

GSO | a GLS company GLS

800-322-5555
www.gso.com

Ship From
CURTIS & TOMPKINS
MICHAEL DAHLQUIST
2323 FIFTH STREET
BERKELEY, CA 94710

Ship To
EUROFINS (CALSCIENCE)
VIK PATEL
7440 LINCOLN WAY
92841-1432
GARDEN GROVE, CA 92841

COD: $0.00
Weight: 0 lb(s)
Reference:

Delivery Instructions:

Signature Type: STANDARD

Tracking #: 542113790

PDS

1449

ORC C

GARDEN GROVE

S92845A

90874375

Print Date: 9/19/2018 3:09 PM

LABEL INSTRUCTIONS:

Do not copy or reprint this label for additional shipments - each package must have a unique barcode.
Step 1: Use the "Print Label" button on this page to print the shipping label on a laser or inkjet printer.
Step 2: Fold this page in half.
Step 3: Securely attach this label to your package and do not cover the barcode.

TERMS AND CONDITIONS:

By giving us your shipment to deliver, you agree to all of the GSO service terms & conditions including, but not limited to; limits of liability, declared value conditions, and claim procedures which are available on our website at www.gso.com.

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WORK ORDER NUMBER: 18-09-1449

SAMPLE RECEIPT CHECKLIST

COOLER 1 OF 1

CLIENT: Enthalpy

DATE: 09/20/2018

TEMPERATURE: (Criteria: 0.0°C – 6.0°C, not frozen except sediment/tissue)

Thermometer ID: SC6 (CF: -0.5°C); Temperature (w/o CF): 3.5 °C (w/ CF): 3.0 °C; ☐ Blank ☑ Sample

☐ Sample(s) outside temperature criteria (PM/APM contacted by: _____)

☐ Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling

☐ Sample(s) received at ambient temperature; placed on ice for transport by courier

Ambient Temperature: ☐ Air ☐ Filter Checked by: YFSO

CUSTODY SEAL:

Cooler ☐ Present and Intact ☐ Present but Not Intact ☑ Not Present ☐ N/A Checked by: YFSO

Sample(s) ☐ Present and Intact ☐ Present but Not Intact ☑ Not Present ☐ N/A Checked by: YFSO

SAMPLE CONDITION:	Yes	No	N/A
Chain-of-Custody (COC) document(s) received with samples	☑	☐	☐
COC document(s) received complete	☑	☐	☐
☐ Sampling date ☐ Sampling time ☐ Matrix ☐ Number of containers			
☐ No analysis requested ☐ Not relinquished ☐ No relinquished date ☐ No relinquished time			
Sampler's name indicated on COC	☐	☐	☑
Sample container label(s) consistent with COC	☑	☐	☐
Sample container(s) intact and in good condition	☑	☐	☐
Proper containers for analyses requested	☑	☐	☐
Sufficient volume/mass for analyses requested	☑	☐	☐
Samples received within holding time	☑	☐	☐
Aqueous samples for certain analyses received within 15-minute holding time			
☐ pH ☐ Residual Chlorine ☐ Dissolved Sulfide ☐ Dissolved Oxygen	☐	☐	☑
Proper preservation chemical(s) noted on COC and/or sample container	☐	☐	☑
Unpreserved aqueous sample(s) received for certain analyses			
☐ Volatile Organics ☐ Total Metals ☐ Dissolved Metals			
Acid/base preserved samples - pH within acceptable range	☐	☐	☑
Container(s) for certain analysis free of headspace	☐	☐	☑
☐ Volatile Organics ☐ Dissolved Gases (RSK-175) ☐ Dissolved Oxygen (SM 4500)			
☐ Carbon Dioxide (SM 4500) ☐ Ferrous Iron (SM 3500) ☐ Hydrogen Sulfide (Hach)			
Tedlar™ bag(s) free of condensation	☐	☐	☑

CONTAINER TYPE: (Trip Blank Lot Number: _____)

Aqueous: ☐ VOA ☐ VOA**h** ☐ VOA**na$_2$** ☐ 100PJ ☐ 100PJ**na$_2$** ☐ 125AGB ☐ 125AGB**h** ☐ 125AGB**p** ☐ 125PB ☐ 125PB**znna** (pH__9)

☐ 250AGB ☐ 250CGB ☐ 250CGB**s** (pH__2) ☐ 250PB ☐ 250PB**n** (pH__2) ☐ 500AGB ☐ 500AGJ ☐ 500AGJ**s** (pH__2) ☐ 500PB

☐ 1AGB ☐ 1AGB**na$_2$** ☐ 1AGB**s** (pH__2) ☐ 1AGB**s** (O&G) ☐ 1PB ☐ 1PB**na** (pH__12) ☐ _____ ☐ _____ ☐ _____

Solid: ☑ 4ozCGJ ☐ 8ozCGJ ☐ 16ozCGJ ☐ Sleeve (___) ☐ EnCores® (___) ☐ TerraCores® (___) ☐ _____ ☐ _____ ☐ _____

Air: ☐ Tedlar™ ☐ Canister ☐ Sorbent Tube ☐ PUF ☐ _____ **Other Matrix** (_____): ☐ _____ ☐ _____ ☐ _____

Container: **A** = Amber, **B** = Bottle, **C** = Clear, **E** = Envelope, **G** = Glass, **J** = Jar, **P** = Plastic, and **Z** = Ziploc/Resealable Bag

Preservative: **b** = buffered, **f** = filtered, **h** = HCl, **n** = HNO_3, **na** = NaOH, **na$_2$** = $Na_2S_2O_3$, **p** = H_3PO_4, **s** = H_2SO_4, **u** = ultra-pure, **x** = Na_2SO_3+$NaHSO_4.H_2O$, **znna** = Zn $(CH_3CO_2)_2$ + NaOH

Labeled/Checked by: YFSO

Reviewed by: VGL



ENTHALPY

ANALYTICAL

Enthalpy Analytical
2323 Fifth Street, Berkeley, CA 94710, Phone (510) 486-0900

Laboratory Job Number 303660
ANALYTICAL REPORT

EKI Environment & Water, Inc.
577 Airport Boulevard, Suite 500
Burlingame, CA 94010-5306

Project : B70123.01
Location : Bridge Point Oakland
Level : II

Sample ID	Lab ID
E03 (BASE)	303660-001
E08 (BASE)	303660-002
E11 (BASE)	303660-003
E12A (BASE)	303660-004

This data package has been reviewed for technical correctness and completeness. Release of this data has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature which applies to this PDF file as well as any associated electronic data deliverable files. The results contained in this report meet all requirements of NELAP and pertain only to those samples which were submitted for analysis. This report may be reproduced only in its entirety.

Signature: Tracy Babjar Date: 10/05/2018

Tracy Babjar
Project Manager
tracy.babjar@enthalpy.com
(510) 204-2226 Ext 13107

CA ELAP# 2896, NELAP# 4044-001

ENTHALPY ANALYTICAL

CASE NARRATIVE

Laboratory number:	**303660**
Client:	**EKI Environment & Water, Inc.**
Project:	**B70123.01**
Location:	**Bridge Point Oakland**
Request Date:	**09/27/18**
Samples Received:	**09/14/18**

This data package contains sample and QC results for four soil samples, requested for the above referenced project on 09/27/18. The samples were received cold and intact. Sample E12A (BASE) was crushed prior to extraction due to the rock soil matrix.

PCBs (EPA 8082):
All samples underwent sulfuric acid cleanup using EPA Method 3665A. All samples underwent sulfur cleanup using the copper option in EPA Method 3660B. A number of samples were prepared outside of hold time; affected data was qualified with "b". No other analytical problems were encountered.

Moisture (ASTM D2216-98/CLP):
No analytical problems were encountered.

MONTROSE

Tracy Babjar <tbabjar@montrose-env.com>

RE: B70123.01 - Enthalpy (Berkeley) Login Summary ~~(303288)~~ 303660

Deepa Gandhi <dgandhi@ekiconsult.com> ~~Thu~~, Sep 27, 2018 at 4:05 PM
To: Tracy Babjar <tracy.babjar@enthalpy.com>

Tracy, please proceed with PCBs analysis (8082) with Soxhlet extraction (3540C) with standard TAT for the following samples:

	Client ID	Lab ID	Sampled	Received
1	**E03 (BASE)**	003	09/13/18 10:27	09/14/18
2	**E08 (BASE)**	004	09/14/18 09:32	09/14/18
3	**E11 (BASE)**	005	09/14/18 14:12	09/14/18
4	**E12A (BASE)**	006	09/14/18 11:01	09/14/18

Thank you,

[Quoted text hidden]

303268

EKI Environment & Water, Inc.
CONSULTING ENGINEERS AND SCIENTISTS

CHAIN OF CUSTODY RECORD

577 Airport Boulevard, Suite 500, Burlingame CA 94010 PHONE: 650-292-9100 http://www.ekiconsult.com

PAGE 1 OF 5

Project Name: Bridge Point Oakland

Location: 5441 International Boulevard, Oakland, CA

Project No.: B70123.01

Sampled By: Priscilla De Jesus

Reporting:
Electronic Format: EDF Hard Copy Format: PDF
EPA Data Report Level:
Please report results to the following people:
(1) Data Archive: labs@ekiconsult.com
(2) Priscilla De Jesus: pdejesus@ekiconsult.com
(3) Deepa Gandhi: dgandhi@ekiconsult.com
(4)

Laboratory:
Enthalpy Analytical
2323 5th Street
Berkeley, CA, USA 94710
(510) 204-2221

EKI COC No.: (YYYYMMDD-#)

Revision: _____ (A, B, C, D, etc.)
Date By

ANALYSES REQUESTED: Method No. / Analyte / Group; 3540C/ 8082 Soxhlet Extraction/ PCBs; ASTM D2216 Moisture Content; Extract and HOLD; HOLD; EXPECTED TURNAROUND TIME

Field Sample ID	Lab Sample No.	Date	Time	Matrix	Container Count & Type	Extract and HOLD	HOLD	Remarks
E01 (base)		09/13/2018	0841	SL	1, 4oz. jar	/	X	
E02 (base)		09/13/2018	0921	SL	1, 4oz. jar		X	
E03 (base)		09/13/2018	1027	SL	1, 4oz. jar		X	
~~E04 (base)~~		~~09/ /218~~		~~SL~~	~~1, 4oz. jar~~			No Sample
~~E05 (base)~~		~~09/ /218~~		~~SL~~	~~1, 4oz. jar~~			No sample
~~E06 (base)~~		~~09/ /2018~~		~~SL~~	~~1, 4oz. jar~~			No sample
~~E07 (base)~~		~~09/ /2018~~		~~SL~~	~~1, 4oz. jar~~			No sample
E08 (base)		09/14/2018	0932	SL	1, 4oz. jar		X	
~~E09 (base)~~		~~09/ /2018~~		~~SL~~	~~1, 4oz. jar~~			No sample
~~E10 (base)~~		~~09/ /2018~~	[illegible]	~~SL~~	~~1, 4oz. jar~~			No sample
E11 (base)		09/14/2018	[illegible]	SL	1, 4oz. jar		X	
E12A (base)		09/14/2018	1101	SL	1, 4oz. jar		X	
~~E12B (base)~~		~~09/ /2019~~		~~SL~~	~~1, 4oz. jar~~			No sample

Special Instructions:
E11 (base) *1412

Relinquished by: (Signature/Affiliation)	Date & Time	Received by: (Signature/Affiliation or Carrier/Air Bill No.)
[signature] / EKI	09/14/18 1600	[signature] 9-14 1600
[signature]	9-14 1651	[signature] 9-14-18 1649

303269

EKI Environment & Water, Inc.

CONSULTING ENGINEERS AND SCIENTISTS

CHAIN OF CUSTODY RECORD

577 Airport Boulevard, Suite 580, Burlingame CA 94010 PHONE: 650-292-9100 http://www.ekiconsult.com

Project Name: Bridge Point Oakland

Project No.: 870123.01

Location: 5441 International Boulevard, Oakland, CA

Sampled By: Priscilla De Jesus

Deliverables:
Electronic Format: EDF Hard Copy Format: PDF
EPA Data Report Level:
Please report results to the following people:
(1) Data Archive: labs@ekiconsult.com
(2) Priscilla De Jesus: pdejesus@ekiconsult.com
(3) Deepa Gandhi: dgandhi@ekiconsult.com
(4)

Laboratory:
Enthalpy Analytical
2323 5th Street
Berkeley, CA, USA 94710
(510) 204-2221

ANALYSES REQUESTED

Field Sample ID	Lab Sample No.	Date	Time	Matrix	Container Count & Type	Analyte / Group	3550C / 8082 Soxhlet Extraction / PCBs	ASTM D2216 Moisture Content	HOLD Extract and HOLD	EDF/EDD TURNAROUND TIME	Remarks
E11 (4.5-5)		09/14/2018	1423	SL	1, 4oz jar		x	x		5-DAY	
E12A (0-0.5)		09/14/2018	1115	SL	1, 4oz jar		x	x		5-DAY	
E12A (2.5-3)		09/14/2018	1124	SL	1, 4oz jar		x	x		5-DAY	
E12A (4.5-5)		09/14/2018	1131	SL	1, 4oz jar		x	x		5-DAY	
E12B (9.5-10)		09/14/2018	1353	SL	1, 4oz jar		x	x		5-DAY	
~~E06 (3-3.5')~~		~~09/14/2018~~	~~1148~~	~~SL~~	~~1, 4oz jar~~		~~X~~	~~X~~		~~5-DAY~~	NO SAMPLE
E06 (4.5-5')		09/14/2018	1157	SL	1, 4oz jar		X	X		5-DAY	
E06 (3-3.5')		09/14/2018	1148	SL	1, 4oz jar				X	5-DAY	

Special Instructions:
5-DAY TAT SOXHLET METHOD

Relinquished by: (Signature/Affiliation)	Date & Time	Received by: (Signature/Affiliation or Carrier/Air Bill No.)
[signature] EKI	09/14/18 1600	[signature] 9-14 1600
[signature]	9-14 1651	[signature] 9-14-18 1649
[signature]		

303268

EKI Environment & Water, Inc.
CONSULTING ENGINEERS AND SCIENTISTS

CHAIN OF CUSTODY RECORD

577 Airport Boulevard, Suite 500, Burlingame CA 94010 PHONE: 650-292-9100 http://www.ekiconsult.com

PAGE 3 OF 5

Project Name: Bridge Point Oakland
Location: 5441 International Boulevard, Oakland, CA
Project No.: 870123.01
Sampled By: Priscilla De Jesus
Laboratory: Enthalpy Analytical, 2323 5th Street, Berkeley, CA, USA 94710, (510) 204-2221
Reporting:
Electronic Format: EDF Hard Copy Format: PDF
EPA Data Report Level:
Please report results to the following people:
(1) Data Archive: labs@ekiconsult.com
(2) Priscilla De Jesus: pdejesus@ekiconsult.com
(3) Deepa Gandhi: dgandhi@ekiconsult.com
(4)

EKI CDC No.: (YYYYMMDD-#)
Revision: _____ (A, B, C, D, etc.)
Date By:

ANALYSES REQUESTED: Method No. / Analyte / Group; 3540C/ 8082 Soxhlet Extraction/ PCBs; ASTM D2216 Moisture Content; Extract and HOLD; HOLD; EXPECTED TURNAROUND TIME

Field Sample ID	Lab Sample No.	Date	Time	Matrix	Container Count & Type	Method No. / Analyte / Group	Soxhlet Extraction/ PCBs	Moisture Content	Extract and HOLD	HOLD	EXPECTED TURNAROUND TIME	Remarks
~~E09 (0-0.5)~~		~~09/ /2018~~		~~SL~~							~~5-DAY~~	
~~E09 (2.5-3)~~		~~09/ /2018~~		~~SL~~							~~5-DAY~~	
~~E09 (4.5-5)~~		~~09/ /2018~~		~~SL~~							~~5-DAY~~	
~~E09 (9.5-10)~~		~~09/ /218~~		~~SL~~							~~5-DAY~~	
~~E09 (15-15.5)~~		~~09/ /218~~		~~SL~~							~~5-DAY~~	
~~E09 (20-20.5)~~		~~09/ /2018~~		~~SL~~							~~5-DAY~~	
~~E09 (25-25.5)~~		~~09/ /2018~~		~~SL~~							~~5-DAY~~	
E10 (0-0.5)		09/14/2018	1442	SL	1, 4oz jar	x	x				5-DAY	
E10 (2.5-3)		09/14/2018	1448	SL	1, 4oz. jar	x	x				5-DAY	
E10 (4.5-5)		09/14/2018	1502	SL	1, 4oz. jar	x	x				5-DAY	
E11 (0-0.5)		09/14/2018	1413	SL	1, 4oz. jar	x	x				5-DAY	
E11 (2.5-3)		09/14/2018	1419	SL	1, 4oz. jar	x	x				5-DAY	

Special Instructions:
5-DAY TAT SOXHLET METHOD

Relinquished by: (Signature/Affiliation)	Date & Time	Received by: (Signature/Affiliation or Carrier/Air Bill No.)
[signature] / EKI	09/14/18 1600	[signature] 9-14 1600
[signature]	9-14 1651	[signature] 9-14-18 1649
[signature]		

303268

EKI Environment & Water, Inc.
CONSULTING ENGINEERS AND SCIENTISTS

CHAIN OF CUSTODY RECORD

577 Airport Boulevard, Suite 500, Burlingame CA 94010 PHONE: 650-292-9100 http://www.ekiconsult.com

PAGE 4 OF 5

Project Name: Bridge Point Oakland
Location: 5441 International Boulevard, Oakland, CA
Reporting:
Electronic Format: EDF Hard Copy Format: PDF
EPA Data Report Level:
Please report results to the following people:
(1) Data Archive: labs@ekiconsult.com
(2) Priscilla De Jesus: pdejesus@ekiconsult.com
(3) Deepa Gandhi: dgandhi@ekiconsult.com
(4)

Project No.: B70123.01
Sampled By: Priscilla De Jesus
Laboratory: Enthalpy Analytical
2323 5th Street
Berkeley, CA, USA 94710
(510) 204-2221

EDI COC No.: (YYYYMMDD-#)
Revision: _____ (A, B, C, D, etc.)
Date: By:

ANALYSES REQUESTED: Method No. / Analyte / Group; 3540C/ 8082 Soxhlet Extraction/ PCBs; ASTM D2216 Moisture Content; Extract and HOLD; HOLD

Field Sample ID	Lab Sample No.	Date	Time	Matrix	Container Count & Type	3540C/ 8082 Soxhlet Extraction/ PCBs	ASTM D2216 Moisture Content	Extract and HOLD	HOLD	EXPECTED TURNAROUND TIME	Remarks
E05 (0-0.5)		09/13/2018	1621	SL	1, 4oz.jar	x	x			5-DAY	
E05 (2.5-3)		09/13/2018	1634	SL	1, 4oz.jar	x	x			5-DAY	
E05 ~~(4.5-5)~~ (2.83.3)		09/13/2018	1650	SL	1, 4oz.jar	x	x			5-DAY	
~~E06 (0-0.5)~~		~~09/ /218~~		~~SL~~	~~1, 4oz.jar~~	~~x~~	~~x~~			~~5-DAY~~	No Sample
~~E06 (2.5-3)~~		~~09/ /2018~~		~~SL~~	~~1, 4oz.jar~~	~~x~~	~~x~~			~~5-DAY~~	No Sample
~~E06 (4.5-5)~~		~~09/ /2018~~		~~SL~~	~~1, 4oz.jar~~	~~x~~	~~x~~			~~5-DAY~~	No Sample
E07 (0-0.5)		09/14/2018	0851	SL	1, 4oz.jar	x	x			5-DAY	
E07 (2.5-3)		09/14/2018	0858	SL	1, 4oz.jar	x	x			5-DAY	
E07 (4.5-5)		09/14/2018	0906	SL	1, 4oz.jar	x	x			5-DAY	
E08 (0-0.5)		09/14/2018	0943	SL	1, 4oz.jar	x	x			5-DAY	
E08 (2.5-3)		09/14/2018	~~0957~~ 1006	SL	1, 4oz.jar	x	x			5-DAY	
E08 (4.5-5)		09/14/2018	1033	SL	1, 4oz.jar	x	x			5-DAY	

Special Instructions:
5-DAY TAT SOXHLET METHOD

Relinquished by: (Signature/Affiliation)	Date & Time	Received by: (Signature/Affiliation or Carrier/Air Bill No.)
[signature] / EKI	09/14/2018 1600	[signature] 9.14 1600
Relinquished by: (Signature/Affiliation)	Date & Time	Received by: (Signature/Affiliation)
[signature]	7-14 1651	[signature] 9-14-18 1649
Relinquished by: (Signature/Affiliation)	Date & Time	Received by: (Signature/Affiliation)

303268

EKI Environment & Water, Inc.
CONSULTING ENGINEERS AND SCIENTISTS

CHAIN OF CUSTODY RECORD

577 Airport Boulevard, Suite 500, Burlingame CA 94010
PHONE: 650-292-9100
http://www.ekiconsult.com

Project Name: Bridge Point Oakland
Location: 5441 International Boulevard, Oakland, CA
Project No.: B70123.01
Sampled By: Priscilla De Jesus
Laboratory: Enthalpy Analytical, 2323 5th Street, Berkeley, CA, USA 94710, (510) 204-2221
Reporting:
Electronic Format: EDF Hard Copy Format: PDF
EPA Data Report Level:
Please report results to the following people:
(1) Data Archive: labs@ekiconsult.com
(2) Priscilla De Jesus: pdejesus@ekiconsult.com
(3) Deepa Gandhi: dgandhi@ekiconsult.com
(4)

EIG COC No.: (YYYYMMDD-#)
Revision: _____ (A, B, C, D, etc.)
Date: By:

ANALYSES REQUESTED: Method No. / Analyte / Group; 3540C/ 8082 Soxhlet Extraction/ PCBs; ASTM D2216 Moisture Content; Extract and HOLD; HOLD; EXPECTED TURNAROUND TIME

Field Sample ID	Lab Sample No.	Date	Time	Matrix	Container Count & Type	Method No. / Analyte / Group	3540C/ 8082 Soxhlet Extraction/ PCBs	ASTM D2216 Moisture Content	Extract and HOLD	HOLD	EXPECTED TURNAROUND TIME	Remarks
~~E01 (0-0.5)~~		~~09/ /2018~~		~~SL~~		x	x				~~5-DAY~~	No Sample
~~E01 (2.5-3)~~		~~09/ /2018~~		~~SL~~		x	x				~~5-DAY~~	No Sample
~~E01 (4.5-5)~~		~~09/ /2018~~		~~SL~~		x	x				~~5-DAY~~	No Sample
~~E02 (0-0.5)~~		~~09/ /218~~		~~SL~~		x	x				~~5-DAY~~	No Sample
~~E02 (2.5-3)~~		~~09/ /2018~~		~~SL~~		x	x				~~5-DAY~~	No Sample
~~E02 (4.5-5)~~		~~09/ /2018~~		~~SL~~		x	x				~~5-DAY~~	No Sample
~~E03 (0-0.5)~~		~~09/ /2018~~		~~SL~~		x	x				~~5-DAY~~	No Sample
~~E03 (2.5-3)~~		~~09/ /2018~~		~~SL~~		x	x				~~5-DAY~~	No Sample
~~E03 (4.5-5)~~		~~09/ /2018~~		~~SL~~		x	x				~~5-DAY~~	No Sample
E04 (0-0.5)		09/14/2018	0750	SL	1, 4oz jar	x	x				5-DAY	
E04 (2.5-3)		09/14/2018	0805	SL	1, 4oz jar	x	x				5-DAY	
E04 (4.5-5)		09/14/2018	0820	SL	1, 4oz jar	x	x				5-DAY	

Special Instructions:
5-DAY TAT SOXHLET METHOD

Relinquished by: (Signature/Affiliation)	Date & Time	Received by: (Signature/Affiliation or Carrier/Air Bill No.)
[signature] / EKI	09/14/2018 1600	[signature] 9-14 1600
[signature]	9.14 1651	[signature] 9-14-18 1649
[signature]		

SAMPLE RECEIPT CHECKLIST

ENTHALPY

Section 1: Login # 303268 Client: EKI

Date Received: 9-14-18 Project: _____

Section 2: Samples received in a cooler? ☒ Yes, how many? 2 ☐ No (skip Section 3 below)

If no cooler Sample Temp (°C): _____ using IR Gun # ☐ A, or ☐ B

☐ Samples received on ice directly from the field. Cooling process had begun

If in cooler: Date Opened 9-14-18 By (print) TKM (sign) TKM

Shipping info (if applicable) _____

Are custody seals present? ☒ No, or ☐ Yes. If yes, where? ☐ on cooler, ☐ on samples, ☐ on package

☐ Date: _____ How many _____ ☐ Signature, ☐ Initials, ☐ None

Were custody seals intact upon arrival? ☐ Yes ☐ No ☒ N/A

Section 3: *Important : Notify PM if temperature exceeds 6°C or arrive frozen*

Packing in cooler: (if other, describe) _____

☒ Bubble Wrap, ☐ Foam blocks, ☒ Bags, ☐ None, ☐ Cloth material, ☐ Cardboard, ☐ Styrofoam, ☐ Paper towels

☐ Samples received on ice directly from the field. Cooling process had begun

Type of ice used : ☒ Wet, ☐ Blue/Gel, ☐ None Temperature blank(s) included? ☐ Yes, ☒ No

Temperature measured using ☐ Thermometer ID: _____, or IR Gun # ☐ A ☒ B

Cooler Temp (°C): #1: 2.1, #2: 3.6, #3: _____, #4: _____, #5: _____, #6: _____, #7: _____

Section 4:

	YES	NO	N/A
Were custody papers dry, filled out properly, and the project identifiable	✓		
Were Method 5035 sampling containers present?		✓	
If YES, what time were they transferred to freezer?			
Did all bottles arrive unbroken/unopened?	✓		
* Are there any missing / extra samples?	✓		
Are samples in the appropriate containers for indicated tests?	✓		
Are sample labels present, in good condition and complete?	✓		
Does the container count match the COC?	✓		
Do the sample labels agree with custody papers?	✓		
Was sufficient amount of sample sent for tests requested?	✓		
Did you change the hold time in LIMS for unpreserved VOAs?			✓
Did you change the hold time in LIMS for preserved terracores?			✓
Are bubbles > 6mm absent in VOA samples?			✓
Was the client contacted concerning this sample delivery?			
If YES, who was called? _____ By _____ Date: _____			

Section 5:

	YES	NO	N/A
Are the samples appropriately preserved? (If N/A, skip the rest of section 5)			✓
Did you check preservatives for all bottles for each sample?			
Did you document your preservative check?			

pH strip lot# _____, pH strip lot# _____, pH strip lot# _____

Preservative added:

☐ H2SO4 lot# _____ added to samples _____ on/at _____

☐ HCL lot# _____ added to samples _____ on/at _____

☐ HNO3 lot# _____ added to samples _____ on/at _____

☐ NaOH lot# _____ added to samples _____ on/at _____

* **Section 6:**

Explanations/Comments: received E09 cuttings sample in plastic bag. All E09 samples are crossed off on COC. Created this as sample. 303268-031A and put on Hold.

Date Logged in 9/17/18 By (print) DD (sign) [signature]

Date Labeled 9/17/18 By (print) AC (sign) [signature]

ENTHALPY ANALYTICAL

Detections Summary for 303660

Results for any subcontracted analyses are not included in this summary.

Client : EKI Environment & Water, Inc.
Project : B70123.01
Location : Bridge Point Oakland

Client Sample ID : E03 (BASE) Laboratory Sample ID : 303660-001

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Aroclor-1260	12,000	b	240	ug/Kg	Dry	10.00	EPA 8082	EPA 3540C
Moisture, Percent	17		1	%	As Recd	1.000	ASTM D2216-98/CLP	METHOD

Client Sample ID : E08 (BASE) Laboratory Sample ID : 303660-002

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Aroclor-1260	77	b	21	ug/Kg	Dry	1.000	EPA 8082	EPA 3540C
Moisture, Percent	3		1	%	As Recd	1.000	ASTM D2216-98/CLP	METHOD

Client Sample ID : E11 (BASE) Laboratory Sample ID : 303660-003

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Aroclor-1260	1,000	b	23	ug/Kg	Dry	1.000	EPA 8082	EPA 3540C
Moisture, Percent	15		1	%	As Recd	1.000	ASTM D2216-98/CLP	METHOD

Client Sample ID : E12A (BASE) Laboratory Sample ID : 303660-004

Analyte	Result	Flags	RL	Units	Basis	IDF	Method	Prep Method
Aroclor-1260	210	b	19	ug/Kg	Dry	1.000	EPA 8082	EPA 3540C
Moisture, Percent	3		1	%	As Recd	1.000	ASTM D2216-98/CLP	METHOD

b = See narrative

ENTHALPY ANALYTICAL

Polychlorinated Biphenyls (PCBs)

Lab #:	303660	Location:	Bridge Point Oakland
Client:	EKI Environment & Water, Inc.	Prep:	EPA 3540C
Project#:	B70123.01	Analysis:	EPA 8082
Matrix:	Soil	Received:	09/14/18
Units:	ug/Kg	Prepared:	10/03/18
Basis:	dry	Analyzed:	10/04/18
Batch#:	264173		

Field ID:	E03 (BASE)	Moisture:	17%
Type:	SAMPLE	Diln Fac:	10.00
Lab ID:	303660-001	Sampled:	09/13/18

Analyte	Result	RL
Aroclor-1016	ND b	240
Aroclor-1221	ND b	480
Aroclor-1232	ND b	240
Aroclor-1242	ND b	240
Aroclor-1248	ND b	240
Aroclor-1254	ND b	240
Aroclor-1260	12,000 b	240

Surrogate	%REC	Limits
Decachlorobiphenyl	153 b	37-170

Field ID:	E08 (BASE)	Moisture:	2%
Type:	SAMPLE	Diln Fac:	1.000
Lab ID:	303660-002	Sampled:	09/14/18

Analyte	Result	RL
Aroclor-1016	ND b	21
Aroclor-1221	ND b	41
Aroclor-1232	ND b	21
Aroclor-1242	ND b	21
Aroclor-1248	ND b	21
Aroclor-1254	ND b	21
Aroclor-1260	77 b	21

Surrogate	%REC	Limits
Decachlorobiphenyl	101 b	37-170

Field ID:	E11 (BASE)	Moisture:	15%
Type:	SAMPLE	Diln Fac:	1.000
Lab ID:	303660-003	Sampled:	09/14/18

Analyte	Result	RL
Aroclor-1016	ND b	23
Aroclor-1221	ND b	47
Aroclor-1232	ND b	23
Aroclor-1242	ND b	23
Aroclor-1248	ND b	23
Aroclor-1254	ND b	23
Aroclor-1260	1,000 b	23

Surrogate	%REC	Limits
Decachlorobiphenyl	107 b	37-170

b= See narrative
ND= Not Detected
RL= Reporting Limit

ENTHALPY ANALYTICAL

Polychlorinated Biphenyls (PCBs)

Lab #:	303660	Location:	Bridge Point Oakland
Client:	EKI Environment & Water, Inc.	Prep:	EPA 3540C
Project#:	B70123.01	Analysis:	EPA 8082
Matrix:	Soil	Received:	09/14/18
Units:	ug/Kg	Prepared:	10/03/18
Basis:	dry	Analyzed:	10/04/18
Batch#:	264173		

Field ID:	E12A (BASE)	Moisture:	3%
Type:	SAMPLE	Diln Fac:	1.000
Lab ID:	303660-004	Sampled:	09/14/18

Analyte	Result	RL
Aroclor-1016	ND b	19
Aroclor-1221	ND b	39
Aroclor-1232	ND b	19
Aroclor-1242	ND b	19
Aroclor-1248	ND b	19
Aroclor-1254	ND b	19
Aroclor-1260	210 b	19

Surrogate	%REC	Limits
Decachlorobiphenyl	96 b	37-170

Type:	BLANK	Diln Fac:	1.000
Lab ID:	QC950301		

Analyte	Result	RL
Aroclor-1016	ND	20
Aroclor-1221	ND	40
Aroclor-1232	ND	20
Aroclor-1242	ND	20
Aroclor-1248	ND	20
Aroclor-1254	ND	20
Aroclor-1260	ND	20

Surrogate	%REC	Limits
Decachlorobiphenyl	93	37-170

b= See narrative
ND= Not Detected
RL= Reporting Limit

ENTHALPY ANALYTICAL

Batch QC Report

Polychlorinated Biphenyls (PCBs)

Lab #:	303660	Location:	Bridge Point Oakland
Client:	EKI Environment & Water, Inc.	Prep:	EPA 3540C
Project#:	B70123.01	Analysis:	EPA 8082
Type:	LCS	Diln Fac:	1.000
Lab ID:	QC950302	Batch#:	264173
Matrix:	Soil	Prepared:	10/03/18
Units:	ug/Kg	Analyzed:	10/04/18

Analyte	Spiked	Result	%REC	Limits
Aroclor-1016	500.0	493.5	99	59-160
Aroclor-1260	500.0	572.4	114	59-170

Surrogate	%REC	Limits
Decachlorobiphenyl	111	37-170

ENTHALPY ANALYTICAL

Batch QC Report

Polychlorinated Biphenyls (PCBs)

Lab #:	303660	Location:	Bridge Point Oakland
Client:	EKI Environment & Water, Inc.	Prep:	EPA 3540C
Project#:	B70123.01	Analysis:	EPA 8082
Field ID:	ZZZZZZZZZZ	Batch#:	264173
MSS Lab ID:	303820-001	Sampled:	10/02/18
Matrix:	Soil	Received:	10/03/18
Units:	ug/Kg	Prepared:	10/03/18
Basis:	as received	Analyzed:	10/04/18
Diln Fac:	1.000		

Type: MS Lab ID: QC950303

Analyte	MSS Result	Spiked	Result	%REC	Limits
Aroclor-1016	<7.394	537.6	653.8	122	73-167
Aroclor-1260	<4.835	537.6	713.9	133	57-178

Surrogate	%REC	Limits
Decachlorobiphenyl	123	37-170

Type: MSD Lab ID: QC950304

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Aroclor-1016	492.1	613.2	125	73-167	2	40
Aroclor-1260	492.1	640.9	130	57-178	2	41

Surrogate	%REC	Limits
Decachlorobiphenyl	135	37-170

RPD= Relative Percent Difference

ENTHALPY ANALYTICAL

Moisture

Lab #:	303660	Location:	Bridge Point Oakland
Client:	EKI Environment & Water, Inc.	Prep:	METHOD
Project#:	B70123.01	Analysis:	ASTM D2216-98/CLP
Analyte:	Moisture, Percent	Batch#:	264038
Matrix:	Soil	Received:	09/14/18
Units:	%	Analyzed:	10/01/18
Diln Fac:	1.000		

Field ID	Lab ID	Result	RL	Sampled
E03 (BASE)	303660-001	17	1	09/13/18
E08 (BASE)	303660-002	3	1	09/14/18
E11 (BASE)	303660-003	15	1	09/14/18
E12A (BASE)	303660-004	3	1	09/14/18

RL= Reporting Limit

ENTHALPY ANALYTICAL

Batch QC Report

Moisture

Lab #:	303660	Location:	Bridge Point Oakland
Client:	EKI Environment & Water, Inc.	Prep:	METHOD
Project#:	B70123.01	Analysis:	ASTM D2216-98/CLP
Analyte:	Moisture, Percent	Units:	%
Field ID:	E12A (BASE)	Diln Fac:	1.000
Type:	SDUP	Batch#:	264038
MSS Lab ID:	303660-004	Sampled:	09/14/18
Lab ID:	QC949777	Received:	09/14/18
Matrix:	Soil	Analyzed:	10/01/18

MSS Result	Result	RL	RPD	Lim
2.826	3.050	1.000	8	26

RL= Reporting Limit
RPD= Relative Percent Difference

APPENDIX D

PRELIMINARY DESIGN DRAWINGS, DETAILS, AND SURVEY CONTROL INFORMATION

5441 International Boulevard
Oakland, California

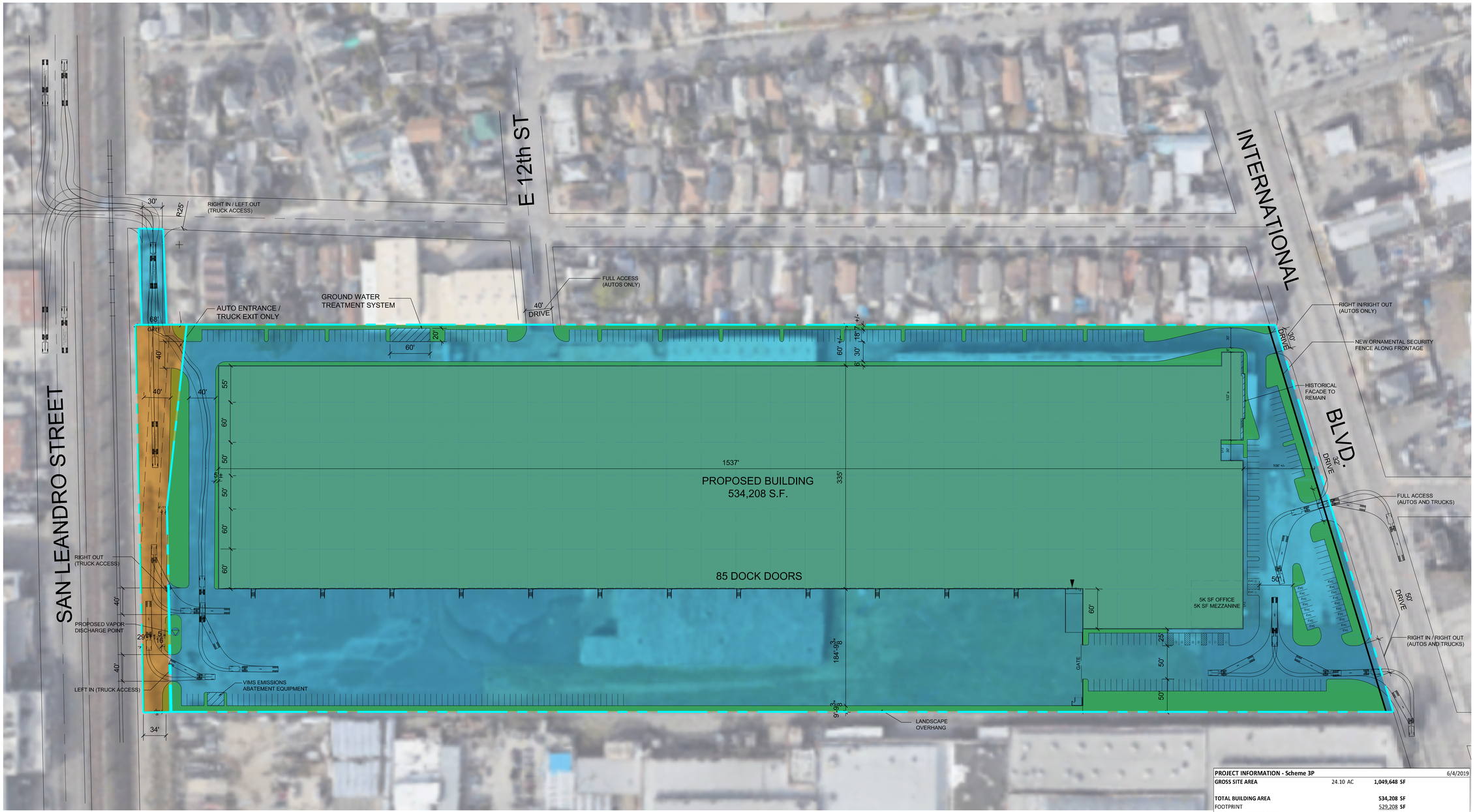
Draft Final - August 2019

(EKI B70123.01)

CONCEPTUAL ALTERNATIVE SITE PLAN,
SCHEME 3Q

(Herdman Architecture + Design)

5441 International Boulevard
Oakland, California



A CONCEPTUAL SITE PLAN
SCALE: 1" = 60'

LEGEND:

UNION PACIFIC PARCEL

BRIDGE PARCELS

PROJECT INFORMATION - Scheme 3P			6/4/2019
GROSS SITE AREA	24.10 AC	**1,049,648 SF**	
TOTAL BUILDING AREA		**534,208 SF**	
FOOTPRINT		529,208 **SF**	
WAREHOUSE		524,208 SF	
OFFICE		5,000 SF	
MEZZANINE LEVEL		5,000 SF	
OFFICE		5,000	
NET COVERAGE		**50.89%**	
MAX FAR		*0.00%*	
LANDSCAPE PROVIDED		**89,633 SF**	**8.54%**
LANDSCAPE REQUIRED		*5.00%*	
PARKING REQUIRED			
WAREHOUSE @ 1/1500		357	
TOTAL REQUIRED		**357**	**STALLS**
PARKING PROVIDED		**357**	**STALLS**
	STANDARD	330	AUTO
	ADA	5	AUTO
	EV	22	
	EV ADA	2	
	TRAILER STALLS	0	TRAILER

PROJECT
BRIDGE DEVELOPMENT
5441 INTERNATIONAL BOULEVARD, CA

SCHEME 3Q
SITE PLAN

BRIDGE

HERDMAN
ARCHITECTURE + DESIGN
16201 Scientific Way
Irvine, CA 92618
www.HerdmanRierson.com
714.389.2800
info@HerdmanRierson.com

A17-2096
07.16.2019

NORTH

CONCEPTUAL SITE PLAN

PRELIMINARY SITE IMPROVEMENT PLANS OF GE SITE

(Kier & Wright, Civil Engineers & Surveyors, Inc.)

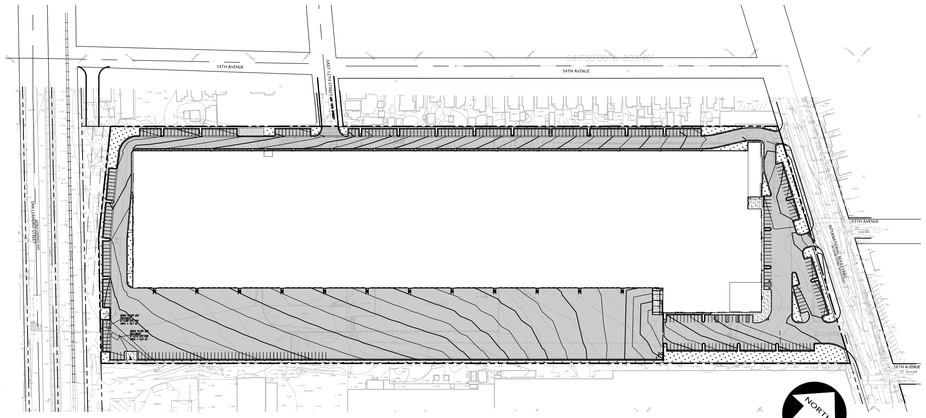
5441 International Boulevard
Oakland, California

PRELIMINARY SITE IMPROVEMENT PLANS
OF
GE SITE
FOR
BRIDGE DEVELOPMENT
OAKLAND, CALIFORNIA

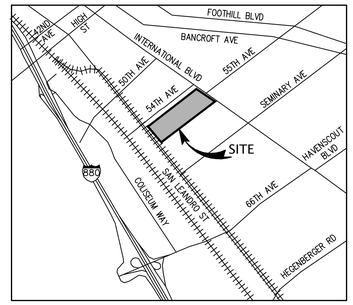
GENERAL NOTES

1. ALL WORK SHALL BE IN CONFORMANCE WITH THE CITY OF OAKLAND DEPARTMENT OF PUBLIC WORKS' STANDARD SPECIFICATIONS AND DETAILS. ALL WORK SHALL BE SUBJECT TO APPROVAL OF AND INSPECTION BY THE CITY ENGINEER.
2. AT LEAST ONE SET OF APPROVED PLANS SHALL BE ON THE SITE AT ALL TIMES FOR INSPECTION. ANY DEVIATION FROM THE APPROVED PLANS DURING CONSTRUCTION WILL REQUIRE 48 HOURS PRIOR NOTICE AND APPROVAL OF THE CITY ENGINEER.
3. THE PERMITTEE/CONTRACTOR SHALL NOTIFY THE CITY OF OAKLAND ENGINEERING DIVISION TWO (2) BUSINESS DAYS PRIOR TO THE START OF ANY WORK.
4. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO ASCERTAIN THE EXISTENCE OF ANY AND ALL UNDERGROUND FACILITIES, WHICH MAY BE SUBJECT TO DAMAGE BY REASON OF HIS OPERATIONS. THE CONTRACTOR SHALL NOTIFY UNDERGROUND SERVICE ALERT (USA) AT (800) 642-2444, 48 HOURS PRIOR TO ANY EXCAVATION. WORK SHALL START WITHIN 5 DAYS AFTER THE ISSUANCE OF A USA INQUIRY IDENTIFICATION NUMBER. COMPLETE REMOVAL OF THE USA MARKINGS SHALL BE WITHIN 2 WORKING DAYS AFTER COMPLETION OF THE EXCAVATION, BACKFILL AND SURFACE REPLACEMENT OR FOURTEEN (14) CALENDAR DAYS FOLLOWING THE ISSUANCE OF THE INQUIRY IDENTIFICATION NUMBER WHICHEVER IS EARLIER.
5. CONTACTING USA DOES NOT RELIEVE THE CONTRACTOR FROM HIS RESPONSIBILITY TO DETERMINE LOCATION AND DEPTH OF BURIED UTILITIES OR REPAIR OF BURIED UTILITIES DAMAGED BY HIS OPERATION.
6. ALL GRADING, SITE PREPARATION, PLACING AND COMPACTION OF FILL SHALL BE DONE IN ACCORDANCE WITH THE CITY OF OAKLAND STANDARDS, SPECIFICATIONS, SPECIFIC NOTES, DETAIL DRAWINGS AND PER THE RECOMMENDATIONS SPECIFIED IN THE "GEOTECHNICAL INVESTIGATION" PREPARED BY CORNERSTONE EARTH GROUP, DATED OCTOBER 25, 2018, FILE NO. 1054-1-1.
7. A GRADING PERMIT IS REQUIRED PRIOR TO COMMENCEMENT OF GRADING. A COPY OF THE GRADING PERMIT IS REQUIRED TO BE ON SITE AT ALL TIMES.
8. GRADING OPERATIONS SHALL BE CONDUCTED IN ACCORDANCE WITH THE RECOMMENDATIONS CONTAINED IN THE SOILS INVESTIGATION REPORT. THE SOILS ENGINEER WILL BE RESPONSIBLE FOR THE ON SITE INSPECTION AND QUALITY CONTROL FOR THE GRADING OPERATION. PLAN REQUIREMENTS AND CONSTRUCTION CONTROL WITH RESPECT TO EARTHWORK, SLOPE STABILITY, SETTLEMENT, COMPACTION, ETC., AS SHOWN HEREIN ARE PROVIDED BY THE SOILS ENGINEER. THE CONTRACTOR SHALL READ AND BE FULLY AWARE OF THE SOILS REPORT BEFORE STARTING WORK. ALL WORK SHALL MEET THE APPROVAL OF THE CITY OF OAKLAND.
9. SUBSEQUENT TO THE COMPLETION OF THE WORK, THE SOILS/GEOTECHNICAL ENGINEER SHALL SUBMIT A REPORT TO THE CITY ENGINEER STATING THAT ALL WORK HAS BEEN DONE IN ACCORDANCE WITH THE "GEOTECHNICAL INVESTIGATION" PREPARED BY CORNERSTONE EARTH GROUP, DATED OCTOBER 25, 2018, FILE NO. 1054-1-1.
10. NOISE-PRODUCING CONSTRUCTION AND GRADING OPERATIONS SHALL BE LIMITED TO WEEKDAYS (MONDAY THROUGH FRIDAY) EXCEPT CITY HOLIDAYS AND FROM THE HOURS OF 7:30 A.M. TO 6:00 P.M. ALL EQUIPMENT SHALL BE ADEQUATELY MUFFLED AND MAINTAINED. NO CHANGES SHALL BE ALLOWED WITHOUT PRIOR WRITTEN CONSENT OF THE CITY. ALL REQUESTS FOR CHANGE MUST BE MADE A MINIMUM OF 72 HOURS PRIOR TO THE REQUEST FOR CHANGE.
11. IT SHALL BE UNDERSTOOD THAT THE TERM "CITY ENGINEER" AS USED HEREIN IS THE CITY ENGINEER OF THE CITY OF OAKLAND OR HIS AUTHORIZED REPRESENTATIVE.

    NO WORK SHALL BE DONE ON THIS PROJECT PRIOR TO A PRE-CONSTRUCTION CONFERENCE TO BE HELD IN THE ENGINEERING DIVISION. CONTACT THE CITY OF OAKLAND ENGINEERING DIVISION TO ARRANGE FOR THE CONFERENCE.
12. A PRE-CONSTRUCTION CONFERENCE SHALL BE SCHEDULED AT LEAST TWO WORKING DAYS IN ADVANCE OF COMMENCEMENT OF ANY CONSTRUCTION WORK FOR THE IMPROVEMENTS DELINEATED WITHIN THIS SET OF PLANS. THE FOLLOWING INDIVIDUALS SHALL BE IN ATTENDANCE: OWNER/DEVELOPER, CONTRACTOR (S), CITY ENGINEER, ENGINEER, SOILS ENGINEER, CONSTRUCTION INSPECTOR, OR THEIR AUTHORIZED REPRESENTATIVES.
13. THE CONTRACTOR SHALL SUBMIT A SCHEDULE OF ALL GRADING OPERATIONS AND RECEIVE APPROVAL OF SAID SCHEDULE FROM THE CITY ENGINEER PRIOR TO OR THE DAY OF THE PRE-CONSTRUCTION CONFERENCE.
14. THE CONSTRUCTION CONTRACTOR AGREES, THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR THE JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND DEFEND, INDEMNIFY AND HOLD THE DESIGN PROFESSIONAL AND CITY HARMLESS FROM ANY AND ALL LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE DESIGN PROFESSIONAL.
15. THE CONTRACTOR SHALL PROVIDE EMERGENCY TELEPHONE NUMBERS FOR PUBLIC WORKS, AMBULANCE, POLICE, AND FIRE DEPARTMENTS AT THE JOB SITE.
16. THE CONTRACTOR SHALL NOT DISTURB OR DESTROY ANY PERMANENT SURVEY POINTS WITHOUT THE CONSENT OF THE CITY ENGINEER. IN THE EVENT IT BECOMES NECESSARY TO REMOVE OR DISTURB A MONUMENT, THE PERSON SO DOING SHALL FIRST OBTAIN PERMISSION, IN WRITING, FROM THE CITY ENGINEER AND SHALL DEPOSIT WITH THE CITY ENGINEER A SUFFICIENT AMOUNT, BASED UPON THE CITY ENGINEER'S ESTIMATE, TO COVER THE COST OF PRELIMINARY REFERENCING AND FINAL RELOCATION OF THE MONUMENTS.
17. ALL CONSTRUCTION STAKING SHALL BE DONE BY A REGISTERED CIVIL ENGINEER OR LICENSED LAND SURVEYOR. UPON COMPLETION OF GRADING, THE CONTRACTOR SHALL REQUEST THE LICENSED LAND SURVEYOR TO CHECK THE GRADES AND CERTIFY THAT THE PADS ARE GRADED TO WITHIN ± 0.10 FOOT OF FINISH PAD GRADE.
18. THE CONTRACTOR SHALL PROVIDE FOR INGRESS AND EGRESS FOR PRIVATE PROPERTY ADJACENT TO THE WORK AREA THROUGHOUT THE PERIOD OF CONSTRUCTION.
19. THE CONTRACTOR IS RESPONSIBLE FOR MATCHING EXISTING STREETS, SURROUNDING LANDSCAPE AND OTHER IMPROVEMENTS, WITH A SMOOTH TRANSITION IN GRADE AVOIDING ANY ABRUPT OR APPARENT CHANGES IN GRADE OR CROSS SLOPE, LOW SPOTS OR HAZARDOUS CONDITIONS.
20. EXISTING CURB AND SIDEWALK WITHIN THE PROJECT LIMITS THAT ARE DAMAGED OR DISPLACED, EVEN THOUGH THEY WERE NOT TO BE REMOVED, SHALL BE REPAIRED OR REPLACED, EVEN IF THE DAMAGE OR DISPLACEMENT OCCURRED PRIOR TO ANY WORK PERFORMED BY THE CONTRACTOR. CONTRACTOR SHALL DOCUMENT CONDITION VIA PHOTOGRAPHS PRIOR TO START OF CONSTRUCTION.
21. THE CONTRACTOR SHALL CONTROL DUST BY WATERING EXPOSED SURFACES AS NEEDED. INCREASED WATERING SHALL BE REQUIRED WHEN WIND SPEEDS EXCEED 10 MPH OR WHEN DIRECTED BY THE CITY.
22. NO PERSON SHALL, WHEN HAULING ANY EARTH, SAND, GRAVEL, STONE, DEBRIS, PAPER, OR ANY OTHER SUBSTANCE OVER ANY PUBLIC STREETS OR OTHER PUBLIC PLACE, ALLOW MATERIAL TO BLOW OR SPILL OVER AND UPON SAID PUBLIC OR ADJACENT PRIVATE PROPERTY. ALL LOADS LEAVING THE SITE SHALL BE COVERED.
23. THE CONTRACTOR SHALL PROVIDE STABILIZED CONSTRUCTION ENTRANCE TO PREVENT THE TRACKING OF SOIL, DUST, MUD, OR CONSTRUCTION DEBRIS ON PUBLIC STREETS.
24. MUD TRACKED ONTO STREETS OR ADJACENT PROPERTIES SHALL BE REMOVED IMMEDIATELY, STREET SHALL BE SWEPT WITH A POWER SWEEPER (NOT PRESSURE WASHED) AS DIRECTED BY THE CITY.
25. A DISPOSAL SITE FOR ANY OFF-SITE HAUL OF DIRT MATERIALS SHALL BE APPROVED BY THE CITY PRIOR TO APPROVAL OF THE GRADING PERMIT. THE OFF-SITE HAUL ROUTE FOR EXCESS DIRT OR CONSTRUCTION DEBRIS IS SUBJECT TO APPROVAL OF THE CITY ENGINEER.
26. EXCAVATIONS SHALL BE ADEQUATELY SHORED, BRACED AND SHEETED SO THAT THE EARTH WILL NOT SLIDE OR SETTLE AND SO THAT ALL EXISTING IMPROVEMENTS OF ANY KIND WILL BE FULLY PROTECTED FROM DAMAGE. ANY DAMAGE RESULTING FROM A LACK OF ADEQUATE SHORING, BRACING AND SHEETING, SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND THE CONTRACTOR SHALL EFFECT NECESSARY REPAIRS OR RECONSTRUCTION AT HIS OWN EXPENSE. WHERE THE EXCAVATION FOR A TRENCH, STRUCTURE AND/OR BORING OR JACKING PIT IS FIVE FEET OR MORE IN DEPTH THE CONTRACTOR SHALL CONFORM TO THE APPLICABLE CONSTRUCTION SAFETY ORDERS OF THE DIVISION OF INDUSTRIAL SAFETY OF THE STATE OF CALIFORNIA.
27. TRENCH BACKFILL MATERIALS SHALL BE CLASS B-1 BEDDING (SD-125)
28. ALL TRENCHES IN EXISTING CITY STREETS SHALL BE BACKFILLED AND PAVED WITHIN 24 HOURS OF EXCAVATION. STEEL PLATES MAY BE PLACED OVER UNBACKFILLED TRENCHES BEYOND THE 24 HOUR PERIOD WITH THE SPECIFIC APPROVAL OF THE CITY ENGINEER.
29. ALL REINFORCED CONCRETE PIPE SHALL BE CLASS III OR BETTER, UNLESS OTHERWISE NOTED.
30. OPERATION OF VALVES ON THE ALAMEDA COUNTY WATER DISTRICT WATER SYSTEM SHALL BE PERFORMED BY WATER BUREAU PERSONNEL ONLY.



SITE LOCATION
1"= 150'



VICINITY MAP
NOT TO SCALE

SHEET INDEX

SHEET	DESCRIPTION
CIVIL	
C1.0	COVER SHEET
C1.1	DETAILS
C2.0	TOPOGRAPHIC SURVEY
C2.1	TOPOGRAPHIC SURVEY
C3.0	PRELIMINARY GRADING & DRAINAGE PLAN
C3.1	PRELIMINARY GRADING & DRAINAGE PLAN
C4.0	PRELIMINARY UTILITY PLAN
C4.1	PRELIMINARY UTILITY PLAN
C5.0	EROSION CONTROL PLAN
C6.0	PRELIMINARY STORM WATER QUALITY CONTROL PLAN

DEVELOPER

BRIDGE DEVELOPMENT PARTNERS
ATTN: BRENDAN KOTLER
1600 E. FRANKLIN AVE., SUITE D
EL SEGUNDO, CA 90245
PHONE: 213-805-6350

CIVIL ENGINEER

KIER & WRIGHT CIVIL ENGINEERS & SURVEYORS, INC.
ATTN: ADAM MAHONEY, P.E., L.S.
2850 COLLIER CANYON ROAD
LIVERMORE, CA 94551
925-245-8788

SOIL ENGINEER

CORNERSTONE EARTH GROUP, INC.
ATTN: DANH T. TRAN, P.E.
1259 OAKMEAD PKWY.,
SUNNYVALE, CA 94085
PHONE: 408-245-4600

LANDSCAPE ARCHITECT

JETT LANDSCAPE ARCHITECTURE + DESIGN
ATTN: BRUCE JETT
ADDRESS: 2 THEATRE SQUARE, #218
ORINDA, CA 94563
PHONE: (925) 254-5422

ARCHITECT

HERDMAN ARCHITECTURE + DESIGN
ATTN: BRIDGET HERDMAN, AIA
16201 SCIENTIFIC WAY,
IRVINE, CA 92618
PHONE: 714-389-2800

811 Know what's below. Call before you dig.

PROGRESS SET

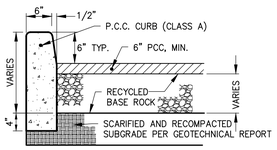
NO.	REVISION	BY

KIER & WRIGHT
CIVIL ENGINEERS & SURVEYORS, INC.
2850 Collier Canyon Road Phone (925) 245-8788
Livermore, California 94551 Fax (925) 245-8796
www.kierwright.com

COVER SHEET
GE SITE
FOR
BRIDGE DEVELOPMENT
OAKLAND, CALIFORNIA

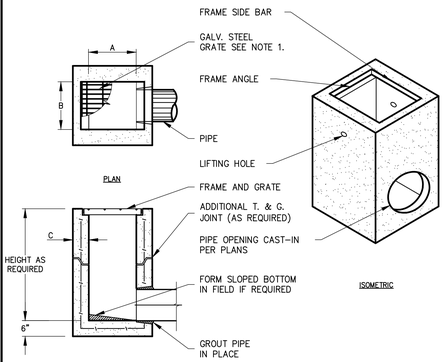
DATE	AUGUST 2019
SCALE	AS SHOWN
DESIGNER	KS
DRAFTER	TAB
JOB NO.	A18535
SHEET	C1.0
OF	10 SHEETS

Z:\2018\A18535\DWG\ENTITLEMENTS\OPTION 1\A18535-PrC-OPTION 1.dwg 8-22-19 09:30:56 AM mphdnell



* WEEPHOLES TO BE PLACED ON ALL CURBS AND CURB & GUTTER WHERE LANDSCAPING SLOPES TOWARD CURB. WEEPHOLES SHALL BE PLACED AT 10' O.C. OR AT EACH SCORELINE OF THE CURB.

CONCRETE CURB
NOT TO SCALE — 1

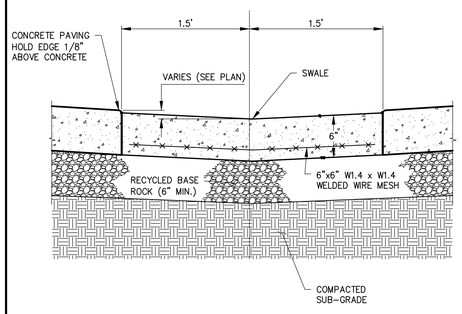


DROP INLET
US CONCRETE PRECAST GROUP
NOT TO SCALE — 5

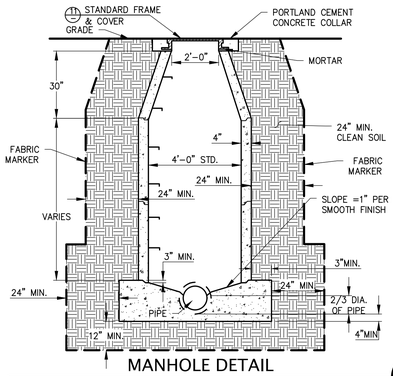
NOTES :
1. FRAMES AND GRATES MAY BE SPECIFIED FOR PEDESTRIAN OR H20 TRAFFIC LOADING. ALL GRATES ARE BICYCLE PROOF. OPTIONAL GRATE LOCKING DEVICE AVAILABLE ON REQUEST SEE DRAWING "LOCK" ON PAGE 1-7 OF THE CENTRAL PRECAST CATALOG. CLOSED-MESH GRATES OR CAST IRON FRAME AND GRATES ARE AVAILABLE ON REQUEST.
2. FOR SURFACE AND DISCHARGE OPTIONS AVAILABLE SEE DRAWING NO. "DI-50" PAGE 1-6 AND "DI-00" PAGE 1-5 OF THE CENTRAL PRECAST CATALOG.
3. FRAMES AND GRATES DETAILS SEE PAGES 1-8, 1-9, AND 1-10 OF THE CENTRAL PRECAST CATALOG.
4. WALL THICKNESSES ON ALL D.I.S. CAN BE CHANGED UPON REQUEST.
5. 18" WIDE D.I.'S REPLACE THE OLD 16" WIDE BOX BK & 1K.
6. ALL TRENCHES TO BE CAPPED PER DETAIL 2 ON THIS SHEET.

DROP INLET TABLE

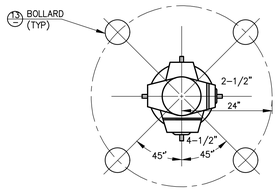
MODEL No.	CPC MODEL NAME	A		B		C	
		IN	MM	IN	MM	IN	MM
CP1212	EK	12	300	12	300	4	100
CP1818	CK	18	450	18	450	5	125
CP1824	1K*	18	450	24	600	5	125
CP2424	2K	24	600	24	600	5	125
CP2430	3K	24	600	30	750	5	125
CP3030	5K	30	750	30	750	6	150
CP2436	1L	24	600	36	900	6	150
CP3636	1M	36	900	36	900	6	150
CP2448	3L	24	600	48	1200	6	150
CP3648	3M	36	900	48	1200	6	150
CP4848	1R	48	1200	48	1200	6	150



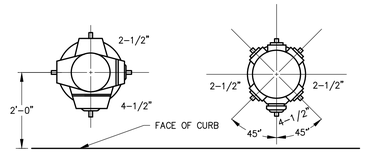
VALLEY GUTTER
NOT TO SCALE — 7



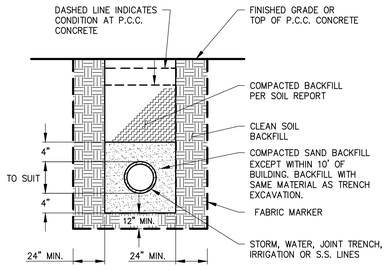
MANHOLE DETAIL
NOT TO SCALE — 10



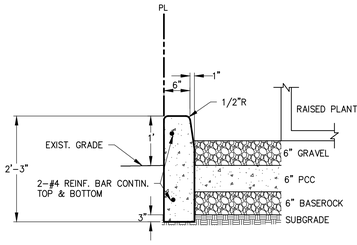
HYDRANT W/ BOLLARDS



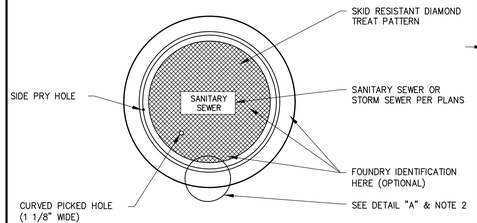
HYDRANT POSITION ON BURY

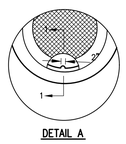


PIPE LINE BACKFILL AND BEDDING DETAIL
NOT TO SCALE — 2

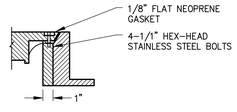


DEEPENED CURB WALL
NOT TO SCALE — 8

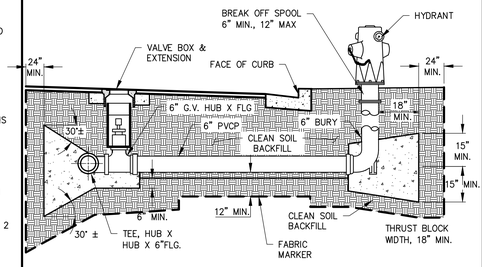




DETAIL A

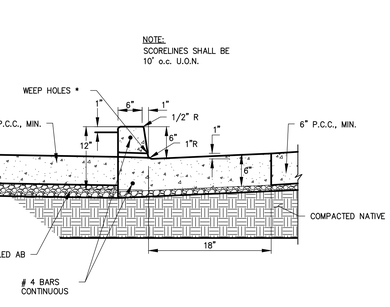


SECTION 1-1



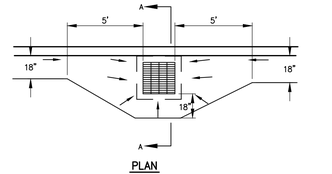
NOTE:
1. CAST CONCRETE AGAINST COMPACTED CLEAN SOIL

HYDRANT INSTALLATION
NOT TO SCALE — 12

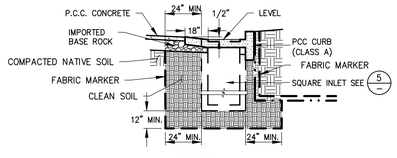


* WEEPHOLES TO BE PLACED ON ALL CURBS AND CURB & GUTTER WHERE LANDSCAPING SLOPES TOWARD CURB. WEEPHOLES SHALL BE PLACED AT 10' O.C. OR AT EACH SCORELINE OF THE CURB.

CONCRETE CURB & GUTTER
NOT TO SCALE — 3

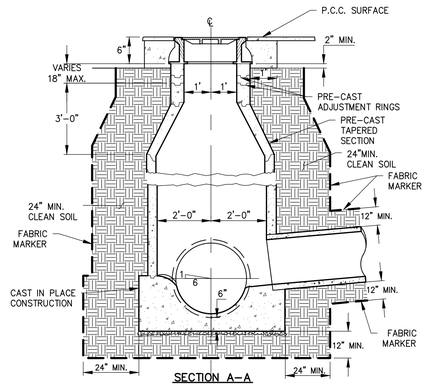


PLAN

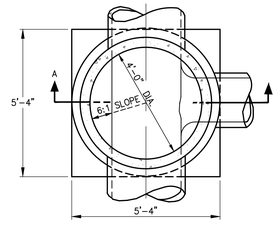


SECTION A-A

GUTTER FLARE DETAIL AT CURB
NOT TO SCALE — 4



SECTION A-A

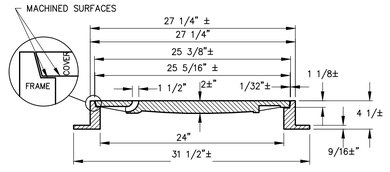


PLAN OF BASE

NOTES:
1. SANITARY SEWER MANHOLES SHALL BE CONSTRUCTED ACCORDING TO SPECIFICATIONS.
2. 3' I.D. MANHOLES WITH 24" HIGH CONES MAY BE USED IN CASE OF SHALLOW COVER IF PRIOR APPROVAL IS GRANTED BY THE CITY ENGINEER.
3. ALL UTILITY STRUCTURES TO BE CAPPED AS SHOWN HERE.
4. ALL PIPES WILL BE SURROUNDED WITH CLEAN IMPORT SOIL AND FABRIC MARKER PER DETAIL 2 ON THIS SHEET

STORM DRAIN MANHOLE
NOT TO SCALE — 6

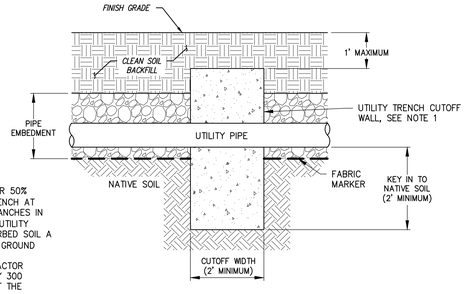
NOT USED
NOT TO SCALE — X



SECTION

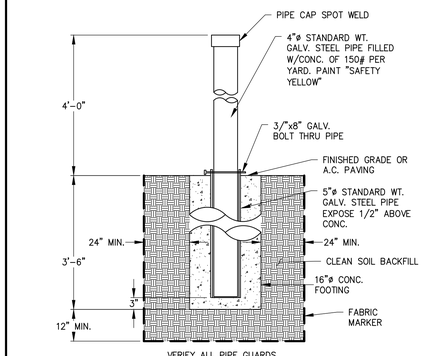
NOTES:
1. MINIMUM WEIGHT OF SET 320 LBS.
2. ADDED BOSS TO FRAME (4 ea.@ 90°) FOR HOLDDOWN BOLTS, PRESSURE TYPE MANHOLES TO BE USED ONLY WHERE CALLED FOR ON THE PLANS.

STANDARD MANHOLE FRAME AND COVER
NOT TO SCALE — 11

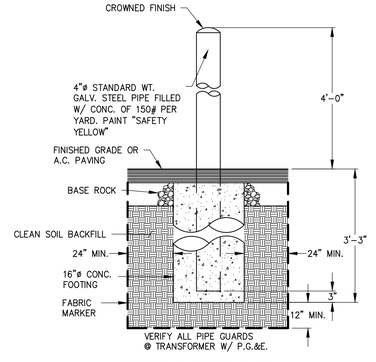


NOTES:
1. CLSM (50% BENTONITE 3/8" PELLETS/50% NATIVE SOIL OR 50% CONCRETE/50% NATIVE SOIL) CUTOFF BARRIER INSIDE TRENCH AT 300 FOOT INTERVALS OR LESS, WITHIN 50 LF OF ALL BRANCHES IN THE DISTRIBUTION SYSTEM, AND AT ENTRANCE/EXITS OF UTILITY STRUCTURES. CUTOFF BARRIER SHALL KEY INTO UNDISTURBED SOIL A MINIMUM OF 2' AND EXTEND TO A MINIMUM OF 1' BELOW GROUND SURFACE.
2. IF A CLSM IS NOT USED TO BACKFILL A TRENCH, CONTRACTOR SHALL INSTALL CUTOFF WALLS WITHIN THE TRENCH EVERY 300 LINEAR FEET, WITHIN 50 FEET OF ANY BRANCHES AND AT THE ENTRANCES/EXITS TO UTILITY STRUCTURES OR BUILDINGS.
3. SEE VIMS DESIGN BY OTHERS FOR BUILDING PERIMETER UTILITY TRENCH CUTOFF WALL.

UTILITY TRENCH CUTOFF WALL
NOT TO SCALE — 9



A-REMOVEABLE PIPE GUARD



B-CONC. FILLED PIPE GUARD

PIPE GUARDS
NOT TO SCALE — 13

PROGRESS SET

REVISION | NO. | BY

KIER & WRIGHT
CIVIL ENGINEERS & SURVEYORS, INC.
2850 Collier Canyon Road
Livermore, California 94551
Phone (925) 245-8788
Fax (925) 245-8796
www.kierwright.com

DETAILS
GE SITE
FOR
BRIDGE DEVELOPMENT
OAKLAND, CALIFORNIA

DATE	AUGUST 2019
SCALE	AS SHOWN
DESIGNER	KS
DRAFTER	TAB
JOB NO.	A18535
SHEET	C1.1
OF	10 SHEETS

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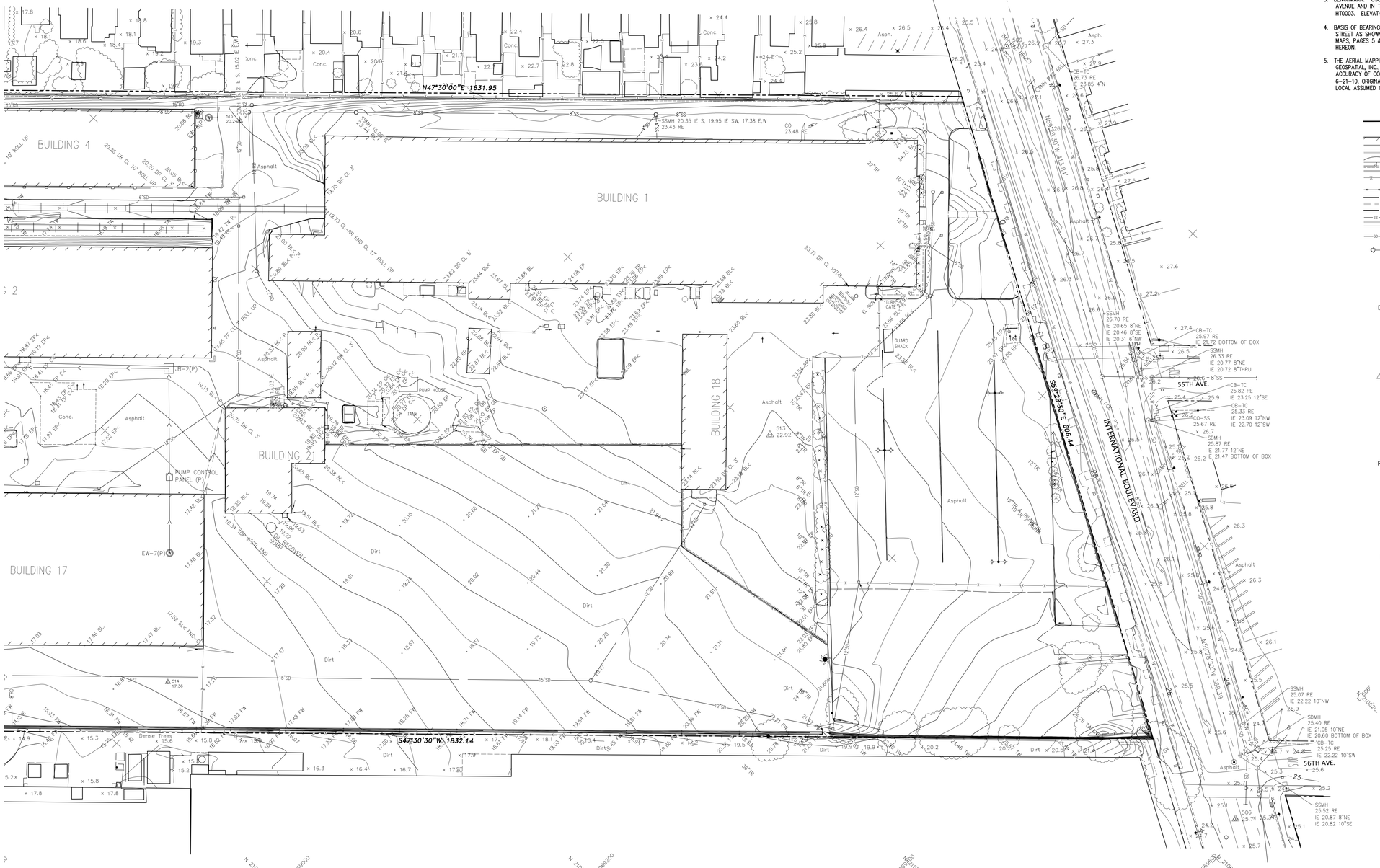


0 20 40 80 120

Scale 1" = 40 ft

NOTES

1. THIS IS NOT A BOUNDARY SURVEY. BOUNDARY INFORMATION SHOWN HEREON WAS PREPARED FROM RECORD DATA INFORMATION. NO LIABILITY IS ASSUMED BY KIER & WRIGHT FOR THE EXISTENCE OF ANY EASEMENTS, ENCUMBRANCES, DISCREPANCIES IN BOUNDARY OR TITLE DEFECTS NOT SHOWN ON THIS DRAWING.
2. ALL DISTANCES SHOWN HEREON ARE IN FEET AND DECIMALS THEREOF.
3. BENCHMARK: USC&GS STANDARD DISC SET IN A SQUARE CONCRETE POST NEAR THE CENTERLINE OF 54TH AVENUE AND IN THE NORTHEAST SIDE OF THE RAILROAD RIGHT OF WAY IN EAST OAKLAND. NGS PID HT0003. ELEVATION = 11.50 (NAVD88)
4. BASIS OF BEARINGS: THE BEARING OF S 59°28'30" E TAKEN ON THE MONUMENT LINE OF EAST 14TH STREET AS SHOWN ON PARCEL MAP NO. 8104, FILED FOR RECORD ON FEBRUARY 5, 2003 IN BOOK 270 OF MAPS, PAGES 5 & 6, ALAMEDA COUNTY RECORDS WAS TAKEN AS THE BASIS FOR ALL BEARINGS SHOWN HEREON.
5. THE AERIAL MAPPING WAS PREPARED USING COMPUTER ASSISTED, PHOTOGRAMMETRIC METHODS BY HJW GEOSPATIAL, INC., IN OAKLAND CALIFORNIA. JOB NUMBER 10-070. IN AREAS OF DENSE VEGETATION, ACCURACY OF CONTOURS MAY DEVIATE FROM ACCEPTED ACCURACY STANDARDS. DATE OF PHOTOGRAPHY 6-21-10, ORIGINAL COMPILED MAP SCALE 1"=40', CONTOUR INTERVAL OF 1 FOOT. THE GRID IS BASED ON LOCAL ASSUMED COORDINATE SYSTEM. CONTROL SURVEY PERFORMED BY KIER & WRIGHT, PLEASANTON, CA.

LEGEND

	BUILDING LINE
	CONCRETE CURB
	CONCRETE CURB & GUTTER
	CONTOUR LINE
	DRIVEWAY
	EDGE OF PAVEMENT
	FENCE LINE
	GAS METER
	GUARD RAIL
	LOT LINE
	MONUMENT/MONUMENT LINE
	PROPERTY LINE
	SANITARY SEWER-MANHOLE & CLEANOUT
	SIDEWALK
	SPOT ELEVATION
	STORM DRAIN-MANHOLE & CATCH BASIN
	BACKFLOW PREVENTION DEVICE
	ELECTROLIER
EW	GROUNDWATER EXTRACTION WELL
	FIRE DEPARTMENT CONNECTION
	FIRE HYDRANT
JB	JUNCTION BOX
	POST INDICATOR VALVE
	POWER POLE/JOINT POLE
	TRAFFIC SIGN
	TREE
	UTILITY BOX
<	ANGLE POINT
AD	AREA DRAIN
ASR	AUTOMATIC SPRINKLER RISER
BEG	BEGIN
BFP	BACK FLOW PREVENTION DEVICE
BL	BUILDING LINE
BS	BOTTOM OF STAIRS
BOTT	BOTTOM
BW	BACK OF WALK
△CNTRL	SURVEY CONTROL POINT
CB	CATCH BASIN
C	CONCRETE
CO	CLEAN OUT
DR	DOOR
DWY	DRIVEWAY
DYLT	DAY LIGHT LINE
EB	ELECTRIC BOX
EC	EDGE OF CONCRETE
EP	EDGE OF PAVEMENT
EW	EDGE OF WALK
FC	FACE OF CURB
FDC	FIRE DEPARTMENT CONNECTION
FD MON	FOUND MONUMENT
FF	FINISH FLOOR
FH	FIRE HYDRANT
FL	FLOW LINE
FNC	FENCE
FW	FACE OF WALL
GA	GUY ANCHOR
GB	GRADE BREAK
GM	GAS MARKER/METER
GRN	GROUND
GV	GAS VALVE
HCR	HANDICAP RAMP
HP	HIGH POINT
HDWL	HEADWALL
HSBIB	HOSEBIBB
IE	INVERT ELEVATION
LP	LOW POINT
LIP	LIP OF GUTTER
M-M	MONUMENT TO MONUMENT
MW	MONITORING WELL
P	PAVEMENT
PIV	POST INDICATOR VALVE
PP	POWER POLE
RE	RIM ELEVATION
SDMH	STORM DRAIN MANHOLE
SL	STREET LIGHT
SLB	STREET LIGHT BOX
SSMH	SANITARY SEWER MANHOLE
TB	TELEPHONE BOX
TC	TOP OF CURB
TR	TREE
TS	TOP OF STAIRS
TW	TOP OF WALL
UB	UNKNOWN UTILITY BOX
WB	WATER BOX
WM	WATER METER
WV	WATER VALVE

PREPARED BY OR UNDER THE SUPERVISION OF JOSEPH D. THOMPSON, L.S. 8121
LICENSE EXPIRES: 12-31-20
DATE

LICENSED LAND SURVEYOR JOSEPH D. THOMPSON No. 8121 Exp. 12-31-20 STATE OF CALIFORNIA

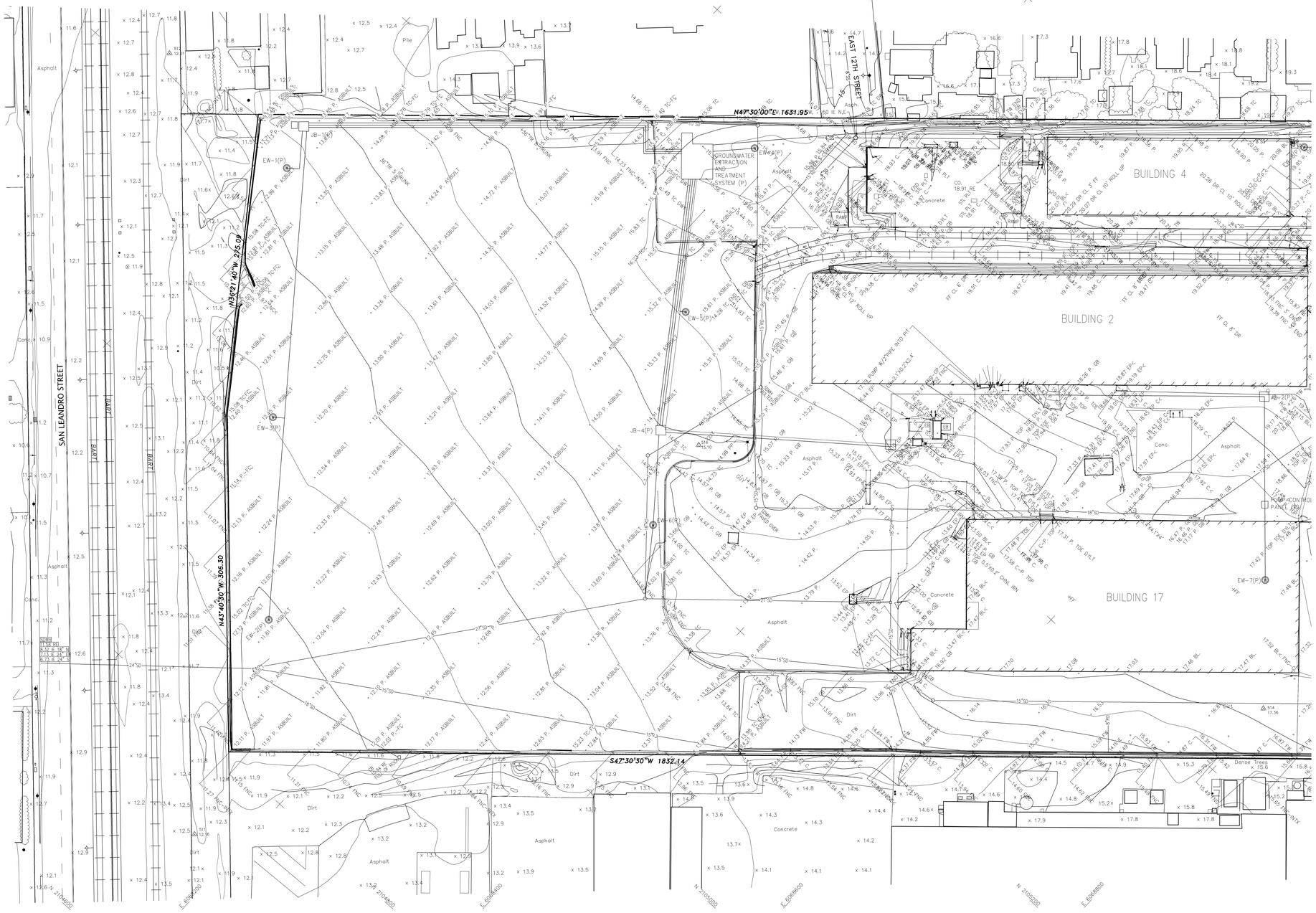
PROGRESS SET

NO.	BY	REVISION

KIER & WRIGHT
CIVIL ENGINEERS & SURVEYORS, INC.
2850 Collier Canyon Road
Livermore, California 94551
Phone (925) 245-8788
Fax (925) 245-8796
www.kierwright.com

TOPOGRAPHIC SURVEY
GE SITE
FOR
BRIDGE DEVELOPMENT
OAKLAND, CALIFORNIA

DATE	AUGUST 2019
SCALE	AS SHOWN
DESIGNER	KS
DRAFTER	TAB
JOB NO.	A18535
SHEET	C2.0
OF	10 SHEETS



0 20 40 80 120

Scale 1" = 40 ft

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LEGEND

	BUILDING LINE
	CONCRETE CURB
	CONCRETE CURB & GUTTER
	CONTOUR LINE
	DRIVEWAY
	EDGE OF PAVEMENT
	FENCE LINE
	GAS METER
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LICENSE EXPIRES: 12–31–20
DATE

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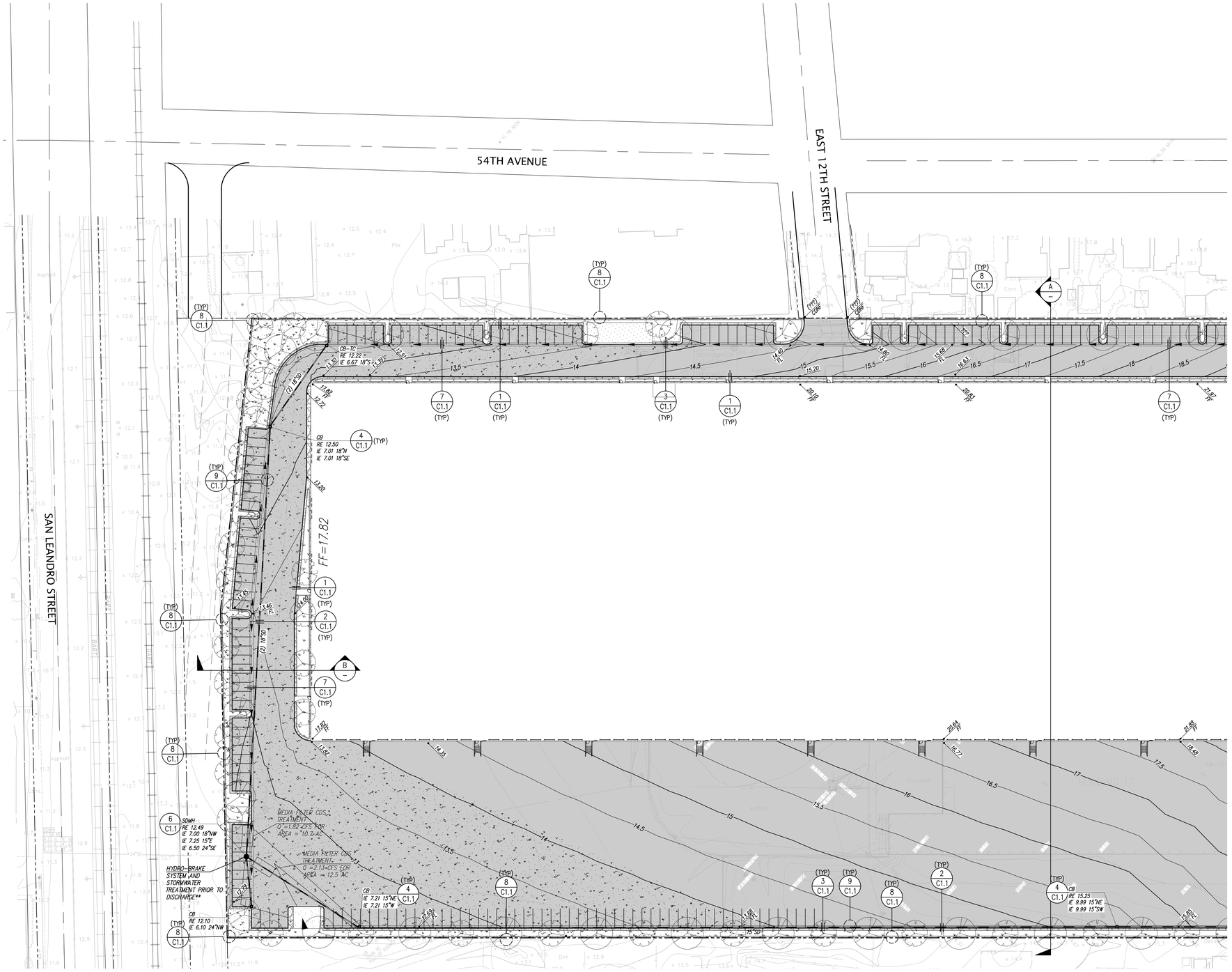
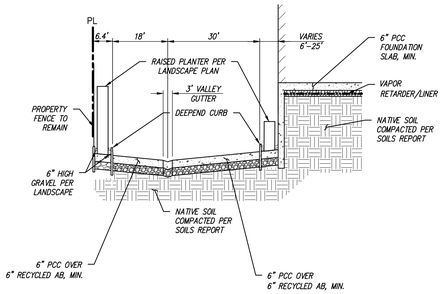




LEGEND

- STORM DRAIN CATCH BASIN
- STORM DRAIN JUNCTION BOX
- STORM DRAIN MANHOLE
- STORM DRAIN CLEANOUT
- FL FLOW LINE
- FF FINISH FLOOR
- P/V PAVEMENT
- RE RIM ELEVATION
- 23.8 / X"SD SPOT ELEVATION
- STORM DRAIN LINE
- TC TOP OF CURB
- TRENCH CUTOFF WALL
- POTENTIAL SURFACE PONDING AREA (DEPTH VARIES FROM 5" TO 12")

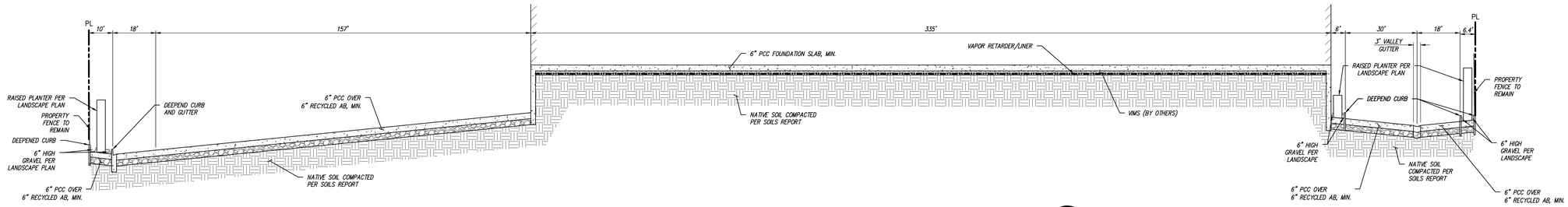


SECTION B
NTS

NOTE:

* EXISTING WALLS ARE TO REMAIN AND PROTECT IN PLAN UNTIL NEW PAVEMENT AND LANDSCAPE GRADING ARE COMPLETED AND INSTALLED

** STORMWATER MANAGEMENT AND SEDIMENT REMOVAL APPROACH TO BE DEVELOPED PENDING HYDRAULIC ANALYSIS TO MEET LOCAL AND STATE REQUIREMENTS. SURFACE PONDING WITH THE USE OF HYDRO-BRAKE SYSTEM SHOWN HERE IS ONE POTENTIAL ALTERNATIVE UNDER CONSIDERATION



SECTION A
NTS

PROGRESS SET

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PRELIMINARY GRADING & DRAINAGE PLAN
GE SITE
FOR
BRIDGE DEVELOPMENT
OAKLAND, CALIFORNIA

DATE	AUGUST 2019
SCALE	AS SHOWN
DESIGNER	KS
DRAFTER	TAB
JOB NO.	A18535
SHEET	C3.0
OF	10 SHEETS

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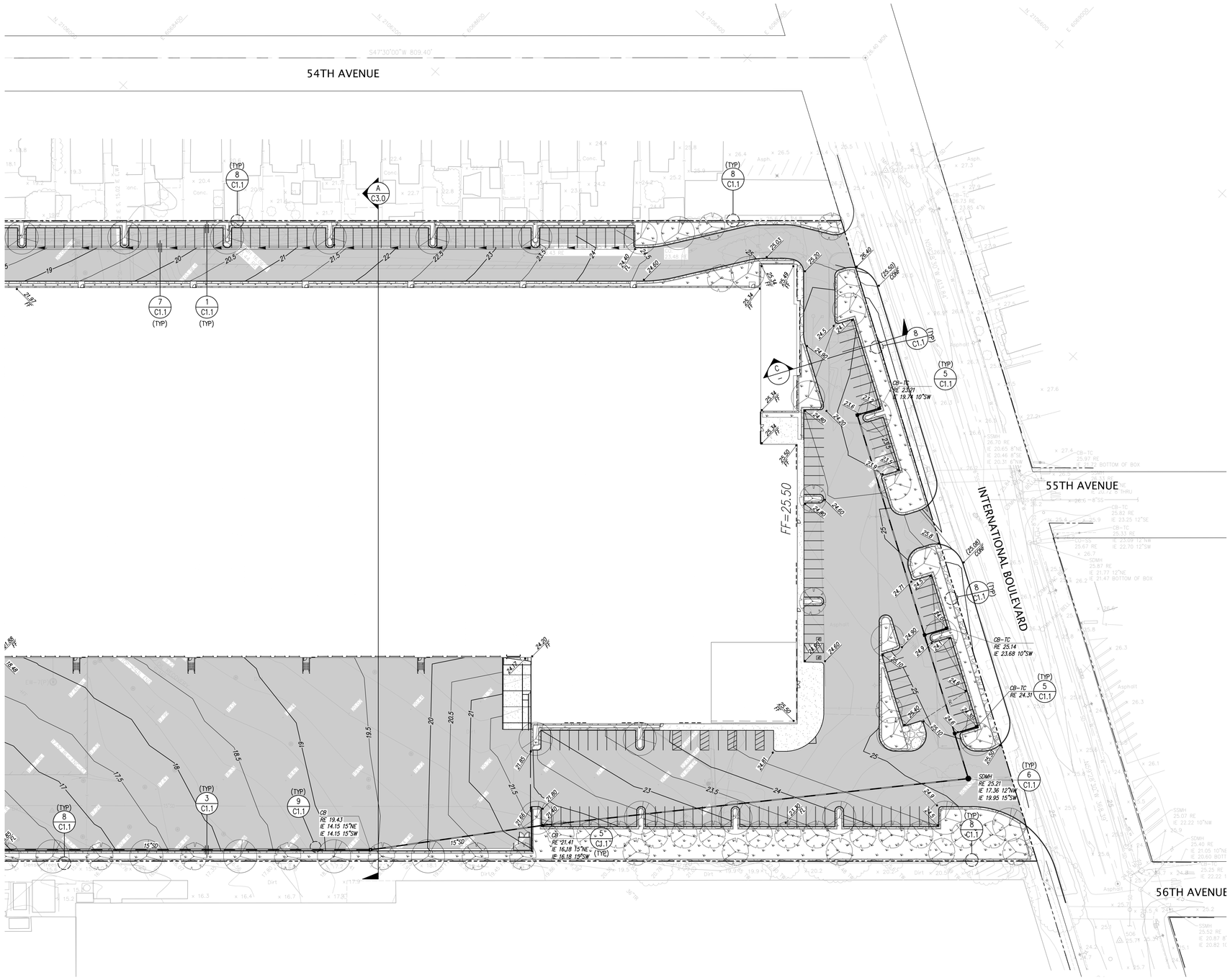

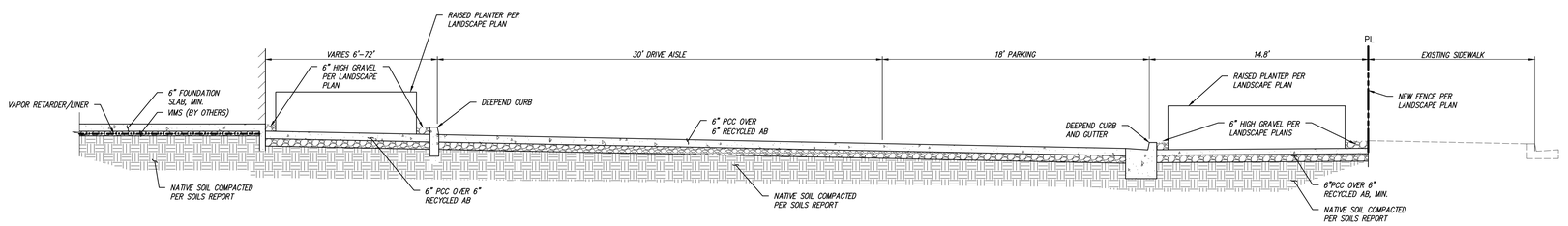

SECTION C

NOTE:

* EXISTING WALLS ARE TO REMAIN AND PROTECT IN PLAN UNTIL NEW PAVEMENT AND LANDSCAPE GRADING ARE COMPLETED AND INSTALLED

0 20 40 80 120

Scale 1" = 40'

LEGEND

	STORM DRAIN CATCH BASIN
	STORM DRAIN JUNCTION BOX
	STORM DRAIN MANHOLE
	STORM DRAIN CLEANOUT
FL	FLOW LINE
FF	FINISH FLOOR
PV	PAVEMENT
RE	RIM ELEVATION
23.8	SPOT ELEVATION
X"SD	STORM DRAIN LINE
TC	TOP OF CURB
	TRENCH CUTOFF WALL

PROGRESS SET

NO.	REVISION	BY

KIER & WRIGHT
CIVIL ENGINEERS & SURVEYORS, INC.
2850 Collier Canyon Road
Livermore, California 94551
Phone (925) 245-8788
Fax (925) 245-8796
www.kierwright.com

PRELIMINARY GRADING & DRAINAGE PLAN
GE SITE
FOR
BRIDGE DEVELOPMENT
OAKLAND, CALIFORNIA

DATE	AUGUST 2019
SCALE	AS SHOWN
DESIGNER	KS
DRAFTER	TAB
JOB NO.	A18535
SHEET	C3.1
OF	10 SHEETS

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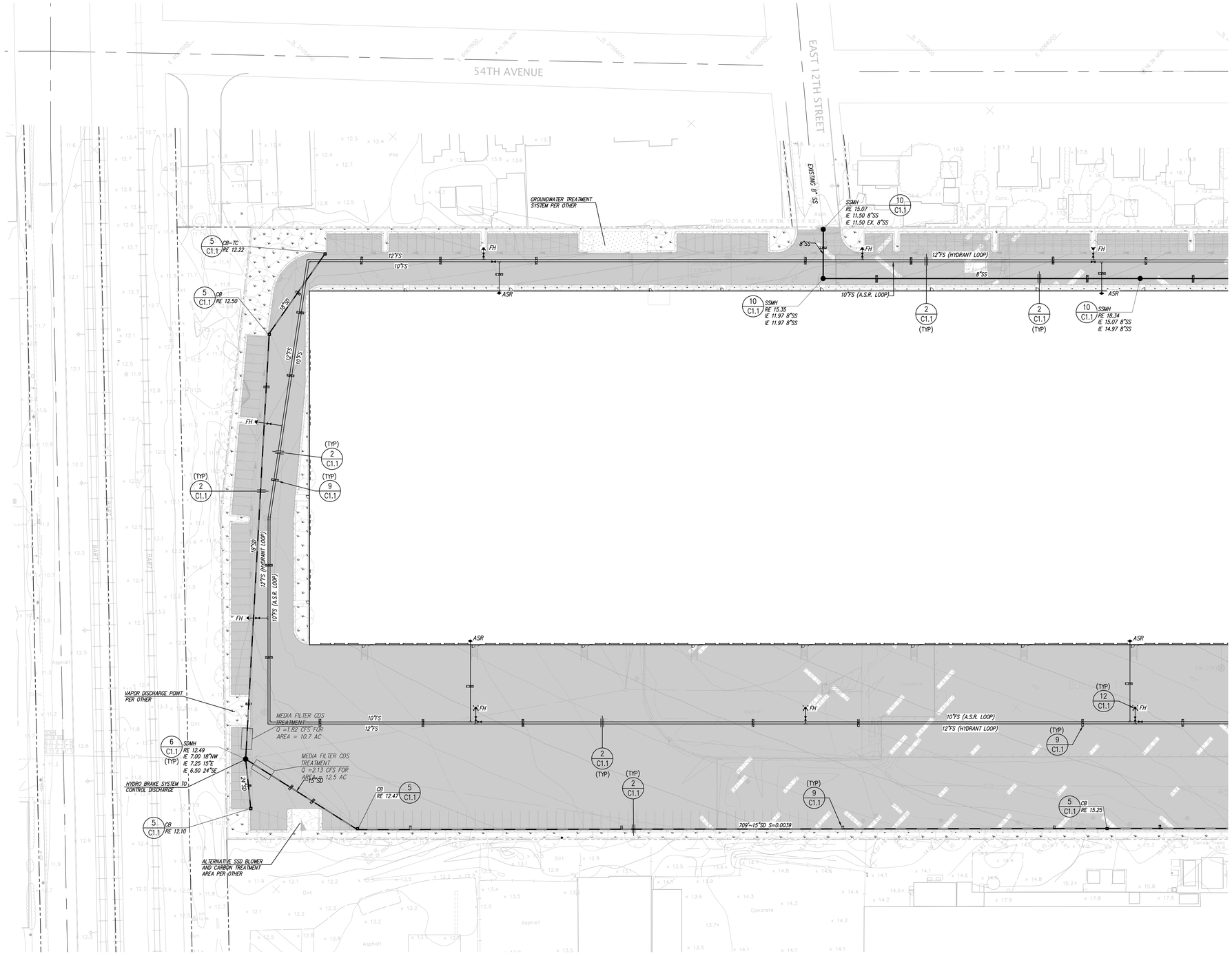



0 20 40 80 120

Scale 1" = 40'

LEGEND

ASR	AUTOMATIC SPRINKLER RISER
RE	RIM ELEVATION
IE	INVERT ELEVATION
TC	TOP OF CURB
WS	WATER SERVICE
	EXISTING UTILITY TO BE ABANDONDED BY REMOVAL
FS	FIRE SERVICE
SS	SANITARY SEWER
COTG	CLEANOUT TO GRADE
	STORM DRAIN LINE
	STORM DRAIN CATCH BASIN
	STORM DRAIN JUNCTION BOX
	STORM DRAIN CLEANOUT
	BACK FLOW PREVENTION DEVICE
	FIRE DEPARTMENT CONNECTION
	FIRE HYDRANT & VALVE
	POST INDICATOR VALVE
SSMH	SANITARY SEWER MANHOLE
	SINGLE CHECK VALVE
SDMH	STORM DRAIN MANHOLE
	WATER METER
	CUTOFF WALL IN TRENCH

NOTE:

ONSITE IRRIGATION AND ELECTRICAL SHALL BE DESIGNED BY OTHERS

PROGRESS SET

NO.	REVISION	BY

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CIVIL ENGINEERS & SURVEYORS, INC.
2850 Collier Canyon Road
Livermore, California 94551
Phone (925) 245-8788
Fax (925) 245-8796
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PRELIMINARY UTILITY PLAN

GE SITE
FOR
BRIDGE DEVELOPMENT

OAKLAND, CALIFORNIA

DATE	AUGUST 2019
SCALE	AS SHOWN
DESIGNER	KS
DRAFTER	TAB
JOB NO.	A18535
SHEET	C4.0
OF	10 SHEETS

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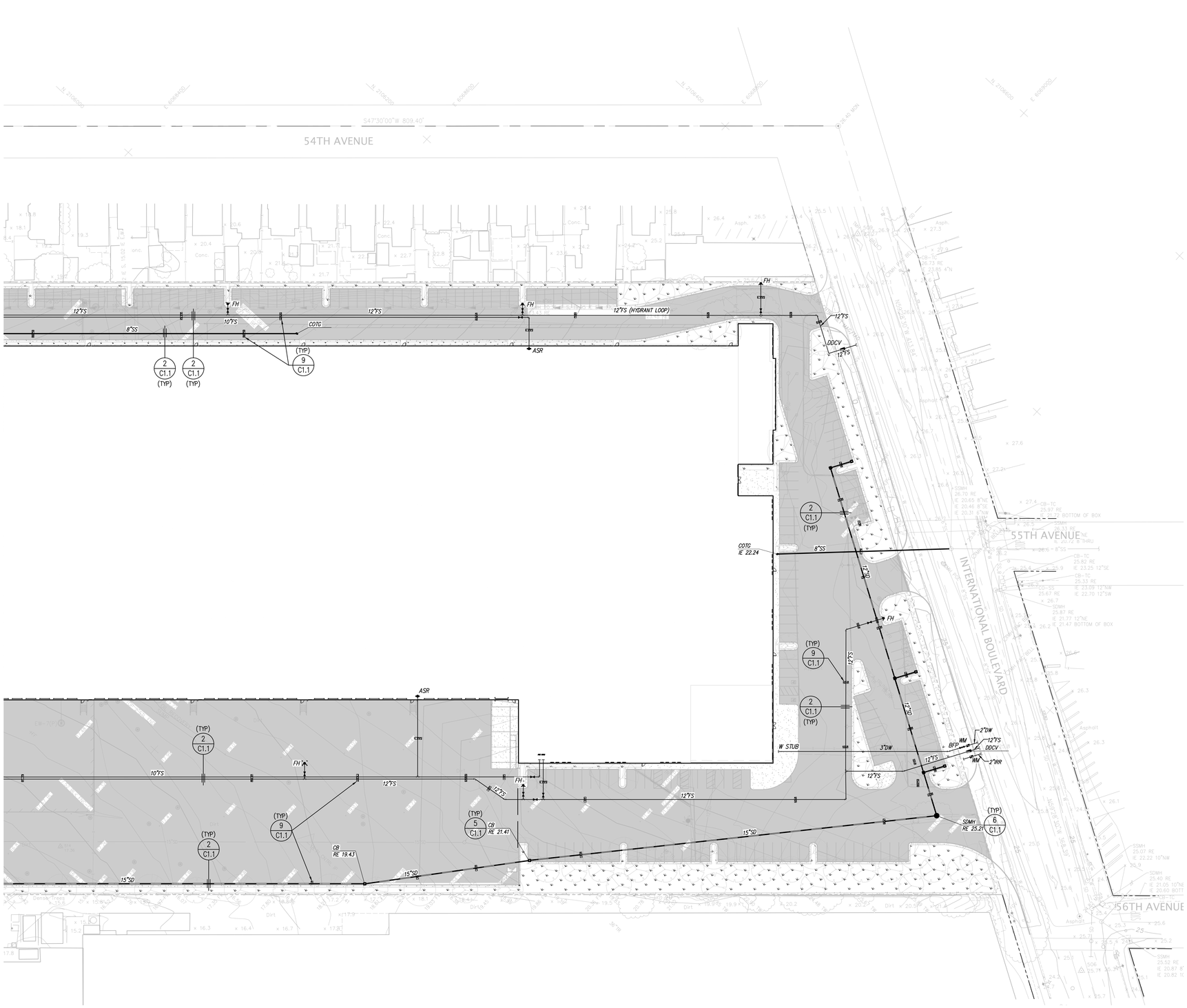

NORTH

0 20 40 80 120

Scale 1" = 40'

LEGEND

ASR	AUTOMATIC SPRINKLER RISER
RE	RIM ELEVATION
TC	TOP OF CURB
WS	WATER SERVICE
X X	EXISTING UTILITY TO BE ABANDONDED BY REMOVAL
FS	FIRE SERVICE
SS	SANITARY SEWER
COTG	CLEANOUT TO GRADE
	STORM DRAIN LINE
	STORM DRAIN CATCH BASIN
	STORM DRAIN JUNCTION BOX
	STORM DRAIN CLEANOUT
	BACK FLOW PREVENTION DEVICE
	FIRE DEPARTMENT CONNECTION
	FIRE HYDRANT & VALVE
	POST INDICATOR VALVE
SSMH	SANITARY SEWER MANHOLE
	SINGLE CHECK VALVE
SDMH	STORM DRAIN MANHOLE
	WATER METER
CUTOFF	CUTOFF WALL IN TRENCH

NOTE:

ONSITE IRRIGATION AND ELECTRICAL SHALL BE DESIGNED BY OTHERS

PROGRESS SET

NO.	REVISION	BY

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PRELIMINARY UTILITY PLAN

GE SITE
FOR
BRIDGE DEVELOPMENT

OAKLAND, CALIFORNIA

DATE	AUGUST 2019
SCALE	AS SHOWN
DESIGNER	KS
DRAFTER	TAB
JOB NO.	A18535
SHEET	C4.1
OF	10 SHEETS

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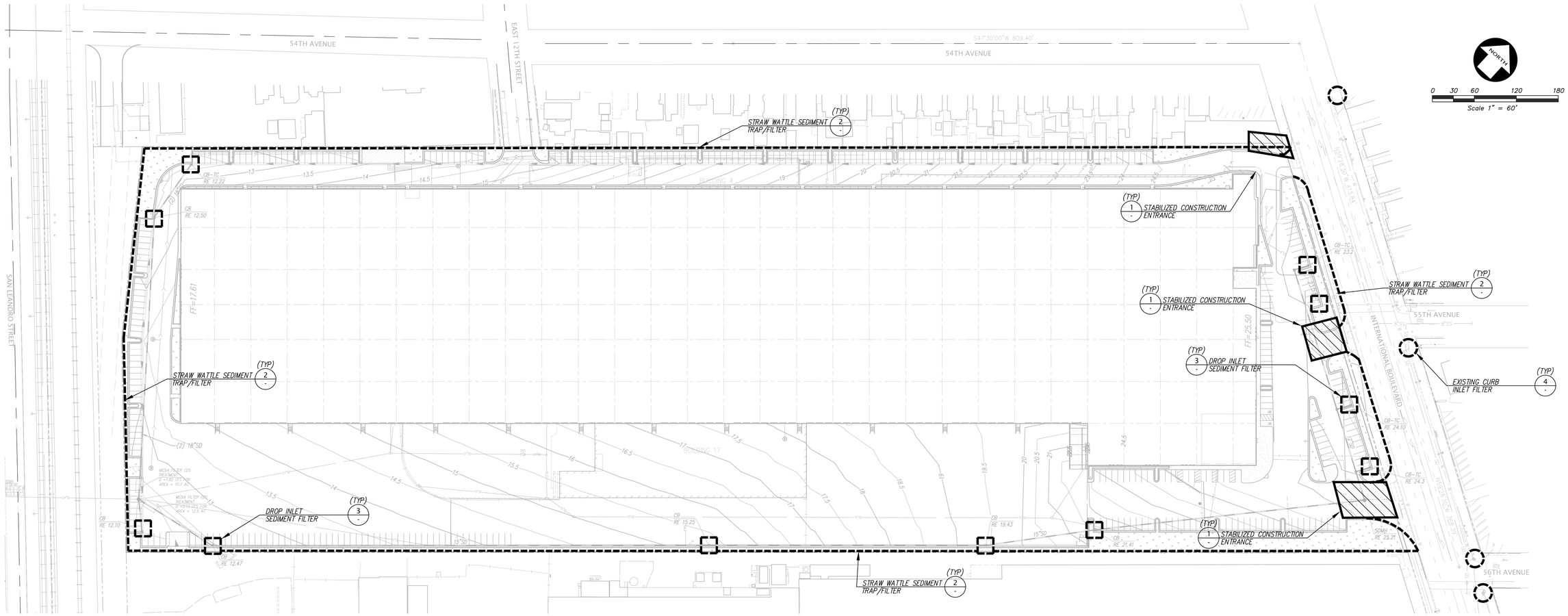
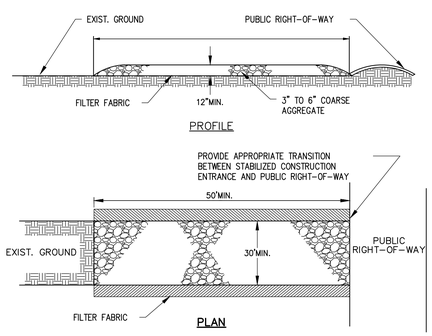


LEGEND

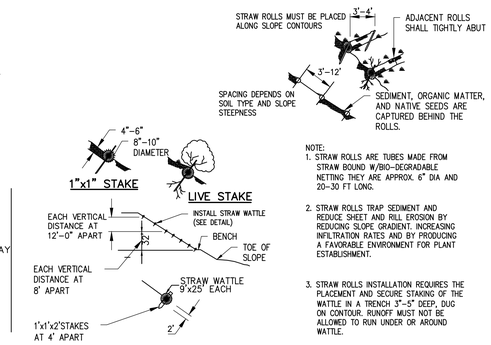
- STABILIZED CONSTRUCTION ENTRANCE (1)
- STRAW WATTLE SEDIMENT TRAP/FILTER (2)
- DROP INLET SEDIMENT FILTER (3)
- EXISTING CURB INLET FILTER (4)

NOTE

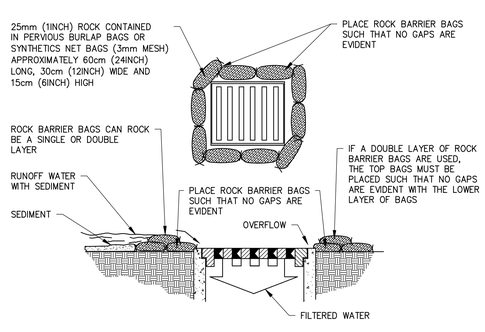
PRIOR TO AND DURING THE CONSTRUCTION OF THE NEW STORM DRAIN SYSTEM, ALL ONSITE STORMWATER RUNOFF WILL BE RETAINED ONSITE BY THE EXISTING CONCRETE CURBS AT THE SITE PERIMETER AND THE DRIVEWAY BERMS.



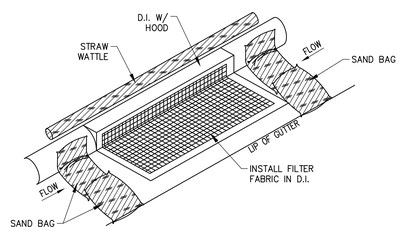
STABILIZED CONSTRUCTION ENTRANCE (1)
NOT TO SCALE



STRAW WATTLE
NOT TO SCALE



DROP INLET SEDIMENT FILTER UTILIZING ROCK BARRIER BAGS
NOT TO SCALE



EXISTING CURB INLET FILTER DETAIL
NOT TO SCALE

REVISION	BY	NO.

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Livermore, California 94551
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Fax (925) 245-8796
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PRELIMINARY EROSION CONTROL PLAN
GE SITE
FOR
BRIDGE DEVELOPMENT
OAKLAND, CALIFORNIA

DATE	AUGUST 2019
SCALE	AS SHOWN
DESIGNER	KS
DRAFTER	TAB
JOB NO.	A18535
SHEET	C5.0
OF	10 SHEETS

PROGRESS SET

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NOTE:

* EXISTING WALLS ARE TO REMAIN AND PROTECT IN PLACE UNTIL NEW PAVEMENT AND NEW PERIMETER CURB/WALL ARE COMPLETED AND INSTALLED

** STORMWATER MANAGEMENT AND SEDIMENT REMOVAL APPROACH TO BE DEVELOPED PENDING HYDRAULIC ANALYSIS TO MEET LOCAL AND STATE REQUIREMENTS. SURFACE PONDING WITH THE USE OF HYDRO-BRAKE SYSTEM SHOWN HERE IS ONE POTENTIAL ALTERNATIVE UNDER CONSIDERATION

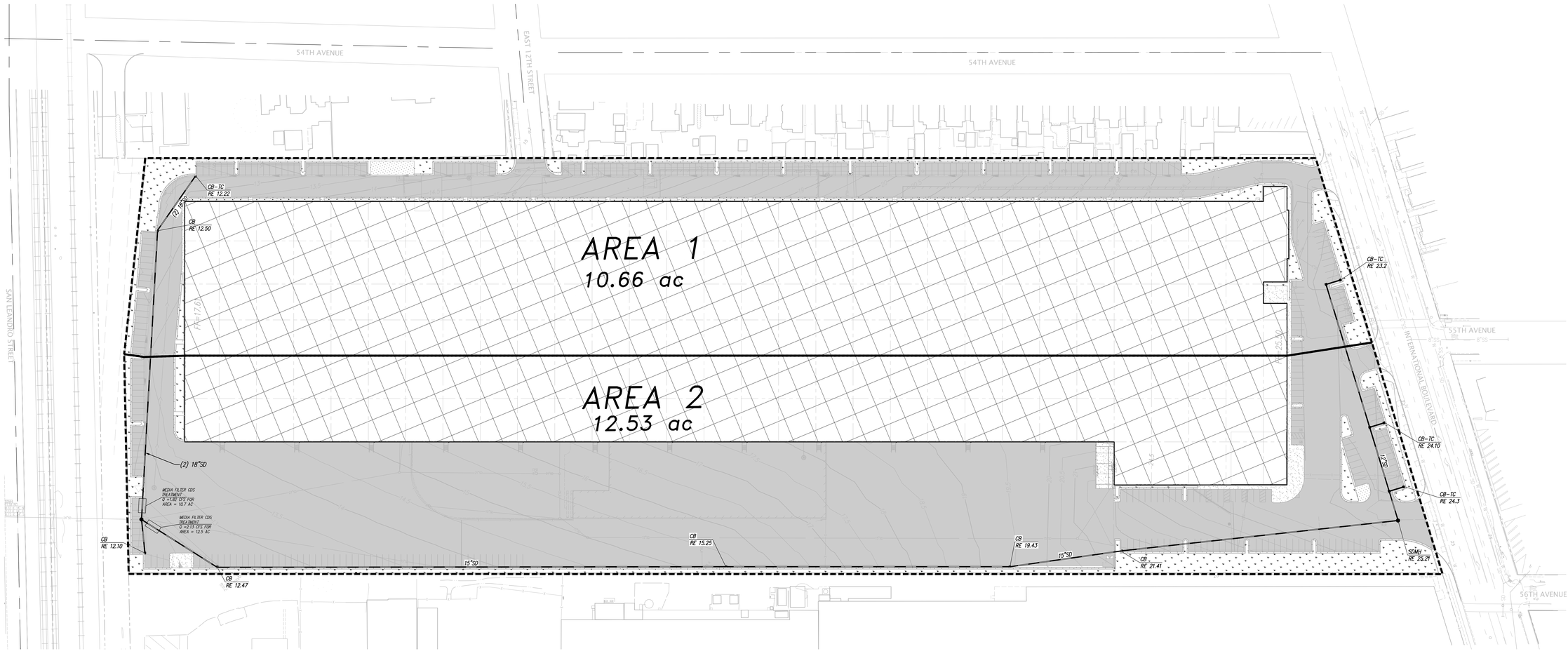
LEGEND

- TRIBUTARY AREA LIMITS
- LANDSCAPE AREA
- IMPERVIOUS ROOFTOP DRAINING TO BIO-SWALE
- IMPERVIOUS PAVEMENT DRAINING TO BIO-SWALE
- BIO-RETENTION TREATMENT AREA
- CONCRETE AREA
- STORM WATER TREATMENT TO BE DETERMINED

NORTH

0 30 60 120 180

Scale 1" = 60'



PROGRESS SET

NO.	REVISION	BY

NO.	REVISION	BY

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2850 Collier Canyon Road
Livermore, California 94551
www.kierwright.com
Phone (925) 245-8788
Fax (925) 245-8796

PRELIMINARY STORM WATER QUALTIY CONTROL PLAN

GE SITE
FOR
BRIDGE DEVELOPMENT

OAKLAND, CALIFORNIA

DATE	AUGUST 2019
SCALE	AS SHOWN
DESIGNER	KS
DRAFTER	TAB
JOB NO.	A18535
SHEET	C6.0
OF	10 SHEETS

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SURFACE WATER MANAGEMENT MEMORANDUM

(Kier & Wright, Civil Engineers & Surveyors, Inc.)

5441 International Boulevard
Oakland, California

KIER & WRIGHT
Civil Engineers & Surveyors, Inc.

MEMORANDUM

TO: BRENDAN KOTLER, BRIDGE ACQUISITION, LLC
FROM: CHUCK MCCALLUM, KIER & WRIGHT

RE: 5441 INTERNATIONAL BLVD., OAKLAND, CA

5441 International Blvd, Oakland, CA (Project) is proposed to redevelop 23.12 acres on an existing site to build a new industrial warehouse/distribution facility. Surface stormwater runoff on the site will be captured through a new storm drain system and will be treated as needed per Alameda Countywide Clean Water Program (Program). The treated surface stormwater is to be discharged to the public system with a hydro-brake installation to help control the maximum allowed discharge to the existing public system.

1.0 Proposed Stormwater Quality Control Measures

The Program facilitates local compliance with the Federal Clean Water Act, coordinating its activities with other pollution prevention programs, such as wastewater treatment plants, hazardous waste disposal, and water recycling. The program compliance is to ensure minimum pollution from entering public storm drain system and into the waterways. The Program was established by a memorandum of understanding among the Co-permittees in the Municipal Regional Stormwater NPDES Permit (MRP) adopted by the Regional Water Quality Control Board, San Francisco Bay Region. The Program implements common tasks and assists the member agencies to implement their local stormwater pollution prevention programs, including provision C.3 of the MRP that requires each Discharger to control the flow of stormwater and stormwater pollutants from new development and redevelopment sites over which it has jurisdiction.

Requirements for new development and redevelopment projects fall in several categories as defined in section C.3 of the MRP. The primary way is through the implementation of low impact development (LID) techniques, which is to reduce runoff and mimic a site's predevelopment hydrology by minimizing disturbed areas and impervious cover and then treated stormwater runoff close to its source with elements such as bio-retention/swales.

The Program does allow some special projects to use limited non-LID treatment measures for stormwater treatment. The following are classified for the various special projects in the Appendix J of C.3 Stormwater Technical Guidance (Program, 2017):

1. Category A: Small Infill Projects (less than ½ acre of impervious surface)

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2. Category B: Larger Infill Projects (less than 2 acres of impervious surface)
3. Category C: Transit-Oriented Development

This project does not fall into any of the above categories. However, this site has been identified by U.S. Environmental Protection Agency (EPA) and Department of Toxic Substances Control (DTSC) as a contaminated site. It is required that as part of the new improvements, stormwater control measures will be implemented in such a way that no stormwater from this site will be infiltrating and entering the ground water table due to contaminants in the soil as determined by EPA and DTSC. The site is either capped with impervious surface (concrete pavement/foundation) or low-permeability geomembrane fabric. Therefore, LID requirements cannot be applied for this redevelopment.

The stormwater runoff from this site will be treated with non-LID treatment measures such as media treatment basin and/or the various on-site and off-site alternative described in the Appendix J (enclosure here for your reference) and per City of Oakland standard requirements. The exact measure or combination of various measures to be used for this project will be further evaluated with the City of Oakland during the construction design phase and will incorporate EPA requirements for stormwater and sediment sampling.

All onsite stormwater will be captured through the new storm drain system and treated with some form of media treatment system designed based on the Combination Flow-Volume Method as detailed in the Alameda County Clean Water Program. The proposed project base runoff will be captured as follow:

1. New retaining curb/wall with new fence around the perimeter of the site is proposed (minimum of 2' deep) to prevent onsite surface runoff over the property lines.
2. The site will be completely capped with minimum of 6" concrete and landscape will be planted in raised planters sitting on the capped surface.
3. Hardscape, parking lot, driveways, truck aprons, building, and planter drainage will drain to the new storm drain system, which will be treated through non-LID measures, on-site or off-site.
4. Hydro-brake system will be installed to control optimum discharge to the public storm drain system and help reduce the surface storage during a major storm, as approved by the City of Oakland.

2.0 Monitoring and Maintenance

The proposed stormwater treatment facilities will require maintenance to ensure continued performance. The proposed stormwater system for the site is designed to

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operate automatically and reliably with necessary routine maintenance. The Operations and Maintenance will follow Alameda Countywide Clean Water Program guidance and be approved by the City of Oakland.

3.0 Conclusions

In conclusion, the development of the above site includes post-construction stormwater treatment facilities that are in conformance with the MRP, Alameda Countywide Clean Water Program, and EPA/DTSC requirements. The project design will capture all surface water flow as stated above.

Through the implementation of the combinations of LID/non-LID measures, and the surface water retention proposed as approved by the City of Oakland, the proposed project will not have any negative impacts on the existing downstream storm drain system.

Appendix

J

Special Projects

Table of Contents

J.1: Introduction
J.2: Category A: Small Infill Projects
J.3: Category B: Larger Infill Projects
J.4: Category C: Transit-Oriented Development
J-5 Calculating the LID Treatment Reduction Credit (Special Projects Worksheet)
J6: LID Infeasibility Requirement for Special Projects
J7: Select Non-LID Treatment Measures Certified by a Government Agency
Attachment: Template for Narrative Discussion of LID Feasibility or Infeasibility

J.1 Introduction

On November 19, 2015, the San Francisco Bay Regional Water Quality Control Board (Water Board) re-issued the MRP, revising search and aspects of Provision C.3.e.ii, which allows LID treatment reduction credits for three categories of smart growth, high density and transit oriented development project, described below. Projects that receive LID treatment reduction credits are allowed to use specific types of non-LID treatment, if the use of LID treatment is first evaluated and determined to be infeasible. As described in Section J.6, documentation must be provided to discuss the feasibility and infeasibility of using 100 percent LID treatment onsite and offsite.

The types of non-LID treatment that may be used are:

- High flow-rate media filters, and
- High flow-rate tree well filters (also called high flow-rate tree box filters).

The three categories of Special Projects are:

- Category A: Small Infill Projects (< ½ acre of impervious surface)
- Category B: Larger Infill Projects (< 2 acres of impervious surface)
- Category C: Transit-Oriented Development

Any Regulated Project that meets all the criteria for more than one Special Project Category (such as a Regulated Project that may be characterized as a Category B or C Special Project) may only use the LID Treatment Reduction Credit allowed under one of the categories. For example, a Regulated Project that may be characterized as a Category B or C Special Project may use the LID Treatment Reduction Credit allowed under Category B or Category C, but not the sum ofboth.

J.2 Category A: Small Infill Projects

The defining criteria and LID treatment reduction credits for Category A projects are described below.

CRITERIA FOR CATEGORY A (SMALL INFILL) SPECIAL PROJECTS

To be considered a Category A Special Project, a Provision C.3 Regulated Project must meet all of the following criteria:

1. Be built as part of the municipality's stated objective to preserve or enhance a pedestrian-oriented type of urban design.
2. Be located in the municipality's designated central business district, downtown core area or downtown core zoning district, neighborhood business district or comparable pedestrian oriented commercial district, or historic preservation site and/or district.
3. Create and/or replace one half acre or less of impervious surface area.
4. Include no surface parking, except for incidental surface parking. Incidental surface parking is allowed only for emergency vehicle access, Americans with Disabilities Act (ADA) accessibility, and passenger and freight loading zones.
5. Have at least 85% coverage for the entire project site by permanent structures. The remaining 15% portion of the site is to be used for safety access, parking structure entrances, trash and recycling service, utility access, pedestrian connections, public uses, landscaping, and stormwater treatment.

LID TREATMENT REDUCTION FOR CATEGORY A (SMALL INFILL) SPECIAL PROJECTS

Any Category A Special Project may qualify for 100% LID Treatment Reduction Credit, which would allow the Category A Special Project to treat up to 100% of the amount of stormwater runoff specified by Provision C.3.d with either one or a combination of the two types of non-LID treatment systems identified in Section J.1. Prior to receiving the LID treatment reduction credits, the applicant must demonstrate, to the satisfaction of municipal staff, that LID treatment is infeasible, as described in Section J.6.

J.3 Category B: Larger Infill Projects

The defining criteria and LID treatment reduction credits for Category B projects are described below.

CRITERIA FOR CATEGORY B (LARGER INFILL) SPECIAL PROJECTS

To be considered a Category B Special Project, a Provision C.3 Regulated Project must meet all of the following criteria:

1. Be built as part of the municipality's stated objective to preserve or enhance a pedestrian-oriented type of urban design.
2. Be located in a permittee's designated central business district, downtown core area or downtown core zoning district, neighborhood business district or comparable pedestrian oriented commercial district, or historic preservation site and/or district.
3. Create and/or replace greater than one-half acre but no more than 2 acres of impervious surface area.
4. Include no surface parking, except for incidental surface parking. Incidental surface parking is allowed only for emergency vehicle access, ADA accessibility, and passenger and freight loading zones.
5. Have at least 85% coverage for the entire project site by permanent structures. The remaining 15% portion of the site is to be used for safety access, parking structure entrances, trash and recycling service, utility access, pedestrian connections, public uses, landscaping, and stormwater treatment.

LID TREATMENT REDUCTION FOR CATEGORY B (LARGER INFILL) SPECIAL PROJECTS

For Category B Special Projects, the maximum LID treatment reduction credit allowed varies depending upon the density achieved by the project in accordance with the criteria shown in Table J-1. Density is expressed in Floor Area Ratios (FARs) for commercial projects, and in Dwelling Units per Acre (DU/Ac) for residential development projects. Density of mixed-use projects can be expressed in either FARs or DU/Ac. The credits are expressed in percentages of the amount of stormwater runoff specified by Provision C.3.d for the Project's drainage area. The Special Project may treat the percentage of the C.3.d amount of runoff that corresponds to the project's density using either one or a combination of the two types of non-LID treatment systems listed in Section J.1. To be eligible to receive the LID treatment reduction credits, the applicant must demonstrate, to the satisfaction of municipal staff, that LID treatment is infeasible, as described in Section J.6. Any remaining amount of stormwater runoff must be treated with LID treatment measures.

Table J-1 Category B LID Treatment Reduction Credits, Based on the Density of Development		
% of the C.3.d Amount of Runoff that May Receive Non-LID Treatment	**Land Use Type**	**Density Required to Obtain the LID Treatment Reduction Credit**
50%	Commercial	Floor Area Ratio 2:1
50%	Residential	50 dwelling units/acre
50%	Mixed Use	Floor Area Ratio 2:1 or 50 dwelling units/acre
75%	Commercial	Floor Area Ratio 3:1
75%	Residential	75 dwelling units/acre
75%	Mixed Use	Floor Area Ratio 3:1 or 75 dwelling units/acre
100%	Commercial	Floor Area Ratio 4:1
100%	Residential	100 dwelling units/acre
100%	Mixed Use	Floor Area Ratio 4:1 or 100 dwelling units/acre

J.4 Category C: Transit-Oriented Development

The defining criteria and LID treatment reduction credits for Category C projects are described below.

CRITERIA FOR CATEGORY C (TRANSIT ORIENTED DEVELOPMENT) SPECIAL PROJECTS

To be considered a Category C Special Project, a Provision C.3 Regulated Project must meet all of the following criteria:

1. Be characterized as a non auto-related land use project. That is, Category C specifically excludes any Regulated Project that is a stand-alone surface parking lot; car dealership; auto and truck rental facility with onsite surface storage; fast-food restaurant, bank or pharmacy with drive-through lanes; gas station, car wash, auto repair and service facility; or other auto-related project unrelated to the concept of Transit-Oriented Development.
2. If a commercial development project, achieve at least an FAR of 2:1.
3. If a residential development project, achieve at least a density of 25 DU/Ac.
4. If a mixed-use development project, achieve at least an FAR of 2:1 or a density of 25 DU/Ac.

LID TREATMENT REDUCTION FOR CATEGORY C (TRANSIT-ORIENTED DEVELOPMENT)

For Category C Special Projects, the total maximum LID treatment reduction credit allowed is the sum of three different types of credits for which the Category C Special Project qualifies. These credits are categorized as follows:

- Location Credits,
- Density Credits, and
- Minimized Surface Parking Credits.

The Special Project may use either one or a combination of the two types of non-LID treatment systems listed in Section J.1 to treat the total percentage of the C.3.d amount of stormwater runoff that results from adding together the Location, Density and Minimized Surface Parking credits that the project is eligible for. In addition, to be eligible to receive the LID treatment reduction credits, the applicant must demonstrate, to the satisfaction of municipal staff, that LID treatment is infeasible, as described in Section J.6. Any remaining amount of stormwater runoff must be treated with LID treatment measures.

Location Credits (Transit-Oriented Development)

Location credits are based on the project site's proximity to a transit hub[1], or its location within a planned Priority Development Area (PDA)[2]. Only one Location Credit may be used by an individual Category C Special Project, even if the project qualifies for multiple Location Credits. In order to qualify for a Location Credit, at least 50 percent or more of a Category C Special Project's site must be located within the ¼ or ½ mile radius of an existing or planned transit hub, or 100 percent of the site must be located within a PDA. The Location Credits, presented in Table J-2, are expressed in percentages of the amount of stormwater runoff specified by Provision C.3.d for the project's drainage area.

Table J-2
Location Credits for Category C, Transit Oriented Development
(Only one Location Credit may be used.)

% of the C.3.d Amount of Runoff that May Receive Non-LID	Project Site Location
50%	50% or more of the site is located within a ¼ mile radius of an existing or planned transit hub
25%	50% or more of the site is located within a ½ mile radius of an existing or planned transit hub
25%	100% of the site is located within a PDA

[1] Transit hub is defined as a rail, light rail, or commuter rail station, ferry terminal, or bus transfer station served by three or more bus routes (i.e., a bus stop with no supporting services does not qualify). A planned transit hub is a station on the MTC's Regional Transit Expansion Program list, per MTC's Resolution 3434 (revised April 2006), which is a regional priority funding plan for future transit stations in the San Francisco Bay Area.

[2] A planned Priority Development Area (PDA) is an infill development area formally designated by the Association of Bay Area Government's / Metropolitan Transportation Commission's FOCUS regional planning program. FOCUS is a regional incentive-based development and conservation strategy for the Bay Area.

Density Credits (Transit-Oriented Development)

To qualify for any Density Credits, a Category C Special Project must first qualify for one of the Location Credits listed above. The Density Credits are based on the density achieved by the project in accordance with the criteria shown in Table J-4. Density is expressed in Floor Area Ratios (FARs) for commercial development projects and in Dwelling Units per Acre (DU/Ac) for residential development projects. Density of mixed-use projects may be expressed in either FARs or DU/Ac. The credits are expressed in percentages of the amount of stormwater runoff specified in Provision C.3.d. Commercial and mixed-use Category C projects do not qualify for Density Credits based on DU/Ac, and residential Category C Projects do not qualify for Density Credits based on FAR. Only one Density Credit may be used by an individual Category C Special Project, even if the project qualifies for multiple Density Credits.

Table J-3
Density Credits for Category C, Transit Oriented Development
(Only one Density Credit may be used.)

% of the C.3.d Amount of Runoff that May Receive Non-LID Treatment	Land Use Type	Density Required to Obtain the Density Credit
10%	Commercial	Floor Area Ratio 2:1
10%	Residential	30 dwelling units/acre
10%	Mixed Use	Floor Area Ratio 2:1 or 30 dwelling units/acre
20%	Commercial	Floor Area Ratio 4:1
20%	Residential	60 dwelling units/acre
20%	Mixed Use	Floor Area Ratio 4:1 or 60 dwelling units/acre
30%	Commercial or Mixed Use	Floor Area Ratio 6:1
30%	Residential	100 dwelling units/acre
30%	Mixed Use	Floor Area Ratio 6:1 or 100 dwelling units/acre

Minimized Surface Parking Credits (Transit-Oriented Development)

To qualify for any Minimized Surface Parking Credits, a Category C Special Project must first qualify for one of the Location Credits listed above. The LID treatment reduction credit is based on the amount of post-project impervious surface area that is dedicated to at-grade surface parking, in accordance with the criteria shown in Table J-3. The credits are expressed in percentages of the amount of stormwater runoff specified in Provision C.3.d. The at-grade surface parking must be treated with LID treatment measures. Only one Minimized Surface Parking Credit may be used by an individual Category C Special Project, even if the project qualifies for multiple Minimized Surface Parking Credits.

Table J-4
Minimized Surface Parking Credits for Category C, Transit Oriented Development
(Only one Minimized Surface Parking Credit may be used.)

% of the C.3.d Amount of Runoff that May Receive Non-LID	Percentage of the Total Post-Project Impervious Surface Dedicated to At-Grade, Surface Parking
10%	10% or less
20%	0% (except for emergency vehicle access, ADA accessibility and passenger and freight loading zones)

J.5 Calculating the LID Treatment Reduction Credit (Special Projects Worksheet)

The Countywide Program has prepared a Special Projects Worksheet, which municipal staff may ask you to complete to document that your project meets the criteria for Special Project Categories A, B, and/or C and to calculate the total allowable LID treatment reduction credit for which the project is eligible. Some municipalities may have developed their own forms; contact municipal staff for the appropriate Special Projects Worksheet. To download an electronic version of the worksheet, visit the Program's website www.cleanwaterprogram.org and click on "Resources," then "Development."

If the project meets all the criteria for more than one Special Project Category, it may use only the LID treatment reduction credit allowed under one of the categories. However, the worksheet may be used to compute the credit allowed under each category in order to determine which category would allow the most credit.

J.6 LID Infeasibility Requirement for Special Projects

In order to be considered a Special Project, in addition to documenting that all applicable criteria for one of the above-described Special Project categories have been met, the applicant must provide a narrative discussion of the feasibility or infeasibility of using 100 percent LID treatment onsite, offsite, or at a Regional Project. The narrative discussion is required to address the following:

1. The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite;
2. The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures offsite or paying in-lieu fees to treat 100% of the Provision C.3.d runoff with LID treatment measures at an offsite or Regional Project; and
3. The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with some combination of LID treatment measures onsite, offsite, and/or paying in-lieu fees towards at an offsite or Regional Project.

The discussion is required to contain enough technical and/or economic detail to document the basis of any infeasibility that is determined. The Template for Narrative Discussion of LID Feasibility or Infeasibility, included as an attachment to Appendix J, can be used to document the basis of infeasibility.

J.6.1 On-site LID Treatment

The narrative discussion should describe how the routing of stormwater runoff has been optimized to route as much runoff as possible to LID treatment measures. A discussion should also be provided for each area of the site for which runoff must be treated with non-LID treatment measures, and should include the following:

1. Uses of impervious surfaces that preclude the use of LID treatment; and
2. Technical constraints that preclude the use of any landscaped areas for LID treatment, such as:
   a. Inadequate size to accommodate biotreatment facilities that meet the sizing requirements for the drainage area;
   b. Slopes too steep to terrace;
   c. Proximity to an unstable bank or slope;
   d. Environmental constraints (e.g., landscaped area is within riparian corridor);
   e. High groundwater or shallow bedrock;
   f. Conflict with subsurface utilities;
   g. Cap over polluted soil or groundwater;
   h. Lack of head or routing path to move collected runoff to the landscaped area or from the landscaped area to the disposal point;
   i. Other conflicts or required uses that preclude use for stormwater treatment (explain).

J.6.2 Off-site LID Treatment.

The applicant must demonstrate to the municipality performing the project review that it is infeasible to provide LID treatment of an equivalent amount of runoff offsite either by paying in-lieu fees to a regional project or on other property owned by the project proponent in the same watershed (in other words, that alternative compliance, as described in Chapter 9, is infeasible).

Check with the local municipality to determine if there are any regional projects available for alternative compliance purposes (at the time of completion of this Appendix, there were none in Alameda County). These considerations should be documented in the narrative discussion of the feasibility and infeasibility of providing 100% L ID treatment.

J.6.3 Combination of On-site and Off-site LID Treatment

The applicant must also demonstrate to the municipality performing the project review that it is infeasible to provide LID treatment of 100% of the amount of runoff specified in Provision C.3.d with some combination of LID measures on-site, offsite, and or paying in-lieu fees to a regional project.

After determining the extent to which stormwater runoff can be optimized to route as much runoff as possible to LID treatment measures, if that amount is less than 100%, and if there are no options to provide LID treatment off-site on a property owned by the project proponent in the same watershed, check with the municipality to determine if there are any regional projects available for alternative compliance purposes for the remainder of the C.3.d amount of runoff. These considerations should be documented in the narrative discussion of the feasibility and infeasibility of providing 100% L ID treatment.

J.7 Select Non-LID Treatment Measures Certified by a Government Agency

MRP Provision C.3.e.vi.(3)(i) requires municipalities to report to the Regional Water Board, for each non-LID treatment measure that the municipality approves, "whether the treatment system either meets minimum design criteria published by a government agency or received certification issued by a government agency, and reference the applicable criteria or certification."

For Special Projects that are allowed to use non-LID treatment measures, applicants are advised to use treatment measures that have been certified by the Washington State Department of Ecology's Technical Assessment Protocol – Ecology (TAPE), under General Use Level Designation (GULD) for Basic Treatment.[3] You can identify proprietary media filters and high flow rate tree well filters currently holding this certification at the following link: http://www.ecy.wa.gov/programs/wq/stormwater/newtech/technologies.html.

The municipality may require that any non-LID treatment measures used in a Special Project be TAPE-certified, or the municipality may allow the use of non-LID treatment measures certified by another governmental program.

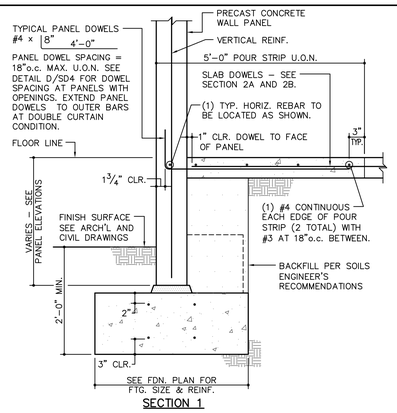
If the TAPE system is used, treatment measures must be sized based on the hydraulic sizing criteria specified in MRP Provision C.3.d and the design operating rate for which the product received TAPE GULD certification for Basic Treatment. If a different certification program is used, specify the design operating rate for which the product received the relevant certification.

[3] "General Use" is distinguished from a pilot or conditional use designation. "Basic Treatment" is distinguished from treatment effectiveness for phosphorus removal. Basic treatment is intended to achieve 80 percent removal of total suspended solids (TSS) for influent concentrations from 100 mg/L to 200 mg/L TSS and achieve 20 mg/L TSS for less heavily loaded influents.

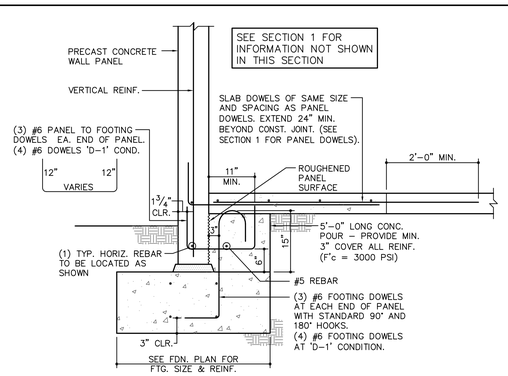
CONSTRUCTION DETAILS

(Kramer Engineering, Inc.)

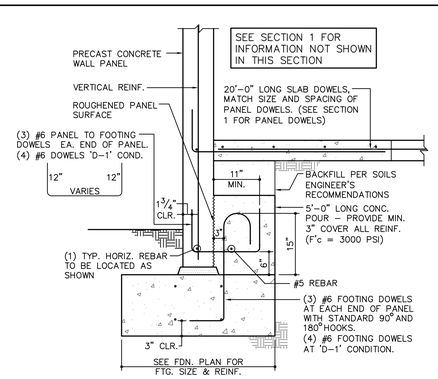
5441 International Boulevard
Oakland, California



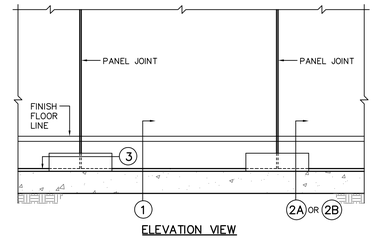
SECTION 1



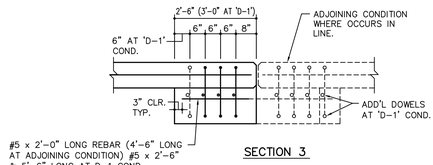
SECTION 2A
PANEL DEPTH 2 FT. OR LESS BELOW FINISH FLOOR



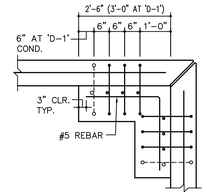
SECTION 2B
PANEL DEPTH OVER 2 FT. BELOW FINISH FLOOR



ELEVATION VIEW



SECTION 3



SECTION 3
(CORNER CONDITION)

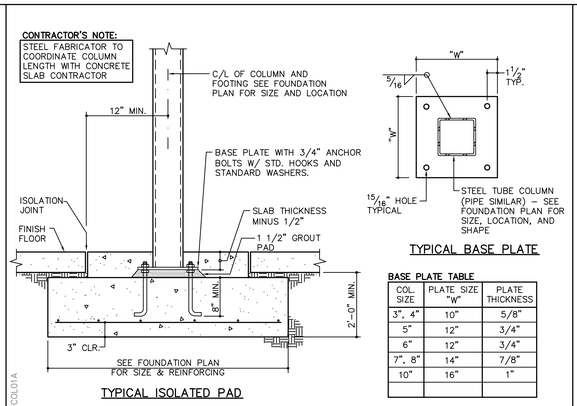
TFFTG01A

TYPICAL PANEL TO FOOTING

D

E

F



TYPICAL ISOLATED PAD

TYPICAL BASE PLATE

BASE PLATE TABLE

COL. SIZE	PLATE SIZE "W"	PLATE THICKNESS
3", 4"	10"	5/8"
5"	12"	3/4"
6"	12"	3/4"
7", 8"	14"	7/8"
10"	16"	1"

TFCOL01A

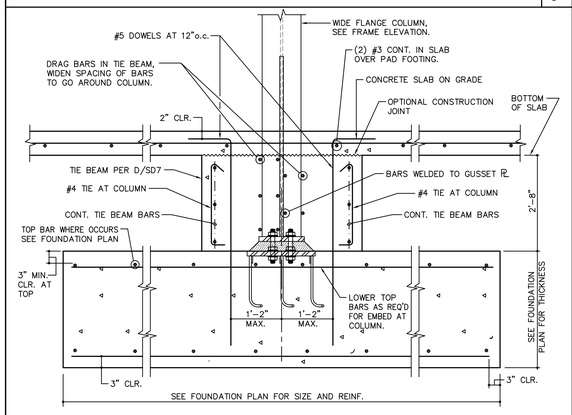
STEEL COLUMN, FOOTING, AND BASE PLATE

G

H

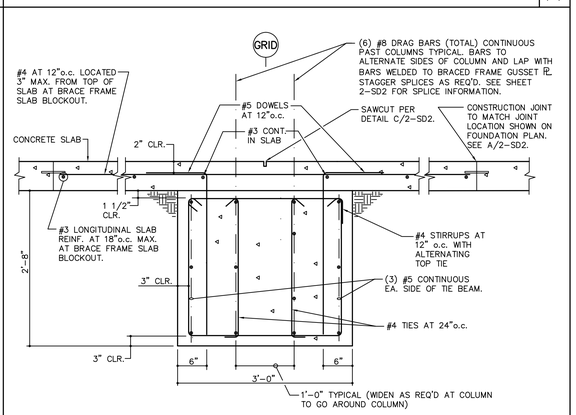
J

K



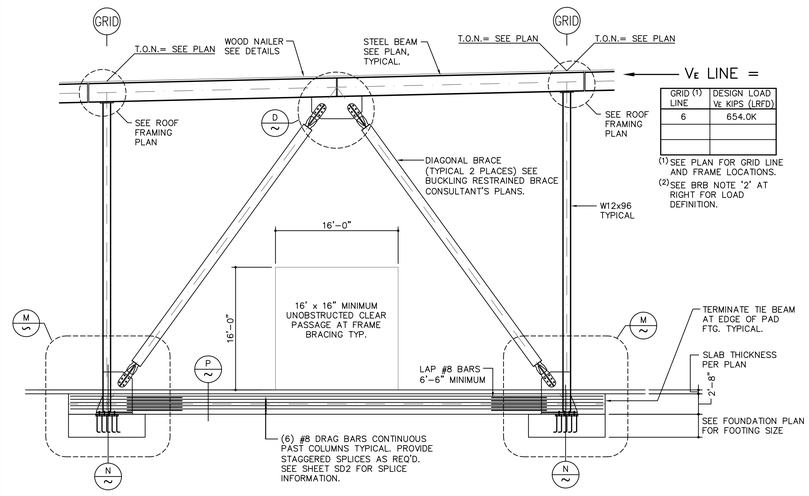
FRAME BRACE TO PAD FOOTING

N



TIE BEAM AT BRACED FRAME

P



V_E LINE =

GRID (1) LINE	DESIGN LOAD V_E KIPS (LRFD)
6	654.0K

(1) SEE PLAN FOR GRID LINE AND FRAME LOCATIONS.
(2) SEE BRB NOTE '2' AT RIGHT FOR LOAD DEFINITION.

BUCKLING RESTRAINED BRACE (BRB) NOTES:

1. BRACE DESIGNATION: BRB X.X
   - CORE AREA IN SQUARE INCHES TO BE DETERMINED BY BRACE MFR.
   - BUCKLING RESTRAINED BRACE
2. FRAME DESIGN LOAD "V_E LINE" IS THE TOTAL STRENGTH LEVEL REACTION TO THE GRID LINE SPECIFIED (BASED ON R=4). LOADS TO FRAMES MAY BE MODIFIED PER ASCE7-10 SECTION 12.2.3.3 WHERE ALLOWED.
3. BRACE CORE MATERIAL SHALL BE ASTM A36 WITH $F_{y\,MIN}$ = 38 KSI AND $F_{y\,MAX}$ = 46 KSI. MATERIAL PROPERTIES TO BE VERIFIED BY COUPON TESTS BY BRACE MANUFACTURER.
4. BRACE MANUFACTURER SHALL SUPPLY TEST RESULTS FOR SIMILAR BRACES IN ACCORDANCE WITH AISC 341-05.
5. CORE MATERIAL ADJUSTMENT FACTORS FOR COMPRESSION STRENGTH (β) AND STRAIN HARDENING (ω):
   β = 1.33 MAXIMUM, ω = 1.30 MAXIMUM
   BRACE MANUFACTURER TO CONFIRM ACTUAL VALUES DO NOT EXCEED THOSE LISTED HERE.
6. BRACE MANUFACTURER TO DESIGN GUSSET PLATE SIZES, GUSSET PLATE CONNECTIONS, BUCKLING RESTRAINED BRACE, AND BRB CONNECTIONS IN ACCORDANCE WITH AISC 341-05.
7. CONNECTION OF BRACE TO BOTTOM GUSSET PLATE SHALL NOT EXTEND BELOW THE BOTTOM OF THE FLOOR SLAB. THE STROKE OF THE BRACE SHALL NOT CAUSE THE CASING OF THE BRACE TO COME INTO CONTACT WITH THE FLOOR SLAB.
8. AXIAL STIFFNESS ADJUSTMENT FACTOR Kr SHALL BE 1.2± 10%. Kr REPRESENTS THE ACTUAL EFFECTIVE STIFFNESS OF THE BRACE DIVIDED BY THE STIFFNESS OF THE CORE AREA ALONE EXTENDING FROM WORK POINT TO WORK POINT.
9. PROVIDE SPECIAL INSPECTION FOR HIGH STRENGTH BOLTS PER SHEET SD1A.

CHEVRON BRACED FRAME ELEVATION (BRBF)

R

HERDMAN
ARCHITECTURE + DESIGN
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IRVINE, CA 92618
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PROJECT NAME

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CLIENT

BRIDGE

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CONSULANT

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3002 Dow Avenue, Suite 136
Tustin, CA. 92780
Tel: 714.838.6222
www.kramerengineeringinc.com

DRAWING INFO

ID	DATE	DESCRIPTION

DRAWN BY: KEI
KEI JOB NO: 19-100
HR-A&D JOB NO: A17-2096
DRAWING SCALE: AS NOTED

SHEET

S1

CONSTRUCTION DETAILS

THESE DRAWINGS ARE NOT INTENDED FOR BIDDING, SHOP DRAWING, OR CONSTRUCTION PURPOSES. THE CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR ALL BIDS MADE FROM THESE DRAWINGS.

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CUTSHEET FOR GEOTEXTILE FABRIC

5441 International Boulevard Oakland,
California

GEOTEX® DND Orange



Product Data

GEOTEX® 401 ORANGE DND

GEOTEX® 401 ORANGE DND is a high-visibility, vibrant orange polypropylene, staple fiber, needle-punched nonwoven geotextile produced by Propex, and will meet the following Typical Values when tested in accordance with the methods listed below. The fibers are needled to form a stable network that retains dimensional stability relative to each other. The geotextile is resistant to biological and chemical environments normally found in soils.

GEOTEX® 401 ORANGE DND conforms to the property values listed below[1]. Propex performs internal Manufacturing Quality Control (MQC) tests that have been accredited by the Geosynthetic Accreditation Institute – Laboratory Accreditation Program (GAI-LAP).

		Typical[2]	
PROPERTY	TEST METHOD	ENGLISH	METRIC
ORIGIN OF MATERIALS			
% U.S. Manufactured		100%	100%
MECHANICAL			
Grab Tensile Strength	ASTM D-4632	120 lbs	534 N
Grab Elongation	ASTM D-4632	70%	70%
CBR Puncture	ASTM D-6241	310 lbs	1379 N
Trapezoidal Tear	ASTM D-4533	50 lbs	222 N
HYDRAULIC			
Apparent Opening Size (AOS)[3]	ASTM D-4751	70 US Std. Sieve	0.212 mm
Permittivity	ASTM D-4491	2.0 sec^{-1}	2.0 sec^{-1}
Water Flow Rate	ASTM D-4491	150 gpm/ft^2	6112 l/min/m^2
ENDURANCE			
UV Resistance at 500 hrs	ASTM D-4355	80%	80%
PHYSICAL			
Printed Text in 24 inch Intervals		"DANGER DO NOT DIG" "PELIGRO NO EXCAVAR"	
ROLL SIZES[3]		15 ft x 360 ft	4.57 m x 109.8 m

NOTES:

1. The property values listed above are effective 12/17/2018 and are subject to change without notice.
2. Values shown are in weaker principal direction. All values are typical based on the testign listed in the table. Values represent testing at time of manufacture.
3. Contact your local Territory Business Manager (TBM) for custom widths and colors. Lead times may vary depending on customer requirements and volume requested.

Propex® GEOSOLUTIONS

ENGINEERED EARTH SOLUTIONS™

www.propexglobal.com

Propex Operating Company, LLC · 4019 Industry Drive Chattanooga, TN 37416 · ph 800 621 1273 · ph 423 855 1466

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TABLE D-1
SURVEY CONTROL DATA FOR EXCAVATION

5441 International Boulevard
Oakland, California

TABLE D-1

Survey Control Data for Excavations

5441 International Blvd., Oakland, California

Location(s)	Northern Corner		Eastern Corner		Southern Corner		Western Corner		Excavation Depth (ft)
	Easting	Northing	Easting	Northing	Easting	Northing	Easting	Northing	
VOC Excavation									
5GP4, 5GP5, 5GP7, 5GP10, 5GP11, 5GP12	6068548.33	2105975.07	6068574.57	2105944.88	6068540.61	2105915.36	6068514.37	2105945.55	20.0
PCB Excavations									
S-609 (Note 2)	6068218.70	2105272.62	6068225.78	2105265.55	6068218.70	2105258.48	6068211.63	2105265.55	3.0
S-610 (Note 2)	6068165.93	2105266.72	6068173.00	2105259.64	6068165.93	2105252.57	6068158.85	2105259.64	8.5
SB-21	6068301.00	2105285.81	6068308.07	2105278.74	6068301.00	2105271.67	6068293.93	2105278.74	2.5
W-791	6068274.26	2105288.94	6068281.33	2105281.86	6068274.26	2105274.79	6068267.19	2105281.86	2.0
S-606	6068352.39	2105261.50	6068359.46	2105254.43	6068352.39	2105247.36	6068345.31	2105254.43	2.0
S-602	**6068321.48**	**2105228.87**	**6068328.55**	**2105221.79**	**6068321.48**	**2105214.72**	**6068314.41**	**2105221.79**	**6.0**
S-604	**6068292.40**	**2105343.62**	**6068299.47**	**2105336.55**	**6068292.40**	**2105329.48**	**6068285.33**	**2105336.55**	**5.0**
S-014	6068357.25	2105339.98	6068364.32	2105332.90	6068357.25	2105325.83	6068350.18	2105332.90	7.0
S-015	6068378.08	2105360.48	6068385.15	2105353.41	6068378.08	2105346.34	6068371.01	2105353.41	7.0
W-619	6068460.87	2105343.66	6068467.94	2105336.59	6068460.87	2105329.52	6068453.80	2105336.59	7.0
S-703, G-002	6068456.31	2105474.64	6068476.99	2105452.91	6068462.50	2105439.12	6068441.82	2105460.86	2.0
S-704	6068502.30	2105501.67	6068509.37	2105494.60	6068502.30	2105487.53	6068495.23	2105494.60	7.0
G-114	6068561.00	2105542.70	6068567.55	2105535.14	6068559.99	2105528.59	6068553.44	2105536.15	2.0
G-001	6068603.86	2105588.96	6068610.15	2105581.19	6068602.38	2105574.90	6068596.09	2105582.67	2.0
S-506	6068679.79	2105680.41	6068686.68	2105673.16	6068679.43	2105666.28	6068672.54	2105673.53	3.0
W-030	6068724.79	2105622.76	6068731.68	2105615.51	6068724.43	2105608.62	6068717.54	2105615.87	2.0
S-528	6068725.83	2105563.04	6068732.72	2105555.79	6068725.47	2105548.90	6068718.58	2105556.15	3.0
W-016	6068844.59	2105597.41	6068851.47	2105590.16	6068844.22	2105583.27	6068837.34	2105590.52	2.0
W-625, Trench 2	6068759.11	2105662.37	6068776.26	2105644.19	6068747.16	2105616.74	6068730.01	2105634.93	2.0
Trench 1	**6068770.36**	**2105673.01**	**6068787.26**	**2105654.58**	**6068776.26**	**2105644.19**	**6068759.11**	**2105662.37**	**5.0**
W-018	6068764.64	2105698.41	6068771.53	2105691.16	6068764.28	2105684.27	6068757.39	2105691.52	2.0
S-047	6068770.11	2105740.99	6068777.00	2105733.74	6068769.75	2105726.85	6068762.86	2105734.10	2.0
S-020	6068793.81	2105785.26	6068800.69	2105778.01	6068793.44	2105771.12	6068786.56	2105778.37	2.0
S-010	6068861.78	2105737.86	6068868.66	2105730.61	6068861.41	2105723.72	6068854.53	2105730.97	3.0
S-008	6068947.19	2105799.32	6068954.08	2105792.07	6068946.83	2105785.18	6068939.94	2105792.43	4.0
S-045	6068957.35	2105848.27	6068964.24	2105841.02	6068956.99	2105834.14	6068950.10	2105841.39	3.0
W-035A	6068907.61	2105849.32	6068914.50	2105842.07	6068907.25	2105835.18	6068900.36	2105842.43	2.0
S-040	6068943.81	2105893.33	6068950.70	2105886.08	6068943.45	2105879.19	6068936.56	2105886.44	3.0
S-012	6068801.79	2105868.07	6068808.68	2105860.82	6068801.43	2105853.93	6068794.54	2105861.18	2.0
W-022	6068771.93	2105902.44	6068778.82	2105895.19	6068771.57	2105888.31	6068764.68	2105895.56	25.0
S-626, W-792, W-793, W-613	**6068565.33**	**2105826.75**	**6068588.73**	**2105800.72**	**6068573.85**	**2105787.35**	**6068550.46**	**2105813.38**	**25.0**
S-712	6068608.13	2105901.40	6068615.02	2105894.15	6068607.77	2105887.27	6068600.88	2105894.52	5.0
G-121	6068554.22	2105999.84	6068561.11	2105992.59	6068553.86	2105985.71	6068546.97	2105992.96	2.0
G-118	6068617.77	2106053.75	6068624.65	2106046.50	6068617.40	2106039.61	6068610.52	2106046.86	2.0
W-736	6068669.07	2106096.72	6068675.96	2106089.47	6068668.71	2106082.58	6068661.82	2106089.83	2.0
G-119	6068768.55	2106186.04	6068775.44	2106178.79	6068768.19	2106171.90	6068761.30	2106179.15	2.0
S-005	6068968.55	2105933.08	6068975.44	2105925.83	6068968.19	2105918.95	6068961.30	2105926.20	2.0
S-611 (Note 2)	6068218.70	2105207.34	6068225.77	2105200.27	6068218.70	2105193.20	6068211.63	2105200.27	3.0
G-004 (Note 2)	6068060.02	2105099.70	6068067.09	2105092.63	6068060.02	2105085.56	6068052.95	2105092.63	4.0
S-702 (Note 2)	6068041.27	2105099.01	6068048.34	2105091.94	6068041.27	2105084.87	6068034.20	2105091.94	8.0
SB-25 (Note 2)	6067889.19	2105242.07	6067896.26	2105235.00	6067889.19	2105227.93	6067882.12	2105235.00	3.0
W-503	Excavated to 20 ft during Phase 1								
S-601	Excavated to 5 ft during Phase 1								
W-622	6068546.64	2105251.99	6068553.71	2105244.92	6068546.64	2105237.85	6068539.57	2105244.92	2.0

Abbreviations:

ft = feet

mg/kg = milligrams per kilogram

PCBs = polychlorinated biphenyls

VOC = volatile organic compound

TABLE D-1

Survey Control Data for Excavations

5441 International Blvd., Oakland, California

Notes:

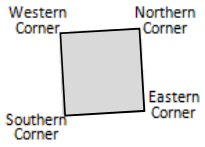
(1) Hotpsot excavation locations are shown in bold. Other locations have ≥50 mg/kg PCBs in soil.

(2) Locations S-609, S-610, S-611, G-004, S-702, and SB-25 are in the Western Portion of the site that was regraded during the Phase 1 remedy. Based on elevations before and after regrading, these locations were either in fill areas or areas with apparently no elevation change before capping materials were placed. The proposed excavation depth for these locations includes the estimated depth of fill (if any) and capping materials (shown below, rounded up to the nearest 0.5 foot) placed at these locations during the Phase 1 remedy:

- S-609: 0.9 feet
- S-610: 1.3 feet
- S-611: 0.95 feet

(3) Easting and Northing coordinates are in California State Plane III (1983, feet). North American Datum of 1983.

(4) Locations of coordinates based on true north and depicted in graphic below:



APPENDIX E

VIMS CALCULATION PACKAGE, DRAWINGS, AND SPECIFICATIONS

5441 International Boulevard
Oakland, California

Draft Final - October 2019

(EKI B70123.01)

APPENDIX E
VIMS CALCULATION PACKAGE, DRAWINGS, AND SPECIFICATIONS
5441 International Boulevard
Oakland, California

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APPENDIX E
VIMS CALCULATION PACKAGE, DRAWINGS, AND SPECIFICATIONS
5441 International Boulevard
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1. DESIGN OVERVIEW - VAPOR INTRUSION MITIGATION SYSTEM (VIMS)

The vapor intrusion mitigation system ("VIMS") will include an active sub-slab depressurization ("SSD") system with the following elements:

- sub-slab liner;
- sub-slab permeable aggregate layer;
- seven suction trenches;
- conveyance piping from suction trenches to an SSD blower system;
- SSD blower system; and,
- sub-slab probes ("SSPs") for vacuum monitoring.

The SSD system will cover the entire ground-floor footprint of the new building, approximately 535,000 square feet ("sf").

An air permit for the SSD system will be obtained from the Bay Area Air Quality Management District ("BAAQMD") prior to construction. Emissions abatement such as using granular activated carbon ("GAC") filtration for the SSD blower discharge is not expected to be required for the SSD system based on VOC emissions estimates and air permitting requirements described in Section 9, and therefore is not included in the SSD system design. As a contingency, underground piping that would allow for installation of emissions controls (if required) will be installed during site development (see Section 9.3).

Key design elements of the planned new building that affect the SSD system design are:

- Building dimensions (approximate):
  - Length: 1,560 feet
  - Width: 335 feet (+ 60 feet wider on far eastern end)
  - Area: 535,000 sf
  - Interior height: approximately 40 feet
- Building floor will be concrete slab on grade.
- The building interior will have multiple structural columns on sub-slab spread footings and grade beams, as described below. This sub-slab construction will allow for a continuous permeable aggregate layer between and around the footings, in each section between grade beams, for effective SSD coverage.
- Grade beams beneath the concrete floor and tie beams between spread footings are planned for the building, but locations of the grade beams and tie beams are not known at this time. The grade beams and tie beams are expected to align parallel to the short side of the building, and therefore would be parallel to suction trenches planned for the SSD system (see Section 4).
  - Grade beams are expected to span the entire width of the building. Three or four grade beams are anticipated, and the lateral location of the SSD suction trenches will

be adjusted based on the final location of grade beams to assure that SSD suction trenches are located within each grade beam section so the SSD effectively covers each area of the floor that is segregated by grade beams.

  - Tie beams are concrete beams that run beneath the floor between sets of two adjacent footings where roof bracing is required. Sub-slab air flow can propagate through the gravel layer around tie beams, so the tie beams may not affect SSD layout. The number and locations of tie beams will be reviewed prior to final design of the SSD suction trench layout, and the layout adjusted as needed to optimize SSD effectiveness.
  - This preliminary design does not account for the grade beams and tie beams, since their specific locations are not known at this time. The SSD design will be modified as needed once the locations of the grade beams and tie beams are known. Design modifications may affect the piping layout and sizing, including the quantity and location of suction trenches. These modifications will be documented in the final construction drawings and in the completion report. SSD blower sizing and emissions estimates are not expected to change.

- At the building perimeter, tilt-up concrete wall panels will be placed on perimeter concrete footings that extend a minimum of two feet below grade. The footings and the below-grade portions of the wall panels will provide a vertical barrier to air flow short-circuiting from outside into the sub-slab permeable aggregate layer. Cutoff walls at the building perimeter will be installed in underground utility trenches that pass beneath the perimeter footings to address short circuiting via utility trenches.

The design basis for primary elements of the VIMS is summarized below. Several of the design details are shown on preliminary design drawings included as Attachment E-3 to this appendix. Final drawings that consider grade beam locations in the final system design will be submitted to DTSC for approval.

2. SUB-SLAB LINER

Purpose:

- A sub-slab liner is recommended by the *DTSC's 2011 Vapor Intrusion Mitigation Advisory* (Advisory) as "an appropriate, redundant feature for the conventional SSD system."

Design criteria:

- Coverage: Entire building footprint, inside perimeter footing (approximately 535,000 sf)
- Material: polyolefin
- Thickness (minimum): 15 mil (0.015-inch)
- ASTM E1745 Class A
- Continuous beneath entire ground floor

Product (or equivalent):

- Stego Wrap® Vapor Barrier

Installation:

- Install liner above permeable aggregate layer and below concrete floor
- Follow manufacturer instructions, including:
  - Overlap liner minimum 6 inches at seams, and seal seams with Stego® Tape
  - Seal at perimeter with Stego Crete Claw® Tape
  - Seal all liner penetrations with Stego® Tape or StegoTack® Tape or Stego® Mastic

Quality Assurance and Quality Control ("QA/QC"):

- Following installation and sealing, perform smoke test and seal all identified leaks.

Maintenance:

- Repair future liner penetrations, if any, in accordance with manufacturer's instructions, using Stego Wrap® as a patch material with Stego® Tape or Stego® Mastic as applicable. Such repairs will not require workers to be health and safety trained if the permeable aggregate layer beneath the liner is not breached, exposing underlying soil.

3. PERMEABLE AGGREGATE LAYER

Purpose:

- Provide a continuous permeable medium beneath the floor in the area between each set of grade beams for the SSD system to withdraw sub-slab vapor and propagate a vacuum (depressurization) beneath the building floor.

Design Criteria:

- Continuous layer beneath entire ground floor (between each set of grade beams), beneath sub-slab liner
- Layer Thickness: 4-inch (minimum)
- Material: Nominal ¾-inch gravel, low fines. Gradation:

SIEVE SIZE	PERCENT PASSING
1.5-INCH	100
1-INCH	90-100
3/4-INCH	55-90
3/8-INCH	5-20
#4	0-10
#8	0-3
#200	0-2

Product (or equivalent):

- To be determined. Construction contractor to select available aggregate material from local quarry(ies) that meets design criteria and import fill chemical and geotechnical requirements.

Installation:

- Standard installation methods for construction aggregate.
- Place and compact as required by project civil, geotechnical, and structural specifications.

QA/QC:

- VIMS engineer to verify product gradation and installed thickness.

Maintenance:

- No maintenance or repair is anticipated for the permeable aggregate layer.

4. SUCTION TRENCHES

Purpose:

- Provide perforated pipe in trench of permeable aggregate to allow withdrawal of sub-slab vapor for applying vacuum (depressurization) to sub-slab region.

Design Criteria:

- Service Coverage:
  - The SSD system is designed to provide depressurization across the entire ground floor building footprint (535,000 sf).
  - Each suction trench is designed to cover approximately 75,000 sf of building floor, so seven suction trenches are included.
  - The 75,000 sf design basis per suction trench is conservatively based on United States Environmental Protection Agency ("U.S. EPA") guidance for constructing SSD systems in large commercial buildings, which indicates suction points in properly-designed sub-slab gravel layers can effectively cover up to 100,000 sf (U.S. EPA, 1993).
- Spacing:
  - The seven suction trenches are spaced uniformly across the building from southwest to northeast, resulting in a spacing of approximately 220 feet between trenches.
  - See discussion of grade beams and tie beams in Section 1. The number and location of suction trenches may be adjusted after foundation construction drawings are finalized and locations of grade beams and tie beams are known.
- Trench Length: Approximately 200 feet.
  - Each suction trench is centered between the north and south sides of the building (see design drawings) to focus sub-slab soil vapor withdrawal from center of building and limit potential short-circuiting across building perimeter footings.

  - In EKI experience, a flow rate of 30 cubic feet per minute ("cfm") per linear foot of pipe in the suction trench is readily attainable, so a pipe of 200 linear feet has capacity for up to 6,000 cfm (which exceeds the design maximum flow rate for suction trenches, see below).
- Planned operational flow rate per suction trench: 375 cfm.
  - The planned operational flow rate is 5 cfm per 1,000 sf. For a service area of 75,000 sf per suction trench, a design flow of 375 cfm per suction trench meets this criterion.
  - The planned operational flow rate of 5 cfm per 1,000 sf is based on EKI experience with similar SSD systems and is sufficient for creating the required depressurization.
  - A lower flow rate may be utilized during operations if determined sufficient during startup testing based on sub-slab vacuum readings.
- Design maximum flow rate per suction trench: 560 cfm
  - Based on planned operational flow rate plus 50% additional capacity.
  - System will be designed with this higher capacity as a contingency in the event additional flow is needed to achieve the target sub-slab vacuum.

Product (or equivalent):

- Perforated pipe in each trench
  - High-density polyethylene ("HDPE") dual-walled (smooth interior) corrugated drainage pipe with factory perforations
    - Size: 6-inch nominal diameter
    - Advanced Drainage Systems ("ADS") N-12 ST or equivalent
    - American Association of State Highway and Transportation Officials ("AASHTO") Class II perforation, type CD (slotted)
    - Minimum open area: 1 square inch per linear foot
    - Wrap perforated pipe in geotextile liner (filter sock)
- Permeable aggregate in trench
  - Same material as specified in Section 3.

Installation:

- Install horizontally.
- Provide minimum 2 inches permeable aggregate on all sides of perforated pipe.

QA/QC:

- VIMS engineer to verify product and observe installed pipe.

Maintenance:

- No maintenance or repair is anticipated for the suction trenches.

5. CONVEYANCE PIPING

Purpose:

- Convey sub-slab vapor withdrawn from suction trenches to the SSD blower system. Limit pressure losses over the conveyance to limit blower size and power requirements.
  - Suction trench lateral pipes: subgrade horizontal pipes that connect the perforated suction trench pipes to the riser pipes.
  - Riser pipes: Interior vertical pipes that connect the perforated pipe in the sub-slab suction trenches to conveyance piping on the roof.
  - Conveyance lateral pipes: horizontal piping on the rooftop that connects each riser pipe to the header piping.
    - A flow control valve and a flow sensor will be installed in each conveyance lateral pipe for system balancing.
    - Soil gas samples will be collected from the conveyance lateral pipes on the rooftop during SSD operations using one of the pressure ports on the flow sensor in each lateral pipe. Each sample will represent sub-slab soil gases withdrawn from the vicinity of the suction trench served by that lateral pipe.
  - Header piping: Horizontal piping on the rooftop that conveys extracted soil vapor from the suction trench conveyance lateral pipes to the SSD blower system.

Design Criteria:

- Limit total pressure losses to less than 2 inches water column ("in-WC").

Products (or equivalent):

- Suction trench lateral pipes: 8-inch nominal diameter N-12 ST or equivalent, no perforations.
- Riser pipes: 8-inch nominal diameter Schedule 10 galvanized steel.
- Conveyance lateral pipes: 8-inch nominal diameter Schedule 10 galvanized steel.
- Header pipe on roof: spiral duct, galvanized steel, minimum 26 gauge, size varies.

Pipe Sizing and Pressure Losses:

- Pipe sizing is based on the design maximum flow rate of 560 cfm per suction trench
- See Table E-1a for estimated pressure losses in the piping at the planned operational flow rate of 375 cfm per suction trench.
- See Table E-1b for estimated pressure losses in the piping at the design maximum flow rate of 560 cfm per suction trench.

Installation:

- Riser pipes:
  - Seal at floor penetration.
  - Secure to interior steel columns.

  - Use air-tight welded joints or groove-lock couplings.
  - Provide water-tight weather seal at roof penetration using roof jack.
- Conveyance lateral pipes:
  - Install horizontally.
  - Install flow sensor a sufficient distance downstream of riser elbow.
  - Install butterfly valve for flow control downstream of flow sensor.
  - Provide pipe supports per manufacturer recommendations.
- Header pipe:
  - Install per standard construction practice for spiral duct.
  - Use with high-pressure sealant at joints to limit inward air leakage.
  - Install duct horizontal or sloping slightly downward in direction of SSD blower.
  - Provide pipe supports at manufacturer-recommended spacing.

QA/QC:

- VIMS engineer inspection.

Maintenance:

- No maintenance or repair is anticipated for below-grade components of the conveyance piping.
- Aboveground piping, including riser pipes, rooftop conveyance lateral piping, and header piping at the blower location should be visually inspected annually where accessible for any damage, cracks, or leaks.
- Repair any identified damage, cracks, or leaks in accordance with industry standard practice.

6. CONTROL VALVES

Purpose:

- Include one flow control valve and one flow sensor in the roof conveyance lateral pipe from each suction trench to allow flow rate adjustment and balancing.

Design Criteria:

- Size valve to match pipe size.

Product (or equivalent):

- Butterfly valve.

Installation:

- Install per standard construction practice.

QA/QC:

- VIMS engineer inspection.

Maintenance:

- No routine maintenance is required for the valve and flow sensor. Repair if found to be damaged during routine operations and monitoring.

7. SUB-SLAB PROBES

Purpose:

- Install permanent sub-slab probes into the permeable aggregate layer below the sub-slab liner for monitoring sub-slab vacuum (depressurization) during SSD operations.
  - Measure sub-slab vacuum in each SSP to verify the SSD system provides sufficient depressurization meeting the target of 0.02 in-WC.
  - Sub-slab soil gas samples will also be collected from select sub-slab probes for comparison to samples from conveyance lateral pipes and to assist in evaluating indoor air data.

Design:

- Continuous ¼-inch nylon tubing routed laterally through 1-inch polyvinyl chloride ("PVC") protector casing within the sub-slab gravel layer to an external access port. Protector casing sealed internally at each end with expanding foam sealant.
- See Drawings in Attachment E-3 for details.

Installation:

- Install per standard piping/tubing construction practice.

QA/QC:

- VIMS engineer inspection.

Maintenance:

- No maintenance or repair is anticipated for the sub-slab probes.

8. SSD BLOWER SYSTEM

Purpose:

- The SSD blower system will apply vacuum to each suction trench to withdraw sub-slab vapor and propagate the vacuum through the sub-slab permeable aggregate beneath the building floor to create sub-slab depressurization.

Design Criteria:

- Planned Operational Flow Rate:
  - 2,625 cfm (based on seven suction trenches at 375 cfm each - see Section 4)

- Design Maximum Flow Rate:
  - 3,920 cfm (based on seven suction trenches at 560 cfm each - see Section 4)
- Vacuum (Inlet Suction)
  - Provide minimum suction of 2 in-WC at each suction trench
    - Basis: Typical for SSD systems with engineered sub-slab gravel layers
  - Allow for up to 4 in-WC pressure losses in piping, based on pressure losses at the design maximum flow rate (see Table E-1b).
    - See Section 5, Table E-1a, Table E-1b
  - Total: 6 in-WC
  - Design for 8 in-WC inlet suction (33% safety factor)
- Discharge pressure
  - Design for discharge to atmosphere (0 in-WC)
- Alarms
  - Output the electrical current through blower to the remote monitoring system to allow for remote verification of blower operation and to notify operator in event that the blower is turned off or loses power.
  - Provide pressure and flow rate instruments in blower influent with signal output to remote monitoring system to allow for remote observation of flow rate and suction and to notify operator in the event the flow rate or suction at the blower inlet decreases to less than 50% of routine operating values, indicating blower failure.

Product (or equivalent):

- Cincinnati Fan ("CF"), model HDBI-150 (see Attachment E-1)
  - 8 hp motor, 3-phase 230/460 V, TEFC
  - Include variable frequency drive ("VFD") for flow rate adjustment if needed

Location:

- Install on building roof in proximity of SSD header piping to reduce piping length and avoid using ground level space for blower.
- Install in the southwestern corner of the building roof so that discharge location is more than 1,000 feet from the nearest K-12 school (see Section 9.2).

Installation:

- Install per standard construction practice.

QA/QC:

- VIMS engineer inspection.
- Verify suction and flow rate performance at commissioning.

Maintenance:

- Maintain blower per manufacturer recommendations.

9. AIR PERMITTING REQUIREMENTS AND EMISSIONS ESTIMATING

An air permit will be required for the SSD blower system from the BAAQMD, as described below.

SSD systems are regulated by the BAAQMD as soil vapor extraction ("SVE") systems under BAAQMD Regulation 8 Rule 47 (*Organic Compounds; Air Stripping and Soil Vapor Extraction Operations*). A permit is required pursuant to BAAQMD Regulation 2 Rule 1 (*Permits; General Requirements*).

Pursuant to BAAQMD 8-47-301, emission controls (such as GAC filters), are required to reduce VOCs emissions by 90 percent, unless an applicable exemption exists.

The planned SSD system is expected to be exempt from emission control requirements pursuant to the exemption in BAAQMD 8-47-113 (*Exemption: Air Stripping and Soil Vapor Extraction Operations Less Than 1 Pound per Day*). To qualify for this exemption, (a) total emissions of tetrachloroethene ("PCE"), trichloroethene ("TCE"), vinyl chloride, benzene, and methylene chloride must be less than 1 pound/day ("lb/day") and (b) the emissions must pass a risk screening in BAAQMD 8-47-402. Estimated VOC emissions for the planned SSD system are presented below and are evaluated with respect to these exemption criteria.

9.1 Estimated VOC Emissions

Estimated VOC emissions from the planned SSD system are calculated using site data and modeling methodology described in detail in Attachment E-2.

As described in Attachment E-2, VOC emissions are estimated by modeling the upward diffusion of VOCs from the groundwater table to the sub-slab permeable aggregate layer. It is then assumed that all of the VOCs that migrate to the permeable aggregate layer are captured by the SSD system and are discharged through the SSD blower system.

Of the five VOCs listed in BAAQMD 8-47-113, only TCE and vinyl chloride are routinely detected in groundwater at the site. Therefore, modeling was performed for those two VOCs, as well as for cis-1,2-dichloroethene ("cDCE") and 1,2-dichloroethane ("1,2-DCA") which are also detected routinely in groundwater at the site.

As shown in Attachment E-2, the estimated emission rates of TCE and VC are 0.011 lb/day and 0.00014 lb/day, respectively, for a total emission rate of 0.011 lb/day. This is substantially less than the 1 lb/day criterion for the exemption in BAAQMD 8-47-113.

To evaluate whether emissions would pass the risk screening require under BAAQMD 8-47-402, the estimated TCE, VC, and 1,2-DCA emission rates are compared to chronic Trigger Levels listed in BAAQMD Regulation 2, Rule 5, Table 2-5-1 (*Toxic Air Contaminant Trigger Levels*).[1] VOC emission rates that are lower than the Trigger Levels are deemed by BAAQMD to pass the risk screening. VOC emission rates higher than the Trigger Levels must be evaluated through site-specific air dispersion modeling and risk calculations.

As shown in Attachment E-2, the estimated emission rates for TCE, VC, and 1,2-DCA are less than 10 percent of their respective chronic Trigger Levels. Therefore, the VOCs emissions are expected to pass the risk screening and meet the second exemption criterion in BAAQMD-8-47-113.

Since the estimated VOC emission rates for the SSD system meet both of the exemption criteria in BAAQMD 8-47-113, emissions controls are not expected to be required by BAAMD and are not included in the design of the SSD system. Emissions monitoring will be required by BAAQMD during startup of the system to verify emission rates.

9.2 Public Notice Evaluation

BAAQMD Regulation 2 Rule 1 Section 2-1-412 (*Public Notice, Schools*) requires that the BAAQMD provide public notice if a proposed source of emissions is located within 1,000 feet of the outer boundary of a K-12 school. The nearest public school to the proposed SSD blower system location is the Melrose Elementary School located northeast of the site. As shown on Figure E-1, the proposed SSD blower location is more than 1,000 feet from the school property boundary. Therefore, the public notice requirement would not apply to the permit application for the SSD system.

9.3 Contingency for Emissions Control

While emissions estimates indicate that emissions controls will not be required for the SSD system, underground SSD conveyance piping to a location that could be used for emissions control will be installed during site development. This underground piping is being installed as a contingency for unanticipated conditions observed during system operation that would require emissions control for the SSD system, as follows.

If emissions controls are required, it would be provided using GAC in two adsorbers connected in series. To accommodate the design maximum flow rate of 3,920 cfm, each adsorber is assumed to include approximately 10,000 pounds of GAC, such as the VF10000 units shown in Attachment E-4. In this scenario, the GAC units would be installed at ground level (not on the building roof) along with the SSD blower and discharge stack. The potential location for this equipment is the parking area in the southwestern portion of the site, as shown on the

[1] There is no chronic Trigger Level for cDCE.

Drawings. See Table E-1a and Table E-1b for estimated pressure losses in the piping for the SSD system operating with GAC emission controls.

To facilitate this contingent treatment system, underground piping and electrical conduits will be installed from the southwestern end of the building to the potential future location of the treatment system, as shown in the Drawings. The underground piping will be 18-inch diameter HDPE pipe. The pipe will be capped at each end. The electrical conduits will be 2-inch diameter Schedule 40 PVC pipe or as required by the electrical engineer. The electrical conduits will be capped at each end. In the event the contingency for emissions control must be implemented, the rooftop SSD conveyance piping would be extended using a spiral-duct downcomer running down outside of the western wall of the building and connected to the underground conveyance pipe, and the SSD blower and emissions control system would be designed and constructed in the SSD treatment area. The SSD blower for this system would be selected to have sufficient pressure to both withdraw soil vapor from the SSD piping system and discharge soil vapor through the two GAC adsorbers. A preliminary blower selection for SSD implementation including GAC treatment is included in Attachment E-4.

10. OPERATIONS AND MAINTENANCE PLAN

An Operations and Maintenance Plan will be prepared concurrent with activating the SSD system and will be included in the completion report, as appropriate.

11. REFERENCES

U.S. EPA, 1993. *Radon Prevention in the Design and Construction of Schools and Other Large Buildings*, United States Environmental Protection Agency, Office of Research and Development, EPA/525/R-92/016. January 1993.

Tables

Table E-1a
Piping Pressure Loss Estimates (at 375 cfm per Suction Trench)
5441 International Boulevard, Oakland, California

Pipe Runs, Valves, Fittings	Pipe Type	Flow Rate	Straight Pipe Length	Equivalent Length of Fittings			Pipe Inside Diameter	Flow Velocity	Flow Velocity	Reynolds Number (Re)	Pipe Roughness (ε)	Relative Roughness (ε/D)	Fanning Friction Factor (*f*)	Pressure Loss (ΔP)
				Quantity	Le/D Ratio (a)	Equivalent Length (Le)	(D)			(b)	(c)		(d)	(e)(f)
		(cfm)	(feet)			(feet)	(in)	(fpm)	(fps)	(--)	(mm)	(--)	(--)	(in-WC)
Suction Trench Lateral to Conveyance Header														
Suction Trench Lateral	HDPE	375	30	--	--	--	8	1074	18	7.5E+04	0.0015	0.0000074	0.0047	0.06
Riser Pipe	GS	375	50	--	--	--	8	1074	18	7.5E+04	0.15	0.00074	0.0054	0.12
Rooftop Lateral	GS	375	15	--	--	--	8	1074	18	7.5E+04	0.15	0.00074	0.0054	0.04
Tee (branch flow)	GS	375	--	1	61	41	8	1074	18	7.5E+04	0.15	0.00074	0.0054	0.10
45 Elbow	GS	375	--	2	12	16	8	1074	18	7.5E+04	0.15	0.00074	0.0054	0.04
90 Elbow	GS	375	--	2	16	21	8	1074	18	7.5E+04	0.15	0.00074	0.0054	0.05
Butterfly Valve	--	375	--	1	32	21	8	1074	18	7.5E+04	0.15	0.00074	0.0054	0.05
Conveyance Header to Blower														
ST7-ST6	SD	375	200	--	--	--	10	688	11	5.7E+04	--	--	--	0.16
ST6-ST5	SD	750	250	--	--	--	14	702	12	8.8E+04	--	--	--	0.14
ST5-ST4	SD	1125	250	--	--	--	16	806	13	1.1E+05	--	--	--	0.15
ST4-ST3	SD	1500	250	--	--	--	18	849	14	1.3E+05	--	--	--	0.15
ST3-ST2	SD	1875	250	--	--	--	18	1061	18	1.7E+05	--	--	--	0.23
ST2-ST1	SD	2250	250	--	--	--	20	1031	17	1.8E+05	--	--	--	0.19
ST1-Blower	SD	2625	100	--	--	--	20	1203	20	2.1E+05	--	--	--	0.10
45 Elbow	SD	2625	--	2	12	40	20	1203	20	2.1E+05	--	--	--	0.04
Discharge Stack														
Stack	GS	2625	6				15	2139	36	2.8E+05	0.15	0.00039	0.0044	0.02
Total Pressure Loss for System with No Carbon Treatment														**1.64**
Additional Piping/Fittings for Alternative with Carbon Treatment														
Rooftop Lateral	SD	2625	30	--	--	--	18	1485	25	2.3E+05	--	--	--	0.05
Downcomer Pipe	SD	2625	50	--	--	--	18	1485	25	2.3E+05	--	--	--	0.09
90 Elbow	SD	2625	--	2	16	48	18	1485	25	2.3E+05	--	--	--	0.08
90 Elbow	HDPE	2625	--	2	16	48	18	1485	25	2.3E+05	0.0015	0.0000033	0.0038	0.07
Lateral to Carbon Treatment	HDPE	2625	170	--	--	--	18	1485	25	2.3E+05	0.0015	0.0000033	0.0038	0.24
Pipe Manifold	SD	2625	60	--	--	--	16	1880	31	2.6E+05	0.0015	0.0000037	0.0037	0.14
Manifold Butterfly Valves	--	2625	--	4	32	171	16	1880	31	2.6E+05	0.15	0.00037	0.0044	0.48
Manifold 90 Elbows	SD	2625	--	16	32	683	16	1880	31	2.6E+05	0.15	0.00037	0.0044	1.93
Carbon Treatment Vessels (Alternative) (g)														
VF10000 GAC Vessels (2)		2625	--	--	--	--	--	--	--	--	--	--	--	20
Total Pressure Loss for Alternative With Carbon Treatment (h)														**24.70**

Table E-1a
Piping Pressure Loss Estimates (at 375 cfm per Suction Trench)
5441 International Boulevard, Oakland, California

Notes
(a) Equivalent length to diameter ratios for pipe fittings and valves are from Katmar, 2019.
(b) The dimensionless Reynolds number (Re) is:

$Re = \rho \, v \, D / \mu$

where:
- Re = Reynolds Number (dimensionless)
- ρ = density (lb/ft3) (= 0.075 for air at 70 Deg. F and 1 atmosphere pressure)
- v = velocity (fps)
- D = pipe diameter (feet)
- μ = viscosity (lbm/ft/s) (=0.000012 for air)

(c) Pipe roughness values are from Bird, et.al. (2007) for the listed pipe type. Roughness values are not listed or used for spiral duct.
(d) The Fanning friction factor (f) is calculated from the equation (Bird, et.al., 2007) [valid for (ε/D) < 0.05 and Re between 4E4 and 1E7]:

$$(1/\sqrt{f}) = -3.6 \log_{10} [6.9 / Re + ((\varepsilon/D)/3.7)^{(10/9)}]$$

where:
- f = fanning friction factor
- D = pipe inside diameter (mm)
- ε = roughness (mm)

(e) Pressure losses are calculated assuming constant density (limited pressure losses) using the following equation:

$$\Delta P = 4 * f * \rho * (\Delta L / D) * (v^2 / 2g_c) / 144 * 27.68$$

where:
- ΔP = pressure loss (in-WC)
- f = fanning friction factor
- ρ = density (lb/ft3) (= 0.075 for air at 70 Deg. F and 1 atmosphere pressure)
- ΔL = straight pipe length, or equivalent length of fittings (feet)
- D = pipe inside diameter (feet)
- v = flow velocity (feet/second)
- gc = gravitational constant (= 32.174 ft -lb_m / lb_f-s^2)
- 144 = conversion from (lbs/ft^2) to (lbs/in^2)
- 27.68 = pressure conversion from (lb/in^2) to (in-WC)

Table E-1a
Piping Pressure Loss Estimates (at 375 cfm per Suction Trench)
5441 International Boulevard, Oakland, California

(f) For spiral duct, pressure loss is estimated using the equation from a spiral duct manufacturer (SMI, 2006):

$$\Delta P = 2.74 * (V/1000)^{1.9} / D^{1.22} * (\Delta L/100)$$

where:
ΔP = pressure loss (in-WC)
ΔL = straight pipe length, or equivalent length of fittings (feet)
D = pipe inside diameter (feet)
V = flow velocity (feet/minute)

(g) Pressure losses through two carbon treatment vessels are estimated based on manufacturer's data.
(h) Total pressure losses for the carbon treatment alternative include all the estimated losses in the table except for the discharge stack from the blower (which is applicable to the design without carbon treatment).

Abbreviations
cfm: cubic feet per minute
D; diameter
ΔP: pressure loss
fpm: feet per minute
fps: feet per second
GS: galvanized steel
HDPE: high density polyethylene
in-WC: inches water column
Le: equivalent length
Re: Reynolds number
SD: spiral duct
sf: square feet

References
Bird, Byron E., Lightfoot, Edwin N.; Stewart, Warren E. *Transport Phenomena.* Revised Second Edition. Wiley. 2007.
Katmar, 2019. Equivalent Length of Pipe Fittings and Valves. Katmar Software. [https://www.katmarsoftware.com/articles/pipe-fitting-equivalent-length.htm], 2019.
SMI, 2006. Engineering Data. Catalog Volume 5. Spiral Manufacturing, Inc. 2006.

Table E-1b
Piping Pressure Loss Estimates (at 560 cfm per Suction Trench)
5441 International Boulevard, Oakland, California

Pipe Runs, Valves, Fittings	Pipe Type	Flow Rate	Straight Pipe Length	Equivalent Length of Fittings			Pipe Inside Diameter	Flow Velocity	Flow Velocity	Reynolds Number (Re)	Pipe Roughness (ε)	Relative Roughness (ε/D)	Fanning Friction Factor (f)	Pressure Loss (ΔP)
				Quantity	Le/D Ratio (a)	Equivalent Length (Le)	(D)			(b)	(c)		(d)	(e)(f)
		(cfm)	(feet)			(feet)	(in)	(fpm)	(fps)	(--)	(mm)	(--)	(--)	(in-WC)
Suction Trench Lateral to Conveyance Header														
Suction Trench Lateral	HDPE	560	30	--	--	--	8	1604	27	1.1E+05	0.0015	0.0000074	0.0044	0.13
Riser Pipe	GS	560	50	--	--	--	8	1604	27	1.1E+05	0.15	0.00074	0.0052	0.26
Rooftop Lateral	GS	560	15	--	--	--	8	1604	27	1.1E+05	0.15	0.00074	0.0052	0.08
Tee (branch flow)	GS	560	--	1	61	41	8	1604	27	1.1E+05	0.15	0.00074	0.0052	0.21
45 Elbow	GS	560	--	2	12	16	8	1604	27	1.1E+05	0.15	0.00074	0.0052	0.08
90 Elbow	GS	560	--	2	16	21	8	1604	27	1.1E+05	0.15	0.00074	0.0052	0.11
Butterfly Valve	--	560	--	1	32	21	8	1604	27	1.1E+05	0.15	0.00074	0.0052	0.11
Conveyance Header to Blower														
ST7-ST6	SD	560	200	--	--	--	10	1027	17	8.9E+04	--	--	--	0.35
ST6-ST5	SD	1120	250	--	--	--	14	1048	17	1.2E+05	--	--	--	0.30
ST5-ST4	SD	1680	250	--	--	--	16	1203	20	1.7E+05	--	--	--	0.33
ST4-ST3	SD	2240	250	--	--	--	18	1268	21	2.0E+05	--	--	--	0.32
ST3-ST2	SD	2800	250	--	--	--	18	1584	26	2.4E+05	--	--	--	0.48
ST2-ST1	SD	3360	250	--	--	--	20	1540	26	2.7E+05	--	--	--	0.40
ST1-Blower	SD	3920	100	--	--	--	20	1797	30	3.1E+05	--	--	--	0.22
45 Elbow	SD	3920	--	2	12	40	20	1797	30	3.1E+05	--	--	--	0.09
Discharge Stack														
Stack	GS	3920	6				15	3194	53	4.1E+05	0.15	0.00039	0.0043	0.05
Total Pressure Loss for System with No Carbon Treatment														**3.50**
Additional Piping/Fittings for Alternative with Carbon Treatment														
Rooftop Lateral	SD	3920	30	--	--	--	18	2218	37	3.5E+05	--	--	--	0.11
Downcomer Pipe	SD	3920	50	--	--	--	18	2218	37	3.5E+05	--	--	--	0.18
90 Elbow	SD	3920	--	2	16	48	18	2218	37	3.5E+05	--	--	--	0.18
90 Elbow	HDPE	3920	--	2	16	48	18	2218	37	3.5E+05	0.0015	0.0000033	0.0035	0.14
Lateral to Carbon Treatment	HDPE	3920	170	--	--	--	18	2218	37	3.5E+05	0.0015	0.0000033	0.0035	0.49
Pipe Manifold	SD	3920	60	--	--	--	16	2807	47	3.9E+05	0.0015	0.0000037	0.0034	0.31
Manifold Butterfly Valves	--	3920	--	4	32	171	16	2807	47	3.9E+05	0.15	0.00037	0.0042	1.08
Manifold 90 Elbows	SD	3920	--	16	32	683	16	2807	47	3.9E+05	0.15	0.00037	0.0042	4.31
Carbon Treatment Vessels (Alternative) (g)														
VF10000 GAC Vessels (2)		3920	--	--	--	--	--	--	--	--	--	--	--	20
Total Pressure Loss for Alternative With Carbon Treatment (h)														**30.23**

Table E-1b
Piping Pressure Loss Estimates (at 560 cfm per Suction Trench)
5441 International Boulevard, Oakland, California

Notes
(a) Equivalent length to diameter ratios for pipe fittings and valves are from Katmar, 2019.
(b) The dimensionless Reynolds number (Re) is:

$Re = \rho \, v \, D / \mu$

where:
- Re = Reynolds Number (dimensionless)
- ρ = density (lb/ft3) (= 0.075 for air at 70 Deg. F and 1 atmosphere pressure)
- v = velocity (fps)
- D = pipe diameter (feet)
- μ = viscosity (lbm/ft/s) (=0.000012 for air)

(c) Pipe roughness values are from Bird, et.al. (2007) for the listed pipe type. Roughness values are not listed or used for spiral duct.
(d) The Fanning friction factor (f) is calculated from the equation (Bird, et.al., 2007) [valid for (ε/D) < 0.05 and Re between 4E4 and 1E7]:

$$(1/\sqrt{f}) = -3.6 \log_{10} [6.9 / Re + ((\varepsilon/D)/3.7)^{(10/9)}]$$

where:
- f = fanning friction factor
- D = pipe inside diameter (mm)
- ε = roughness (mm)

(e) Pressure losses are calculated assuming constant density (limited pressure losses) using the following equation:

$$\Delta P = 4 * f * \rho * (\Delta L / D) * (v^2 / 2g_c) / 144 * 27.68$$

where:
- ΔP = pressure loss (in-WC)
- f = fanning friction factor
- ρ = density (lb/ft3) (= 0.075 for air at 70 Deg. F and 1 atmosphere pressure)
- ΔL = straight pipe length, or equivalent length of fittings (feet)
- D = pipe inside diameter (feet)
- v = flow velocity (feet/second)
- gc = gravitational constant (= 32.174 ft -lb_m / lb_f-s^2)
- 144 = conversion from (lbs/ft^2) to (lbs/in^2)
- 27.68 = pressure conversion from (lb/in^2) to (in-WC)

Table E-1b
Piping Pressure Loss Estimates (at 560 cfm per Suction Trench)
5441 International Boulevard, Oakland, California

(f) For spiral duct, pressure loss is estimated using the equation from a spiral duct manufacturer (SMI, 2006):

$$\Delta P = 2.74 * (V/1000)^{1.9} / D^{1.22} * (\Delta L/100)$$

where:
ΔP = pressure loss (in-WC)
ΔL = straight pipe length, or equivalent length of fittings (feet)
D = pipe inside diameter (feet)
V = flow velocity (feet/minute)

(g) Pressure losses through two carbon treatment vessels are estimated based on manufacturer's data.
(h) Total pressure losses for the carbon treatment alternative include all the estimated losses in the table except for the discharge stack from the blower (which is applicable to the design without carbon treatment).

Abbreviations
cfm: cubic feet per minute
D; diameter
ΔP: pressure loss
fpm: feet per minute
fps: feet per second
GS: galvanized steel
HDPE: high density polyethylene
in-WC: inches water column
Le: equivalent length
Re: Reynolds number
SD: spiral duct
sf: square feet

References
Bird, Byron E., Lightfoot, Edwin N.; Stewart, Warren E. *Transport Phenomena.* Revised Second Edition. Wiley. 2007.
Katmar, 2019. Equivalent Length of Pipe Fittings and Valves. Katmar Software. [https://www.katmarsoftware.com/articles/pipe-fitting-equivalent-length.htm], 2019.
SMI, 2006. Engineering Data. Catalog Volume 5. Spiral Manufacturing, Inc. 2006.

Figures



Legend

- Melrose Elementary Property
- Proposed SSD Blower Location
- 1,000 foot boundary
- Site Property Boundary
- Proposed Redeveloped Site Building

Abbreviations

SSD = sub-slab depressurization

Notes

1. All locations Approximate

Source

1. Imagery: Google Earth Pro, 2017.

0 200 400
Feet

Distance from SSD Emission Point to Nearest School

Draft Final

Bridge Acquisition, LLC
5441 International Blvd.
Oakland, CA
August 2019
B70123.01
Figure E-1

eki environment & water

Path: X:\B70123\Maps\...01\2019\01\FigX_BlowerLoc_1000FtRadius.mxd

Attachment E-1

SSD Blower System Cut Sheets and Blower Curve

FAN SELECTION And PERFORMANCE

Your Representative:
Shane Parks
Air Handling Equipment, Inc.
P.O. BOX 548
Suisun CA 94585
707-425-7305 Phone
707-425-7236 Fax
ahefan2@sbcglobal.net

Friday, July 26, 2019

Job Name: EKI Environment & Water, INC.
Reference: Quote: 399327

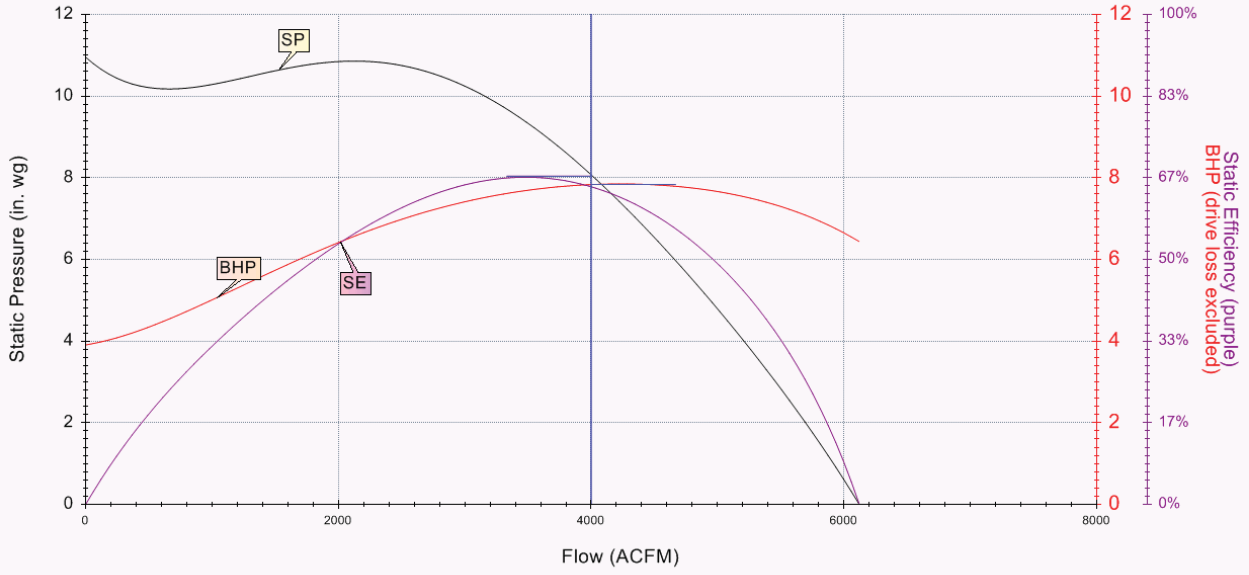
Operating Requirements

Volume, ACFM	4,000
Static Pressure, in. wg	8.0
Density, lb./ft.³	0.075
Operating Temperature, °F	70
AMCA Arrangement No.	4
Motor Frequency, Hz	60
Start-Up Temperature, °F	70

Fan Selection and Specifications

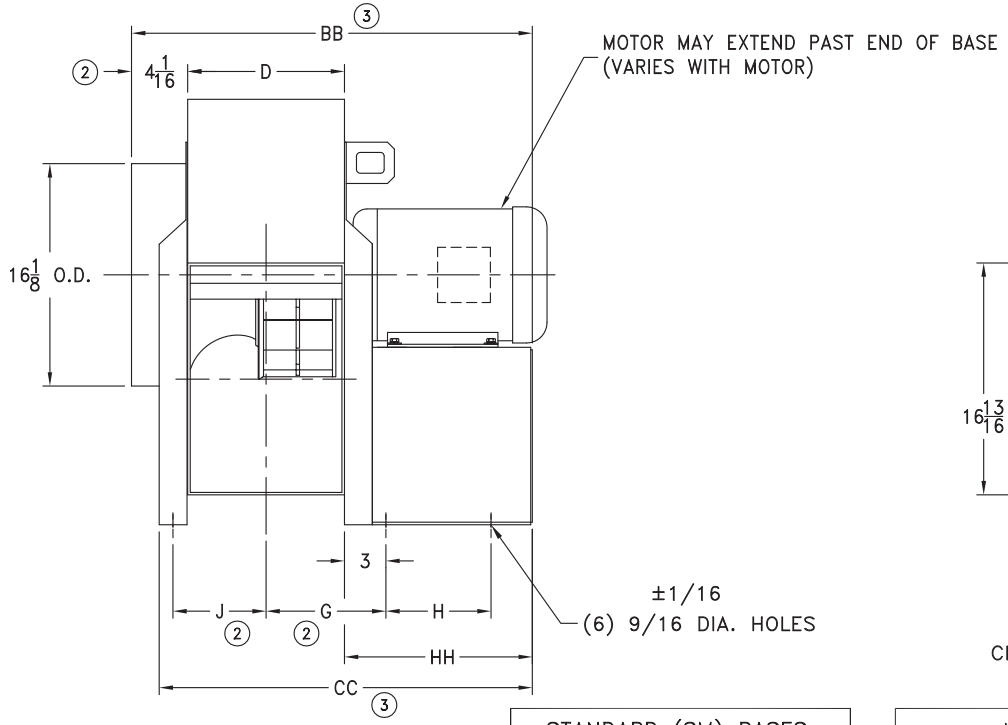
Model	HDBI-150		
Fan RPM	3,530		
Wheel Description	HD Backward Inclined		
Wheel Width, %	95%		
Wheel Diameter, in.	15.00		
Inlet Diameter, in.	16.13		
Outlet Velocity, ft./min.	3,088		
Fan BHP	7.8	Suggested Motor HP:	10.0
Static Efficiency, %	64.8%		
Cold Start BHP	7.8		
Construction Class	Class IV		

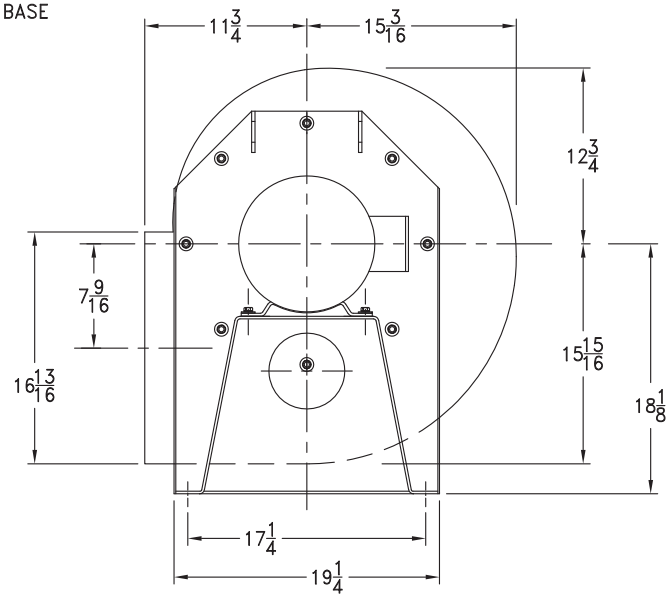
Cincinnati Fan HDBI-150 HD Backward Inclined Wheel (95% Width) @ 3,530 RPM
Rating Point: 4,000 ACFM @ 8.0 in. wg SP, 0.075 lb./ft.³ Density, 7.8 BHP



CFSWin Version: 8.5.7009.24787 Database Version: 8.5.4

Cincinnati Fan Selector - © 2017 by Cincinnati Fan and Ventilator Co. All Rights Reserved





CLOCKWISE BOTTOM HORIZONTAL DISCHARGE SHOWN

	% WIDTH	D	② G	② J	STANDARD (SM) BASES MOTOR FRAME 143T–215T H	HH	③ BB	③ CC	WEIGHT*	LARGE BASE MOTOR FRAME 254T–256T H	HH	③ BB	③ CC	WEIGHT*
	100%	11 3/8	8 11/16	6 3/4			29 1/16	27 1/16	190			37 7/16	35 7/16	210
	95%	11 1/8	8 9/16	6 5/8			28 13/16	26 13/16	189			37 3/16	35 3/16	209
	90%	10 7/8	8 7/16	6 1/2			28 9/16	26 9/16	188			36 15/16	34 15/16	208
	85%	10 9/16	8 9/32	6 11/32			28 1/4	26 1/4	187			36 5/8	34 5/8	207
	80%	10 5/16	8 5/32	6 7/32			28	26	186			36 3/8	34 3/8	206
	75%	10 1/16	8 1/32	6 3/32	7 5/8	13 5/8	27 3/4	25 3/4	185	16	22	36 1/8	34 1/8	205
	70%	9 3/4	7 7/8	5 15/16			27 7/16	25 7/16	184			35 13/16	33 13/16	204
	65%	9 1/2	7 3/4	5 13/16			27 3/16	25 3/16	183			35 9/16	33 9/16	203
	60%	9 1/4	7 5/8	5 11/16			26 15/16	24 15/16	182			35 5/16	33 5/16	202
	55%	8 15/16	7 15/32	5 17/32			26 5/8	24 5/8	181			35	33	201
	50%	8 11/16	7 11/32	5 13/32			26 3/8	24 3/8	180			34 3/4	32 3/4	200

NOTES:

1. FANS ARE ROTATABLE IN 45° INCREMENTS.
2. ADD 1/8" FOR AMCA "C" CONSTRUCTION FANS AND/OR DOWNBLAST DISCHARGE POSITION.
3. ADD 1/4" FOR AMCA "C" CONSTRUCTION FANS AND/OR DOWNBLAST DISCHARGE POSITION.

* 4. WEIGHT DOES NOT INCLUDE MOTOR OR OPTIONS.

cincinnati fan
7697 SNIDER ROAD MASON, OHIO 45040

TOLERANCES:
ANGLES: ± 1°
FRACTIONS ±1/8
ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED

SUPERSEDES:

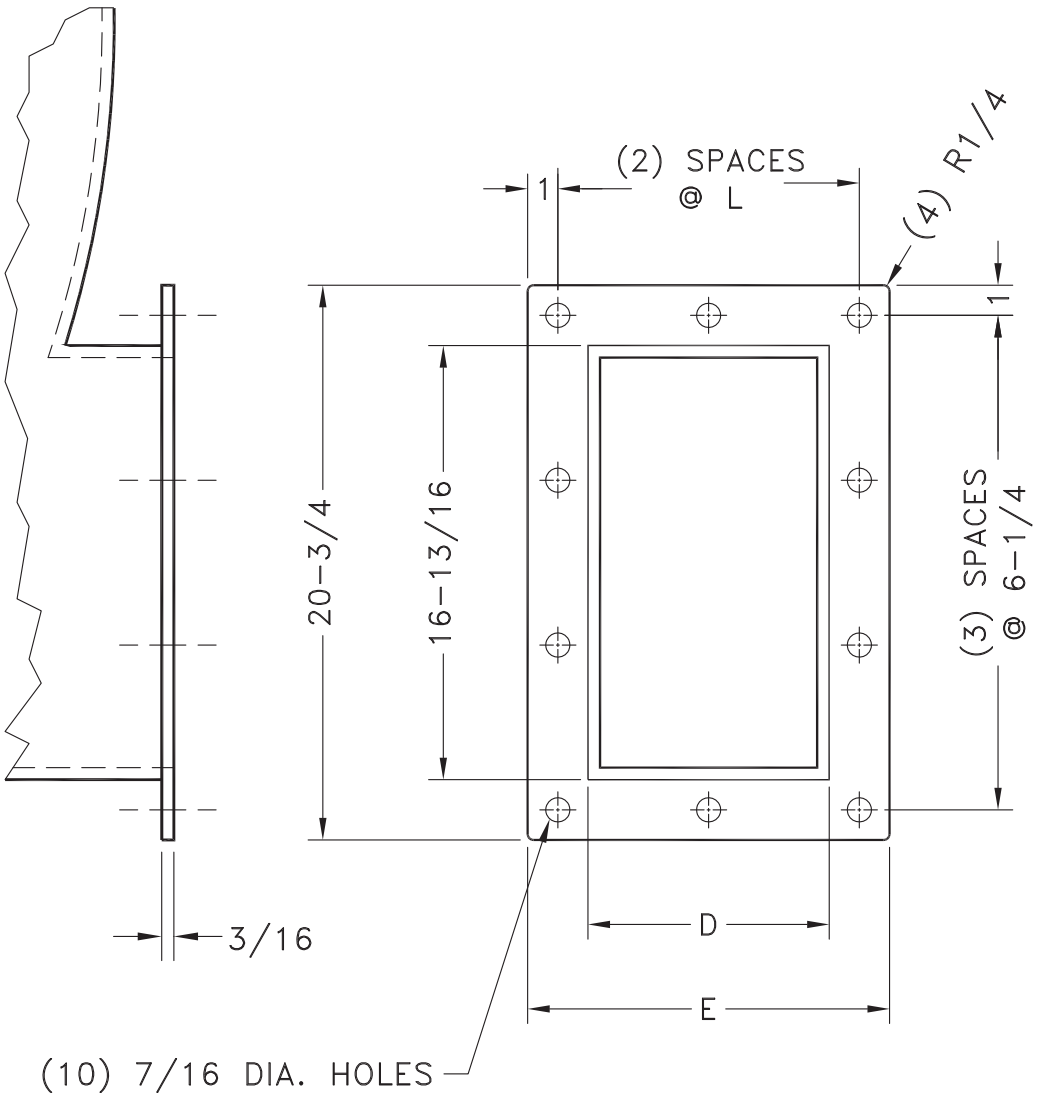
CERTIFIED DRAWING

TITLE HDBI/HDAF–150 ARR. 4 REDUCED WIDTH FANS

A

DRAWING NO. HD1504S

REV. 3



% WIDTH	D	E	L
100	11-3/8	15-3/8	6-11/16
95	11-1/8	15-1/8	6-9/16
90	10-7/8	14-7/8	6-7/16
85	10-9/16	14-9/16	6-9/32
80	10-5/16	14-5/16	6-5/32
75	10-1/16	14-1/16	6-1/32
70	9-3/4	13-3/4	5-7/8
65	9-1/2	13-1/2	5-3/4
60	9-1/4	13-1/4	5-5/8
55	8-15/16	12-15/16	5-15/32
50	8-11/16	12-11/16	5-11/32
45	8-7/16	12-7/16	5-7/32
40	8-3/16	12-3/16	5-3/32

cincinnati fan
7697 SNIDER ROAD MASON, OHIO 45040

TOLERANCES:
ANGLES: ± 1°
FRACTIONS ±1/8
ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED

SUPERSEDES:

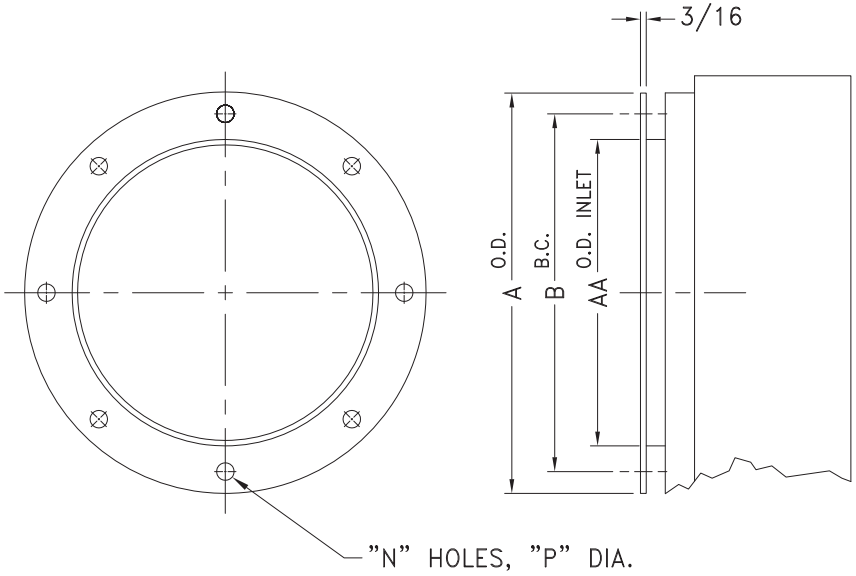
CERTIFIED DRAWING

TITLE
REDUCED WIDTH
HDBI/HDAF-150 DISCHARGE FLANGE

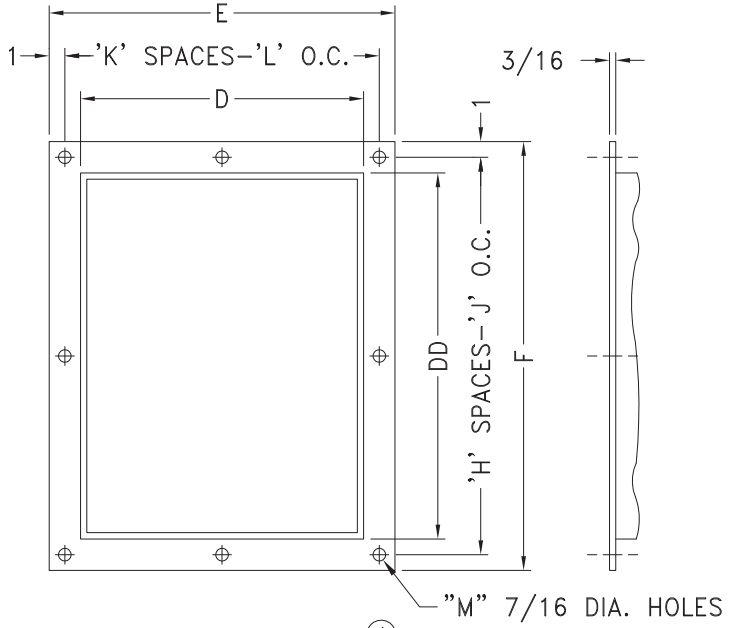
A

DRAWING NO. 27207-01

REV. 6



INLET FLANGE



DISCHARGE FLANGE ①

	INLET					DISCHARGE								
SIZE	A O.D.	B B.C.	N	AA DIA.	P	D	E	F	H	J	K	L	M	DD
120	16	14–3/8	8	13–1/4	7/16	9–3/8	13–3/8	17–11/16	2	7–27/32	2	5–11/16	8	13–3/4
130	17–3/4	15–15/16	8	14–5/8	7/16	10–3/8	14–3/8	19–3/16	2	8–19/32	2	6–3/16	8	15–1/4
150	19–1/4	17–1/2	8	16–1/8	7/16	11–3/8	15–3/8	20–3/4	3	6–1/4	2	6–11/16	10	16–13/16
160	21–1/8	19–3/8	8	18	7/16	12–1/2	16–1/2	22–7/16	3	6–13/16	2	7–1/4	10	18–7/16
180	23–1/2	21–1/2	12	20	7/16	13–7/8	17–7/8	24–1/2	3	7–1/2	2	7–15/16	10	20–3/8
200	25–1/2	23–1/2	12	22	7/16	15–1/4	19–1/4	26–3/8	3	8–1/8	3	5–3/4	12	22–3/8
220	28–1/8	26–1/8	12	24–5/8	7/16	16–7/8	20–15/16	28–7/8	4	6–23/32	3	6–5/16	14	24–7/8
240	30–3/4	28–3/4	16	27	7/16	18–9/16	22–5/8	31–3/8	4	7–11/32	3	6–7/8	14	27–3/8
270	33–3/4	31–5/8	16	30	7/16	20–7/16	24–1/2	34–1/8	4	8–1/32	3	7–1/2	14	30–1/16
300	37–1/4	35–1/4	16	33–1/2	7/16	22–3/4	26–3/4	37–5/8	5	7–1/8	3	8–1/4	16	33–9/16
330	40–3/8	38–3/4	16	36–3/4	1/2	24–7/8	28–7/8	40–7/8	7	5–9/16	5	5–3/8	24	36–3/4
360	43–5/8	42	16	40	1/2	27–1/4	31–1/4	44–1/4	7	6–1/32	5	5–27/32	24	40–1/4

NOTE:

① NOT AVAILABLE ON ANY MODEL FOR DOWNBLAST, BOTTOM ANGULAR DOWN OR TOP ANGULAR DOWN DISCHARGE POSITIONS. DISCHARGE FLANGE IS STANDARD ON SIZES –270 THRU –360.

cincinnati fan
7697 SNIDER ROAD MASON, OHIO 45040

TOLERANCES:
ANGLES: ± 1°
FRACTIONS ±1/8
ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED

SUPERSEDES:

CERTIFIED DRAWING

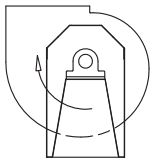
TITLE: HDBI/HDAF INLET AND DISCHARGE FLANGES

A

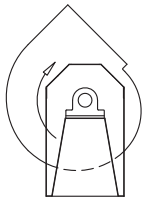
DRAWING NO. 27205

REV. 12

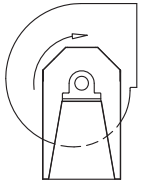
CLOCKWISE ROTATION



CLOCKWISE
UP BLAST



CLOCKWISE
TOP ANGULAR UP



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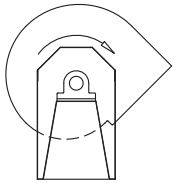

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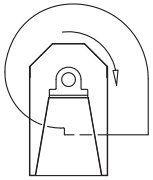

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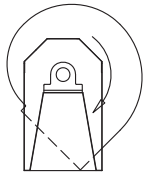

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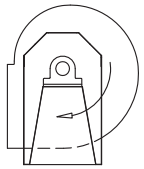

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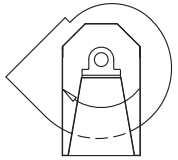

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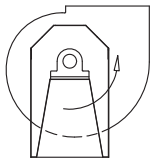
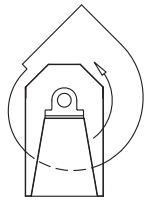
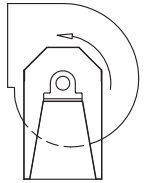
COUNTERCLOCKWISE ROTATION



COUNTERCLOCKWISE
UP BLAST



COUNTERCLOCKWISE
TOP ANGULAR UP



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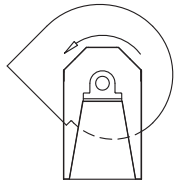

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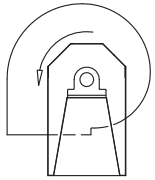
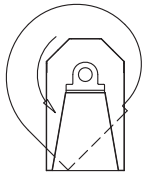
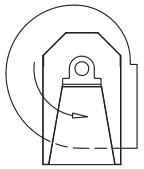


COUNTERCLOCKWISE
DOWN BLAST



COUNTERCLOCKWISE
BOTTOM ANGULAR DOWN



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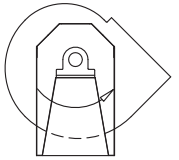


COUNTERCLOCKWISE
BOTTOM ANGULAR UP

NOTES:

1. DIRECTION OF ROTATION IS DETERMINED FROM DRIVE SIDE OF FAN.
2. SAME AS AMCA STANDARD 99–2406.

cincinnati fan
7697 SNIDER ROAD MASON, OHIO 45040

TOLERANCES:
ANGLES: ± 1°
FRACTIONS ±1/8
ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED

SUPERSEDES:

CERTIFIED DRAWING

TITLE: DESIGNATION FOR ROTATION AND DISCHARGE OF CENTRIFUGAL FANS EXCEPT SQBI/SQAF MODELS

A

DRAWING NO. ROTATION–DISCHARGE

REV. 1

Attachment E-2

Estimating Emissions for Sub-Slab Depressurization System Using Groundwater Data

Attachment E-2
Estimating Emissions for Sub-Slab Depressurization System Using Groundwater Data
5441 International Boulevard, Oakland, California

This attachment summarizes the methodology for estimating volatile organic compound ("VOC") emission rates from the sub-slab depressurization ("SSD") system planned for the new building at 5441 International Boulevard, Oakland, California ("site"). This methodology utilizes publicly-available models of subsurface vapor transport published by the United States Environmental Protection Agency ("U.S. EPA") and the California Environmental Protection Agency ("Cal-EPA") Department of Toxic Substances Control ("DTSC").

The new building and the SSD system are currently being designed. Emissions estimates are developed based on the design parameters for the new facility and SSD system, the soil characteristics at the site, and VOC concentrations measured in shallow groundwater underlying the site. Parameters are conservatively chosen from available data sets to model the maximum likely VOC emission rates.

CONCEPTUAL MODEL

VOCs are present in shallow groundwater at the site. The conceptual model for VOC emissions is:

- VOCs in groundwater will evaporate from shallow groundwater into soil vapor, establishing an equilibrium soil vapor concentration at the top of the water table.
- VOCs in soil vapor will migrate upward by diffusion from the top of the water table, through air-filled pore spaces in soil, up to the gravel venting layer that will be installed beneath the building floor for the SSD system. The soil above the water table includes very moist soil (the "capillary fringe," where moisture is drawn upward by capillary forces) and drier soil above the capillary fringe.
- At the gravel venting layer, the SSD system will capture and remove the VOCs that have migrated upward from groundwater into the gravel layer.

With this conceptual model, the estimated VOC emission rate is equal to the rate that VOCs migrate upward from the groundwater into the gravel venting layer for capture and removal by the SSD system.

There are VOCs present in soil in localized areas of the site. The concentration of VOCs expected to remain in soil following excavation and building foundation construction is considered negligible relative to the VOCs in groundwater for the purpose of modeling the potential VOC emission rates from the SSD system.

VAPOR TRANSPORT MODEL METHODOLOGY

The vapor transport model methodology uses standard chemical diffusive transport modeling equations that have been incorporated into vapor intrusion models by the U.S. EPA and the DTSC. The U.S. EPA issued its modeling guidance in the document *User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings* (U.S. EPA, 2003). The DTSC has adopted the modeling procedures in the U.S. EPA guidance, with some revisions to modeling parameters, and issued Excel spreadsheets with recommended parameters most recently in December 2014 (DTSC, 2014).

Table E-2 lists the modeling parameters and calculated outputs for the conditions at the site. The key modeling steps and the conservative approach to parameter selection are described below. The equations used for the modeling are shown at the end of this document. The modeling equations and parameters are taken from the U.S. EPA and DTSC guidance and site data, as noted.

VOC Concentrations in Groundwater

VOC concentrations in the uppermost groundwater, known as the A-Zone, are relevant for estimated VOC diffusive flux upward through the vadose zone. VOC concentrations in groundwater at the site as measured in September 2018 are reported in Wood (2018). Well locations and selected VOC monitoring results are shown on "Figure 7" in that report, which is attached hereto for reference. During September 2018, samples were collected from two A-Zone monitoring wells that are within the future building footprint (W-614A and W-529A) and from two groundwater extraction wells that are within the future building footprint (EW-5 and EW-6). Groundwater samples were also collected from other monitoring wells and extraction wells outside the future building footprint, and from the influent to the groundwater extraction treatment system ("GETS"), which serves 8 extraction wells at the site.

Table A below summarizes the results for four VOCs from the wells within the future building footprint and the GETS influent. The four VOCs listed are trichloroethene ("TCE"), cis-1,2-dichloroethene ("cDCE"), vinyl chloride ("VC") and 1,2-dichloroethane ("1,2-DCA"). TCE, cDCE, and 1,2-DCA are frequently detected in the groundwater samples; VC is detected less frequently but has a relatively low emission rate limit so it is included in the modeling.

Table A
VOC Concentrations in September 2018 at
Select Wells and the Groundwater Extraction Treatment System Influent (Wood, 2018**)**

Sampling Location	Screen Interval (feet bgs)	VOC Concentrations (ug/L)			
		TCE	cDCE	VC	1,2-DCA
W-529A	10-20	<0.5	<0.5	<0.5	<0.5
W-614A	20-25	72	11	10	8.2
EW-5	13-16	1,500	63	19	<10
EW-6	8-10, 24-26	1,500	110	<13	55
GETS Influent	n/a	2,200	150	<17	130

bgs = below ground surface
ug/L = micrograms per liter

TCE is present at the highest concentration of the VOCs detected. The TCE concentration is highest in the GETS influent, slightly lower in the extraction wells, and lowest in the monitoring wells.

Figure 4a from the Feasibility Study ("FS") for the site (Geosyntec, 2009) is a groundwater plume map for the A-zone from 2008 and earlier data and is attached hereto for reference. That map indicates VOCs are primarily impacting the southern side of the site. Well W-529A is in a portion of the site with lesser VOC concentrations. Well W-614A is within the primary plume area and beneath the building and suggest relatively low VOC concentrations in the 20 to 25-foot depth range.

Given the data summarized above, the VOC concentrations measured in the GETS Influent are conservatively assumed to represent shallow groundwater beneath the building. The GETS Influent includes groundwater from eight extraction wells within the southern two-thirds of the site (see Figure 7), and has concentrations higher than measured in the two monitoring wells and the two extraction wells that are within the future building footprint.

Soil Parameters

The key to modeling vapor transport rates through the soil is to estimate the overall effective diffusivity of the VOCs, which is highly dependent on the air-filled porosity in the soil, a function of the soil type and moisture content. For this site, groundwater is approximately 10 to 12 feet bgs. Review of borehole logs indicates the upper 3 to 5 feet of soil is often described as clayey sand, and the underlying soil down to the water table is typically described as lean clay or sandy clay, with fines usually exceeding 60 percent.

The DTSC model (DTSC, 2014) provides soil parameters for a number of soil types, and a "Figure 3" in the related U.S. EPA guidance shows the range of percentages of sand, silt, and clay for each soil type (U.S. EPA, 2003). The upper soil (clayey sand) will be re-worked for geotechnical purposes, but for emissions modeling herein is conservatively modeled as 5 feet of sand, which has low moisture content and relatively higher VOC diffusion rates. The lower soil zone is modeled as 5 feet of clay. The DTSC recommended soil parameters for a sand and clay are listed in Table E-2 (DTSC, 2014).

Chemical Parameters

Chemical parameters for the VOCs are taken directly from the DTSC guidance (DTSC, 2014) and are listed in Table E-2. Key chemical parameters are the Henry's Law constant (which determines the equilibrium vapor phase concentration for a given groundwater concentration) and the diffusion coefficients for each VOC in air and water phases.

Chemical parameters are typically provided at a reference temperature of 25 ^{o}C (77 ^{o}F). Because the groundwater temperature at the site is estimated to be approximately 18 ^{o}C (65 ^{o}F), the chemical parameters in the model are adjusted to the system temperature using the equations in the U.S. EPA guidance (U.S. EPA, 2003).

Physical Parameters

Key physical parameters are the depth to groundwater and the areal extent of the gravel venting layer for the SSD system.

The groundwater elevations at the site are reported in the semi-annual monitoring report (Wood, 2018). The depth to groundwater is typically in the range of 10 to 12 feet. A depth of 10 feet is used for the modeling in Table E-2.

The gravel venting layer beneath the floor of the building at the site will cover an area of approximately 535,000 sf. However, review of the VOC distribution at the site (Figure 4a from Geosyntec, 2009) indicates the VOC plume is predominantly in the southwestern portion of the new building footprint. Therefore, the modeling assumes an area two-thirds of the size of the building, or 360,000 sf. Applying

the assumed VOC concentrations across the entire building footprint would over-state the estimated emissions.

Diffusion Rates

The upward diffusion rates of VOCs are modeled using:

- chemical-specific diffusivities in air and water, taken from DTSC guidance (DTSC, 2014);
- conservatively chosen soil properties, as described above;
- equations that describe the effective diffusion coefficients for chemicals diffusing through soil (see Equation [1], Equation [2], and Equation [3], below); and,
- the VOC concentration gradient between the groundwater table and the gravel venting zone.

The VOC concentration gradient from the top of the groundwater table to the gravel venting layer is determined conservatively by assuming a concentration of zero in the gravel venting layer, which essentially assumes that the SSD system reduces the concentration to a level much lower than at the top of groundwater - soil interface and maximizes estimated diffusion rates. The VOC concentration in soil vapor at the top of the groundwater - soil interface is calculated using Henry's Law (Equation [6]) for equilibrium between the VOCs in the aqueous and vapor phases.

With these parameters, the diffusive flux of VOCs from the groundwater interface to the gravel venting layer is calculated using Fick's Law of diffusion, as represented in Equation [10].

The values of the parameters used in estimating the diffusion rates and the calculated diffusive flux on a unit basis (micrograms per square meter per second (ug/m^2-s) are listed for each VOC in Table E-2.

VOC Emission Rates

VOC emission rates for the SSD system are estimated by multiplying the diffusive flux for each VOC by the total modeled area of the gravel venting layer and then converting the result to units of pounds/day and pounds/year. With this approach, 100% of the VOCs that migrate upward into the gravel venting layer are presumed to be captured and vented by the SSD system. The resulting estimated VOC emission rates are listed near the bottom of Table E-2.

Table E-2 also lists BAAQMD chronic Trigger Levels from BAAQMD Regulation 2, Rule 5, Table 2-5-1. The Trigger Levels are listed in units of pounds/year in the regulation and are divided by 365 days/year in Table E-2 to also show the Triger Levels in equivalent pounds/day units.

The last row of Table E-2 listed the estimated VOC emission rates as a percentage of the BAAQMD Trigger Level. As shown, the estimated VOC emission rates are all less than 10% of their respective BAAQMD Trigger Levels.

EQUATIONS LIST

Equation [1] Effective Diffusion Coefficient in Soil (ASTM, 1995; U.S. EPA, 2003)

$$D_S^{eff} = \left[D^{air} \times \frac{(\theta_{AS})^{10/3}}{(\theta_T)^2} \right] + \left[D^{water} \times \frac{(\theta_{WS})^{10/3}}{H \times (\theta_T)^2} \right]$$

[See parameter abbreviations under Equation [3]]

Equation [2] Effective Diffusion Coefficient in Capillary Fringe (ASTM, 1995; U.S. EPA, 2003)

$$D_{CAP}^{eff} = \left[D^{air} \times \frac{(\theta_{ACAP})^{10/3}}{(\theta_T)^2} \right] + \left[D^{water} \times \frac{(\theta_{WCAP})^{10/3}}{H \times (\theta_T)^2} \right]$$

[See parameter abbreviations under Equation [3]]

Equation [3] Effective Diffusion Coefficient Between Groundwater and Ground Surface (ASTM, 1995; U.S. EPA, 2003)

$$D_{WS}^{eff} = \frac{(h_{CAP} + h_V)}{\left[\frac{h_{CAP}}{D_{CAP}^{eff}} + \frac{h_V}{D_S^{eff}} \right]}$$

where:

D_S^{eff} = effective diffusion coefficient in soil (cm^2 / s)
D_{CAP}^{eff} = effective diffusion coefficient in capillary fringe (cm^2 / s)
D_{WS}^{eff} = effective diffusion coefficient between groundwater and ground surface (cm^2 / s)
D^{air} = diffusion coefficient of the chemical in air (cm^2 / s)
D^{water} = diffusion coefficient of the chemical in water (cm^2 / s)
θ_{AS} = volumetric air content in vadose zone soil (cm^3 air / cm^3 soil)
θ_{WS} = volumetric water content in vadose zone soil (cm^3 water / cm^3 soil)
θ_T = total soil porosity (cm^3 / cm^3 soil)
θ_{ACAP} = volumetric air content in capillary fringe soil (cm^3 air / cm^3 soil)
θ_{WCAP} = volumetric water content in capillary fringe soil (cm^3 water / cm^3 soil)
H = Henry's Law constant (cm^3 H_2O / cm^3 air)
h_{cap} = thickness of capillary fringe (cm)
h_v = thickness of vadose zone (cm)

Equation [4] Water-Filled Porosity in Capillary Zone (U.S. EPA, 2003)

$$\Theta_{w,cz} = \Theta_r + \frac{\Theta_s - \Theta_r}{\left[1 + (\alpha h)^N\right]^M}$$

where:

- $\theta_{w,cz}$ = water-filled porosity in the capillary zone (cm^3/cm^3)
- θ_r = residual soil water content (cm^3/cm^3)
- $\theta_{w,cz}$ = saturated soil water content (cm^3/cm^3)
- α = point of inflection in the water retention curve where d θ_w/dh is maximal (cm^{-1})
- h = air entry pressure (cm) (=1/α and assumed to be positive)
- N = van Genuchten curve shape parameter (unitless)
- M = 1 – (1/N)

Equation [5] Mean Capillary Rise (U.S. EPA, 2003)

$$L_{cz} = \frac{2\,\alpha\,COS(\lambda)}{\rho_w\,g\,R} = \frac{0.15}{R}$$

where:

- L_{cz} = mean rise of the capillary zone (cm)
- α = surface tension of water (= 73 g/s)
- λ = angle of water meniscus with the capillary tube (degrees) (assumed to be zero)
- ρ_w = density of water (=1 g / cm^3)
- g = gravitational acceleration (= 980 cm/s^2)
- R = mean interparticle pore radius (cm)
  = 0.2 x (mean particle diameter)

Equation [6] Henry's Law

$$C_a = C_w \times H'$$

or, rearranged to solve for the concentration in water,

$$C_w = \frac{C_a}{H'}$$

where:

- C_a = chemical concentration in air (ug/L)
- C_w = chemical concentration in water (ug/L)
- H' = Henry's Law constant at temperature T (unitless)

Equation [7] Henry's Law Constant Units Conversion at Constant Temperature (U.S. EPA, 2003)

$$H' = \frac{H}{R \times T}$$

where:

- H' = Henry's Law constant at temperature T (unitless)
- H = Henry's Law constant at temperature T (atm-m^3/mol)
- R = universal gas law constant = 8.2 x 10^{-5} (m^3-atm/mol-k)
- T = absolute temperature (K), = Temperature (°C) + 273.15

Equation [8] Henry's Law Constant Conversion for Different Temperature (U.S. EPA, 2003)

$$H'_{TS} = \frac{\exp\left[-\frac{\Delta H_{v,TS}}{R_c}\left(\frac{1}{T_S}-\frac{1}{T_R}\right)\right] H_R}{R T_S}$$

where:

- H'_{TS} = Henry's Law constant at system temperature T (unitless)
- $\Delta H_{v,TS}$ = enthalpy of vaporization at the system temperature (cal/mol)
- T_S = system temperature (K)
- T_R = reference temperature for Henry's Law constant (K)
- H_R = Henry's Law Constant at reference temperature (atm-m^3/mol)
- Rc = universal gas constant (= 1.9872 cal/mol-K)
- R = universal gas constant (= 8.2 x 10^{-5} atm-m^3/mol-K)

Equation [9] Enthalpy of Vaporization at System Temperature (U.S. EPA, 2003)

$$\Delta H_{v,TS} = \Delta H_{v,b}\left[\frac{1-T_S/T_C}{1-T_B/T_C}\right]^n$$

where:

- $\Delta H_{v,TS}$ = enthalpy of vaporization at the system temperature (cal/mol)
- $\Delta H_{v,b}$ = enthalpy of vaporization at the normal boiling point (cal/mol)
- T_S = system temperature (K)
- T_B = normal boiling point (K)
- T_C = critical temperature (K)
- n = 0.3 for T_B/T_C <0.57
  = [0.74 * T_B/T_C -0.116] for T_B/T_C = 0.57 – 0.71
  = 0.41 for T_B/T_C >0.71

Equation [10] Diffusive Vapor Flux from Subsurface Vapor Source (ASTM, 1995; U.S. EPA, 2003)

$$F = D_{eff} \frac{C_v}{d} \times 10^{-4} \left(\frac{m^2}{cm^2}\right)$$

where:

F = vapor flux (ug/m^2-s)
D_{eff} = effective diffusivity between soil vapor source and ground surface (cm^2/s)
C_v = chemical concentration in soil vapor at subsurface source (ug/m^3)
d = distance between ground surface and subsurface vapor source (m)

REFERENCES

ASTM, 1995. *Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites.* Designation E 1739-95, American Society for Testing and Materials, November 1995.

DTSC, 2014. USEPA GW-SCREEN Version 3.0, 04/2003, DTSC Modification December 2014. California Environmental Protection Agency, Department of Toxic Substances Control (DTSC), Human and Ecological Risk Office (HERO). December 2014. [http://www.dtsc.ca.gov/assessingrisk/humanrisk2.cfm]

Geosyntec, 2009. *Feasibility Study Report, General Electric Site, 5441 International Boulevard, Oakland, California*. Geosyntec Consultants, Inc., August 2009.

U.S. EPA, 2003. *User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings*, prepared by Environmental Quality Management, Inc., for the U.S. Environmental Protection Agency. 14 March 2003.

Wood, 2018. *Semiannual Monitoring Report, April 2018 Through September 2018,* 5441 International Boulevard, Oakland, California. Wood Environment & Infrastructure Solutions, Inc. December 2018.

ATTACHMENTS

Table E-2	Estimated VOC Emission Rates Based on Flux from Groundwater to Sub-Slab Gravel Venting Layer
Figure 3	U.S. Soil Conservation Service Classification Chart Showing Centroid Compositions (Solid Circles) (from U.S. EPA, 2003)
Figure 4a	Trichloroethene in On-Site Groundwater, A-Zone (from Geosyntec, 2009)
Figure 7	Performance Monitoring Analytical Results, September 2018 (from Wood, 2018)

Table E-2

Estimated VOC Emission Rates Based on Flux from Groundwater to Sub-Slab Gravel Venting Layer

5441 International Boulevard, Oakland, California

Parameter	Symbol	Units	Values					Source
			System Parameters	TCE	cDCE	VC	12DCA	
System Parameters								
System Temperature		^{o}F	65	--	--	--	--	Approximate groundwater temperature
	T_S	^{o}C	18.3	--	--	--	--	unit conversion
Gravel venting layer area		sf	360,000	--	--	--	--	Approximate area of gravel venting layer
	A_B	m^2	33,462	--	--	--	--	unit conversion
Total depth from gravel venting layer to groundwater		feet	10	--	--	--	--	Typical average, from site data
	L_T	m	3.05	--	--	--	--	unit conversion
Soil - Lower Zone (above water table)								
Soil type (SCS)	--	--	C	--	--	--	--	Selected for site-specific soil type
Thickess, lower soil zone (above water table)		feet	5.0	--	--	--	--	Typical average, from site data
	L_{LZ}	m	1.52	--	--	--	--	unit conversion
Estimated parameters based on soil type:								
Total soil porosity (vol/vol) (calculated)	θ_T	--	0.459	--	--	--	--	DTSC (2014)
Soil moisture (vol/vol)	θ_w	--	0.215	--	--	--	--	DTSC (2014)
Air-filled porosity in soil (vol/vol)	θ_a	--	0.244	--	--	--	--	$= \theta_T - \theta_w$
Soil - Upper Zone								
Soil type (SCS)	--	--	S	--	--	--	--	Selected for site-specific soil type
Thickess, upper soil zone		feet	5.0	--	--	--	--	Typical average, from site data
	L_{UZ}	m	1.52	--	--	--	--	unit conversion
Estimated parameters based on soil type:								
Total soil porosity (vol/vol) (calculated)	θ_T	--	0.375	--	--	--	--	DTSC (2014)
Soil moisture (vol/vol)	θ_w	--	0.054	--	--	--	--	DTSC (2014)
Air-filled porosity in soil (vol/vol)	θ_a	--	0.321	--	--	--	--	$= \theta_T - \theta_w$
Capillary Zone Parameters								
Capillary zone soil type (SCS)	--	--	C	--	--	--	--	Same as lower soil zone
Estimated parameters based on soil type:								
Saturated water content	θ_s	--	0.459	--	--	--	--	DTSC (2014)
Residual water content	θ_r	--	0.098	--	--	--	--	DTSC (2014)
Van Genuchten - a	a	cm^{-1}	0.01496	--	--	--	--	DTSC (2014)
Van Genuchten - N	N	--	1.253	--	--	--	--	DTSC (2014)
Van Genuchten - M	M	--	0.2019	--	--	--	--	DTSC (2014)
Mean grain diameter	D	cm	0.0092	--	--	--	--	DTSC (2014)
Water-filled porosity in capillary zone	$\theta_{w,cz}$	--	0.412	--	--	--	--	Equation 4
Air-filled porosity in capillary zone	$\theta_{a,cz}$	--	0.047	--	--	--	--	$= \theta_T - \theta_{w,cz}$
Thickness of capillary zone	L_{cz}	cm	81.5	--	--	--	--	Equation 5

Table E-2

Estimated VOC Emission Rates Based on Flux from Groundwater to Sub-Slab Gravel Venting Layer

5441 International Boulevard, Oakland, California

Parameter	Symbol	Units	Values					Source
			System Parameters	TCE	cDCE	VC	12DCA	
Chemical Parameters - Input								
CAS No.	--	--	--	79016	156592	75014	107062	
Henry's Constant (unitless) at T_R	H'_{TR}	--	--	4.03E-01	1.67E-01	1.14E+00	4.82E-02	DTSC (2014)
Henry's Constant at T_R	H_{TR}	atm-m^3/mol	--	9.85E-03	4.08E-03	2.78E-02	1.18E-03	DTSC (2014)
Reference temperature for H	T_R	^oC	--	25	25	25	25	DTSC (2014)
Diffusivity in air	D_a	cm^2/s	--	6.87E-02	8.84E-02	1.07E-01	8.57E-02	DTSC (2014)
Diffusivity in water	D_w	cm^2/s	--	1.02E-05	1.13E-05	1.20E-05	1.10E-05	DTSC (2014)
Water solubility	S	mg/L	--	1.28E+03	6.41E+03	8.80E+03	8.60E+03	DTSC (2014)
Normal boiling point	T_B	K	--	3.60E+02	3.34E+02	2.59E+02	3.57E+02	DTSC (2014)
Critical temperature	T_c	K	--	5.44E+02	5.44E+02	4.32E+02	5.61E+02	DTSC (2014)
Enthalpy of vaporization at normal boiling point	$DH_{v,b}$	cal/mol	--	7.51E+03	7.19E+03	5.25E+03	7.64E+03	DTSC (2014)
Chemical Parameters - Calculated								
Henry's Constant (unitless) at T_S	H'_{TS}	--	--	2.97E-01	1.27E-01	9.62E-01	3.56E-02	Equation 8
Enthalpy of vaporization at system temperature	DHv,TS	cal/mol	--	8.46E+03	7.65E+03	4.91E+03	8.43E+03	Equation 9
Effective diffusivity in soil - lower zone	D_S^{eff}	cm^2/s	--	2.97E-03	3.83E-03	4.64E-03	3.72E-03	Equation 1
Effective diffusivity in soil - upper zone	D_S^{eff}	cm^2/s	--	1.11E-02	1.43E-02	1.73E-02	1.39E-02	Equation 1
Effective diffusivity in capillary zone	D_{CZ}^{eff}	cm^2/s	--	2.10E-05	3.81E-05	2.25E-05	9.19E-05	Equation 2
Overall effective diffusion coefficient	D_T^{eff}	cm^2/s	--	7.76E-05	1.40E-04	8.37E-05	3.33E-04	Equation 3
VOC Transport / Emission Rate Calculations								
Concentration in groundwater	C_w	ug/L	--	2,200	150	8.5	170	Note (a)
Equilibrium concentration in soil vapor	$C_{sv(ug/L)}$	ug/L	--	6.54E+02	1.90E+01	8.18E+00	6.06E+00	= C_w * H'_{TS}
	C_{sv}	ug/m^3	--	6.54E+05	1.90E+04	8.18E+03	6.06E+03	= $C_{sv(ug/L)}$ * 1000 (L/m^3)
Unit mass flux	F	ug/(m^2-s)	--	1.66E-03	8.77E-05	2.24E-05	6.61E-05	= D_T^{eff} * (C_{sv} / L_T) * 0.0001 (m^2/cm^2)
Total mass flux (emission rate)	ER_1	ug/s	--	55.7	2.9	0.8	2.2	= F * A_B
	ER_2	g/day	--	4.81	0.25	0.06	0.19	unit conversion
	ER_3	lb/day	--	0.011	0.0006	0.00014	0.0004	unit conversion
	ER_4	lb/year	--	3.87	0.20	0.05	0.15	unit conversion
BAAQMD Chronic Trigger Level		lb/day	--	0.11	--	0.003	0.011	= (lb/year) / 365 (days/year)
		lb/year	--	41	--	1.1	4.0	BAAQMD Regulation 2, Rule 5, Table 2-5-1
Emission rate as percent of BAAQMD Trigger Level		%		9.4%	--	4.7%	3.8%	= Emission Rate / Trigger Level

Table E-2

Estimated VOC Emission Rates Based on Flux from Groundwater to Sub-Slab Gravel Venting Layer

5441 International Boulevard, Oakland, California

Notes

(a) The assumed VOC concentration in groundwater is based on concentrations in influent to groundwater treatment system in September 2018. See text for discussion.

Abbreviations

atm: atmosphere
BAAQMD: Bay Area Air Quality Management District
12DCA: 1,2-dichloroethane
cDCE: cis-1,2-dichloroethene
cm: centimeter
DTSC: Department of Toxic Substances Control
L: liter
lb: pound
m: meter
n/a: not applicable
SCS: soil classification system
sf: square feet
TCE: trichloroethene
ug: microgram
VC: vinyl chloride
VOC: volatile organic compound

References

DTSC, 2014. *USEPA GW-SCREEN Version 3.0, 04/2003, DTSC Modification December 2014.* California Environmental Protection Agency, Department of Toxic Substances Control (DTSC), Human and Ecological Risk Office (HERO). December 2014.

Source: User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings, prepared by Environmental Quality Management, Inc., for the U.S. Environmental Protection Agency. 14 March 2003.

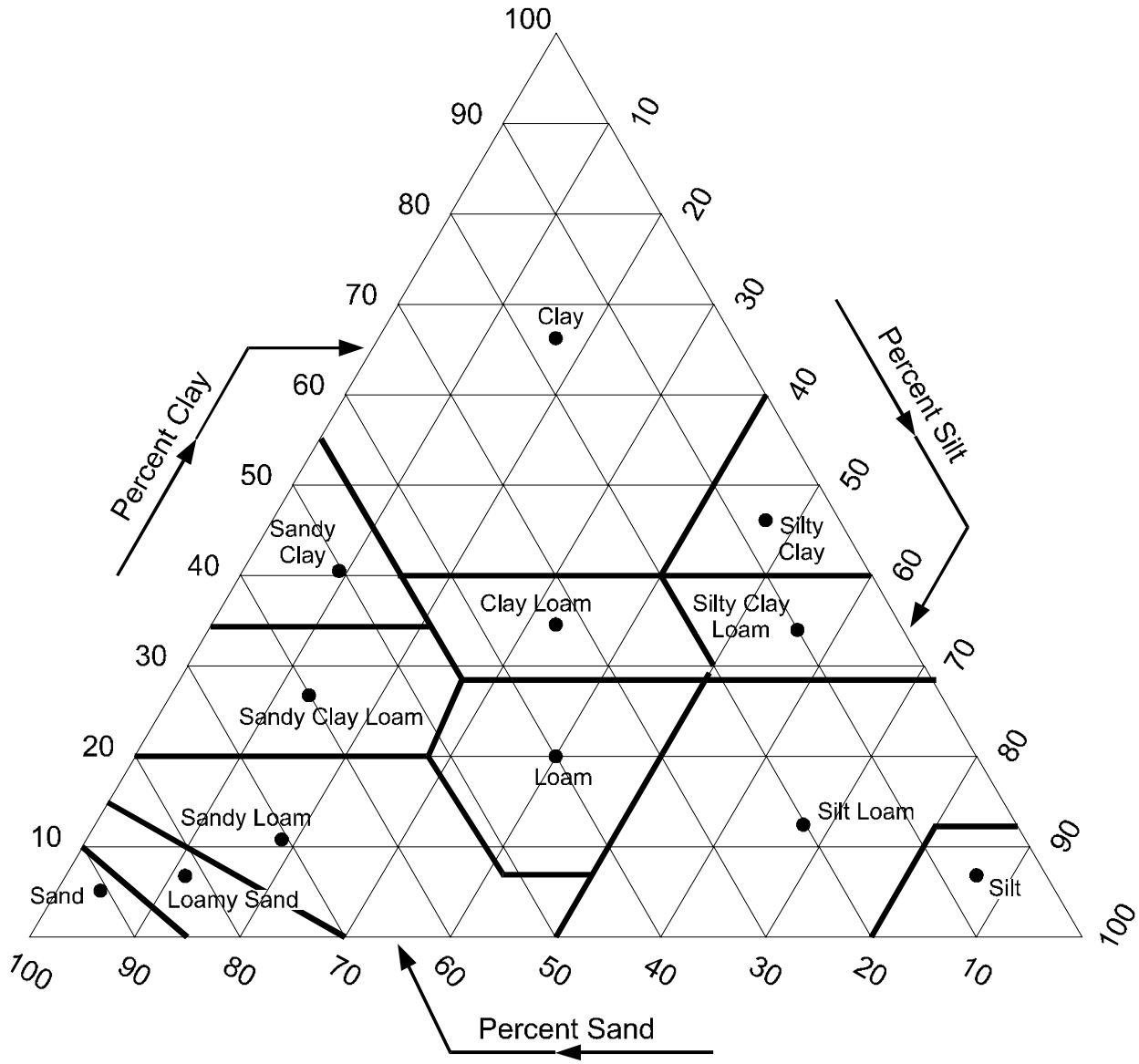


Figure 3. U.S. Soil Conservation Service Classification Chart Showing Centroid Compositions (Solid Circles)

TCE Result (micrograms per liter)
- Non-Detect
- ≤5
- >5 - 50
- >50 - 500
- >500 - 5,000
- >5,000 - 50,000
- >50,000

Contours - Dashed where approximate
- > 5 - 50
- > 50 - 500
- > 500 to 5,000
- > 5,000 - 50,000
- > 50,000

Source: *Feasibility Study Report, General Electric Site, 5441 International Boulevard, Oakland, California*. Geosyntec Consultants, Inc., August 2009.

OSW-HP-01 3,300
OSW-HP-02 5,400
OSW-HP-03 320
GW-2A 82
GW-3A 370
W-733A 410
W-732A 850
W-751A 6,200
4HP05 24,000
4HP04 17,000
4HP03 13,000
4HP08 7,100
4HP07 280
4HP01 ≤0.5
W-029A ≤0.5
W-616A 540
2HP05 16,000
2HP04 2,700
2HP04 ≤0.5
2HP03 4,100
2HP02 4,000
2HP01 270
W-614A 1,400
W-615A 2,600
W-617A 4,000
W-503A 210,000
W-028A ≤0.5
W-752A ≤0.5
W-622A ≤0.5
3HP14 ≤0.5
3HP11 71
3HP12 5,200
3HP10 5,900
3HP13 3,700
3HP14 970
3HP09 ≤0.5
3HP08 420
3HP04 11,000
3HP07 130
3HP06 370
3HP02 360
W-734A 5,400
W-621A 610
2HP06 540
W-620A 280
W-756A 160
W-755A ≤0.5
W-004A 55
5GP14 4,700
5GP11 170
5GP12 87,000
5GP4 ≤250
5GP5 2,000
5GP6 ≤20
W-736A ≤0.5
W-758A ≤0.5
W-613A ≤36
W-022A ≤0.5
W-612A ≤0.5
W-006A 40
W-757A ≤0.5
W-506A ≤0.5
W-041A 96
W-018A 1
W-030A ≤0.5
W-031A 90
W-038A ≤0.5
W-523A ≤0.5
W-529A 9.8
W-011A ≤0.5
W-009A 1
W-036A ≤0.5
W-016A 0.7
W-624A ≤0.5
W-002A ≤0.5
W-026A ≤0.5
W-027A ≤0.5
W-516A ≤0.5
W-540A ≤0.5
W-524A ≤0.5
W-017A ≤0.5
W-541A ≤0.5
W-623A ≤0.5

100 50 0 100 Feet

Notes:
Presented data are the most recent results from monitoring points (grab groundwater samples and monitoring well data), excluding data from prior to 2005.

Trichloroethene in On-Site Groundwater A-Zone

General Electric Company, Oakland, CA

Geosyntec consultants

Guelph | 06-Mar-09

Figure **4a**

P:\PJ\Projects\TR0247 GE Oakland\GIS\Oakland Database&GIS\GE-Oakland_TopIsoConcs.mxd JBF TR0247.05

Source: *Semiannual Monitoring Report, April 2018 Through September 2018,* 5441 International Boulevard, Oakland, California. Wood Environment & Infrastructure Solutions, Inc. December 2018.

GW-2A		
TCE	c-1,2-DCE	VC
2.3 / 2.5	<0.5 / <0.5	<0.5 / <0.5

GW-2B		
TCE	c-1,2-DCE	VC
1,900 / 2,100	**79 / 82**	<17 / <17

EW-1		
TCE	c-1,2-DCE	VC
1,100	**44**	<10

GW-2C		
TCE	c-1,2-DCE	VC
30 / 30	**0.8 / 0.8**	<0.5 / <0.5

EW-4		
TCE	c-1,2-DCE	VC
3200 / 3500	**290 / 290**	<20 / <20

GW-1A		
TCE	c-1,2-DCE	VC
1,500	**2,200**	<50

W-004B		
TCE	c-1,2-DCE	VC
98 / 98	**210 / 210**	**74 / 74**

W-004A		
TCE	c-1,2-DCE	VC
0.6	**2.4**	<0.5

EW-8		
TCE	c-1,2-DCE	VC
1,200	**110**	<10

GW-1B		
TCE	c-1,2-DCE	VC
29	**1.4**	<0.5

GW-1C		
TCE	c-1,2-DCE	VC
2.6	<0.5	<0.5

EW-3		
TCE	c-1,2-DCE	VC
1,600	**1,200**	**46**

EW-5		
TCE	c-1,2-DCE	VC
1,500	**63**	**19**

GW-4B		
TCE	c-1,2-DCE	VC
420	**34**	**7.9**

W-614A		
TCE	c-1,2-DCE	VC
72	**11**	**10**

GW-3C		
TCE	c-1,2-DCE	VC
15	**1.2**	<1.0

EW-7		
TCE	c-1,2-DCE	VC
<10	**150**	**1,900**

W-003BR		
TCE	c-1,2-DCE	VC
4,800	**240**	**3.2**

W-804B		
TCE	c-1,2-DCE	VC
1,600	**73**	<13

EW-6		
TCE	c-1,2-DCE	VC
1,500	**110**	<13

GW-3A		
TCE	c-1,2-DCE	VC
10	**12**	**8.0**

W-741B		
TCE	c-1,2-DCE	VC
7.6	<0.5	<0.5

W-529A		
TCE	c-1,2-DCE	VC
<0.5	<0.5	<0.5

EW-2		
TCE	c-1,2-DCE	VC
5,600	**300**	<50

W-803C		
TCE	c-1,2-DCE	VC
8.2	**4.1**	<1.0

W-751A		
TCE	c-1,2-DCE	VC
250	**90**	**4.0**

Groundwater Extraction and Treatment System (GETS)

OW-1 (A, B, C, D)

OW-2 (A, B, C, D)

OW-3 (A, B, C, D)

GW-2A, GW-2B, EW-1, GW-2C, GW-2D, GW-1A, W-754B, EW-4, GW-1C, GW-1B, W-733A, GW-4D, W-805B, EW-5, W-734A, W-615A, EW-3, GW-3C, GW-3D, W-003B, W-003BR, GW-3A, W-614A, EW-6, W-621A, GW-4B, EW-2, W-804B, GW-1D, W-803C, W-751A, W-752A, W-752B, DW-03, DW-02, W-524A, W-002B, W-741B, EW-7, W-625B, W-523A, W-529A, W-757A, W-757B, W-036A, W-036B, W-758A, W-758B, W-736A, EW-8, W-004B, W-004A, W-022A, UPG-1C, UPG-1B

0 150 300 Feet

ABBREVIATIONS:
c-1,2-DCE = cis-1,2-dichloroethene
MNA = Monitored Natural Attenuation
TCE = trichloroethene
VC = vinyl chloride
J- = indicates the reported concentration is an estimated value and may be biased low
UJ = indicates the analyte was not detected and the reporting limit is considered to be estimated

NOTES:
1. Results are in micrograms per liter (µg/L).
2. Analytes not detected are shown as less than (<) the reporting limit.
3. Bold results indicate analyte detected at a concentration greater than the reporting limit.
4. September semiannual 2018 samples were collected from September 26 through September 28, 2018.
5. Information included in this figure was adapted from Figure 2 of the Fourth Quarter 2015 and Annual Monitoring Report (Geosyntec, 2016).

Explanation

- MNA Monitoring Well Location
- GETS Performance Monitoring Well Location
- GETS Performance Monitoring Well, Destroyed
- Other Monitoring Well Location
- Extraction Well
- Property Boundary and Security Fence
- Buildings
- 4-Inch Existing Cap
- 6-Inch Asphalt Cap
- Existing Bentonite-Soil Cap

GW-2B (Sample location ID)
TCE: 1,900 / 2,100 (Analyte)
c-1,2-DCE: 79 / 82 (Analyte)
VC: <17 / <17 (Duplicate sample result / Analyte result)

PERFORMANCE MONITORING ANALYTICAL RESULTS SEPTEMBER 2018
5441 International Boulevard
Oakland, California

wood.

By: KLU
Date: 11/20/2018
Prj. No. 8616181201.02
Figure 7

S:\18000\181201\phase_02\18_1011_2SA18_fig_07_2SA18.mxd

Attachment E-3

Sub-Slab Depressurization System Drawings

SUB-SLAB DEPRESSURIZATION SYSTEM

5441 INTERNATIONAL BOULEVARD, OAKLAND, CALIFORNIA

PREPARED FOR

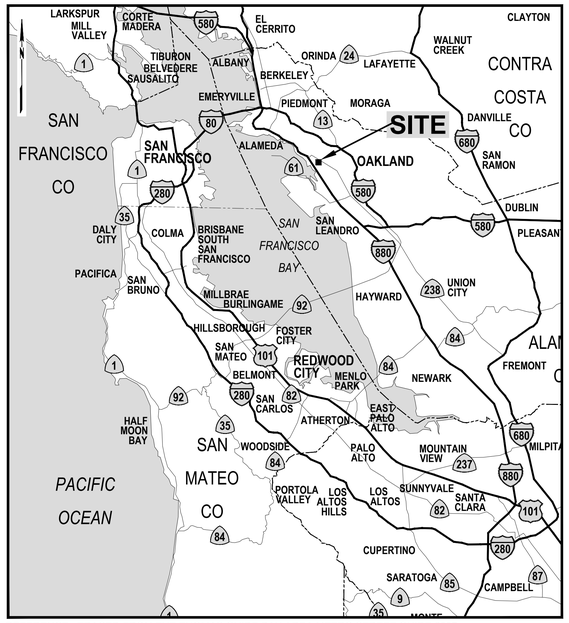
BRIDGE ACQUISITION, LLC

PREPARED BY

EKI ENVIRONMENT & WATER, INC.

LIST OF DRAWINGS:

SHEET	TITLE
SSD-G1	TITLE SHEET, VICINITY MAP, SITE LOCATION MAP, AND SSD SYSTEM SUMMARY
SSD-G2	LEGEND AND ABBREVIATIONS
SSD-G3	SPECIFICATIONS AND NOTES
SSD-M1	SUB-SLAB DEPRESSURIZATION LAYOUT
SSD-M2	SUB-SLAB DEPRESSURIZATION DETAILS (1 OF 2)
SSD-M3	SUB-SLAB DEPRESSURIZATION DETAILS (2 OF 2)
SSD-M4	MANUFACTURER'S INSTALLATION INSTRUCTIONS FOR STEGO WRAP LINER
SSD-M5	MANUFACTURER'S INSTALLATION DETAILS FOR STEGO WRAP LINER
SSD-P1	PIPING AND INSTRUMENTATION DIAGRAM (P&ID)
SSD-T1	EQUIPMENT, PIPING, AND INSTUMENTION LISTS



REFERENCE: TRACED FROM THE THOMAS GUIDE BAY AREA METRO STREET GUIDE 2007.

VICINITY MAP

5 0 5 10
(APPROXIMATE SCALE IN MILES)



REFERENCE: GOOGLE EARTH PRO. DATE OF IMAGERY 2 APRIL 2018.

SITE LOCATION MAP

500 0 500 1,000
(APPROXIMATE SCALE IN FEET)

DEVELOPER INFORMATION:

MR. BRENDAN KOTLER
BRIDGE ACQUISITION, LLC
1600 E FRANKLIN AVE, SUITE D
EL SEGUNDO, CALIFORNIA 90245
TEL.: 818-674-6770

SYSTEM SUMMARY:

A SUB-SLAB DEPRESSURIZATION ("SSD") SYSTEM FUNCTIONS BY WITHDRAWING SOIL GASES FROM IMMEDIATELY BENEATH A BUILDING FLOOR, THEREBY CREATING A SMALL SUCTION, OR DEPRESSURIZATION, IN THE SOIL OR AGGREGATE BELOW THE FLOOR. THE DEPRESSURIZATION BELOW THE FLOOR REDUCES THE POTENTIAL FOR SOIL GAS LEAKAGE (VAPOR INTRUSION) INTO THE BUILDING INTERIOR.

FOR THE BUILDING AT 5441 INTERNATIONAL BOULEVARD, OAKLAND, CALIFORNIA, THE SSD SYSTEM WILL INCLUDE THE FOLLOWING PRIMARY ELEMENTS:

1. SEVEN "SUCTION TRENCHES" BENEATH THE BUILDING'S CONCRETE FLOOR, FILLED WITH DRAIN ROCK;
2. CONVEYANCE PIPING FROM EACH SUCTION TRENCH TO THE SSD BLOWER INSTALLED ON THE ROOF:
   A. SLOTTED DUAL WALL CORRUGATED HDPE DRAIN PIPE IN THE SUCTION TRENCHES;
   B. SOLID DUAL WALL CORRUGATED HDPE DRAIN PIPE FROM THE SUCTION TRENCHES TO THE RISER PIPE LOCATION;
   C. VERTICAL GALVANIZED STEEL RISER PIPE FROM EACH SUCTION TRENCH LATERAL TO THE ROOFTOP;
   D. HORIZONTAL GALVANIZED STEEL PIPE LATERAL AT THE ROOFTOP CONNECTING THE RISER PIPE AND THE CONVEYANCE DUCT;
   E. HORIZONTAL GALVANIZED STEEL SPIRAL DUCTING CONNECTING TO ALL ROOFTOP LATERAL PIPES AND LEADING TO THE SSD BLOWER SYSTEM;
3. ONE SSD BLOWER, INSTALLED ON THE ROOF, TO CONTINUOUSLY WITHDRAW SOIL GASES FROM THE SSD SUCTION TRENCHES AND DISCHARGE TO OUTDOOR AIR THROUGH AN 8-FOOT TALL OUTLET PIPE NEAR THE SOUTHWESTERN CORNER OF THE SITE BUILDING:
   a. BLOWER PLANNED OPERATION POINT: 2,625 CFM AT 4 IN-WC INLET SUCTION
   b. BLOWER DESIGN MAXIMUM OPERATION POINT: 4,000 SCFM AT 8 IN-WC INLET SUCTION;
4. TWENTY-TWO (22) SUB-SLAB VAPOR PROBES ("SSPS") BENEATH THE CONCRETE FLOOR FOR PERIODICALLY MEASURING SUB-SLAB VACUUM CREATED BY THE SSD SYSTEM:
   a. TARGET SUB-SLAB VACUUM: 0.02 IN-WC (MINIMUM); AND
5. FLOW RATE AND PRESSURE SENSORS IN SSD BLOWER INLFLUENT AND CURRENT SENSOR IN SSD BLOWER ELECTRICAL SERVICE, WITH ALARM SIGNAL TO REMOTE MONITORING UNIT UNIT UPON LOSS OF POWER OR 50% DROP IN FLOWRATE OR SUCTION.

EMISSIONS:

1. TYPICAL CHEMICALS IN EMISSIONS: TRICHLOROETHENE, CIS-1,2-DICHLOROETHENE, VINYL CHLORIDE;
2. ESTIMATED INITIAL TOTAL EMISSION RATE: ~0.012 POUNDS PER DAY;
3. AIR DISCHARGE PERMIT (AUTHORITY TO CONSTRUCT AND PERMIT TO OPERATE) FROM THE BAY AREA AIR QUALITY MANAGEMENT DISTRICT ("BAAQMD") TO BE OBTAINED BY DEVELOPER.

THE SSD SYSTEM WILL BE DESIGNED TO OPERATE 24 HOURS/DAY, 7 DAYS A WEEK, EXCEPT FOR DURING SSD BLOWER MAINTENANCE AND POWER OUTAGES.

MORE INFORMATION:

1. *FIVE YEAR STATUS REPORT FOR THE PERIOD AUGUST 2013 THROUGH DECEMBER 2017, GE OAKLAND SITE, OAKLAND, CALIFORNIA*. WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS, INC., 20 JUNE 2018.
2. *SEMIANNUAL MONITORING REPORT APRIL 2018 THROUGH SEPTEMBER 2018, 5441 INTERNATIONAL BOULEVARD, OAKLAND, CALIFORNIA*. WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS, INC., 19 DECEMBER 2018.
3. *2006 - 2008 FIELD INVESTIGATIONS REPORT, GENERAL ELECTRIC SITE, 5441 INTERNATIONAL BOULEVARD, OAKLAND, CALIFORNIA*. GEOSYNTEC CONSULTANTS, 13 MARCH 2009.

REGISTERED PROFESSIONAL ENGINEER
IRINA THOMAS DE WITT
C 55468
CIVIL
STATE OF CALIFORNIA

DRAFT FINAL - NOT FOR CONSTRUCTION

ekI environment & water
577 AIRPORT BOULEVARD, SUITE 500
BURLINGAME, CALIFORNIA 94010-5306
(650) 292-9100 • FAX (650) 552-9012

SUB-SLAB DEPRESSURIZATION SYSTEM
5441 INTERNATIONAL BOULEVARD, OAKLAND, CALIFORNIA

TITLE SHEET, VICINITY MAP, SITE LOCATION MAP, AND SSD SYSTEM SUMMARY

REV	DESCRIPTION	APPRD	DATE

DATE: AUG 2019
SCALE: AS SHOWN
DRAWN: ZCS/CCR
DESIGNED: ZCS/MJM
APPROVED:
JOB NO.: B70123.01

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY
0 1"

SHEET NUMBER
SSD-G1
1 OF 10

20190814.123819 C:\Users\ricasata\appdata\local\temp\AcPublish_6584\SSD-G1.dwg Layout1

GENERAL LEGEND

- SSD PIT/TRENCH RISER
- SUB-SLAB MONITORING POINT
- SSD SUCTION TRENCH
- OUTLET PIPE
- COLUMN
- PROPERTY LINES
- SSD LINE UNDERGROUND
- SSD LINE ON ROOF / ABOVE GROUND
- UNDERGROUND SUB-SLAB PROBE CASING AND TUBING
- ROOF EDGE
- ARCHITECTURAL GRID LINE

NOTE: NOT ALL ABBREVIATIONS AND SYMBOLS LISTED MAY BE USED IN THIS PROJECT.

SYMBOLS

- FP — FLOW RATE MEASUREMENT PORT
- FS — FLOW SENSOR
- FAL — FLOW ALARM LOW
- FIT — FLOW INDICATING TRANSMITTER
- LC — LEVEL CONTROL
- LSH — LEVEL SWITCH HIGH
- LSL — LEVEL SWITCH LOW
- PI — PRESSURE INDICATOR
- P/S — PRESSURE/SAMPLE PORT
- PAH — PRESSURE ALARM HIGH
- PAL — PRESSURE ALARM LOW
- PIT — PRESSURE INDICATING TRANSMITTER
- PSH — PRESSURE SWITCH HIGH
- PSL — PRESSURE SWITCH LOW
- PCT — PUMP CONTROLLER TIMER
- TI — TEMPERATURE INDICATOR
- M — MOTOR
- H O — HAND-OFF-AUTO SELECTOR SWITCH
- HS A
- R — RED LIGHT
- G — GREEN LIGHT
- BLOWER
- COMPRESSED AIR TANK
- AIR COMPRESSOR
- FILTER
- SILENCER
- LOCAL PANEL
- REMOTE MONITORING FUNCTION
- PRESSURE RELIEF VALVE
- VACUUM RELIEF VALVE
- S — SOLENOID VALVE
- PRESSURE REGULATING VALVE (WITH INDICATION OF WHICH SIDE OF VALVE PRESSURE IS CONTROLLED)
- INTERLOCK
- REDUCER
- BALL VALVE
- BLAST GATE
- GATE VALVE
- CHECK VALVE
- HOSE CONNECTION
- CAP
- QUICK DISCONNECT

SECTION A / M1 — SECTION DESIGNATION; SHEET NUMBER WHERE SECTION IS SHOWN

DETAIL 1 / M1 — DETAIL DESIGNATION; SHEET NUMBER WHERE DETAIL IS SHOWN

SECTION A / – — SECTION DESIGNATION; NO SHEET NUMBER IS REQUIRED WHEN SECTION IS NOT USED ON ANOTHER SHEET

DETAIL 1 / – — DETAIL DESIGNATION; NO SHEET NUMBER IS REQUIRED WHEN DETAIL IS NOT USED ON ANOTHER SHEET

INSTRUMENTATION LEGEND

	FIRST LETTER (INITIATING VARIABLE)	SUCCEEDING LETTERS (OUTPUT FUNCTIONS)
A	ANALYSIS or AMBER (LIGHT)	ALARM or AUTOMATIC
B	BURNER or BLUE (LIGHT)	-
C	CHECK	CONTROL
D	DENSITY (MASS)	DIFFERENTIAL or DETECTOR
E	POTENTIAL (VOLTS)	PRIMARY ELEMENT
F	FLOW RATE	RATIO (FRACTION)
G	FIRE ALARM or GREEN (LIGHT)	GLASS (SIGHT GAUGE)
H	HAND (MANUALLY)	HIGH
I	CURRENT (AMPERES)	INDICATOR
J	POWER	-
K	TIME	CONTROL STATION
L	LEVEL or LEAK	LOW or LIGHT
M	MANUAL OR MOTOR	-
O	-	OFF
P	PRESSURE	POINT (TEST CONNECTION)
Q	QUANTITY	INTEGRATE (TOTALIZE)
R	RED (LIGHT)	RECORD or PRINT
S	SPEED	SENSOR OR SWITCH
T	TEMPERATURE	TRANSMIT
U	MULTIVARIABLE	MULTIVARIABLE
V	VIBRATION or VOLUME	VALVE or DAMPER
W	WEIGHT or FORCE or TORQUE or WHITE (LIGHT)	-
X	UNCLASSIFIED	UNCLASSIFIED
Y	EVENT, STATE, OR PRESENCE	RELAY or COMPUTE
Z	POSITION	DRIVE or ACTUATE

ABBREVIATIONS

AB	AGGREGATE BASE
ACC	AIR COMPRESSOR CONDENSATE
ACH	AIR CHANGES PER HOUR
A/C	AIR COMPRESSOR
APPROX	APPROXIMATE
AVE	AVENUE
BFV	BUTTERFLY VALVE
BL	BLOWER
BLDG	BUILDING
BV	BALL VALVE
CA	COMPRESSED AIR
CF	COMPRESSION FITTING
CJ	CONSTRUCTION JOINT
CL	CENTERLINE
CONC	CONCRETE
CONTD.	CONTINUED
CS	CARBON STEEL
CT	COPPER TUBING
DC	DOUBLE CONTAINED
DIA	DIAMETER
E	EAST, ELECTRIC
(E)	EXISTING
EB	ELECTRIC BOX
F.	FILTER
F.C.	FAIL CLOSED
FHP	FREE HYDROCARBON PRODUCT
FIG.	FIGURE
FL	FLOW LINE
FPR	FREE PRODUCT RECOVERY
FPT	FEMALE PIPE THREAD
FT	FEET
G	GAS
GAC	GRANULAR ACTIVATED CARBON
GAL	GALLONS
GS	GALVANIZED STEEL
H	HOSE
HDPE	HIGH DENSITY POLYETHYLENE
ID	INSIDE DIAMETER
IE	INVERT ELEVATION
IM	INTERNAL MUFFLER
IN	INCH
IN-WC	INCHES OF WATER COLUMN
JB	JUNCTION BOX
L	LOWER, LITER
LB	POUNDS
LD	LEAK DETECTOR
LP	LOW POINT
MAN.	MANUAL
MAX.	MAXIMUM
MIN.	MINIMUM
MS	MOISTURE SEPARATOR
MV	MANUAL VALVE
N.C.	NORMALLY CLOSED
N.O.	NORMALLY OPEN
NT	NYLON TUBING
NTS	NOT TO SCALE
O.C.	ON CENTER
OD	OUTSIDE DIAMETER
(P)	PERFORATED
P&ID	PIPING AND INSTRUMENTATION DIAGRAM
PCC	PORTLAND CEMENT CONCRETE
PEX	PUMP EXHAUST
PLC	PROGRAMMABLE LOGIC CONTROLLER
PRV	PRESSURE REGULATING VALVE
PSIG	POUNDS PER SQUARE INCH GAUGE
PSV	PRESSURE SAFETY (RELIEF) VALVE
PVC	POLYVINYL CHLORIDE
R	RADIUS
RT	RUN-TIME
RTM	RUN-TIME METER
(S)	SOLID
SCFM	STANDARD CUBIC FEET PER MINUTE
SCH	SCHEDULE
SD	STORM DRAIN
SHT	SHEET
SL	SILENCER
SP	SPIRAL DUCT
SPEC	SPECIFICATION
SPG	SPIGOT
SS	SANITARY SEWER, STAINLESS STEEL
SSD	SUB-SLAB DEPRESSURIZATION
SSP	SUB-SLAB PROBE
SV	SOIL VAPOR
SVE	SOIL VAPOR EXTRACTION
T,TEL	TELEPHONE
TOC	TOP OF CASING
TC	TOP OF CURB
TP	TEST POINT (INSTRUMENT PORT)
TYP.	TYPICAL
VIF	VERIFY IN FIELD



DRAFT FINAL - NOT FOR CONSTRUCTION

ekl environment & water
577 AIRPORT BOULEVARD, SUITE 500
BURLINGAME, CALIFORNIA 94010-5306
(650) 292-9100 • FAX (650) 552-9012

SUB-SLAB DEPRESSURIZATION SYSTEM
5441 INTERNATIONAL BOULEVARD, OAKLAND, CALIFORNIA

LEGEND AND ABBREVIATIONS

	DATE	APPRD	DESCRIPTION	REV

DATE: AUG 2019
SCALE: AS SHOWN
DRAWN: ZCS/CCR
DESIGNED: ZCS/MJM
APPROVED:
JOB NO.: B70123.01

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING. 0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

SHEET NUMBER
SSD-G2
2 OF 10

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SPECIFICATIONS AND GENERAL NOTES

DEFINITIONS

AGREEMENT: WRITTEN CONTRACTUAL AGREEMENT BETWEEN DEVELOPER AND CONTRACTOR PROVIDING TERMS AND CONDITIONS FOR PERFORMING THE WORK, AND ALL SUBSEQUENT WRITTEN WORK AUTHORIZATIONS, CHANGE ORDERS, AND ADDENDA.

CONTRACTOR: TO BE DETERMINED

DRAWINGS: DRAWINGS LISTED ON SHEET SSD-G1.

VIMS ENGINEER: EKI ENVIRONMENT & WATER, INC., 577 AIRPORT BOULEVARD, SUITE 500, BURLINGAME, CALIFORNIA 94010

CONTACT: ZACHARY SALIN, PHONE: (650) 292-9100

EMAIL: ZSALIN@EKICONSULT.COM

LAWS AND REGULATIONS: APPLICABLE LAWS, REGULATIONS, ORDINANCES, CODES, AND OTHER ISSUANCES OF GOVERNMENTAL AUTHORITIES IN EFFECT AT TIME OF BIDDING.

DEVELOPER: BRIDGE DEVELOPMENT PARTNERS

DEVELOPER REPRESENTATIVE: PARTY TO BE DESIGNATED BY DEVELOPER TO REPRESENT DEVELOPER DURING CONSTRUCTION.

PROJECT: CONSTRUCT SSD SYSTEM AS DESCRIBED IN THE AGREEMENT AND ON DRAWINGS. DRAWINGS DESCRIBE CONSTRUCTION OF THE SSD SYSTEM ONLY. OTHER CONSTRUCTION, INCLUDING CORE & SHELL AND INTERIOR BUILD-OUT TO OCCUR UNDER SEPARATE CONTRACT AND WILL BE PERFORMED BY OTHERS.

PROJECT LOCATION: 5441 INTERNATIONAL BOULEVARD, OAKLAND, CALIFORNIA.

STANDARD SPECIFICATIONS: THE LATEST EDITION OF THE STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION, STANDARD SPECIFICATIONS.

SSD: SUB-SLAB DEPRESSURIZATION

VIMS: VAPOR INTRUSION MITIGATION SYSTEM

WORK: THE WORK CONSISTS OF THE SCOPE OF WORK DESCRIBED IN THE AGREEMENT AND AS SHOWN ON DRAWINGS.

GENERAL

1. CONSTRUCTION OF THE SSD SYSTEM INCLUDES, BUT IS NOT LIMITED TO, THE FOLLOWING:
   - A. CONSTRUCT SSD SUCTION TRENCHES SSD-1 THROUGH SSD-7. TRENCH LOCATIONS AND NUMBER OF TRENCHES ARE PRELIMINARY AND SUBJECT TO CHANGE.
   - B. PROVIDE AND INSTALL RISER PIPES FROM SSD SUCTION TRENCHES UP THROUGH BUILDING ROOF. PROVIDE WATER-TIGHT ROOF JACK AT ROOF PENETRATIONS. CAP RISER PIPES ABOVE ROOF.
   - C. CONSTRUCT SUB-SLAB PROBES ("SSPS") WITH TUBING AND CASING TO BUILDING EXTERIOR FOR MONITORING SUB-SLAB VAPORS.
   - D. PROVIDE AND INSTALL SUB-SLAB LAYER OF PERMEABLE AGGREGATE.
   - E. PROVIDE AND INSTALL AND SEAL SUB-SLAB LINER.
     - i. SEAL LINER PER MANUFACTURER SPECIFICATION AT ALL UTILITY OR FLOOR PENETRATIONS, SEAMS, EDGES, FOOTINGS, ETC.
   - F. REUSE SOIL EXCAVATED DURING SSD SYSTEM CONSTRUCTION ON-SITE.
   - G. SEAL ANY CRACKS, GAPS, AND PENETRATIONS IN THE BUILDING FLOOR.
   - H. PROVIDE AND INSTALL SSD HEADER CONVEYANCE DUCT ON ROOF TO BLOWER SYSTEM
   - I. PROVIDE AND INSTALL LATERAL PIPING FROM THE RISER PIPES TO THE COMBINED SSD HEADER CONVEYANCE DUCT ON THE ROOF.
   - J. FURNISH AND INSTALL FLOW CONTROL VALVES AND FLOW SENSORS IN LATERAL PIPING.
   - K. PROVIDE AND INSTALL SSD BLOWER SYSTEM EQUIPMENT, INSTRUMENTATION, AND CONTROLS ON THE ROOFTOP WHERE SHOWN ON DRAWINGS. CONNECT TO SSD HEADER CONVEYANCE DUCT.
   - L. PROVIDE AND INSTALL DISCHARGE STACK FROM THE BLOWER.
   - M. PROVIDE AND INSTALL ELECTRICAL POWER TO SSD SYSTEM FROM EXISTING PANEL PROVIDED BY OTHERS.
   - N. PROVIDE AND INSTALL INSTRUMENT CONNECTIONS AND ELECTRICAL POWER TO REMOTE MONITORING UNIT.
2. PERFORM WORK IN ACCORDANCE WITH LAWS AND REGULATIONS.
3. CONFIRM ALL EXISTING STRUCTURES AND DIMENSIONS IN THE FIELD PRIOR TO COMMENCING WORK. DIMENSIONS SHOWN ON DRAWINGS ARE APPROXIMATE AND MAY NOT BE RELIED UPON. COORDINATE ALL WORK WITH OTHER TRADES.
4. CONTRACTOR MUST NOTIFY DEVELOPER REPRESENTATIVE AND VIMS ENGINEER IF CONFLICTS OR DISCREPANCIES ARE FOUND IN THE SSD DRAWINGS, OR IF LOCAL CONDITIONS OR REQUIREMENTS VARY FROM THOSE SHOWN ON THE SSD DRAWINGS.
5. EXISTING CONDITIONS
   - A. GROUNDWATER, SOIL, AND SOIL GAS AT THE SITE MAY CONTAIN VOLATILE ORGANIC COMPOUNDS ("VOCS") AND POLYCHLORINATED BIPHENYLS ("PCBS"). TRICHLOROETHENE ("TCE") AND OTHER VOCS HAVE BEEN DETECTED IN GROUNDWATER, SOIL, AND SOIL VAPOR SAMPLES. AROCLOR 1260, A PCB, HAS BEEN DETECTED IN SOIL SAMPLES. REPORTS DESCRIBING SOIL, GROUNDWATER, AND SOIL VAPOR CONDITIONS AT THE PROJECT SITE ARE LISTED BELOW IN REFERENCE DOCUMENTS, AVAILABLE FROM THE DEVELOPER.
6. CONTRACTOR IS RESPONSIBLE FOR HEALTH, SAFETY, AND SITE SECURITY AS DESCRIBED IN THE AGREEMENT, AND MUST PERFORM WORK IN ACCORDANCE WITH LAWS AND REGULATIONS, INCLUDING BUT NOT LIMITED TO CAL/OSHA AND 29 CFR 1910.120, AS NEEDED FOR PROTECTING ITS WORKERS AND THE PUBLIC.
7. REFERENCE DOCUMENTS: SEE SHEET SSD-G1

ACKNOWLEDGMENT OF HAZARDOUS CONDITIONS

8. CONTRACTOR ACKNOWLEDGES BEING INFORMED THAT HAZARDOUS CONDITIONS MAY BE PRESENT AT THE SITE. PRIOR TO COMMENCING WORK, CONTRACTOR MUST INSPECT THE SITE AND ASCERTAIN WHETHER ANY HEALTH OR SAFETY HAZARDS EXIST THAT WOULD REQUIRE PERSONAL PROTECTIVE EQUIPMENT OR SPECIAL OPERATING PRACTICES. CONTRACTOR FURTHER ACKNOWLEDGES AND AGREES THAT IT HAS BEEN PROVIDED WITH AND HAS REVIEWED AND UNDERSTOOD THE REFERENCE DOCUMENTS, WHICH DESCRIBE AVAILABLE INFORMATION REGARDING SITE ENVIRONMENTAL CONDITIONS, AND IS FAMILIAR WITH THE LOCATIONS, QUANTITIES, AND TYPES OF POTENTIAL HAZARDOUS MATERIALS IDENTIFIED THEREIN. ADDITIONAL INFORMATION IS AVAILABLE IN REPORTS THAT ARE LISTED IN REFERENCE DOCUMENTS AND WILL BE PROVIDED TO CONTRACTOR IF REQUESTED.
9. CONTRACTOR MUST COMPLY WITH ALL LAWS AND REGULATIONS CONCERNING DISCLOSURE AND OCCUPATIONAL SAFETY AND HEALTH REQUIREMENTS AND MUST CAREFULLY INSTRUCT ALL OF ITS PERSONNEL AND ALL OTHERS UNDER CONTRACTOR'S CONTROL WORKING IN POTENTIALLY HAZARDOUS AREAS AS TO POTENTIAL DANGERS.
10. CONTRACTOR WILL BE SOLELY AND CONTINUOUSLY RESPONSIBLE FOR WORKSITE HEALTH, SAFETY, AND SECURITY, INCLUDING, WITHOUT LIMITATION, INITIATING, MAINTAINING, SUPERVISING, AND DOCUMENTING ALL NECESSARY SAFETY PRECAUTIONS IN CONNECTION WITH WORK IN ORDER TO PREVENT INJURIES TO OR DEATH OF PERSONS OR DAMAGE TO OR DESTRUCTION OF PROPERTY IN, ON, OR ABOUT THE SITE. THIS RESPONSIBILITY BY CONTRACTOR FOR HEALTH, SAFETY, AND SECURITY IS COMPLETE AND CONTINUOUS AND IS NOT LIMITED TO WORKING HOURS. CONTRACTOR MUST COMPLY WITH, AND ENSURE THAT ITS EMPLOYEES, AGENTS, SUPPLIERS, AND SUBCONTRACTORS AND ALL OTHERS UNDER CONTRACTOR'S CONTROL COMPLY WITH ALL LAWS AND REGULATIONS, AS WELL AS ANY HEALTH AND SAFETY RULES FURNISHED TO CONTRACTOR BY DEVELOPER OR BY ANY TENANT.
11. WARNING: THE SITE CONTAINS CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER, BIRTH DEFECTS, AND OTHER REPRODUCTIVE HARM.

HEALTH AND SAFETY PLAN

12. COMPLY WITH ALL LAWS AND REGULATIONS, INCLUDING APPLICABLE CALIFORNIA DIVISION OF OCCUPATIONAL SAFETY AND HEALTH, ("CAL/OSHA") SAFETY ORDERS SUCH AS THE HAZARDOUS COMMUNICATION STANDARD (8 CCR §5194) HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE SAFETY ORDER (8 CCR §5192; "HAZWOPER ORDER"). CONTRACTOR MUST INDEPENDENTLY DETERMINE THE HEALTH AND SAFETY AND SECURITY MEASURES NECESSARY TO PROTECT CONTRACTOR'S PERSONNEL AND OTHERS UNDER CONTRACTOR'S CONTROL, AS WELL AS EMPLOYEES OF DEVELOPER, TENANTS, AND VIMS ENGINEER.
13. PREPARE A WRITTEN SITE-SPECIFIC HEALTH AND SAFETY PLAN ("HASP") COMPLYING WITH LAWS AND REGULATIONS, SIGNED BY A CERTIFIED INDUSTRIAL HYGIENIST. HASP MUST ADDRESS SPECIFIC PRACTICES RELATED TO MONITORING AND PROTECTING WORKERS FROM HAZARDS ASSOCIATED WITH VOCS FROM SUB-SLAB SOURCES. CONTRACTOR AND SUBCONTRACTOR EMPLOYEES ENGAGED IN WORK WITH POTENTIAL EXPOSURE TO HAZARDOUS MATERIALS MUST BE ABLE TO PRODUCE UPON DEMAND INDIVIDUAL DOCUMENTATION OF CURRENT TRAINING, A PHYSICIAN'S STATEMENT CERTIFYING THAT THE WORKER IS FIT FOR HAZARDOUS WASTE ACTIVITIES AND CAN WEAR A RESPIRATOR (IF NECESSARY), AND A RESPIRATOR FIT TEST RECORD (AS APPROPRIATE). PROVIDE FIRST AID SUPPLIES, ACCESSIBLE TO PERSONNEL AT ALL TIMES.
14. COMPLY WITH SITE-SPECIFIC POLICIES SUCH AS SAFE SOIL HANDLING BEST PRACTICES.

ELECTRICAL AND CONTROLS

15. ELECTRICAL WORK FOR THE SSD SYSTEM IS NOT SHOWN ON THE DRAWINGS.
16. ELECTRICAL WORK NECESSARY TO COMPLETE THE PROJECT MUST BE DESIGN/BUILD, AND MUST INCLUDE PROVISION OF NEW ELECTRICAL SERVICE TO THE BLOWER LOCATION ON THE ROOFTOP. CONTRACTOR SHALL DESIGN AND PERMIT ELECTRICAL WORK.
   - A. PROVIDE POWER FOR SSD EQUIPMENT AND INSTRUMENTATION.
   - B. ELECTRICAL WORK MUST BE PERFORMED BY A PROPERLY LICENSED ELECTRICIAN IN ACCORDANCE WITH ALL APPLICABLE CODES.
17. CONTROL WIRING FOR THE SSD SYSTEM, INSTRUMENTATION, AND REMOTE MONITORING UNIT IS NOT SHOWN ON THE DRAWINGS.
   - A. CONTROL WIRING NECESSARY TO COMPLETE THE PROJECT MUST BE DESIGN/BUILD, AND MUST INCLUDE WIRING TO INTEGRATE SSD BLOWER, INSTRUMENTS, AND CONTROLS AS SHOWN ON THE DRAWINGS WITH THE REMOTE MONITORING UNIT.

PERMITTING

18. DEVELOPER WILL OBTAIN AN AUTHORITY TO CONSTRUCT AND PERMIT TO OPERATE FOR THE SSD SYSTEM FROM THE BAY AREA AIR QUALITY MANAGEMENT DISTRICT ("BAAQMD") PRIOR TO SSD BLOWER INSTALLATION.
19. WITH THE EXCEPTION OF THE BAAQMD PERMIT, CONTRACTOR MUST OBTAIN AND PAY FOR ALL PERMITS REQUIRED BY LOCAL JURISDICTIONS FOR INSTALLATION OF THE SSD SYSTEM.

SUBMITTALS

20. CONTRACTOR MUST SUBMIT TO DEVELOPER REPRESENTATIVE:
   - A. PROPOSED SCHEDULE FOR IMPLEMENTATION OF THE WORK.
   - B. COPIES OF ALL PERMITS OBTAINED BY CONTRACTOR.
   - C. MANUFACTURER'S DATA FOR ALL EQUIPMENT, INSTRUMENTATION, AND MATERIALS SPECIFIED HEREIN.
   - D. MANUFACTURER'S WARRANTIES TO BENEFIT OF DEVELOPER FOR ALL EQUIPMENT, INSTRUMENTATION, AND MATERIALS SPECIFIED HEREIN.
   - E. MANUFACTURER'S DATA AND SHOP DRAWING FOR SSD BLOWER SYSTEM AND CONTROLS.
   - F. ELECTRICAL, CONTROL AND REMOTE MONITORING UNIT CONNECTION SHOP DRAWINGS.
   - G. ROOFTOP ANCHORAGE DESIGN FOR SSD BLOWER.
21. EACH SUBMITTAL MUST RECEIVE FAVORABLE REVIEW OF DEVELOPER REPRESENTATIVE AND VIMS ENGINEER PRIOR TO DELIVERY OR INSTALLATION OF MATERIALS. DO NOT PROCURE OR FABRICATE ITEMS UNTIL FAVORABLE REVIEW HAS BEEN RECEIVED FROM VIMS ENGINEER.

DELIVERY, STORAGE, AND HANDLING

22. DELIVERY: DELIVER EQUIPMENT AND MATERIALS TO PROJECT SITE IN MANUFACTURER'S ORIGINAL, UNOPENED CONTAINERS AND PACKAGING, WITH LABELS CLEARLY IDENTIFYING PRODUCT NAME AND MANUFACTURER.
23. STORAGE: STORE EQUIPMENT AND MATERIALS IN A CLEAN, DRY AREA IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. EQUIPMENT AND MATERIAL MAY BE STORED INSIDE THE BUILDING, IF AUTHORIZED BY DEVELOPER REPRESENTATIVE. EQUIPMENT AND MATERIALS STORED AT THE SITE MUST BE SECURED BY THE CONTRACTOR; CONTRACTOR WILL BE RESPONSIBLE FOR ANY LOSS OR DAMAGE TO EQUIPMENT OF MATERIALS STORED AT THE SITE.
24. HANDLING: PROTECT EQUIPMENT AND MATERIALS DURING HANDLING AND INSTALLATION TO PREVENT DAMAGE.

EQUIPMENT, INSTRUMENTATION, AND MATERIALS

25. REFER TO SHEET SSD-T1 FOR LISTS AND SPECIFICATIONS FOR EQUIPMENT, INSTRUMENTATION, AND PIPING.
26. ALL EQUIPMENT, INSTRUMENTATION, PIPING, AND OTHER MATERIALS MUST BE NEW.
27. SUBSTITUTIONS FOR ITEMS SPECIFIED IN THESE PLANS ARE ALLOWED ONLY IF FAVORABLY REVIEWED IN WRITING BY VIMS ENGINEER.
28. PERMEABLE AGGREGATE:
   - A. MATERIAL: NOMINAL 3/4-INCH CRUSHED ROCK OR DRAIN ROCK, VIRGIN MATERIAL, LOW FINES, DURABILITY INDEX OF NOT LESS THAN 40, CONFORMING TO GRADATION:

SIEVE SIZE	PERCENT PASSING
1.5-INCH	100
1-INCH	90-100
3/4-INCH	55-90
3/8-INCH	5-20
#4	0-10
#8	0-3
#200	0-2

   - B. PROVIDE GRADATION ANALYSIS (CTM-202) AND DURABILITY INDEX ANALYSIS (CTM-229) TO VIMS ENGINEER FOR REVIEW AND APPROVAL.
   - C. PROVIDE CHEMICAL ANALYSIS PER SITE IMPORT FILL REQUIREMENTS PROVIDED IN SECTION 4.4 OF THE REMEDIAL DESIGN AND IMPLEMENTATION PLAN ("RDIP") ADDENDUM TO VIMS ENGINEER FOR REVIEW AND APPROVAL.
     - i. COLLECT A MINIMUM OF ONE SAMPLE PER MATERIAL SOURCE.
   - D. PROVIDE AND INSTALL PERMEABLE AGGREGATE DIRECTLY BENEATH FLOOR AND SUB-SLAB LINER ACROSS ENTIRE BUILDING FOOTPRINT AS SHOWN ON DRAWINGS.
29. PIPE BEDDING FOR UNDERGROUND SSD HEADER CONVEYANCE PIPE MUST BE SELF-COMPACTING PEA GRAVEL CONFORMING TO THE FOLLOWING GRADES AND SPECIFICATION OR AS SPECIFIED BY THE GEOTECHNICAL ENGINEER.
30. PEA GRAVEL CONFORMING TO 3/8" x #4 (ASTM C33 #8) DURABILITY INDEX OF NOT LESS THAN 40:

SIEVE SIZE	PERCENT PASSING
1/2-INCH	100
3/8-INCH	85-100
#4	10-30
#8	0-10
#16	0-5

   - A. PROVIDE GRADATION ANALYSIS (CTM-202) AND DURABILITY INDEX ANALYSIS (CTM-229) TO VIMS ENGINEER FOR REVIEW AND APPROVAL.
   - B. FOR UNDERGROUND SSD HEADER CONVEYANCE PIPE, FLOWABLE FILL MAY BE USED AS AN ALTERNATIVE TO PEA GRAVEL BACKFILL. FLOWABLE FILL IS A SELF-COMPACTING MIXTURE OF PORTLAND CEMENT, FLY ASH, FINE AGGREGATES, WATER, AND ENTRAINED AIR CONFORMING TO ACI 229R WITH A 28-DAY COMPRESSIVE STRENGTH OF 50 TO 100 PSI OR AS SPECIFIED BY THE GEOTECHNICAL ENGINEER.
31. SUB-SLAB LINER:
   - A. MATERIALS:
     - i. STEGO® WRAP VAPOR BARRIER
       - a. 15-MIL MULTI-LAYER PLASTIC EXTRUSION LINER
       - b. CLASS A RATING (ASTM E1745)
       - c. MANUFACTURER: STEGO INDUSTRIES, LLC
     - ii. STEGO® TAPE
       - a. LOW PERMEANCE TAPE FOR PROTECTIVE SEALING AND PATCHING APPLICATIONS TO STEGO® WRAP.
       - b. MANUFACTURER: STEGO INDUSTRIES, LLC
     - iii. STEGOTACK® TAPE
       - a. SOLVENT-RESISTANT, FLEXIBLE DOUBLE-SIDED ADHESIVE USED TO BOND AND SEAL STEGO® WRAP TO CONCRETE, METAL, WOOD, AND OTHER SURFACES.
       - b. MANUFACTURER: STEGO INDUSTRIES, LLC
     - iv. STEGO® CRETE CLAW® TAPE
       - a. MULTILAYERED TAPE USED TO SEAL STEGO® WRAP TO THE PERIMETER SLAB.
       - b. MANUFACTURER: STEGO INDUSTRIES, LLC
     - v. STEGO® PRE-CUT PIPE BOOTS
       - a. 15-MIL MULTI-LAYER PLASTIC EXTRUSION LINER USED TO SEAL PIPE PENETRATIONS IN STEGO® WRAP.
       - b. MANUFACTURER: STEGO INDUSTRIES, LLC
     - vi. STEGO® MASTIC
       - a. WATER-BASED, POLYMER-MODIFIED ANIONIC BITUMINOUS/ASPHALT EMULSION MASTIC FOR SEALING UTILITY AND PIPE PENETRATIONS IN STEGO® WRAP.
       - b. MANUFACTURER: STEGO INDUSTRIES, LLC
32. BOLLARDS
   - A. TYPE: SURFACE MOUNTED, SECURE WITH ANCHOR BOLTS.
   - B. SIZE: 4.5-INCH NOMINAL DIAMETER, 36-INCH HEIGHT (ULINE H-2118 OR EQUIVALENT).
   - C. FINISH: SURFACE FINISH ON BOLLARDS MUST BE SAFETY YELLOW.
   - D. HARDWARE: UTILIZE APPROPRIATELY SIZED ANCHOR BOLTS WITH EMBEDMENT DEPTH LESS THAN TWO-THIRDS (2/3) OF THE SLAB THICKNESS.

INSTALLATION/CONSTRUCTION

33. GENERAL
   - A. THE TERMS "PROVIDE" OR "FURNISH AND INSTALL" WILL MEAN CONTRACTOR IS TO PURCHASE, INSTALL, CONNECT, SUPPORT, LUBRICATE, PROVIDE MANUALS AND SPARE PARTS LIST, TEST, FURNISH WARRANTIES, AND MAKE READY FOR CONTINUOUS OPERATION.
   - B. WORK ON THE SSD SYSTEM WILL BE PERFORMED DURING NORMAL WORKING HOURS DURING NON-HOLIDAY WEEKDAYS OR WEEKENDS AS ALLOWED BY CITY BUILDING PERMITS.
   - C. PROVIDE ALL COMPONENTS NEEDED FOR A COMPLETE, PROPERLY FUNCTIONING SSD SYSTEM. NOT ALL COMPONENTS ARE SHOWN OR SPECIFIED ON THE DRAWINGS. PROVIDE ALL ANCILLARY CONNECTIONS, VALVES, APPURTENANCES, SUPPORTS FOR EQUIPMENT, PIPING, AND INSTRUMENTATION, AND OTHER FEATURES TO COMPLETE THE WORK.
34. SSD PIPE INSTALLATION
   - A. FURNISH AND INSTALL PIPING SHOWN ON SSD DRAWINGS, INCLUDING SUCTION TRENCH PIPING, RISER PIPES FROM SSD SUCTION TRENCHES, SSD CONVEYANCE PIPES, ROOFTOP LATERAL PIPING, CONVEYANCE DUCTING, SYSTEM INTERCONNECTING PIPING, AND OUTLET PIPE (STACK).
   - B. PROVIDE SUFFICIENT PIPE SUPPORTS AND HANGERS FOR ALL SSD PIPING IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, STANDARD PRACTICE, AND APPLICABLE BUILDING CODE, AND AS NEEDED TO ACCOMMODATE REASONABLE AND CUSTOMARY USE OF SPACE BY FUTURE OCCUPANTS.
   - C. INSTALL TO ELIMINATE ANY DIPS OR LOW POINTS IN SSD CONVEYANCE PIPING WHERE MOISTURE, IF PRESENT, COULD COLLECT. THE SSD ROOFTOP HEADER CONVEYANCE PIPING MUST BE LEVEL OR SLOPED TOWARD THE SSD BLOWER.
   - D. ALL INTERIOR SSD PIPING JOINTS MUST BE AIRTIGHT. JOINTS IN OUTDOOR SSD HEADER CONVEYANCE PIPING (SPIRAL DUCT) SHALL BE SEALED WITH UV-RESISTANT SEALANT IN ACCORDANCE WITH BEST PRACTICES TO MINIMIZE AIR LEAKAGE.
   - E. MARK ALL EXPOSED SSD CONVEYANCE PIPES UPSTREAM OF BLOWER WITH LABELS ON SIDE OF PIPE STATING "VAPOR CONTROL SYSTEM - NOTIFY MANAGEMENT IF DAMAGED". BLACK LETTERING 1 INCH HIGH. PROVIDE LABELS APPROXIMATELY EVERY 50 FEET.
   - F. DO NOT ALLOW SUB-SLAB VAPORS TO VENT INTO BUILDING DURING CONSTRUCTION. PLUG SSD RISER PIPES WHEN NOT ACTIVELY WORKING ON THE PIPING.
35. SUB-SLAB PROBE INSTALLATION
   - A. FURNISH AND INSTALL SUB-SLAB PROBES SHOWN ON THE DRAWINGS.
   - B. PROVIDE INTERNAL SEAL AT EACH END OF SUB-SLAB PROBE CONDUITS USING EXPANDING CLOSED-CELL POLYURETHANE FOAM SEALANT.
   - C. PROVIDE SECURE EXTERIOR TERMINUS FOR CONDUIT IN A WEATHER PROOF LOCKABLE EPOXY-COATED STEEL ENCLOSURE.
36. SUB-SLAB LINER INSTALLATION:
   - A. INSTALL SUB-SLAB LINER ABOVE SSD PERMEABLE AGGREGATE LAYER AND BELOW CONCRETE SLAB AS SHOWN ON DRAWINGS.
   - B. SUB-SLAB LINER MUST BE INSTALLED BY CERTIFIED OR QUALIFIED CONTRACTOR.
   - C. INSTALL SUB-SLAB LINER ACCORDING TO THE LINER MANUFACTURER INSTALLATION INSTRUCTION AND SPECIFICATIONS. SEAL LINER SEAMS, EDGES, AND ALL PIPE PENETRATIONS THROUGH THE LINER.
   - D. PROVIDE THIRD-PARTY SMOKE TESTING AND CERTIFICATION FOLLOWING INSTALLATION; SEAL ANY IDENTIFIED LEAKS.
   - E. PROTECT LINER FROM DAMAGE AFTER INSTALLATION AND TESTING, DURING FLOOR AND FOUNDATION INSTALLATION.
37. SSD EQUIPMENT INSTALLATION
   - A. INSTALL SSD EQUIPMENT AS SHOWN ON THE DRAWINGS, AND AS NECESSARY TO ALLOW ADEQUATE AND SAFE ACCESS TO ALL EQUIPMENT, PIPING, AND INSTRUMENTATION FOR ROUTINE OPERATIONS, MAINTENANCE, AND MONITORING.
   - B. MODIFICATIONS TO THE LAYOUT SHOWN ON THE DRAWINGS MAY BE IMPLEMENTED ONLY UPON FAVORABLE REVIEW OF DEVELOPER REPRESENTATIVE AND VIMS ENGINEER.
   - C. THE SSD BLOWER SYSTEM MUST BE INSTALLED LEVEL AND SECURELY ANCHORED TO THE ROOFTOP.
   - D. THE SSD BLOWER DISCHARGE STACK MUST BE INSTALLED A DISTANCE OF AT LEAST 1,000 FEET FROM THE NEAREST PROPERTY LINE OF ALL NEARBY K-12 SCHOOLS. THE LOCATION SHOWN ON DRAWINGS MEETS THIS CRITERION.
38. BOLLARDS
   - A. BOLLARD(S) SHALL BE ADDED TO PROVIDE PROTECTION FOR SSD RISER PIPES AT ANY LOCATION WHERE THE RISER PIPE IS EXPOSED TO INDOOR VEHICLE TRAFFIC, SUCH AS FORK LIFTS. BOLLARDS ARE NOT REQUIRED WHERE RISER PIPES ARE SHIELDED FROM TRAFFIC BY INTERIOR FINISH, SUCH AS WALLS OR STORAGE STACKS.
   - B. ANCHOR EMBEDMENT MUST BE LESS THAN TWO-THIRDS (2/3) OF THE SLAB THICKNESS AND MAY NOT PENETRATE OR DAMAGE THE SUB-SLAB LINER.
   - C. SEQUENCING: WHERE BOLLARDS ARE REQUIRED, BOLLARD(S) TO BE INSTALLED DURING INTERIOR/EXTERIOR BUILD OUT.

EXCAVATION AND TRENCHING

39. SUPPORT ALL OPEN EXCAVATIONS IN ACCORDANCE WITH APPLICABLE OSHA REQUIREMENTS.
40. PROVIDE AND MAINTAIN TRENCH PLATES OR PLYWOOD AS APPLICABLE, FENCING, BARRICADES, SIGNAGE, FLAGMEN AND ANY OTHER SAFETY RELATED REQUIREMENTS. IN TRAFFIC AREAS WHERE ACTIVE CONSTRUCTION IS NOT OCCURRING, COVER OPEN TRENCHES WITH TRENCH PLATES (CONFIGURED TO ALIGN UNIFORMLY) TO ALLOW FOR NORMAL VEHICLE TRAFFIC AND MAINTAIN SO AS NOT TO PRESENT TRIP HAZARDS FOR PEDESTRIANS.
41. MAINTAIN SAFETY FENCING AND/OR STEEL PLATES OR PLYWOOD AS APPLICABLE UNTIL THE TRENCH IS BACKFILLED AND COMPACTED TO SATISFACTION OF GEOTECHNICAL ENGINEER.
42. BACKFILL THE TRENCHES AFTER FAVORABLE REVIEW OF PIPING FROM THE VIMS ENGINEER.
43. CONTRACTOR WILL BE RESPONSIBLE FOR ANY DAMAGE TO THE PIPE DURING BEDDING AND BACKFILL PLACEMENT.
44. UNDERGROUND UTILITIES
   - A. VIMS ENGINEER AND DEVELOPER DO NOT HAVE COMPLETE KNOWLEDGE OR INFORMATION REGARDING THE LOCATION OF UNDERGROUND UTILITIES AT THE SITE. INFORMATION REGARDING UTILITY TYPES AND LOCATIONS SHOWN ON THE DRAWINGS HAS BEEN MADE KNOWN TO VIMS ENGINEER BY OTHERS, BUT THIS INFORMATION IS NOT TO BE CONSTRUED AS BEING COMPLETE OR ACCURATE.
   - B. CONTRACTOR IS RESPONSIBLE, BEFORE THE START OF ACTIVE CONSTRUCTION, FOR ACCURATELY LOCATING, AND POTHOLING (PHYSICALLY EXPOSING), ALL BURIED UTILITIES IN THE AREA OF THE SUBSURFACE WORK. CONTRACTOR MUST ENGAGE THE SERVICES OF A SPECIALTY UTILITY LOCATING SUBCONTRACTOR TO ASSIST WITH THE LOCATING OF KNOWN AND UNKNOWN UTILITIES. CONTRACTOR MUST PERFORM ALL WORK IN A MANNER TO PROTECT EXISTING UNDERGROUND AND OVERHEAD UTILITIES FROM DAMAGE, AND MUST PROMPTLY REPAIR ANY DAMAGE CAUSED BY CONTRACTOR.
   - C. OVERHEAD ELECTRICAL LINES, UTILITY POLES, AND OTHER ABOVE GROUND UTILITIES, ARE NOT SHOWN ON THE DRAWINGS BUT MUST BE VERIFIED BY CONTRACTOR PRIOR TO ACTIVE WORK.

SOIL AND DEBRIS MANAGEMENT

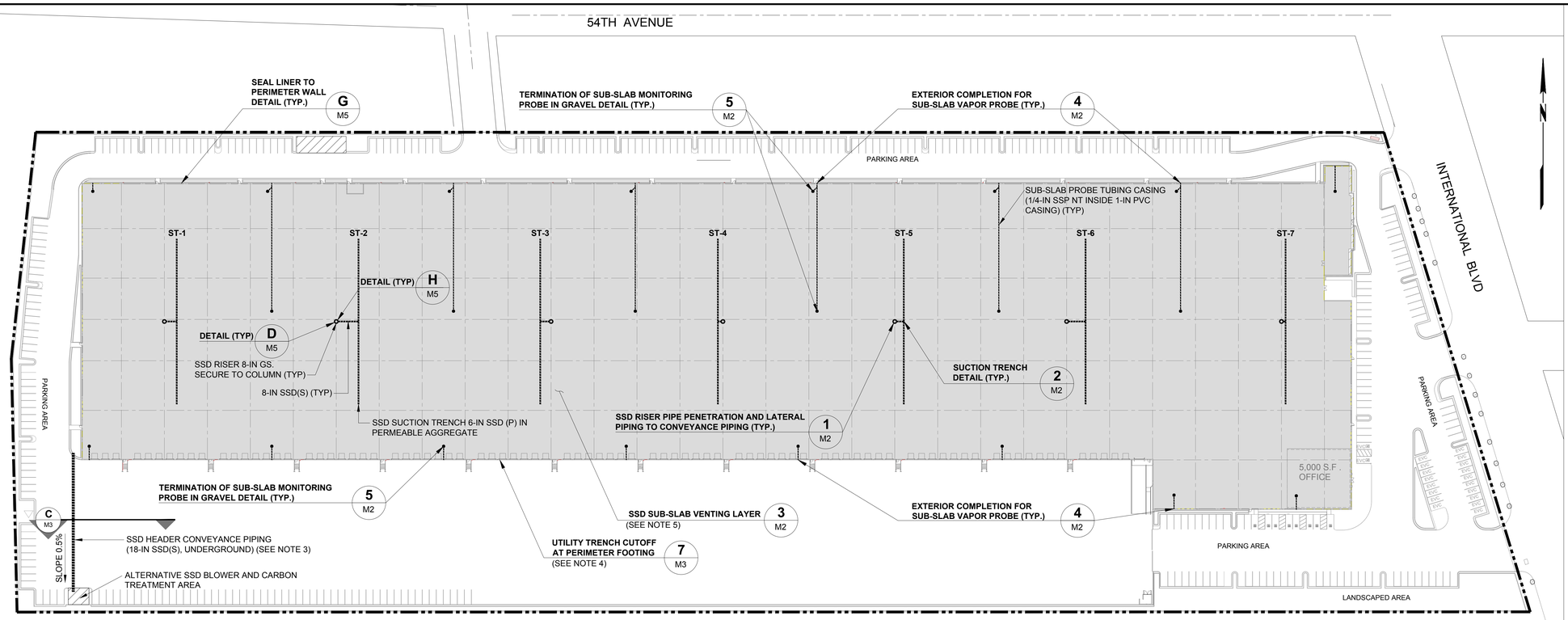
45. FULLY COMPLY WITH ANY AND ALL SITE PROCEDURES FOR SAFE MATERIAL HANDLING, SOIL MANAGEMENT PLANS, DECONTAMINATION PROCEDURES, AND APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE WORKING WITH OR NEAR SOIL OR OTHER FILL MATERIAL ON SITE.
46. STOCKPILE ALL SOIL AND SUB-GRADE FILL MATERIAL THAT IS REMOVED FOR PERFORMANCE OF THE WORK ON-SITE ON PLASTIC SHEETING AND SECURELY COVERED WITH PLASTIC SHEETING, AT A LOCATION AT THE PROPERTY DESIGNATED BY DEVELOPER'S REPRESENTATIVE PENDING ON-SITE REUSE. CONTRACTOR MUST NOTIFY DEVELOPER'S REPRESENTATIVE IF OILY SOIL OR FREE PRODUCT IS ENCOUNTERED.
47. ALL CONSTRUCTION DEBRIS AND WASTE MATERIALS MUST BE MANAGED AND DISPOSED BY CONTRACTOR IN ACCORDANCE WITH LAWS AND REGULATIONS.

FLOOR SEALING

48. FOLLOWING FLOOR CONSTRUCTION, SEAL ANY OBSERVED GAPS, CRACKS, PENETRATIONS, OR OTHER OPENINGS IN THE FLOOR TO THE EXTENT FEASIBLE IN ACCORDANCE WITH THE FOLLOWING SPECIFICATIONS.
49. FILL EACH OF THE FOLLOWING WITH SEALANT THAT IS FLEXIBLE, DURABLE, AND ADHERES TO CONCRETE:
   - A. VISIBLE CRACKS GREATER THAN 1 MILLIMETER WIDE;
   - B. EXPANSION JOINTS (SEAL TOP OF EXPANSION JOINT, ABOVE FILLER MATERIAL);
   - C. OTHER VISIBLE CRACKS, GAPS, AND OPENINGS AMENABLE TO FILLING WITH A SEALANT.
50. HAIRLINE CRACKS: SEALING IS NOT REQUIRED.
51. LARGE OPENINGS: FILL WITH CONCRETE OR NON-SHRINK GROUT, AS APPROPRIATE.
52. FLOOR FIXTURES (E.G., DRAINS, FLOOR SINKS, POWER/COMMUNICATION RECEPTACLES/JUNCTION BOXES):
   - A. SEAL PERIMETER OF FLOOR FIXTURE TO CONCRETE.
   - B. SEAL ANY INTERIOR GAPS OR HOLES IN THE FIXTURE (E.G., IN POWER/COMMUNICATION RECEPTACLES).
   - C. PROVIDE A CONDUIT SEAL INSIDE POWER/COMMUNICATION CONDUIT UNLESS SUB-GRADE CONDUIT IS AIRTIGHT (E.G., PVC WITH SOLVENT-WELD JOINTS).
53. PIPE AND CONDUIT PENETRATIONS THROUGH FLOOR:
   - A. SEAL GAP, IF ANY, BETWEEN PIPE AND CONCRETE FLOOR WITH FLEXIBLE SEALANT, ADHERING TO PIPE WALL AND CONCRETE. IF NO GAP, APPLY SEALANT AT PERIMETER OF PIPE/CONDUIT INTERFACE WITH THE FLOOR.
54. ELECTRICAL/COMMUNICATIONS CONDUITS THAT PASS UNDERGROUND BEFORE ENTERING THE BUILDING:
   - A. IF FEASIBLE, PROVIDE INTERIOR CONDUIT SEAL AT ACCESSIBLE LOCATION (TYPICALLY NEAR PANEL), USING EXPANDABLE CLOSED-CELL POLYURETHANE FOAM SEALANT.
55. ANY OTHER LOCATION WHERE THERE IS AN ACTUAL OR POTENTIAL GAP OR OPENING THROUGH THE FLOOR THAT WOULD ALLOW SOIL GASES OR AIR TO PASS THROUGH:
   - A. USE COMMERCIALLY-ACCEPTED METHODS TO PROVIDE A DURABLE SEAL.
56. SEALANTS
   - A. SEALANTS WILL ADHERE TO THE MATERIAL(S) BEING SEALED, AND SEALANTS WILL BE FLEXIBLE, DURABLE, COMPATIBLE WITH THE MATERIALS CONTACTED BY THE SEALANT, AND COMPATIBLE WITH THE FINISHED FLOOR COVERINGS OR PAINT. SURFACES TO BE SEALED SHOULD BE CLEANED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. SEALANTS MAY INCLUDE BUT ARE NOT LIMITED TO:
     - i. POLYURETHANE-BASED SEALANTS AND CAULK;
     - ii. EXPANDABLE CLOSED-CELL POLYURETHANE FOAM.

QUALITY ASSURANCE

57. NOTIFY VIMS ENGINEER 48 HOURS PRIOR TO THE FOLLOWING ACTIVITIES TO ALLOW OBSERVATION BY VIMS ENGINEER:
   - A. INSTALLATION OF SUB-GRADE PIPING IN SUCTION TRENCHES AND CONVEYANCE PIPE TRENCH, PRIOR TO BACKFILL PLACING PERMEABLE AGGREGATE AROUND PIPE;
   - B. CONSTRUCTION OF SUB-SLAB PROBES, WHILE VISIBLE;
   - C. COMPLETION OF SECTIONS OF LINER AND ASSOCIATED SMOKE TESTING;
   - D. COMPLET



GROUND LEVEL CONSTRUCTION

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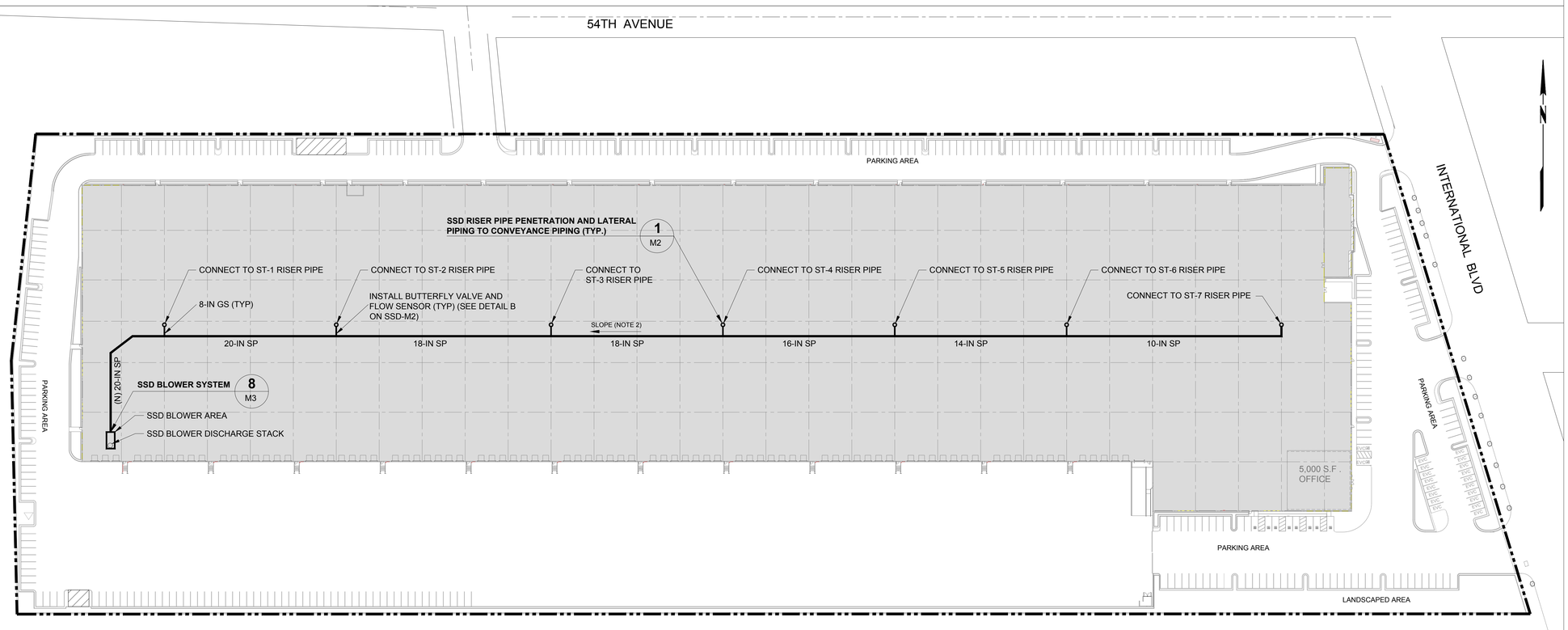
(APPROXIMATE SCALE IN FEET)



ROOFTOP LEVEL CONSTRUCTION

60 0 60 120
(APPROXIMATE SCALE IN FEET)

DRAFT FINAL - NOT FOR CONSTRUCTION

NOTES:

1. SSD SYSTEM CONSTRUCTION TO OCCUR DURING BUILDING CORE AND SHELL CONSTRUCTION.
2. ROOFTOP PIPING SHALL BE EITHER FLAT OR SLOPED DOWN IN THE DIRECTION OF THE SSD BLOWER INLET.
3. UNDERGROUND SSD HEADER CONVEYANCE PIPE IS FOR POTENTIAL FUTURE CONNECTION TO ALTERNATIVE BLOWER LOCATION AT GROUND LEVEL. CAP PIPE BELOW GROUND AT EACH END.
4. LOCATIONS OF UTILITY TRENCHES PENETRATING THE BUILDING PERIMETER TO BE COORDINATED WITH PLUMBING DESIGN.
5. THE SUB-SLAB VENTING LAYER, INCLUDING PERMEABLE AGGREGATE AND LINER, COVERS THE ENTIRE INTERIOR BUILDING FOOTPRINT.

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BURLINGAME, CALIFORNIA 94010-5306
(650) 292-9100 • FAX (650) 552-9012

SUB-SLAB DEPRESSURIZATION SYSTEM
5441 INTERNATIONAL BOULEVARD, OAKLAND, CALIFORNIA

SUB-SLAB DEPRESSURIZATION LAYOUT

REV	DESCRIPTION	APPR'D	DATE

DATE: OCT 2019
SCALE: AS SHOWN
DRAWN: ZCS/CCR
DESIGNED: ZCS/NJM
APPROVED:
JOB NO.: B70123.01

VERIFY SCALE
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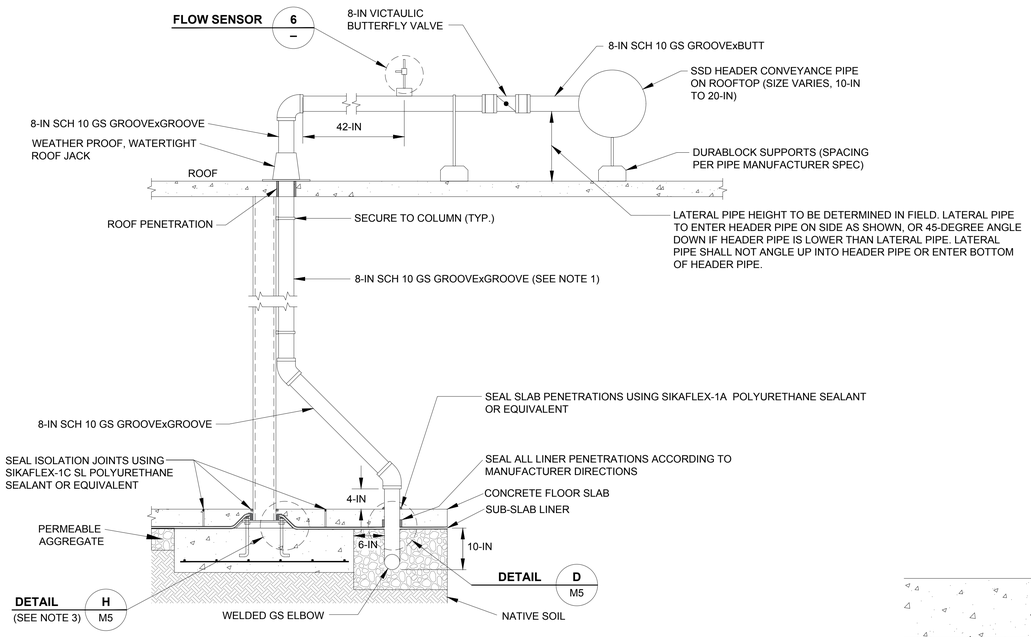
SHEET NUMBER
SSD-M1
4 OF 10

REGISTERED PROFESSIONAL ENGINEER
JOHN THOMAS DE WITT
C 55468
CIVIL
STATE OF CALIFORNIA

20191002.111859 C:\Users\ricasata\appdata\local\temp\AcPublish_4924\SSD-M1.dwg M1

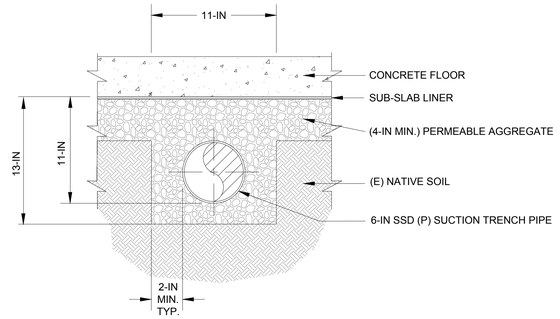


NOTES:

1. INSTALL GS PIPING WITH GROOVE-GROOVE PIPING AND COUPLINGS AS SHOWN. WELDED JOINTS ALLOWED AS AN ALTERNATIVE.
2. BOLLARD(S) SHALL BE ADDED TO PROVIDE PROTECTION FOR SSD RISER PIPES AT ANY LOCATION WHERE RISER PIPE IS EXPOSED TO INDOOR VEHICLE TRAFFIC, SUCH AS FORK LIFTS. BOLLARDS ARE NOT REQUIRED WHERE RISER PIPES ARE SHIELDED FROM TRAFFIC BY INTERIOR FINISH, SUCH AS WALLS OR STORAGE RACKS.
3. CONTRACTOR TO DETERMINE APPROPRIATE LINER SEAL BASED ON FIELD CONDITIONS.

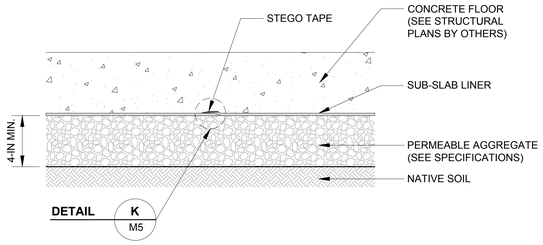
SSD RISER PIPE PENETRATION AND LATERAL PIPING TO CONVEYANCE PIPING 1 / M1

NOT TO SCALE



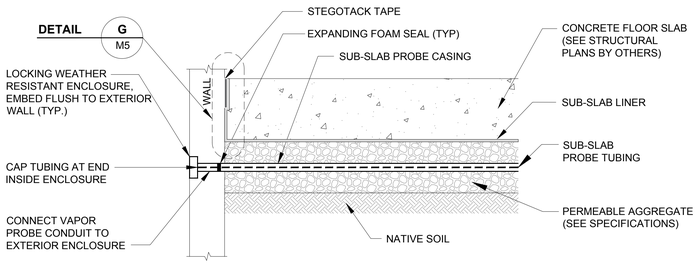
SUCTION TRENCH A / –

NOT TO SCALE



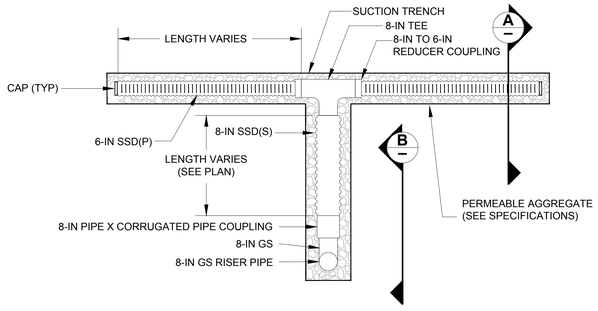
SSD SUB-SLAB VENTING LAYER 3 / M1

NOT TO SCALE



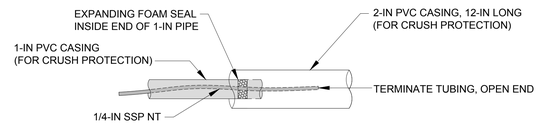
EXTERIOR COMPLETION FOR SUB-SLAB PROBE 4 / M1

NOT TO SCALE



SUCTION TRENCH 2 / M1

NOT TO SCALE

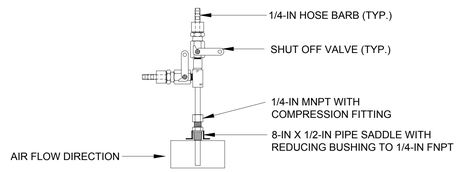


NOTES:

1. ROUTE 1/4-IN NYLON TUBING AND 1-IN PVC FROM SUB-SLAB LOCATIONS SHOWN ON SHEET SSD-M1. USE CONTINUOUS TUBING, NO JOINTS.

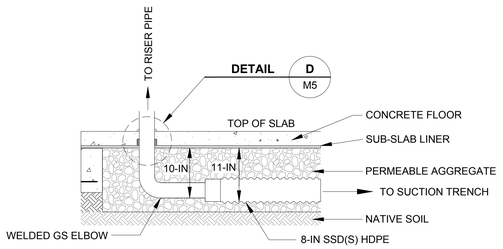
TERMINATION OF SUB-SLAB PROBE IN GRAVEL LAYER DETAIL 5 / M1

NOT TO SCALE



FLOW SENSOR DWYER DS-300-8 6 / –

NOT TO SCALE



SUCTION TRENCH TO RISER PIPING TRANSITION B / –

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SUB-SLAB DEPRESSURIZATION SYSTEM
5441 INTERNATIONAL BOULEVARD, OAKLAND, CALIFORNIA

SUB-SLAB DEPRESSURIZATION DETAILS (1 OF 2)

REV	DESCRIPTION	APPR'D	DATE

DATE: OCT 2019
SCALE: AS SHOWN
DRAWN: ZCS/CCR
DESIGNED: ZCS/MJM
APPROVED:
JOB NO.: B70123.01

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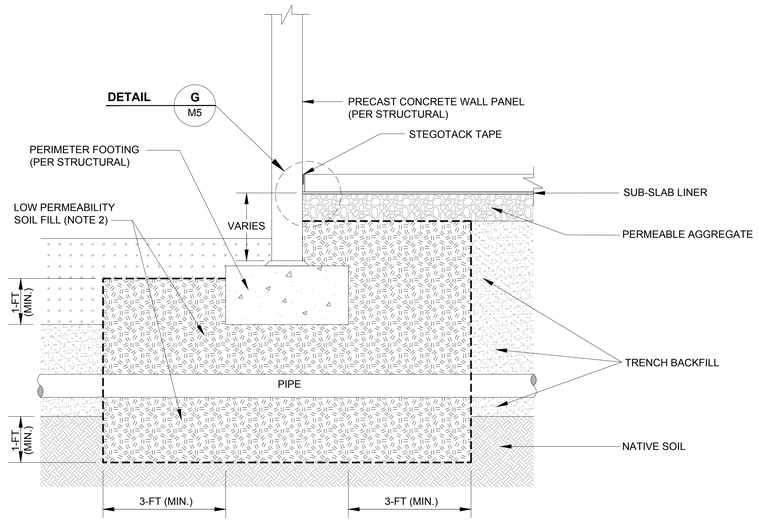
REGISTERED PROFESSIONAL ENGINEER
JOHN THOMAS DE WITT
C 55468
CIVIL
STATE OF CALIFORNIA

SHEET NUMBER
SSD-M2
5 OF 10

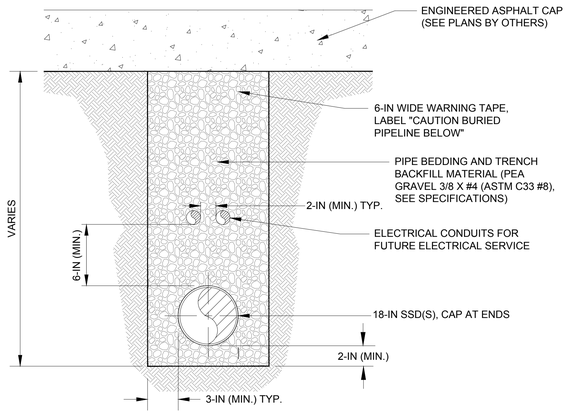
20190121.1534.3496 G:\EKI_CONSTRUCTION DWGS\B70123.01\2019-01\SSD-M2.dwg Model



NOTES:

1. DETAIL APPLIES TO ALL TRENCHES THAT PASS BENEATH BUILDING PERIMETER FOOTING.
2. LOW PERMEABILITY SOIL FILL IS 50% BENTONITE (3/8" PELLETS) AND 50% CLEAN IMPORTED FILL WELL MIXED, PLACED INSIDE TRENCH AT BUILDING PERIMETER FOOTING AS SHOWN.
3. COMPACT LOW PERMEABILITY SOIL FILL TO 90% RELATIVE COMPACTION.

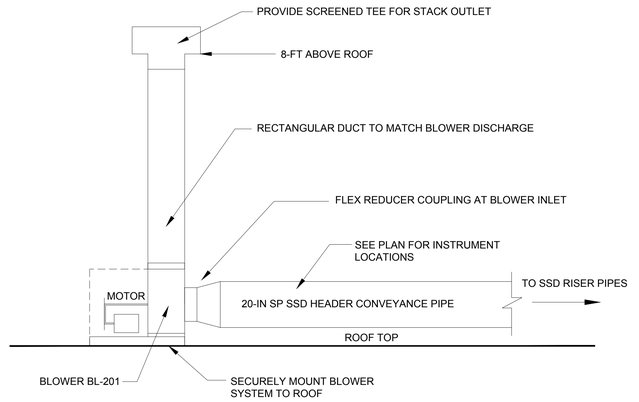
UTILITY TRENCH CUTOFF AT PERIMETER FOOTING 7 M1
NOT TO SCALE



NOTES:

1. FLOWABLE FILL MAY BE SELECTED AS AS AN ALTERNATE BACKFILL MATERIAL. SEE SPECIFICATIONS.

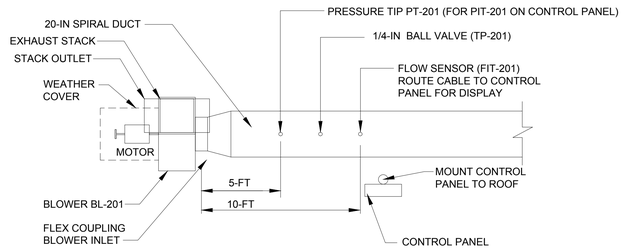
SSD BURIED CONVEYANCE PIPE TRENCH SECTION C M1
NOT TO SCALE



ELEVATION

NOTES:

1. SECURE EXHAUST DUCT WITH GUY WIRES OR POST.



PLAN

NOTES:

1. PROVIDE 120-VOLT GFCI ELECTRICAL OUTLET NEAR CONTROL PANEL FOR OPERATOR USE.
2. MOUNT CONTROL PANEL TO ROOF USING BRACKETS, UNISTRUT, OR OTHER SUITABLE SUPPORT. PROVIDE SUBMITTAL TO ENGINEER FOR REVIEW.

SSD BLOWER SYSTEM 8 M1
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SUB-SLAB DEPRESSURIZATION SYSTEM
5441 INTERNATIONAL BOULEVARD, OAKLAND, CALIFORNIA

SUB-SLAB DEPRESSURIZATION DETAILS (2 OF 2)

REV	DESCRIPTION	APPR'D	DATE

DATE: AUG 2019
SCALE: AS SHOWN
DRAWN: ZCS/CCR
DESIGNED: ZCS/MJM
APPROVED:
JOB NO.: B70123.01

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REGISTERED PROFESSIONAL ENGINEER
IRAN THOMAS DE RAITT
C 55468
CIVIL
STATE OF CALIFORNIA

SHEET NUMBER
SSD-M3
6 OF 10

DRAFT FINAL - NOT FOR CONSTRUCTION

20190814.122515 C:\Users\ricasato\appdata\local\temp\AcPublish_6584\SSD-M3.dwg Model

STEGO® WRAP VAPOR BARRIER/RETARDER INSTALLATION INSTRUCTIONS

IMPORTANT: Please read these installation instructions completely, prior to beginning any Stego Wrap installation. The following installation instructions are based on ASTM E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs. If project specifications call for compliance with ASTM E1643, then be sure to review the specific installation sections outlined in the standard along with the techniques referenced in these instructions.

UNDER-SLAB INSTRUCTIONS:

FIGURE 1: UNDER-SLAB INSTALLATION

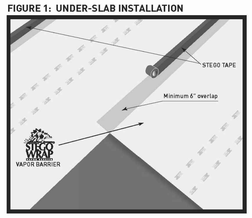


FIGURE 2a: SEAL TO SLAB AT PERIMETER

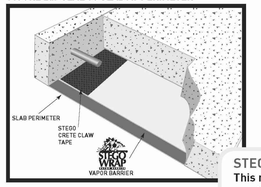
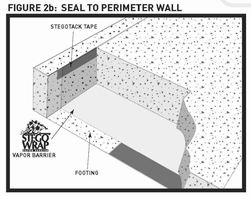


FIGURE 2b: SEAL TO PERIMETER WALL



1. Stego Wrap can be installed over an aggregate, sand, or tamped earth base. It is not necessary to have a cushion layer or sand base, as Stego Wrap is tough enough to withstand rugged construction environments.
2. Unroll Stego Wrap over the area where the slab is to be placed. Stego Wrap should completely cover the concrete placement area. All joints/seams both lateral and butt should be overlapped a minimum of 6" and taped using Stego® Tape.

   NOTE: The area of adhesion should be free from dust, dirt, moisture, and frost to allow maximum adhesion of the pressure-sensitive tape.
3. ASTM E1643 requires sealing the perimeter of the slab. *Extend vapor retarder over footings and seal to foundation wall, grade beam, or slab at an elevation consistent with the top of the slab or terminate at impediments such as waterstops or dowels.* Consult the structural engineer of record before proceeding.

SEAL TO SLAB AT PERIMETER:*

NOTE: Clean the surface of Stego Wrap to ensure that the area of adhesion is free from dust, dirt, moisture, and frost to allow maximum adhesion of the pressure-sensitive adhesive.

a. Install Stego® Crete Claw® Tape on the entire perimeter edge of Stego Wrap.
b. Prior to the placement of concrete, ensure that the top of Stego Crete Claw Tape is free of dirt, debris, or mud to maximize the bond to the concrete.

STEGO LABOR SAVER!
This method not only complies with ASTM E1643, but it also:
• reduces labor compared to other perimeter sealing techniques.
• can be used even without an existing wall or footing, unlike alternatives.

OR **SEAL TO PERIMETER WALL WITH STEGOTACK® TAPE:***

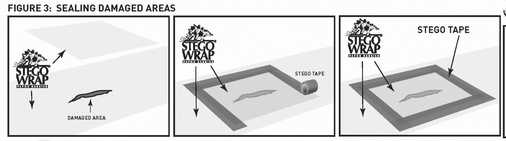
a. Make sure area of adhesion is free of dust, dirt, debris, moisture, and frost to allow maximum adhesion.
b. Remove release liner on one side and stick to desired surface.
c. When ready to apply Stego Wrap, remove the exposed release liner and press Stego Wrap firmly against StegoTack Tape to secure.

* If ASTM E1643 is specified, consult with project architect and structural engineer to determine which perimeter seal technique should be employed for the project.

Continued...
Note - legal notice on page 2.

4. In the event that Stego Wrap is damaged during or after installation, repairs must be made. For holes, cut a piece of Stego Wrap to a size and shape that covers any damage by a minimum overlap of 6" in all directions. Clean all adhesion areas of dust, dirt, moisture, and frost. Tape down all edges using Stego Tape **(See Figure 3)**.

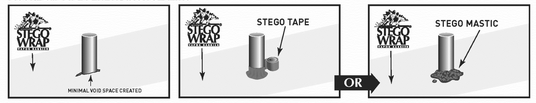
FIGURE 3: SEALING DAMAGED AREAS



NOTE: Stego Industries recommends the use of vapor barrier-safe concrete accessories, like Beast® Screed, to help minimize the amount of penetrations in a Stego Wrap Installation.

5. **IMPORTANT: ALL PENETRATIONS MUST BE SEALED.** All pipe, ducting, rebar, wire penetrations and block outs should be sealed using Stego Wrap, Stego Tape and/or Stego Mastic **(See Figure 4a)**. If penetrations are encased in other materials, such as expansive materials like foam, unless otherwise specified, Stego Wrap should be sealed to the underlying penetration directly.

FIGURE 4a: PIPE PENETRATION SEALING



STEGO WRAP PIPE PENETRATION REPAIR DETAIL:

1: Install Stego Wrap around pipe penetrations by slitting/cutting material as needed. Try to minimize the void space created.
2: If Stego Wrap is close to pipe and void space is minimized then seal around pipe penetration with Stego Tape and/or Stego Mastic. **(See Figure 4a)**
3: If detail patch is needed to minimize void space around penetration, then cut a detail patch to a size and shape that creates a 6" overlap on all edges around the void space at the base of the pipe. Stego Pre-Cut Pipe Boots are also available to speed up the installation.
4: Cut an "X" the size of the pipe diameter in the center of the pipe boot and slide tightly over pipe.
5: Tape down all sides of the pipe boot with Stego Tape.
6: Seal around the base of the pipe using Stego Tape and/or Stego Mastic. **(See Figure 4b)**

FIGURE 4b: DETAIL PATCH FOR PIPE PENETRATION SEALING

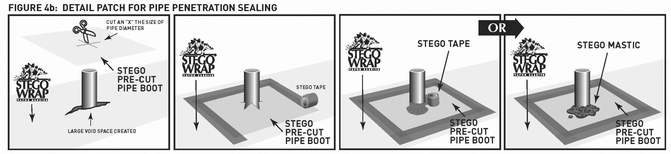
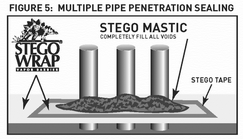


FIGURE 5: MULTIPLE PIPE PENETRATION SEALING



MULTIPLE PIPE PENETRATION SEALING:
Multiple pipe penetrations in close proximity and very small pipes may be sealed using Stego Wrap and Stego Mastic for ease of installation **(See Figure 5)**.

NOTE: Stego Industries, LLC's ("Stego") installation instructions are based on ASTM E1643 - *Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.* These instructions are meant to be used as a guide, and do not take into account specific job site situations. Consult local building codes and regulations along with the building owner or owner's representative before proceeding. If you have any questions regarding the above mentioned installation instructions or Stego products, please call us at 877-464-7834 for technical assistance. While Stego employees and representatives may provide technical assistance regarding the utility of a specific installation practice or Stego product, they are not authorized to make final design decisions.

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577 AIRPORT BOULEVARD, SUITE 500
BURLINGAME, CALIFORNIA 94010-5306
(650) 292-9100 • FAX (650) 552-9012

SUB-SLAB DEPRESSURIZATION SYSTEM
5441 INTERNATIONAL BOULEVARD, OAKLAND, CALIFORNIA

MANUFACTURER'S INSTALLATION INSTRUCTIONS FOR STEGO WRAP LINER

DATE:	AUG 2019
SCALE:	AS SHOWN
DRAWN:	ZCS/CCR
DESIGNED:	ZCS/MJM
APPROVED:	
JOB NO.:	B70123.01

REV | DESCRIPTION | APPRD | DATE

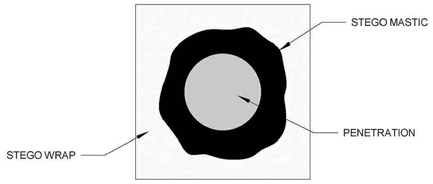
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

REGISTERED PROFESSIONAL ENGINEER
JOHN THOMAS SEWITT
C 55468
CIVIL
STATE OF CALIFORNIA

SHEET NUMBER
SSD-M4
7 OF 10

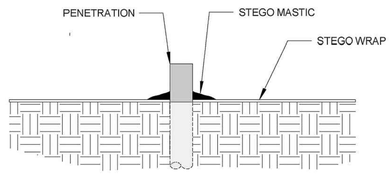
DRAFT FINAL - NOT FOR CONSTRUCTION

20190124.134553 G:\EKI_CONSTRUCTION DWGS\B70123.01\2019-01_new SSD-M5.dwg Model

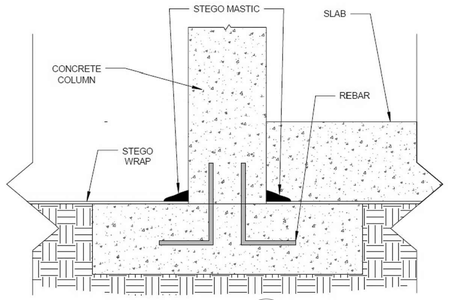


DETAIL D M1

TOP VIEW
PENETRATION SEALED WITH STEGO MASTIC
NOT TO SCALE



SIDE VIEW
PENETRATION SEALED WITH STEGO MASTIC
NOT TO SCALE



DETAIL E –

CONCRETE COLUMN SEALED TO COLUMN WITH STEGO MASTIC
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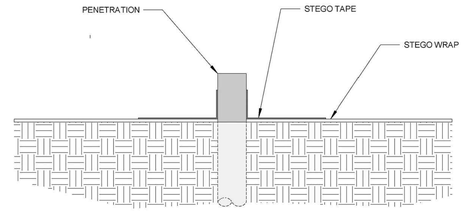

DETAIL F –

SIDE VIEW
PENETRATION SEALED WITH STEGO TAPE,
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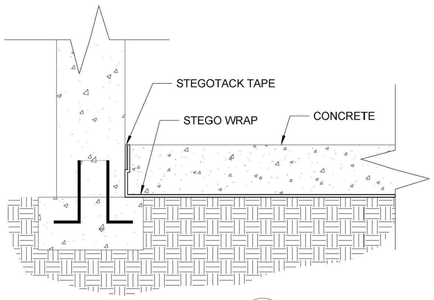
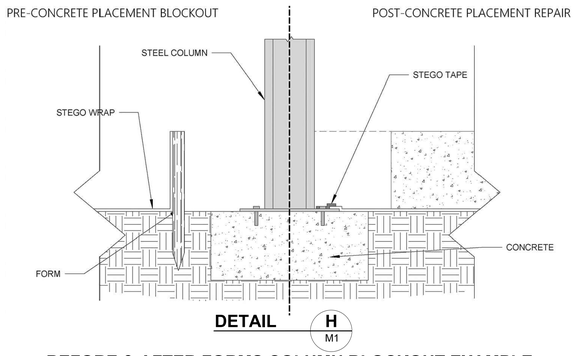


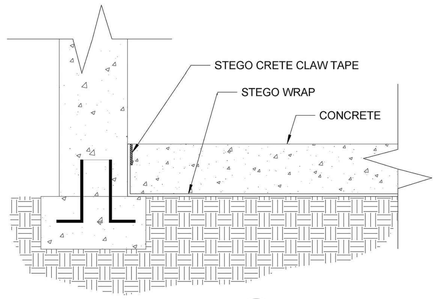
DETAIL G M1

PERIMETER WALL SEAL TO SLAB AT SLAB ELEVATION WITH STEGOTACK TAPE
NOT TO SCALE



DETAIL H M1

BEFORE & AFTER FORMS COLUMN BLOCKOUT EXAMPLE SEALED TO COLUMN WITH STEGO TAPE
NOT TO SCALE



DETAIL I –

PERIMETER WALL SEAL TO SLAB AT SLAB ELEVATION WITH STEGO CRETE CLAW TAPE
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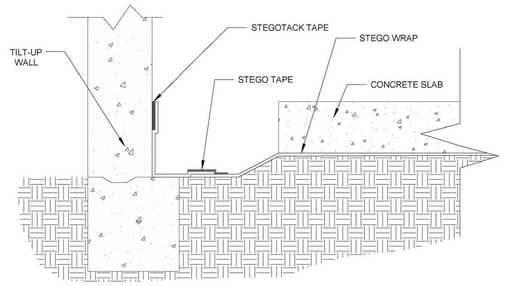

DETAIL J –

TILT-UP WALL SEAL TO WALL AT SLAB ELEVATION WITH STEGOTACK TAPE AND STEGO TAPE
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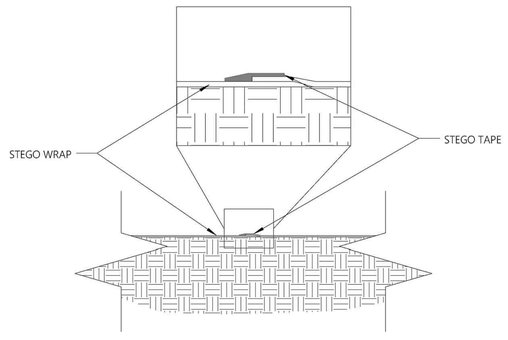
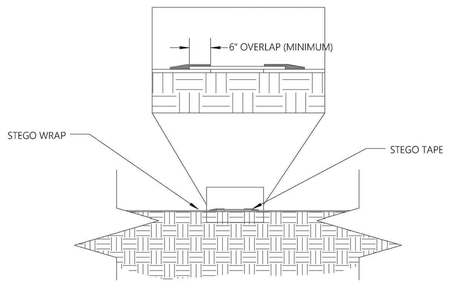


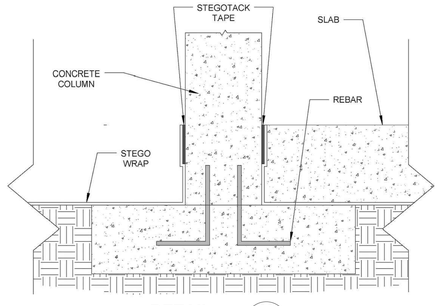
DETAIL K M2

OVERLAP WITH STEGO TAPE
NOT TO SCALE



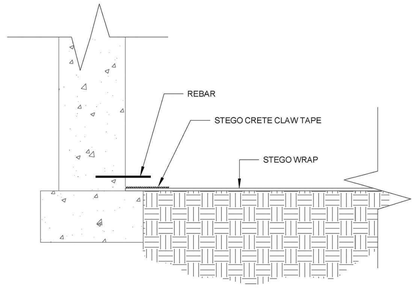
DETAIL L –

REPAIR OF DAMAGED AREA WITH STEGO TAPE
NOT TO SCALE



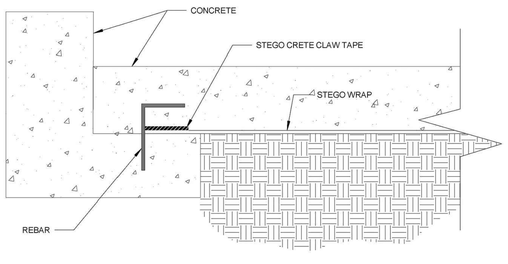
DETAIL M –

CONCRETE COLUMN SEAL TO COLUMN WITH STEGOTACK TAPE
NOT TO SCALE



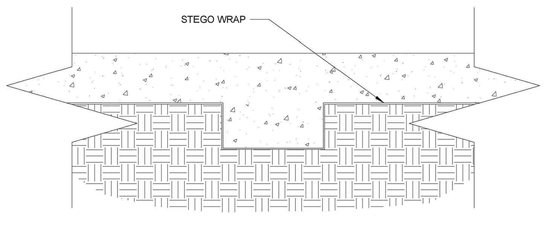
DETAIL N –

PERIMETER WALL SEAL TO FOOTING BENEATH REBAR WITH STEGO CRETE CLAW TAPE
NOT TO SCALE



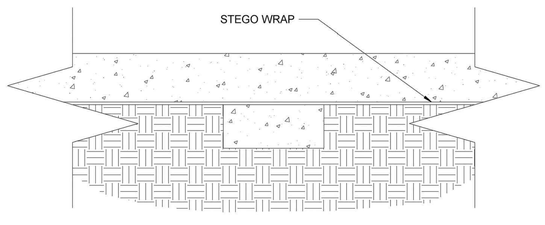
DETAIL O –

PERIMETER WALL SEAL TO FOOTING AT REBAR WITH STEGO CRETE CLAW TAPE
NOT TO SCALE



DETAIL P M1

ENCAPSULATING MONOLITHICALLY POURED INTERIOR GRADE BEAM
NOT TO SCALE



DETAIL Q M1

STEGO WRAP OVER TWO-POUR INTERIOR GRADE BEAM
NOT TO SCALE

NOTE: THIS SHEET SHOWS THE MANUFACTURER'S GENERIC DETAILS FOR THE STEGO WRAP LINER. NOT ALL DETAILS SHOWN MAY BE USED IN THIS PROJECT. CALLOUTS ARE PROVIDED ON OTHER SHEETS WHERE THESE DETAILS ARE ANTICIPATED TO BE USED FOR THE SSD SYSTEM DESIGN. PROJECT-SPECIFIC DETAILS SUCH AS THE GRAVEL LAYER ARE NOT SHOWN HERE ON THE MANUFACTURER'S GENERIC DETAILS, HOWEVER THEY ARE REFLECTED ON SHEETS SSD-M2 AND SSD-M3.

REGISTERED PROFESSIONAL ENGINEER
JOHN THOMAS DE WITT
C 55468
CIVIL
STATE OF CALIFORNIA

DRAFT FINAL - NOT FOR CONSTRUCTION

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577 AIRPORT BOULEVARD, SUITE 500
BURLINGAME, CALIFORNIA 94010-5306
(650) 292-9100 • FAX (650) 552-9012

SUB-SLAB DEPRESSURIZATION SYSTEM
5441 INTERNATIONAL BOULEVARD, OAKLAND, CALIFORNIA

MANUFACTURER'S INSTALLATION DETAILS FOR STEGO WRAP LINER

	DESCRIPTION	APPRV'D	DATE

DATE: OCT 2019
SCALE: AS SHOWN
DRAWN: ZCS/CCR
DESIGNED: ZCS/MJM
APPROVED:
JOB NO.: B70123.01

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
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SHEET NUMBER
SSD-M5
8 OF 10

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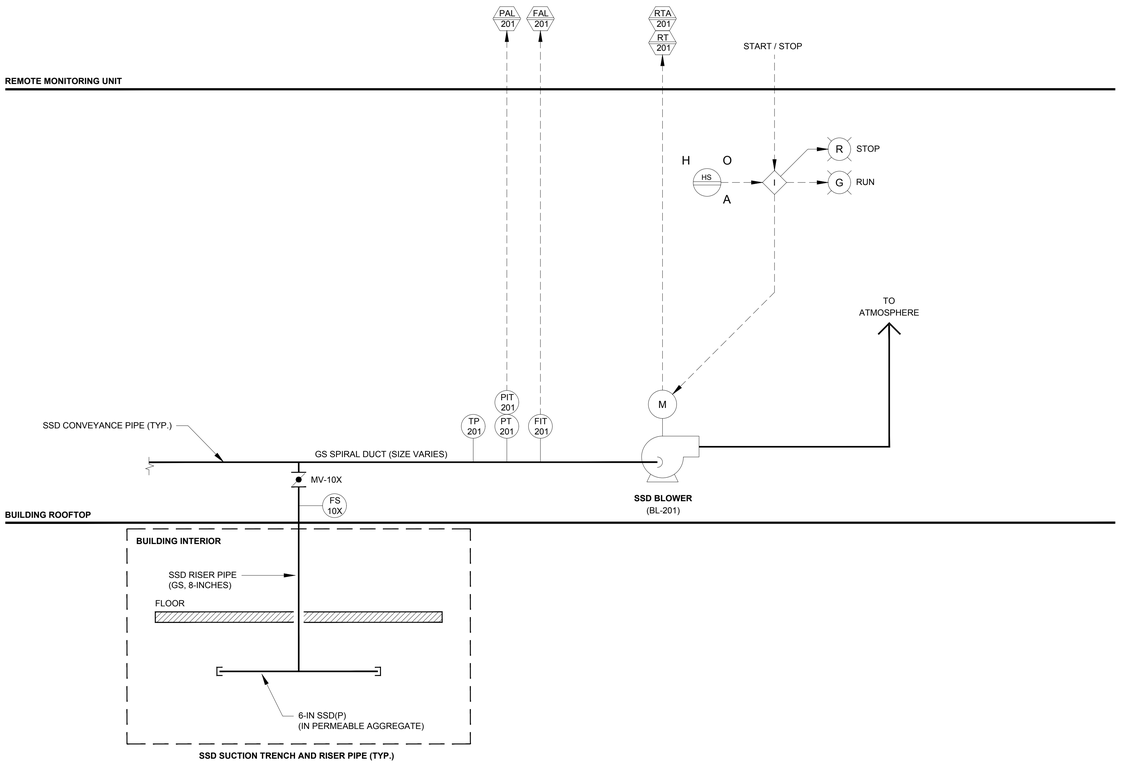

SSD SUCTION TRENCH AND RISER PIPE (TYP.)

REGISTERED PROFESSIONAL ENGINEER
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SUB-SLAB DEPRESSURIZATION SYSTEM
5441 INTERNATIONAL BOULEVARD, OAKLAND, CALIFORNIA

PIPING AND INSTRUMENTATION DIAGRAM (P&ID)

DATE:	AUG 2019		
SCALE:	AS SHOWN		
DRAWN:	ZCS/CCR		
DESIGNED:	ZCS/MJM		
APPROVED:		REV	DESCRIPTION	APPR'D	DATE
JOB NO.:	B70123.01				

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SHEET NUMBER
SSD-P1
9 OF 10

20190121.15262045 G:\EKI_CONSTRUCTION DWGS\B70123.01\2019-01\SSD-P1.dwg Model

EQUIPMENT AND INSTRUMENTATION LIST

ITEM NO.	NAME	QUANTITY	DESCRIPTION	MANUFACTERER / SUPPLIER (A),(B)	MODEL OR PART NO.	NOTES
MV-10X	BUTTERFLY VALVE IN SSD LATERAL PIPE	7	8-INCH FULL-PORT BUTTERFLY VALVE WITH LEVER LOCK HANDLE	VICTAULIC	VIC-300 MASTERSEAL SERIES 761	SS DISC FLUOROELASTOMER SEAT
FS-10X	FLOW SENSOR IN SSD LATERAL PIPES (AND PRESSURE/SAMPLING PORTS)	7	STAINLESS STEEL AVERAGING PITOT TUBE, 1/4-INCH DIAMETER. USED TO MEASURE FLOW RATE IN PIPE. LOW PRESSURE PORT ON PITOT TUBE WILL ALSO BE USED FOR MEASURING VACUUM IN PIPE AND FOR COLLECTING SAMPLES.	DWYER INSTRUMENTS	DS-300-8	PROVIDE A TAPERED HOSE BARB ON THE SHUT-OFF VALVE AT EACH PRESSURE PORT.
BL-201	SSD BLOWER	1	CENTRIFUGAL FAN, BACKWARD INCLINE, 4,000 CFM AT 8 IN-WC INLET SUCTION; 10 HP TEFC MOTOR, 220/440V, THREE PHASE.	CINCINNATI FAN	HDBI-150	DESIGN BASIS: 4,000 CFM AT 8 IN-WC INLET SUCTION.
	MOTOR STARTER AND CONTROLS	1	MOTOR STARTER, VARIABLE FREQUENCY DRIVE (VFD), AND INTEGRATED BLOWER CONTROL PANEL (NEMA 4) WITH MOTOR OVERLOAD RELAY, HAND-OFF-AUTO SWITCH.	CUSTOM, PROVIDED BY SSD CONTRACTOR OR BLOWER SUPPLIER	N/A	HAND: LOCAL ON/OFF OPERATION. AUTO: REMOTE MONITORING UNIT ON/OFF OPERATION.
FIT-201	FLOW INDICATING TRANSMITTER	1	HOT-WIRE ANEMOMETER WITH AIR VELOCITY LED DISPLAY AND TRANSDUCER, 20-INCH PROBE; LED DISPLAY; 4-20 MA OUTPUT; 0.5-INCH NPT MOUNTING CONNECTION.	DWYER INSTRUMENTS	641RM-12-LED	INSTALL IN TOP OF STRAIGHT RUN OF DUCT AT SSD BLOWER INFLUENT. SETUP FOR RANGE OF 0 TO 2,000 FPM. INSTALL LED DISPLAY AT BLOWER CONTROL PANEL. CONNECT OUTPUT TO REMOTE MONITORING UNIT FOR CONTINUOUS MONITORING.
FAL-201	FLOW ALARM LOW	1	ALARM IN REMOTE MONITORING UNIT IN THE EVENT FLOW VELOCITY DROPS TO SET POINT THAT WILL BE SET AS 50% OF THE ROUTINE OPERATING FLOW RATE MEASURED DURING STARTUP TESTING.	N/A	N/A	SET ALARM INITIALLY AT 500 FPM. SETUP REMOTE MONITORING UNIT TO NOTIFY SSD SYSTEM OPERATOR IF FLOW DROPS BELOW ALARM SET POINT.
PIT-201	PRESSURE INDICATING TRANSMITTER	1	MAGNEHELIC DIFFERENTIAL PRESSURE INDICATOR AND TRANSMITTER, 0-10 IN-WC RANGE, 4-20 MA OUTPUT.	DWYER INSTRUMENTS	605-10	INSTALL GAUGE IN SSD BLOWER CONTROL PANEL OR SEPARATE NEMA-4 WEATHERPROOF ENCLOSURE. GAUGE ELEVATED ABOVE PS-201 CONNECTION. CONNECT LOW PRESSURE PORT TO PT-201 WITH ¼-INCH SS INSTRUMENT TUBING; TUBING LOW POINT AT PT-201 CONNECTION. HIGH PRESSURE PORT OPEN TO AIR. CONNECT OUTPUT SIGNAL TO REMOTE MONITORING UNIT FOR REMOTE MONITORING.
PT-201	STATIC PRESSURE TIP	1	LOW RESISTANCE STATIC PRESSURE TIP	DWYER INSTRUMENTS	A-305	INSTALL IN TOP OF DUCT, UPSTREAM OF BLOWER INLET.
PAL-201	PRESSURE ALARM LOW	1	ALARM IN REMOTE MONITORING UNIT AND NOTIFY OPERATOR IN THE EVENT SUCTION DROPS BELOW SET POINT, INDICATING FAN FAILURE.	N/A	N/A	SET INITIALLY AT 2 IN-WC. SETUP REMOTE MONITORING UNIT TO NOTIFY SSD SYSTEM OPERATOR IF PRESSURE DROPS BELOW ALARM SET POINT
TP-201	SAMPLE PORT NEAR SSD BLOWER INTAKE	1	¼-INCH BRASS BALL VALVE	MCMASTER-CARR	47865K41	N/A
RT-201	RUN TIME	1	CUMULATIVE FAN RUN TIME, TO BE MONITORED BY REMOTE MONITORING UNIT BASED ON FAN MOTOR POWER DRAW.	N/A	N/A	MONITOR RUN-TIME AT REMOTE MONITORING UNIT.
RTA-201	RUN TIME ALARM	1	ALARM IN REMOTE MONITORING UNIT IN THE EVENT FAN POWER DRAW DROPS TO ZERO, INDICATING FAN MOTOR FAILURE.	N/A	N/A	REMOTE MONITORING UNIT TO BE SETUP TO NOTIFY OPERATOR IN THE EVENT FAN POWER DRAW DROPS TO ZERO, INDICATING FAN MOTOR FAILURE.
RM-201	REMOTE MONITORING UNIT	1	SENSAPHONE SENTINEL REMOTE MONITORING SYSTEM TRANSMITTING ALARMS AND REAL TIME MONITORING DATA FOR THE SSD SYSTEM.	SENSAPHONE	SENTINEL	REMOTE MONITORING UNIT TO BE SETUP TO NOTIFY OPERATOR IN THE EVENT FAN POWER DRAW DROPS TO ZERO, INDICATING FAN MOTOR FAILURE, OR REDUCTION IN SUCTION OR FLOWRATE BY 50%.

PIPING LIST

NAME	DESIGNATOR	NOMINAL SIZE	ID (INCHES)	OD (INCHES)	MATERIAL	MANUFACTURER / MODEL (A)	ADDITIONAL SPECIFICATIONS
SSD SUCTION TRENCH PIPE	6-IN SSD(P)	6-INCH	6	6.9	HDPE	ADVANCED DRAINAGE SYSTEMS N-12 ST WITH ADS FILTER SOCK	CORRUGATED HDPE, DUAL-WALL (SMOOTH INTERIOR), SOIL-TIGHT (ST) COUPLINGS AASHTO CLASS II PERFORATION, TYPE CD (SLOTTED), MINIMUM 1 SQUARE INCH OPEN AREA PER LINEAR FOOT. INCLUDE FILTER FABRIC WRAP (ADS FILTER SOCK OR EQUIVALENT)
SSD SUCTION TRENCH LATERAL	8-IN SSD(S)	8-INCH	8	9.1	HDPE	ADVANCED DRAINAGE SYSTEMS N-12 ST	CORRUGATED HDPE, DUAL-WALL (SMOOTH INTERIOR), SOIL-TIGHT (ST) COUPLINGS, SOLID PIPE (NO SLOTTING OR PERFORATIONS).
SSD RISER PIPE	8" GS	8-INCH	8.33	8.625	SCH. 10 GS	NOT SPECIFIED	GROOVED ENDS WITH VICTAULIC OR GRUVLOK COUPLERS AND FITTINGS. WELDED CONNECTIONS ACCEPTABLE AS ALTERNATIVE.
SSD HEADER DUCT (ROOFTOP)	10-IN SP	10-INCH	10	10.04	26 GAUGE GS OR SS	NOT SPECIFIED	N/A
	14-IN SP	14-INCH	14	14.04	26 GAUGE GS OR SS	NOT SPECIFIED	N/A
	16-IN SP	16-INCH	16	16.04	26 GAUGE GS OR SS	NOT SPECIFIED	N/A
	18-IN SP	18-INCH	18	18.04	26 GAUGE GS OR SS	NOT SPECIFIED	N/A
	20-IN SP	20-INCH	20	20.04	26 GAUGE GS OR SS	NOT SPECIFIED	N/A
SSD HEADER CONVEYANCE PIPE (UNDERGROUND)	18-IN SSD(S)	18-INCH	18	21	HDPE	ADVANCED DRAINAGE SYSTEMS N-12 WT	UNDERGROUND HEADER PIPE TO BE INSTALLED TO SUPPORT A POTENTIAL FUTURE EXTENSION TO A REMOTE BLOWER LOCATION AT GROUND LEVEL.
SSP TUBING	SSP-NT	1/4-INCH	0.17	0.25	NYLON	MCMASTER-CARR 5548K84 (SPECIFY LENGTH)	FOR SUB-SLAB PROBES COLOR: BLACK USE CONTINUOUS TUBING FOR EACH PROBE; NO COUPLINGS. ORDER IN 200-FOOT LENGTH OR AS NEEDED FOR CONTINUOUS TUBING FOR EACH PROBE.
SSP CASING	1-IN PVC	1-INCH	1.05	1.32	SCH. 40 PVC	NOT SPECIFIED	PROTECTIVE CASING FOR SSP TUBING
ELECTRICAL CONDUIT	2-IN PVC	2-INCH	2.067	2.357	SCH. 40 PVC	NOT SPECIFIED	OR PER PROJECT ELECTRICAL ENGINEER REQUIREMENTS

FITTINGS LIST

NAME	NOMINAL SIZE	ID (INCHES)	OD (INCHES)	MATERIAL	MANUFACTURER / MODEL (A)	ADDITIONAL SPECIFICATIONS
GS GROOVED PIPE COUPLERS AND FITTINGS	MATCH PIPE	MATCH PIPE	MATCH PIPE	ENAMEL COATED IRON	VICTAULIC OR GRUVLOK	ENAMEL-COATED DUCTILE IRON GRADE "T" NITRILE GASKETS CARBON-STEEL BOLTS
SADDLE TAP TEE	½-INCH NPT TEE FOR 8-INCH PIPE	8.625	N/A	EPOXY-COATED IRON TEE WITH BUNA-N GASKET	MCMASTER-CARR #4572K216	FOR INSTALLATION OF DWYER DS-300 FLOW SENSOR (FS-10X)
ADS INTERNAL END PLUG	6-INCH	N/A	N/A	HDPE	ADS; 0633AA	N/A
ADS DUAL WALL REDUCER	8-INCH TO 6-INCH	N/A	N/A	HDPE	ADS; 0871AN	N/A

NOTES:

(A) SUBSTITUTIONS OF SPECIFIED EQUIPMENT ARE NOT ALLOWED EXCEPT WHERE SPECIFICALLY INDICATED.
(B) OTHER SUPPLIERS MAY BE USED FOR EQUIVALENT MATERIALS.

ABBREVIATIONS:

CFM	= CUBIC FEET PER MINUTE
FPM	= FEET PER MINUTE
GS	= GALVANIZED STEEL
IN-WC	= INCHES WATER COLUMN
LED	= LIGHT EMITTING DIODE
MA	= MILLIAMP
NPT	= NATIONAL PIPE THREAD
NT	= NYLON TUBING
PVC	= POLYVINYL CHLORIDE
SCFM	= STANDARD CUBIC FEET PER MINUTE
SP	= SPIRAL DUCT
SS	= STAINLESS STEEL
SSD	= SUB-SLAB DEPRESSURIZATION
SSP	= SUB-SLAB PROBE
TEFC	= TOTALLY ENCLOSED FAN COOLED
VFD	= VARIABLE FREQUENCY DRIVE

REGISTERED PROFESSIONAL ENGINEER
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SUB-SLAB DEPRESSURIZATION SYSTEM
5441 INTERNATIONAL BOULEVARD, OAKLAND, CALIFORNIA

EQUIPMENT, PIPING, AND INSTRUMENTATION LISTS

REV	DESCRIPTION	APPRD	DATE

DATE: AUG 2019
SCALE: AS SHOWN
DRAWN: ZCS/CCR
DESIGNED: ZCS/MJM
APPROVED:
JOB NO.: B70123.01

VERIFY SCALE
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SSD-T1
10 OF 10

20190124, 163539 G:\EKI_CONSTRUCTION DWGS\B70123.01\2019-01_SSD-T1-zcs.dwg Model

Attachment E-4

SSD Blower and Carbon Treatment Vessels
for Contingent Emissions Control

FAN SELECTION And PERFORMANCE

Your Representative:
Shane Parks
Air Handling Equipment, Inc.
P.O. BOX 548
Suisun CA 94585
707-425-7305 Phone
707-425-7236 Fax
ahefan2@sbcglobal.net

Friday, July 26, 2019

Job Name: EKI Environment & Water, INC.
Reference: Quote: 399327

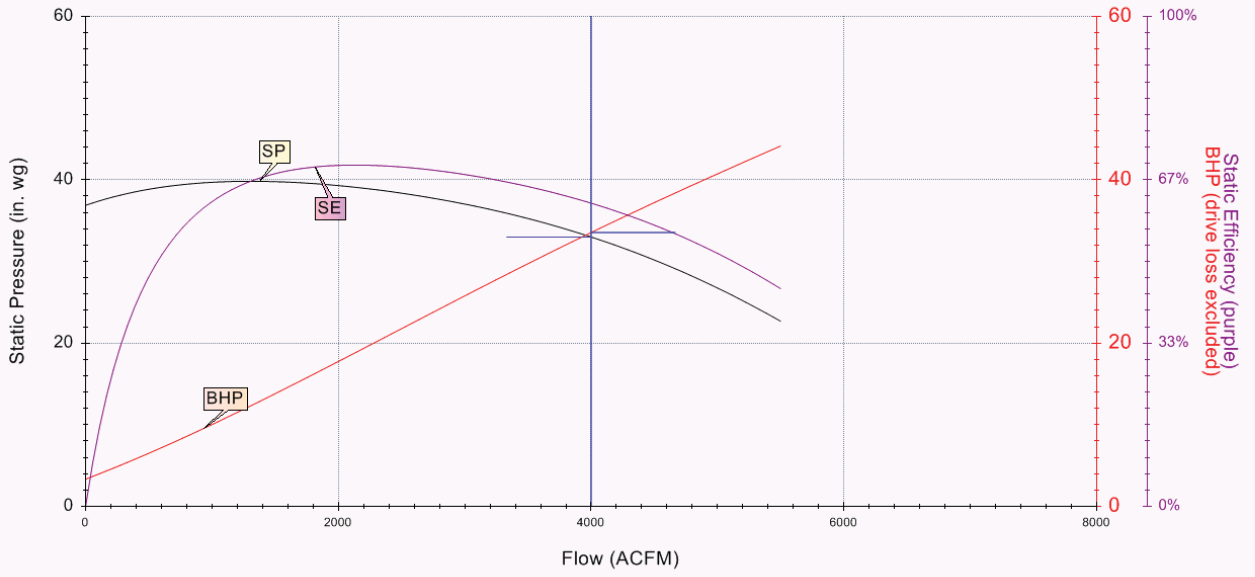
Operating Requirements

Volume, ACFM	4,000
Static Pressure, in. wg	33.0
Density, lb./ft.³	0.081
Operating Temperature, °F	70
AMCA Arrangement No.	4
Motor Frequency, Hz	60
Start-Up Temperature, °F	70

Fan Selection and Specifications

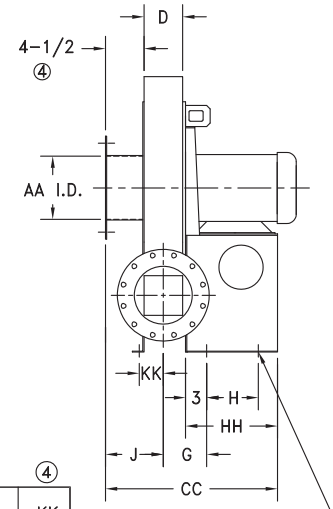
Model	HP-12F23		
Fan RPM	3,253		
Wheel Description	23 X 6		
Wheel Width, %	100%		
Wheel Diameter, in.	23.00		
Inlet Diameter, in.	10.00		
Outlet Velocity, ft./min.	5,093		
Fan BHP	33.6	Suggested Motor HP:	40.0
Static Efficiency, %	61.9%		
Cold Start BHP	33.6		
Construction Class	N/A		

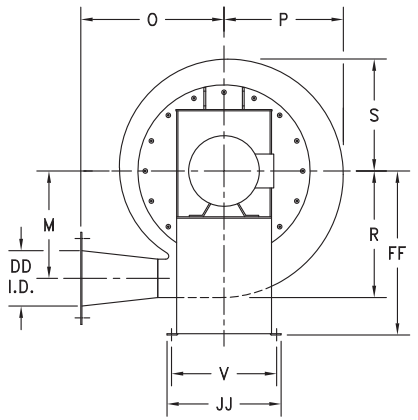
Cincinnati Fan Model HP-12F23 with 23 X 6 Wheel (Full Width) @ 3,253 RPM
Rating Point: 4,000 ACFM @ 33.0 in. wg SP, 0.081 lb./ft.³ Density, 33.6 BHP



CFSWin Version: 8.5.7009.24787 Database Version: 8.5.4

Cincinnati Fan Selector - © 2017 by Cincinnati Fan and Ventilator Co. All Rights Reserved





CW BOTTOM HORIZONTAL DISCHARGE SHOWN

	MODEL *	MOTOR FRAME	D	④ G	H	④ J	M	O	P	R	S	V	AA	⑤ CC	DD	FF	HH	JJ	④ KK
	HP-4A	143T-184T	4	5	6 3/4	6 1/2	11 3/4	18	13 9/16	14 7/16	12 3/4	14 3/4	6	21 1/4	4	21	12 3/4	16 3/4	3
	HP-4C	143T-215T			9		14 13/16	17 15/16	16 7/16	17 7/16	15 7/16	17		23 1/2		25	15	19	
		254T-256T			14									28 1/2			20		
	HP-6B	143T-184T	6 3/8	6 3/16	6 3/4	7 11/16	11 3/4	18	13 9/16	14 7/16	12 3/4	14 3/4	8	23 5/8	6	21	12 3/4	16 3/4	4 3/16
		213T-215T			12 1/2									29 3/8			18 1/2		
	HP-6C	143T-215T	4	5	9	6 1/2	14 13/16	17 15/16	16 7/16	17 7/16	15 7/16	17	6	23 1/2		25	15	19	3
		254T-256T			14									28 1/2			20		
	HP-6E	184T-256T	5 3/8	5 11/16	13	7 3/16	17 7/16	19 3/16	19 3/8	20 9/16	18 3/16	19	8	28 7/8		29	19	21	3 11/16
	HP-8B	143T-184T	6 3/8	6 3/16	6 3/4	7 11/16	11 3/4	19 13/16	13 9/16	14 7/16	12 3/4	14 3/4		23 5/8	8	21	12 3/4	16 3/4	4 3/16
		213T-256T			12 1/2									29 3/8			18 1/2		
	HP-8D	182T-215T			9		14 13/16	19 3/4	16 7/16	17 7/16	15 7/16	17		25 7/8		25	15	19	
		254T-286TS			14									30 7/8			20		
	HP-8E	184T-256T	5 3/8	5 11/16	13	7 3/16	17 7/16	21	19 3/8	20 9/16	18 3/16	19		28 7/8		29	19	21	3 11/16
		284TS-324TS			15 1/2									31 3/8			21 1/2		
	HP-10D	184T-215T	6 3/8	6 3/16	9	7 11/16	14 13/16	21 3/4	16 7/16	17 7/16	15 7/16	17		25 7/8	10	25	15	19	4 3/16
		254T-286TS			14									30 7/8			20		
	HP-10F	215T-256T	7 3/8	6 11/16	13	8 3/16	17 7/16	23	19 3/8	20 9/16	18 3/16	19	10	33 3/8		29	21 1/2	21	4 11/16
		284TS-326TS			15 1/2									39 7/8			28		
		364TS-365TS			22														
	HP-12F	182T-256T			13									30 7/8	12		19		
		284TS-326TS			15 1/2									33 3/8			21 1/2		
		364TS-365TS			22									39 7/8			28		

* COMPLETE MODEL NUMBER INCLUDES WHEEL DIA.

NOTES:
1. TEFLON SHAFT SEAL IS STANDARD.
2. MOTOR MAY EXTEND PAST END OF BASE.
3. FAN HOUSINGS ARE REVERSIBLE AND ROTATABLE IN 45° INCREMENTS.
4. IF AMCA "C" ADD 1/8 INCH TO DIMENSIONS.
5. IF AMCA "C" ADD 1/4 INCH TO DIMENSION.
6. SEE DRAWING A27338 FOR FLANGE DETAILS.
7. DISCHARGE FLANGE NOT AVAILABLE WITH DOWNBLAST DISCHARGE ON FOLLOWING MODELS: HP-8B, HP-10D, & HP-12F.

cincinnati fan
7697 SNIDER ROAD MASON, OHIO 45040

TOLERANCES:
ANGLES: ± 1°
FRACTIONS ±1/8
ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED

SUPERSEDES:

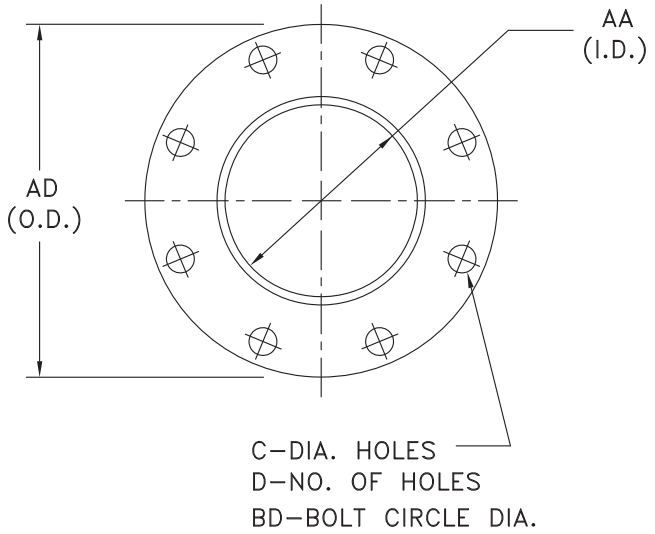
CERTIFIED DRAWING

TITLE HP BLOWERS, SERIES II, ARR. 4 WITH INLET PLATE EXTENDED TO GROUND

A

DRAWING NO. HP4G

REV. 1

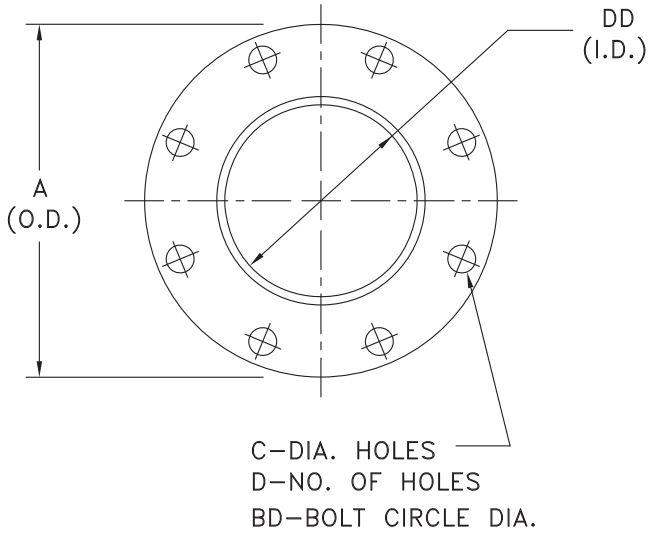


INLET FLANGE

☐ OPTIONAL HOLE PATTERN:
FLANGE HOLES ON
MAJOR CENTERLINES

NOTE

STANDARD HOLE PATTERN
IS FOR FLANGE HOLES TO
STRADDLE CENTERLINES



DISCHARGE FLANGE

☐ OPTIONAL HOLE PATTERN:
FLANGE HOLES ON
MAJOR CENTERLINES

	DIMENSIONS					
MODEL	INLET SIZE	AD O.D.	AA I.D.	BD B.C.	C DIA.	D
HP–4A,4C,6C	6	11	6	9–1/2	7/8	8
HP–6B,6E,8B 8D,8E,10D	8	13–1/2	8	11–3/4	7/8	8
HP–10F,12F	10	16	10	14–1/4	1	12
HP–12G	14	21	14	18–3/4	1–1/8	12

	DIMENSIONS					
MODEL	DISCHARGE SIZE	A O.D.	DD I.D.	BD B.C.	C DIA.	D
HP–4A,4C	4	9	4	7–1/2	3/4	8
HP–6B,6C,6E	6	11	6	9–1/2	7/8	8
HP–8B,8D,8E	8	13–1/2	8	11–3/4	7/8	8
HP–10D,10F	10	16	10	14–1/4	1	12
HP–12F,12G	12	19	12	17	1	12

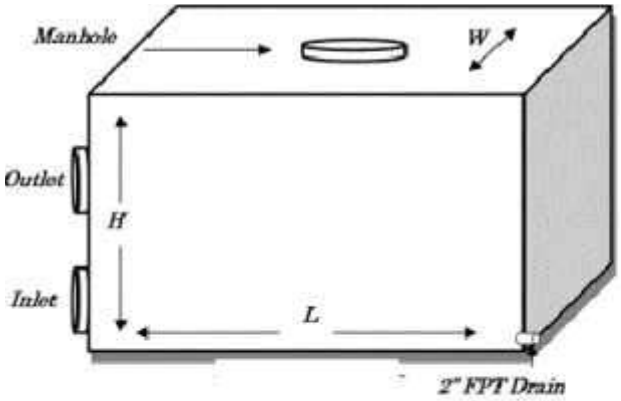
CSI CARBON SUPPLY INC

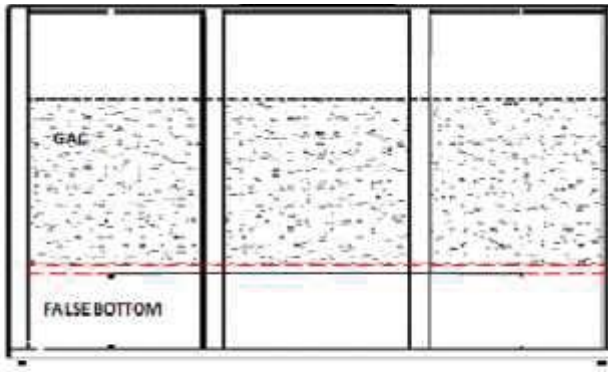
INFORMATION SHEET

CSI 2013

CSI VFB Series Adsorption Vessels

CSI VFB series adsorption vessels are designed to treat gas streams in a wide variety of adsorption applications. The box-style design is ideal for applications near atmospheric conditions. Standard Features include steel construction with epoxy internal coating, efficient internal distributor array, forklift skid, and lifting eyes. A wide variety of options and contact media are available. Lease pricing is available upon request.





Model Number	VF 500	VF 1000	VF 2000	VF 3000	VF 7000	VF 10000
Dimensions (L/W/H)	3'/3'/4'8"	4'/4'/4'8"	4'/4'/6'8"	4'/6'/6'8"	8'/8'/6'8"	10'/7'3"/8'
Process Connection	4" FLNG	6" FLNG	6" FLNG	8" FLNG	10" FLNG	16" FLNG
Typical GAC Fill	500 lb	1,000 lb	2,000 lb	3,000 lb	7,000 lb	10,000 lb
Shipping Weight (empty)	900 lb	1,450 lb	2,650 lb	4,500 lb	7,650 lb	14,500 lb
Operational Weight**	1,650 lb	2,950 lb	5,650 lb	9,000 lb	15,150 lb	29,500 lb
Bed Cross Sectional Area	9 ft^2	16 ft^2	16 ft^2	24 ft^2	60 ft^2	80 ft^2
Available Bed Volume	18 ft^3	36 ft^3	72 ft^3	107 ft^3	175 ft^3	360 ft^3
Minimum Flowrate*	50 cfm	320 cfm	320 cfm	400 cfm	960 cfm	1600 cfm
MaximumFlowrate*	180 cfm	1000 cfm	1300 cfm	1500 cfm	3000 cfm	6000 cfm

* Flow rate recommendations may vary with treatment goals. Flow rates listed based on linear velocity guidelines of 20 to 60 ft/min.

** Operational weight is estimated based on 50% loading capacity of granular activated carbon; loading capacities may vary.

Carbon Supply Inc. *8429 S. Eastern Avenue Bell Gardens CA, USA*
Telephone (562) 806-0300 FAX (562)806-0302
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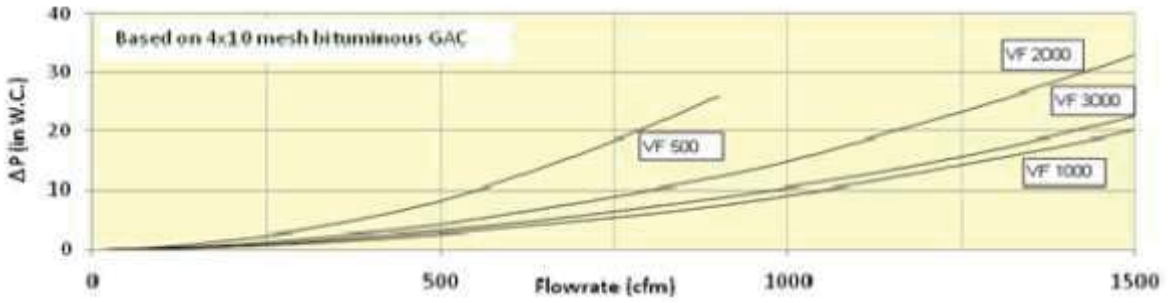
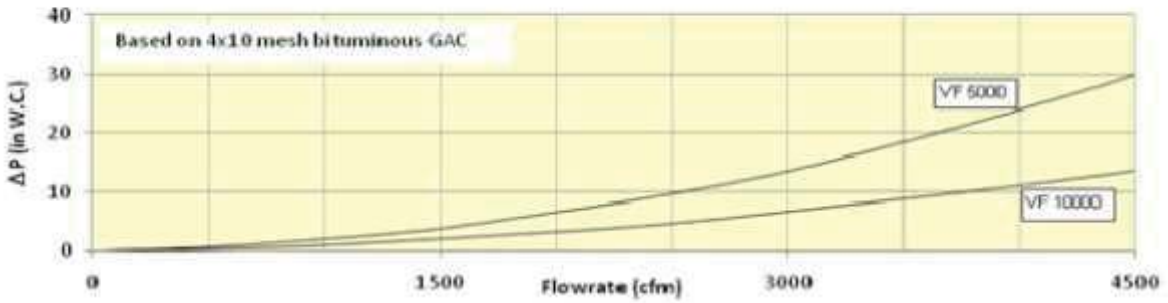
INFORMATION SHEET

CSI
Dec 2008

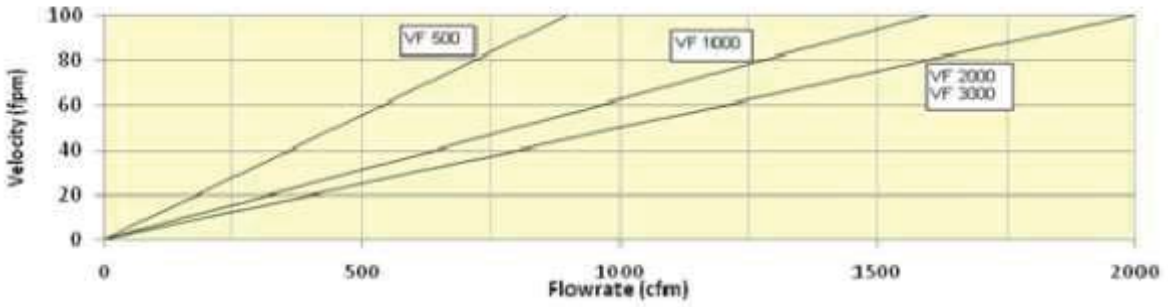
Pressure Drop Curves
VF 500 thru VF 3000



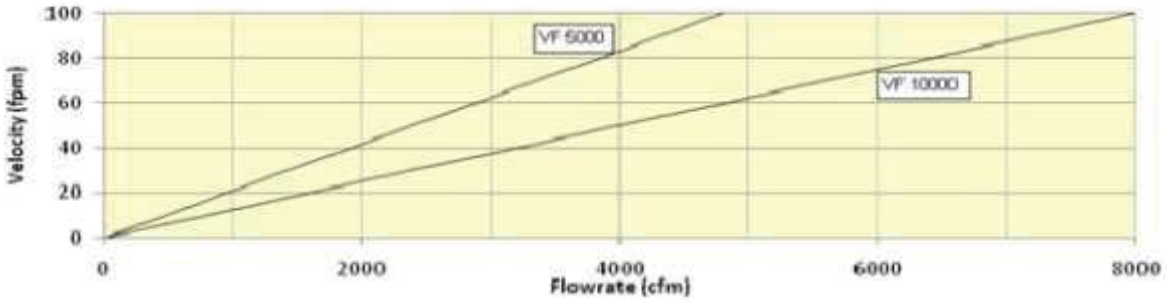
Pressure Drop Curves
VF 5000 thru VF 10000



Bed Velocity Chart
VF 500 thru VF 3000



Bed Velocity Chart
VF 5000 thru VF 10000



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APPENDIX F

GROUNDWATER REMEDY MODIFICATIONS AND OFF-SITE VAPOR INTRUSION ASSESSMENT

(WOOD ON BEHALF OF GE)

5441 International Boulevard
Oakland, California

Draft Final - October 2019

(EKI B70123.01)

APPENDIX F
GROUNDWATER REMEDY MODIFICATIONS AND OFF-SITE VAPOR INTRUSION ASSESSMENT

5441 International Boulevard
Oakland, California

Prepared for:

General Electric Company

Prepared by:

Wood Environment & Infrastructure Solutions, Inc.
180 Grand Avenue, Suite 1100
Oakland, California 94612

October 2019

Project No. WDC7012.200.201

APPENDIX F
GROUNDWATER REMEDY MODIFICATIONS
AND OFF-SITE VAPOR INTRUSION ASSESSMENT
5441 International Boulevard
Oakland, California

October 2, 2019
Project WDC7012.200.201

This report was prepared by the staff of Wood Environment & Infrastructure Solutions, Inc. under the supervision of the Engineer(s) and/or Geologist(s) whose seal(s) and signature(s) appear hereon.

The findings, recommendations, specifications, or professional opinions are presented within the limits described by the client, in accordance with generally accepted professional engineering and geologic practice. No warranty is expressed or implied.



Frank S. Szerdy, PhD, PE
Principal Engineer

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ATTACHMENT

Attachment 1 Modeling Parameters and Assumptions

ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
µg/L	microgram(s) per liter
1,1-DCE	1,1-dichloroethene
1,2-DCA	1,2-dichloroethane
BAAQMD	Bay Area Air Quality Management District
Bridge	Bridge Development Partners
bbs	below bottom of concrete slab and base rock, if present
feet bgs	feet below ground surface
BS	blank spike
BSD	blank spike duplicate
cis-1,2-DCE	cis-1,2-dichloroethene
COCs	constituents of concern
DO	dissolved oxygen
EBMUD	East Bay Municipal Utility District
EKI	EKI Environmental & Water, Inc.
GE	General Electric Company
Geosyntec	Geosyntec Consultants, Inc.
GETS	Groundwater Extraction and Treatment System
gpm	gallons per minute
LCS	laboratory control samples
LCSD	laboratory control sample duplicates
LGACE	liquid-phase granular activated carbon effluent
MCL	Maximum Contaminant Level
mg/L	milligram(s) per liter
MNA	monitored natural attenuation
MS	matrix spike
MSD	matrix spike duplicate
OMM	Operation, Maintenance, and Monitoring
ORP	oxidation reduction potential
PCB	polychlorinated biphenyls
PCE	tetrachloroethene
RL	reporting limit
t-1,2-DCE	trans-1,2-dichloroethene
TCE	trichloroethene
TOC	total organic carbon
TPHg	total petroleum hydrocarbons, gasoline range
U. S. EPA	United States Environmental Protection Agency
VOCs	volatile organic compounds
Wood	Wood Environment & Infrastructure Solutions, Inc. (formerly known as Amec Foster Wheeler Environment & Infrastructure, Inc.)

APPENDIX F
GROUNDWATER REMEDY MODIFICATIONS AND OFF-SITE VAPOR INTRUSION ASSESSMENT

5441 International Boulevard
Oakland, California

1.0 INTRODUCTION

This appendix, prepared by Wood Environment & Infrastructure Solutions, Inc. (Wood) on behalf of General Electric Company (GE), presents the proposed modifications to the approved remedy for the Oakland Service Center located at 5441 International Boulevard, Oakland, California (the Site, Figure F-1). The Site consists of approximately 24 acres facing International Boulevard between 54th Avenue and 57th Avenue. The 24-acre Site is covered by buildings, a 4-inch or 6-inch asphalt cap, and a bentonite-gravel cap, as shown on Figure F-2a. The Site currently has a full perimeter fence and access is controlled 24 hours per day by an on-site security guard. Aside from the security guard, the Site is uninhabited and unused for any purpose at this time.

The Site is subject to Consent Order #HAS 96/97-061 (Order) dated June 25, 1997 and a Covenant of Deed Restriction (Deed Restriction) dated April 19, 1993, which is on file with DTSC and Alameda County. The Deed Restriction requires the existing asphalt and bentonite-soil cap to be maintained in place, prohibits penetration of the cap without agency approval, and restricts the property to commercial or industrial uses.

GE has entered into a Purchase Agreement with Bridge Acquisitions, LLC (Bridge). Bridge's proposed redevelopment plan includes constructing an approximate 530,000-square foot (sf) warehouse at the location shown on Figure F-2a and paving most of the remainder of the Site. This redevelopment plan is consistent with the remedy described in the Remedial Action Plan (Geosyntec Consultants, Inc. [Geosyntec], 2011), which includes capping the Site so that soil containing residual PCB concentrations is not exposed to potential receptors or the elements. This redevelopment plan is also consistent with the Site Deed Restriction that requires the Site be limited to commercial or industrial uses.

1.1 DESCRIPTION OF CURRENT REMEDY

The groundwater remedy was implemented between August 2013 and March 2015 in accordance with the Final Remedial Action Plan (RAP; Geosyntec, 2011) and Remedial Design and Implementation Plan (RDIP; Geosyntec, 2012). The RAP and RDIP were approved by the California Department of Toxic Substances Control (DTSC) on June 30, 2011 and May 23, 2013, respectively. On April 10, 2013, the RAP, Revised Work Plan for Additional Soil Investigation and Soil Removal at Pepsico Site (Geosyntec, 2011) (which described additional soil investigation and removal at the adjacent PepsiCo property), and RDIP were submitted to the Environmental Protection Agency (EPA) as part of a Toxic Substance Control Act (TSCA) application for a risk-based cleanup (GE, 2013). EPA approved the TSCA application on May 23, 2013 (EPA, 2013).

The groundwater remedy includes extraction of groundwater at the western (downgradient) property boundary to contain affected groundwater on Site and extraction in areas where elevated volatile organic compounds (VOCs) have been detected in groundwater at concentrations exceeding 5 milligrams per liter (mg/L).

In 2009, soil gas monitoring conducted onsite near the fence line adjacent to residential properties to the northwest detected VOCs associated with chemicals of concern in groundwater. Soil gas testing was also conducted at an adjacent residence in 2009. The results did not contain site-related VOCs above detection limits and DTSC did not require any further action.

Since startup in March 2015 through September 2018, over 18 million gallons of groundwater have been extracted and approximately 444 pounds of VOCs have been removed. GE has completed 11 sampling events to confirm containment and assessment of the effectiveness of the remedy. The groundwater treatment has proven effective in removing VOCs and discharge has been in compliance with the East Bay Municipal District (EBMUD) discharge permit and the Bay Area Air Quality Management District (BAAQMD) air discharge permit.

In 2018, DTSC performed a 5-year review and in August issued approval of the Five-Year Status Report (Wood, 2018a) confirming that the remedy is effective and protective.

1.2 PROPOSED MODIFICATIONS TO THE REMEDY

To facilitate the proposed redevelopment and maintain the effectiveness of the remedy, modifications are proposed in accordance with the requirements in Section 4.15 of the Order and the Deed Restriction. The proposed modifications described in this appendix include:

- relocation of the groundwater extraction and treatment system (GETS);
- destruction of monitoring wells not used as part of the current monitoring program and wells no longer needed to monitor the plume;
- installation of replacement monitoring wells;
- groundwater sampling and analysis after the GETS is shut down for redevelopment of the property and after the new groundwater treatment system is brought on line; and
- preliminary design of the relocated groundwater treatment system.

1.3 PROPOSED RESIDENTIAL SOIL GAS INVESTIGATION

In 2009, off-site soil gas monitoring from a residential property adjacent to the northern property boundary did not identify site-related compounds in soil gas that would indicate a risk to receptors. As discussed in Sections 2.1.2.1 and 4.2 and shown on Figure 4 of the Final RDIP Addendum, to further mitigate VOC impacts on site, soil from an area with elevated VOCs located between Buildings 1 and 4 near the northern property boundary will be excavated and disposed of off site. The excavation will encompass a 40-foot by 45-foot area to a depth of 20 feet and will include removal of soil from sample location 5GP5 where TCE at 21 mg/kg was previously detected at 13 feet below ground surface (feet bgs) and from sample locations where the highest soil gas concentrations were observed. Following excavation, temporary soil gas probes will be installed and two rounds of soil gas sampling will be conducted to assess soil gas conditions post soil removal.

If the soil gas results from the two rounds of sampling from the point closest to the property boundary are above applicable screening levels, then following placement of the cap, GE will attempt to collect soil gas samples from off site. Consistent with previous efforts, GE will request access to three adjacent residential properties, including the property that was sampled in 2009 and the two properties immediately north of the excavation area (see Figure 4) and will collect soil gas samples once access is granted. GE will attempt to collect soil gas samples from a depth of 5 feet bgs depending upon field conditions and the depth of

groundwater. Samples will be sampled and analyzed for VOCs as described in Appendix N – Field Sampling and Laboratory Analysis Plan with Addendum. In accordance with DTSC/Water Board guidance (DTSC/Water Board, 2015), two rounds of soil gas sampling will be conducted at least three months apart to account for seasonal variability. If the soil gas results exceed applicable screening levels, then a monitoring plan will be developed to collect indoor air samples.

As a proactive contingency measure, a permeable material will be used to backfill the north perimeter of the VOC hot spot excavation to the subgrade elevation to disrupt a potential vapor migration pathway from the site to adjacent off-site residences.

1.4 PROPOSED COMMERCIAL SOIL GAS INVESTIGATION

Regarding the inhalation pathway for commercial/industrial workers to the south of the Site, in 2009 GE conducted a soil gas assessment along the west side of San Leandro Boulevard, adjacent to the property at 5401 San Leandro Boulevard. Based on the DTSC HERO Note 3 and USEPA regional screening levels (RSLs) at that time, no inhalation risk was identified for commercial/industrial workers and DTSC required no further action.

Due to the recent changes in vapor intrusion (VI) protocols and RSLs, GE plans to include further evaluation of the commercial/industrial VI pathway south of the Site. GE will update the September 2008 Work Plan to include current guidance and protocols. Soil gas samples will be collected from approximately the same three locations along the west side of San Leandro Boulevard that were sampled in 2009. If the analytical results from these samples exceed applicable screening levels, then GE will collect soil gas samples from a minimum of three locations on the property at 5401 San Leandro Boulevard. Consistent with previous efforts, GE will request access from the City for sampling along San Leandro Boulevard and, if necessary, from the property owner and will collect soil gas samples once access is granted. If commercial soil gas results exceed applicable screening levels, then a monitoring plan will be developed to collect indoor air samples.

In 2009, GE made two attempts to collect soil gas samples in January. However, sampling was unsuccessful due to the shallow water table and sampling was postponed until July after temporal high groundwater water levels had dropped. To increase the likelihood that

sampling will be successful, GE proposes to again conduct the sampling in July 2020 and will submit a work plan addendum by March 2020 for DTSC's review and approval.

2.0 RELOCATION OF GROUNDWATER EXTRACTION AND TREATMENT SYSTEM

The proposed redevelopment conflicts with the location of the following elements of the GETS (Figure F-2a):

- Treatment compound;
- Groundwater conveyance, electrical, and controls lines;
- Electrical power drop;
- Vapor discharge line; and
- Extraction wells EW-5, EW-6, and EW-7.

The GETS treatment compound will be relocated southwest of 12th Street to avoid conflict with the proposed warehouse footprint and drive lanes. The existing GETS treatment compound and proposed relocated location are shown on Figure F-2a. The GETS will be dismantled prior to property redevelopment activities and reinstalled in coordination with redevelopment activities. The majority of existing equipment will be used where feasible; the treatment plant relocation design, including proposed modifications, is described in Section 7.0.

Three extraction wells (EW-1 through EW-3) located on the western (downgradient) property boundary extract affected groundwater from the A-zone (generally 15 to 35 feet depth) and B-zone (35 to 75 feet depth) to contain affected groundwater on Site. Five extraction wells (EW-4 through EW-8) are located within the central portion of the Site near VOC "hot spots." Figures F-3 through F-6 show the potentiometric surface for the A-, B-, C- (70 to 90 feet depth), and D-zones (90 to 120 feet depth) in September 2018. These figures show that groundwater in the A- and B-zones is being captured by the extraction well network, while groundwater in the C- and D-zones flows under natural conditions.

Depth to groundwater and concentrations of COCs are currently monitored in 26 and 25 on-site monitoring wells, respectively, including extraction wells and performance monitoring wells screened in the A-, B-, C-, and D-zones. Also, off-site monitoring is conducted in 26 wells, but no changes are proposed to the off-site wells.

Eight of these on-site monitoring wells and two of the extraction wells are within the footprint of the proposed warehouse, and one extraction well (EW-7) and two monitoring wells (W-741B and W-529A) are located in conflict with anticipated truck court operations as shown on Figure F-2a. GE and Bridge request DTSC approval to relocate eight monitoring wells and one extraction well (EW-7) and to destroy two monitoring wells and two extraction wells, EW-5 and EW-6. All of these wells are included in Table F-1, which identifies wells proposed for relocation and destruction. The current and proposed locations of these wells are shown on Figure F-2a.

Although prior monitoring has not indicated that impacted groundwater is migrating onsite from upgradient, to confirm if any changes occur in the future, GE plans to install two new upgradient monitoring wells, one in the A-zone and one in the B-zone, as shown on Figure F-2b. In addition, GE plans to monitor groundwater in existing wells W-758A and W-758B located near the upgradient property boundary.

2.1 WELLS PROPOSED FOR RELOCATION

Seven performance monitoring wells (W-004A, W-529A, W-004B, GW-1B, GW-2B, W741-B, and GW-1C), one deep monitoring well (GW-4D), and extraction well EW-7 located within or near the boundary of the proposed warehouse footprint are proposed to be relocated (i.e., destroyed and reinstalled) outside of and adjacent to the warehouse (Table F-1 and Figure F-2a). The furthest distance any of these wells will be moved is approximately 85 feet from wells W-529A and W-741B to their corresponding replacement wells, although the replacement well locations may be closer to the original wells depending on final building plans. Because these distances are short compared to the extent of VOC-affected groundwater, there should be no appreciable difference in the evaluation of groundwater elevations or concentrations of VOCs measured in the relocated wells. The groundwater elevation and analytical data collected from the replacement wells will be of sufficient quality to monitor remedy performance.

If Site redevelopment activities, including grading or soil excavation, interfere with extraction and/or monitoring wells not proposed for relocation or destruction, these wells may require destruction and reinstallation after redevelopment is completed.

2.2 WELLS PROPOSED FOR DESTRUCTION

Two extraction wells and two monitoring wells located under the proposed building footprint are proposed for destruction and not relocation.

2.2.1 Extraction Well EW-5

Extraction well EW-5 is located near the center of the proposed warehouse footprint (Figure F-2a). It is screened from 13 to 16 feet depth, at the top of the A-zone. EW-5 was installed to target areas where total VOC concentrations in localized groundwater exceeded 5 mg/L. Since 2015, concentrations of total VOCs in EW-5 and other monitoring wells in the EW-5 cluster have remained below 5 mg/L (Wood, 2018b). In September 2018, total VOCs were 1.623 mg/L in EW-5, 0.117 mg/L in W-614A, and 0.540 mg/L in GW-4B. Additionally, due to low water levels and the shallow screen depth, almost no water has been pumped from EW-5 since January 2016; for example, during 2018 the pump in EW-5 ran for approximately 14 hours and pumped a total of approximately 6 to 12 gallons of groundwater. Because this well is no longer removing a significant mass of VOCs from groundwater and has no impact on containment of the affected groundwater, we recommend that this well be destroyed and not relocated.

2.2.2 Extraction Well EW-6 and Associated Monitoring Wells

Extraction well EW-6 was installed to target the area where total VOC concentrations in localized groundwater exceeded 5 mg/L near the area of limited excavation that removed high concentrations of VOCs in soil in 2013 (Geosyntec, 2015a) (Figure F-2a). Since 2015, concentrations of total VOCs in EW-6 and other monitoring wells in the EW-6 cluster (i.e., W-614A, GW-4B) have remained below 5 mg/L (Wood, 2018b). In September 2018, total VOCs were 1.850 mg/L in EW-6, 0.117 mg/L in W-614A, and 0.540 mg/L in GW-4B. During 2018, EW-6 was pumped at an average flow rate of 1.6 gpm, removing approximately 12.8 pounds of total VOCs.

An existing groundwater flow model was used to evaluate the effect of moving or removing extraction well EW-6. The model structure is described in detail in the Fourth Quarter 2015 and Annual Monitoring Report (Geosyntec, 2016). The model simulates steady-state groundwater flow in the A-Zone (Model Layer 1) and the B-Zone (Model Layer 2). Head along the up- and down-gradient model boundaries was specified to match the groundwater elevations observed at the Site in March 2018. Pumping from the extraction wells was set to the average observed flowrates over the period October 2017 to March 2018; when simulating removal of EW-6, its flowrate was set to zero.

Groundwater "particle-tracking" was used to determine the extent of hydraulic capture provided by groundwater extraction. Figures F-7 and F-8 (i.e. Figures 9 and 10 from the 5-year status report) show particle tracks under current conditions. The area covered by particle tracks that end at an extraction well represents the area captured by that well (areas around extraction wells are blank because of modeling discretization). As shown on Figures F-7 and F-8, and as reported in the Five-Year Status Report (Wood, 2018a), the current extraction well system is capturing all groundwater in the A- and B-zones at the Site, and is creating a combined capture area that extends beyond the boundaries of the Site. This result is consistent with potentiometric surfaces estimated for the A- and B-zones in September 2018 and shown in Figures F-3 and F-4.

Figures F-9 and F-10 show the particle tracks in the A- and B-zone with EW-6 removed from the extraction system and Figures F-11 and F-12 show particle tracks in the A- and B-zone with EW-6 moved south of the building footprint. These figures demonstrate that the capture zone provided by groundwater extraction is maintained and not materially changed in the A- or B-zone by either removal or relocation of EW-6.

Total VOC concentrations in groundwater currently extracted from EW-6 are now significantly less than 5 mg/L and this well is no longer removing a significant mass of VOCs from groundwater. Groundwater modeling shows that removal of EW-6 from the groundwater extraction system will not materially affect capture of Site groundwater. Therefore, we recommend that extraction well EW-6, and wells W-614A and GW-4B that monitor its performance, be destroyed and not relocated.

2.3 UPGRADIENT MONITORING WELLS

GE plans to retain monitoring well pair W-758A and W-758B as upgradient monitoring locations, and install two new upgradient monitoring wells, one in the A Zone and one in the B Zone in the approximate locations shown on Figure 2b.

3.0 ADDITIONAL MONITORING WELLS PROPOSED FOR DESTRUCTION

There are 30 wells on the Site (Table F-1) that were installed during the investigation phase to characterize and assess groundwater conditions and are not part of the approved monitoring well network included in the Operation, Maintenance, and Monitoring (OMM) Plan (Appendix F of the Remedial Action Implementation Completion Report (Geosyntec, 2015)). Fifteen of these

monitoring wells (W-022A, W-035A, W-035B, W-613A, W-615A, W-621A, W-625B, W-733A, W-734A, W-757A, W-757B, W-792B, W-793C, W-801B, and W-802B) are located within the proposed warehouse footprint (Figure F-2a) and GE plans to destroy them. In addition, GE plans to destroy 14 remaining wells that are not part of the monitoring well network and not located in the warehouse footprint. Many of these wells are located in the truck load dock area, which presents an access risk. Also, many of these wells are located in areas where stormwater will pond during significant rain events and removing the wells will eliminate potential for stormwater infiltration. In addition, these wells could act as vertical conduits and increase the potential for cross contamination in the future. Table F-1 identifies which wells are proposed for destruction. Well destruction activities will be described in the completion report submitted to DTSC (Section 8.0).

Following destruction of these wells and the four wells mentioned above (EW-5, EW-6, W-614A, and GW-4B), 26 wells will remain in the on-site monitoring network. Figure 2b shows the final monitoring well network that will be in place following Site redevelopment and after well destruction and replacement. This network of wells has proven to be effective to date and is adequate for evaluating the groundwater conditions and remediation progress at the Site.

Wells W-731A and W-805B that are not currently included in the monitoring network will be retained, redeveloped and incorporated into the groundwater monitoring program.

4.0 WELL DESTRUCTION ACTIVITIES

The Site plan (Figure F-2a) shows the locations of the 32 wells proposed for destruction and the nine wells that will be destroyed and replaced. Well construction details are summarized in Table F-1. The well destruction activities will be described in the completion report (Section 8.0).

The Alameda County Public Works Agency (ACPWA) and DTSC will be notified and kept appraised of the field schedule, as well as any substantial deviations from this scope of work described in this RDIP appendix. Before field activities begin, well destruction permits will be obtained from ACPWA. Wood will notify Underground Service Alert of subsurface work and will retain a private utility locator to mark underground utilities in the vicinity of each well. A site-specific health and safety plan (HASP) will be prepared for the field work, in accordance with the appropriate federal and state regulations; a copy of the HASP will be available at the

Site during field work. ACPWA inspections will be scheduled as soon as permits are issued, in conjunction with scheduling of well destruction, as required.

A California C-57 licensed driller will be retained to complete well destruction activities. Each groundwater monitoring well, and extraction well will be destroyed by pressure grouting. Type I/II neat cement grout will be placed from the total depth of each well to the approximate elevation of the future redevelopment grade (to be provided by Bridge) using a tremie pipe. Each well casing will then be capped and pressurized to a minimum of 25 pounds per square inch for at least 5 minutes. If after 5 minutes the grout column has dropped, additional grout will be added, and the casing will be pressurized for an additional 5 minutes. This process will continue until the grout column ceases to drop.

Following pressure grouting, the protective well box will be removed from each well. Each well will then be over drilled to at least 6 feet below the lowest of the current grade or the approximate elevation of the future redevelopment grade, and the borehole will be backfilled to the ground surface with clean fill or hydrated bentonite chips. Steel well casings may be cut at depth with a torch if over drilling is not possible. During redevelopment, the Site will be capped with the new warehouse, concrete pavement, and landscaping as described in the main text of the report.

Any groundwater reaching the ground surface elevation will be contained and treated in the GETS and other waste materials (i.e. well materials and soil) will be properly contained, transported, and disposed of at an off-site facility.

5.0 INSTALLATION OF NEW AND REPLACEMENT MONITORING WELLS AND EXTRACTION WELL EW-7

The locations of the nine wells to be replaced are shown on Figure F-2a. The locations of the two new upgradient monitoring wells are shown on Figure F-2b. The well installation activities will be described in the completion report (Section 8.0).

5.1 WELL INSTALLATION ACTIVITIES

Before field work begins, well installation permits will be obtained from the ACPWA. Wood will notify Underground Service Alert of subsurface work and will retain a private utility locator to mark underground utilities in the vicinity of each well. ACPWA and ACFCD inspections will be

scheduled as soon as permits are issued, in conjunction with scheduling of well installation, as required.

The ACPWA and DTSC will be notified and kept appraised of the field schedule, as well as substantial deviations from the proposed field activities.

Replacement groundwater monitoring wells will be installed by a California C-57 licensed driller with a roto-sonic drill rig and constructed with 2-inch Schedule 40 polyvinyl chloride (PVC) casing and screen. Screen intervals will be the same as the original wells (Table F-1) with 0.010-inch slots. Well screens will be installed at similar geologic depths as the original wells, accounting for changes in grade and A-zone location. The sand filter pack will extend approximately 1 foot above and below the screen interval. A minimum of 2 feet of hydrated bentonite chips will be placed above the filter pack as a seal. A sanitary cement seal will be emplaced above the bentonite seal to grade, with oversight from an ACPWA inspector, with a proper wellhead completion. Annular materials will be placed at depth inside the drive casing as it is retracted to prevent bridging or borehole collapse. The top of casing of each well will be secured with a traffic-rated well box. At least 48 hours after installation, each well will be developed using a combination of bailing, surging, and pumping techniques to remove fines and establish improved hydraulic communication between the well and the surrounding formation.

Replacement extraction well EW-7 will be installed by a California C-57 licensed driller with a hollow stem auger drilling rig with 12-inch augers and constructed with 6-inch Schedule 40 polyvinyl chloride (PVC) casing and screen. The well will be screened at the approximate depths as shown in Table F-1, however final screen intervals will be determined based on field observations. Well screens will be installed at similar geologic depths as the original well, accounting for changes in grade and A-zone location. Well construction will be completed as specified in the updated design documents referenced in Section 7.0. At least 48 hours after installation, each well will be developed using a combination of bailing, surging, and pumping techniques to remove fines and establish improved hydraulic communication between the well and the surrounding formation. The extraction well will be completed within a concrete vault as specified in the updated design and will include wellhead equipment connecting a submersible pump to the extraction system piping and electrical network.

5.2 WASTE MANAGEMENT AND DISPOSAL

Soil recovered during well installation activities will be properly contained, transported, and disposed of at an off-site facility. Well development and decontamination water will be treated in the GETS. If the GETS is not yet operable, well development and decontamination water will be containerized and disposed of at an off-site facility.

5.3 SURVEYING

Each replacement well will be surveyed by a licensed surveyor to the nearest 0.01 foot using North American Datum of 1983 (NAD 83) and North American Vertical Datum of 1988 (NAVD 88).

6.0 GROUNDWATER MONITORING DURING AND AFTER REDEVELOPMENT

The GETS will be shut down and removed during redevelopment of the property and will be replaced and recommissioned as redevelopment activities allow. The duration of the GETS shutdown is anticipated to be approximately 48 weeks. Due to safety concerns and relocation of the system, there will be no groundwater extraction or treatment during property redevelopment activities, including GETS demolition and rebuilding, soil excavation, grading, utility installation, etc. The new GETS will be constructed when the location is clear of other construction activities. As discussed in Section 7.0, modeling shows that the migration of affected groundwater during shutdown of the system will be insignificant.

Figure 2b shows the final monitoring well network that will be in place following Site redevelopment and well destruction and replacement. As discussed previously, only four wells are proposed for removal from the current monitoring network: two extraction wells (EW-5 and EW-6) and two associated monitoring wells (W-614A, GW-4B). Well EW-5 is no longer removing a significant mass of VOCs from groundwater and has no impact on containment of affected groundwater. Groundwater modeling (Figures F-9 and F-10) demonstrates that the capture zone provided by groundwater extraction is maintained and not materially changed in the A- or B-zone with the removal of EW-6. In addition, the wells planned for relocation will not be very far from the original locations. The current approved network of wells has proven to be effective to date over 11 monitoring events, and the groundwater elevation and analytical data collected from the slightly modified network of will remain sufficient for evaluating groundwater conditions and the remediation progress at the Site.

Groundwater samples are currently collected in accordance with the OMM Plan. In 2019, groundwater monitoring is semi-annual (March and September), except for monitoring of PCBs, which is biennial, in accordance with DTSC's approval of the Five-Year Status Report (Wood, 2018a). Beginning in 2020, groundwater monitoring will be performed annually every September, as approved by DTSC, except for monitoring of PCBs, which will be biennial beginning in March 2020.

To monitor potential changes in groundwater conditions during GETS shutdown, groundwater samples will be collected for CVOC and PCB analyses quarterly starting three months after shutdown. Groundwater samples will be collected for CVOC analyses from accessible extraction wells and onsite performance monitoring wells within the monitoring well network, and offsite MNA monitoring wells OW-1A and B, OW-2A and B and OW-3A and B (remaining MNA monitoring wells will continue to be sampled semi-annually). Groundwater samples will be collected for PCB analyses from accessible A and B Zone performance and MNA monitoring wells (PCBs have not been detected in C and D Zone wells). Groundwater samples will continue to be collected quarterly for the first year after startup of the new GETS from the complete monitoring well network for CVOC analyses and from the A and B Zone wells for PCB analyses. After the first year of operation, groundwater samples will be collected semi-annually for two years, and annually thereafter. The well sampling summary, including analytical parameters, is provided in Table F-2. Groundwater monitoring reports will be submitted semi-annually, 60 days after the last final lab report is received from the laboratory, as described in the OMM Plan, during and after redevelopment activities. Future reports will use confidence intervals together with a trend analysis for statistical evaluation of groundwater in accordance with regulatory guidance (ITRC, 2013; USEPA, 2014).

The results from PCB sampling of downgradient monitoring wells OW-1A and 1B OW-2A and 2B and OB-3A and 3B will be compared to the Saltwater Ecotox Aquatic Habitat ESL (0.03 µg/L) (ESL) to assess if PCBs are migrating offsite. If the results are above the ESL, a corrective action plan will be developed and submitted to the agencies for review within 15 days of receipt of final results.

6.1 GROUNDWATER TREATMENT SYSTEM PCB SAMPLING

PCB sampling of influent and effluent of the groundwater treatment system is performed quarterly in accordance with the Wastewater Discharge Permit No 40300524 (the discharge

permit) and EBMUD approval. Samples are analyzed using EPA Method 8082 ultra low level (ULL) for Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254 and Aroclor 1260. The discharge limit for total PCBs is 0.017 micrograms per liter (µg/L). The method reporting limit (MRL) is 0.005 µg/L for all aroclors, except Aroclor 1221 which has an MRL of 0.010 µg/L. The sampling results are reported in semi-annual reports submitted to EBMUD in May and November.

The groundwater treatment system discharge has been below the permit discharge limits since the system was started on March 16, 2015. In the event the discharge limit is exceeded, the system will be temporarily shut down and the lead liquid phase granular activated carbon filter vessel will be replaced. The sampling data will be evaluated to assess if the carbon change out frequency should be increased. Additionally, EBMUD may prohibit the discharge of groundwater and require additional treatment in accordance with the discharge permit.

Following relocation, the groundwater treatment system will be restarted and the influent and effluent will be sampled and analyzed for PCBs monthly for the first three months and quarterly thereafter. The results of the startup sampling and semiannual reports will be submitted to EPA.

7.0 DESIGN OF GROUNDWATER TREATMENT SYSTEM RELOCATION

The design of the relocated GETS includes locating and reconfiguring the treatment compound, rerouting groundwater conveyance pipelines, installation of a new electrical power drop, rerouting electrical and controls conduit and wiring, rerouting the vapor discharge line and discharge stack, and demolition of existing infrastructure. Revised GETS features, such as piping alignments, pad elevations, or wells with adjusted completions will also be surveyed by a licensed surveyor. Each element of GETS relocation is further described below.

Although the redevelopment schedule has not been finalized, it is anticipated that the GETS could be shut down for 48 weeks. The groundwater flow model was used to evaluate potential plume migration during a 1-year shutdown of the GETS. Two scenarios were evaluated to develop upper and lower bound estimates of how far groundwater could flow during the shutdown period. The shutdown period was modeled by setting extraction rates from the extraction wells to zero. In the first scenario, groundwater head along the up- and down-gradient model boundaries was specified to match the background gradient determined when

simulating groundwater conditions at the Site in March 2018. The resulting hydraulic gradient across the Site was very low (0.00014 ft/ft), and Figure F-13a shows the groundwater particle tracks in the B-zone over the 1-year shutdown; groundwater moves an estimated 2 feet during this period (note that the particle tracks approximate the transport of perfectly conservative solutes, and therefore are not subject to various retardation processes). In the second modeling scenario, the approximate slope of the current, pre-development ground surface across the Site (0.0044 ft/ft) was assumed to provide an upper bound estimate of the hydraulic gradient in the A- and B-zones (a gradient this high has not been observed at the site in the past). Figure F-13b shows the groundwater particle tracks in the B-zone over the 1-year shutdown; during this period groundwater moves an estimated 62 feet under these conditions. Only the B-zone is shown in Figures F-13a and 13b because the hydraulic conductivity in the A-zone is much lower than the B-zone, and particles migrate far less in the A-zone than the B zone (no measurable movement in the first scenario and only approximately 0.3 feet in the second scenario). As shown in Figures F-9 and F-10, the relocated GETS will capture groundwater in the A- and B-zones at the Site and will create a combined capture area that extends well beyond the boundaries of the Site. As long as groundwater migration is less than approximately 62 feet during the GETS shutdown, the model shows that COCs in the groundwater plume will be recaptured when the relocated GETS is restarted. This distance is over 30 times greater than the estimated distance the groundwater will move in a 1-year period under background hydraulic gradient conditions, and equal to the distance moved by particles under the upper-bound hydraulic gradient used in the second scenario. Wood's groundwater model does not account for stormwater infiltration due to removal of the cap. However, Wood believes that the 62-foot particle movement estimated in the upper-range, high-gradient model analysis is very conservative and is greater than particle movement that would result from any reasonable amount of stormwater infiltration through the uncapped area. Therefore, the system shutdown is not anticipated to have an impact on the effectiveness and protectiveness of the groundwater remedy. To the extent practicable, GE plans to operate EW-1 through EW-3 during the wet season. As described in Section 6.0, quarterly monitoring of off-site groundwater wells OW-1A and 1B, OW-2A and 2B, and OB-3A and 3B will be performed and the results will be used to assess potential risk to downgradient receptors during the shutdown period and if further action is warranted.

7.1 TREATMENT COMPOUND

The treatment compound will be relocated southwest of 12th Street, as shown on Figure F-14. The relocated treatment compound will be constructed in a similar manner to the existing treatment compound and will include a new concrete equipment pad, existing shipping container, 8-foot high fencing with privacy screen, and the existing treatment equipment. The shape of the concrete pad and layout of the treatment equipment will be modified to accommodate the new location. In addition, some minor changes will be made to instrumentation and appurtenances to optimize the system. Access ramps and gates will be installed to accommodate operations and maintenance activities for the system.

The concrete equipment pad, fence, and equipment anchorage will be designed and constructed in accordance with requirements of the 2016 California Building Code (based on 2015 International Building Code) for Seismic Zone 4.

7.2 TRENCH AND CONVEYANCE PIPELINES

Extracted groundwater conveyance piping, controls conduits, and electrical power conduits will be installed within utility trenches that connect each extraction well to the treatment system and the main power supply similar to the existing system. Where practicable, existing conveyance piping, controls conduits, and electrical conduits will be used. Extracted groundwater will be conveyed to the treatment system via piping with secondary containment. Electrical power and communications cable for each pump and transducer will be installed in conduits above the groundwater conveyance piping in common utility trenches. The trenches will be excavated, backfilled, and compacted up to surface completions that will be performed by the developer. Work and any future work on the conveyance system will be performed in compliance with 29 Code of Federal Regulations 1910.120; therefore, conveyance systems will be installed outside of the clean corridors.

7.3 ELECTRICAL SERVICE

A new 3-phase, 480-volt electrical power drop will be installed to service the GETS. The location of the power drop will be coordinated with the development activities and Pacific Gas and Electric. Existing control panels and stepdown transformer will be relocated to the new treatment compound. Connection from the power drop location to the treatment compound will be determined once the location of the power drop has been finalized.

Electrical systems will be designed and constructed in accordance with the 2016 California Electrical Code (based on the 2014 National Electric Code).

7.4 VAPOR DISCHARGE

New vapor discharge piping will be installed, and the vapor discharge point will be relocated as shown on Figure F-14. The vapor discharge piping will be installed in the common utility trench with the groundwater conveyance piping and conduits. The vapor discharge stack will be installed similarly to the existing vapor discharge stack and will comply with the BAAQMD Permit to Operate. An application for a Permit to Construct for the relocation of the GETS and application to modify the Permit to Operate will be submitted to BAAQMD prior to relocating the GETS.

7.5 SANITARY SEWER CONNECTION

A new connection to the sanitary sewer will be installed, if needed, to discharge treated groundwater from the GETS. The connection location will be coordinated with the development activities. The connection will be installed similarly to the existing connection and will comply with the East Bay Municipal Utility District (EBMUD) Wastewater Discharge Permit No. 40300524. Modifications to the existing permit for the relocation of the connection will be coordinated with EBMUD.

7.6 DEMOLITION

The existing GETS will be carefully disassembled and demolished to allow reuse of major treatment equipment, including piping, equipment, instrumentation, and appurtenances, as well as extraction wells not proposed for demolition, and pipelines and conduits where feasible. Equipment and infrastructure planned for reuse will be inspected after demolition and relocation to confirm there was no damage that would require repair or replacement. Other components of the GETS, including the equipment pad, outdoor aboveground piping and instrumentation that cannot be reused, and underground infrastructure that conflicts with the proposed development will be demolished and removed. Waste generated during demolition will be decontaminated and recycled or disposed of in accordance with all local, state, and federal regulations.

7.7 STARTUP AND SHAKEDOWN

After relocation of the GETS is complete, startup and shakedown testing will be conducted before the system is restarted. The shakedown testing will include hydrostatic and pressure testing and functional testing of alarms and mechanical equipment. Hydrostatic pressure testing will be conducted to verify that conveyance hose, piping, and manifolds were properly installed and water- or air-tight. If a test does not pass, the potential causes of the pressure loss or water leaks will be identified and resolved, and the test will be repeated until field testing indicates that the leak had been addressed. Functional testing of individual alarms will consist of triggering each alarm to verify that the programmed interlocks are working properly. The communication between the control panel and the mechanical equipment will also be confirmed to verify that the equipment responds as designed to the switches on the panel. Functional testing of mechanical components will include checking the amperage and motor rotation of the transfer pumps and blower to confirm operation in accordance with manufacturer recommendations. Instrumentation will be checked for proper operation. GETS startup procedures will be performed as described in detail in the OMM Plan (Geosyntec, 2015b).

8.0 COMPLETION REPORT

A report will be prepared following completion of the remedy modifications. The Completion Report will describe the well destruction and installation activities, the groundwater monitoring program, and operation and maintenance of the GETS. As-built drawings of the replacement wells and GETS will also be included.

9.0 REFERENCES

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TABLE F-1

WELL CONSTRUCTION INFORMATION
AND RATIONALE FOR WELLS PROPOSED FOR RELOCATION OR DESTRUCTION
5441 International Boulevard
Oakland, California

Well ID	Installation Date	Total Depth of Well (feet bgs)	Screened Interval (feet bgs)	Well Diameter (inches)	Well Material	Rationale
Wells Proposed for Relocation						
EW-7	8/16/2013	53.0	42.5-52.5	6	PVC	Within truck loading docks
GW-2B	4/9/1999	48.0	37.2-46.2	2	PVC	Within building footprint
GW-1B	4/5/1999	48.5	40-48	2	PVC	Within building footprint
GW-1C	7/31/1997	85.0	72-83	2	PVC	Within building footprint
GW-4D	7/30/1997	109.0	97-107	2	PVC	Within building footprint
W-004A	4/10/1980	26.0	20-23	2	Galvinized Steel	Within building footprint
W-004B	4/10/1980	42.0	37-40	2	Galvinized Steel	Within building footprint
W-529A	4/9/1980	20.0	10-20	2	Galvinized Steel	Within truck loading docks
W-741B	3/11/1981	41.0	35-40	2	Galvinized Steel	Within truck loading docks
Wells Proposed for Destruction						
EW-5	8/15/2013	16.0	13.0-16.0	6	PVC	Low pumping rate and cVOC concentrations <5 mg/L
EW-6	8/16/2013	26.0	24.0-26.0	6	PVC	Low pumping rate and cVOC concentrations <5 mg/L
DW-02	6/6/2000	435.0	420.0–434.0	2	PVC	Well not part of current monitoring network
DW-03	6/12/2000	274.0	255.9–270.0	2	PVC	Well not part of current monitoring network
GW-4B	4/6/1999	46.0	36.5-44.0	2	PVC	Performance well for EW-5 and E-W-6 to be removed
UPG-1B	4/8/1999	56.5	42.0–56.0	2	PVC	Well not part of current monitoring network
UPG-1C	4/7/1999	83.5	73.9–82.9	2	PVC	Well not part of current monitoring network
W-002B	4/6/1980	47.0	42.0–45.0	2	Galvinized Steel	Well not part of current monitoring network
W-022A	3/25/1980	29.0	24.0–27.0	2	Galvinized Steel	Well not part of current monitoring network
W-035A	3/25/1980	35.0	30.0–33.0	2	Galvinized Steel	Well not part of current monitoring network
W-035B	4/1/1980	60.0	55.0–58.0	2	Galvinized Steel	Well not part of current monitoring network
W-036A	3/24/1980	20.0	15.0–18.0	2	Galvinized Steel	Well not part of current monitoring network
W-036B	4/7/1980	65.0	60.0–63.0	2	Galvinized Steel	Well not part of current monitoring network
W-523A	4/9/1980	25.0	15.0–25.0	2	Galvinized Steel	Well not part of current monitoring network

wood.

TABLE F-1

WELL CONSTRUCTION INFORMATION
AND RATIONALE FOR WELLS PROPOSED FOR RELOCATION OR DESTRUCTION
5441 International Boulevard
Oakland, California

Well ID	Installation Date	Total Depth of Well (feet bgs)	Screened Interval (feet bgs)	Well Diameter (inches)	Well Material	Rationale
W-524A	4/9/1980	25.0	15.0–25.0	2	Galvinized Steel	Well not part of current monitoring network
W-613A	7/2/1980	26.0	20.0–25.0	2	Galvinized Steel	Well not part of current monitoring network
W-614A	7/3/1980	25.0	20-25	2	Galvinized Steel	Performance well for EW-5 and E-W-6 to be removed
W-615A	7/7/1980	25.0	20.0–25.0	2	Galvinized Steel	Well not part of current monitoring network
W-621A	7/10/1980	25.0	20.0–25.0	2	Galvinized Steel	Well not part of current monitoring network
W-625B	8/7/1980	44.5	39.5–44.5	2	Galvinized Steel	Well not part of current monitoring network
W-733A	4/17/1981	24.5	19.3–24.3	2	Galvinized Steel	Well not part of current monitoring network
W-734A	4/15/1981	24.7	19.5–24.5	2	Galvinized Steel	Well not part of current monitoring network
W-736A	3/5/1981	25.0	19.8–24.8	2	Galvinized Steel	Well not part of current monitoring network
W-752A	3/9/1981	24.8	19.6–24.6	2	Galvinized Steel	Well not part of current monitoring network
W-752B	4/9/1981	45.1	39.9–44.9	2	Galvinized Steel	Well not part of current monitoring network
W-754B	4/15/1981	49.4	39.2–47.2	2	Galvinized Steel	Well not part of current monitoring network
W-757A	3/2/1981	25.1	19.9–24.9	2	Galvinized Steel	Well not part of current monitoring network
W-757B	3/18/1981	50.6	5.0–20.0	2	Galvinized Steel	Well not part of current monitoring network
W-792B	4/1/1981	51.4	43.2–48.2	2	Galvinized Steel	Well not part of current monitoring network
W-793C	4/22/1981	78.6	68.4–78.4	2	Galvinized Steel	Well not part of current monitoring network
W-801B	10/31/2007	47.0	42.0–52.0	2	PVC	Well not part of current monitoring network
W-802B	10/31/2007	52.0	42.0–47.0	2	PVC	Well not part of current monitoring network

Abbreviations
bgs = below ground surface
PVC = polyvinylchloride

TABLE F-2

REMAINING AND REPLACEMENT WELLS AND SAMPLING SUMMARY[1]

5441 International Boulevard

Oakland, California

Well	MNA	Performance Monitoring	Screen Interval[2] (feet)	Analysis						
				VOCs[3] (U.S. EPA SW8260B)	PCBs[4] (U.S. EPA 8082 ULL)	Anions[5] (U.S. EPA 300.0)	Total Organic Carbon (SM5310C)	Dissolved[6] Hydrocarbon Gases (RSK-175)	pH[7] (SI)	Oxidation Reduction Potential[7] (mV)
Extraction Wells										
EW-1			22-27, 32-42	X					X	X
EW-2			19-29, 39-44	X					X	X
EW-3			13-14.5, 36-49	X					X	X
EW-4			14-17, 36-49	X					X	X
EW-7			9-21, 32-34	X					X	X
EW-8			13-16	X					X	X
A-Zone										
GW-1A		X	19-24	X	X				X	X
GW-2A		X	19-24	X	X				X	X
GW-3A		X	12-15	X	X				X	X
GW-5AR	X		5.2-15	X		X	X	X	X	X
OW-1A	X		25-30	X	X	X	X	X	X	X
OW-2A	X		15-25	X	X	X	X	X	X	X
OW-3A	X		12-32	X	X	X	X	X	X	X
OW-5A	X		24-34	X		X	X	X	X	X
OW-6A	X		25-35	X		X	X	X	X	X
W-004AR		X	20-23	X	X				X	X
W-529A		X	10-20	X	X				X	X
W-731A[9]		X	18-22	X	X				X	X
W-751A		X	19-24	X	X				X	X
W-758A[9]		X	18.8-23.8	X	X				X	X
Proposed Upgradient Well		X	NA	X	X				X	X

wood.

TABLE F-2

REMAINING AND REPLACEMENT WELLS AND SAMPLING SUMMARY[1]

5441 International Boulevard

Oakland, California

Well	MNA	Performance Monitoring	Screen Interval[2] (feet)	Analysis						
				VOCs[3] (U.S. EPA SW8260B)	PCBs[4] (U.S. EPA 8082 ULL)	Anions[5] (U.S. EPA 300.0)	Total Organic Carbon (SM5310C)	Dissolved[6] Hydrocarbon Gases (RSK-175)	pH[7] (SI)	Oxidation Reduction Potential[7] (mV)
B-Zone										
GW-1BR		X	40-48	X					X	X
GW-2BR		X	37.2-46.2	X	X				X	X
GW-5B	X		46-60	X		X	X	X	X	X
GW-7B	X		55-64	X		X	X	X	X	X
OW-1B	X		36-41	X	X	X	X	X	X	X
OW-2B	X		41-51	X	X	X	X	X	X	X
OW-3B	X		50-65	X	X	X	X	X	X	X
OW-5B	X		45-60	X		X	X	X	X	X
W-003BR		X	35.3-40.1	X	X				X	X
W-004BR		X	37-40	X					X	X
W-741B		X	35-40	X					X	X
W-758B[9]		X	44.1–59.1	X	X				X	X
W-804B		X	40-50	X	X				X	X
W-805B[9]		X	NA	X	X				X	X
Proposed Upgradient Well		X	NA	X	X				X	X
C-Zone										
GW-1CR	X	X	72-83	X					X	X
GW-2C	X	X	67-82	X					X	X
GW-3C	X	X	76-86	X					X	X
GW-5C	X		75.3-84.3	X					X	X
OW-1C	X		72-92	X					X	X
OW-2C	X		73-93	X					X	X
OW-3C	X		78-83	X					X	X
OW-5C	X		70-90	X					X	X
OW-6C	X		75-90	X					X	X
W-803C	X	X	75-85	X					X	X

TABLE F-2

REMAINING AND REPLACEMENT WELLS AND SAMPLING SUMMARY[1]

5441 International Boulevard

Oakland, California

Well	MNA	Performance Monitoring	Screen Interval[2] (feet)	Analysis						
				VOCs[3] (U.S. EPA SW8260B)	PCBs[4] (U.S. EPA 8082 ULL)	Anions[5] (U.S. EPA 300.0)	Total Organic Carbon (SM5310C)	Dissolved[6] Hydrocarbon Gases (RSK-175)	pH[7] (SI)	Oxidation Reduction Potential[7] (mV)
D-Zone										
GW-1D	X		97-107	X					X	X
GW-2D	X		97-107	X					X	X
GW-3D	X		100.5-110.5	X					X	X
GW-4DR[10]			97-107							
OW-1D	X		100-110	X					X	X
OW-2D	X		100-110	X					X	X
OW-3D	X		94-99	X					X	X
OW-4D	X		86-91	X					X	X
OW-5D	X		100-110	X					X	X
OW-6D	X		109-119	X					X	X

TABLE F-2

REMAINING AND REPLACEMENT WELLS AND SAMPLING SUMMARY[1]

5441 International Boulevard

Oakland, California

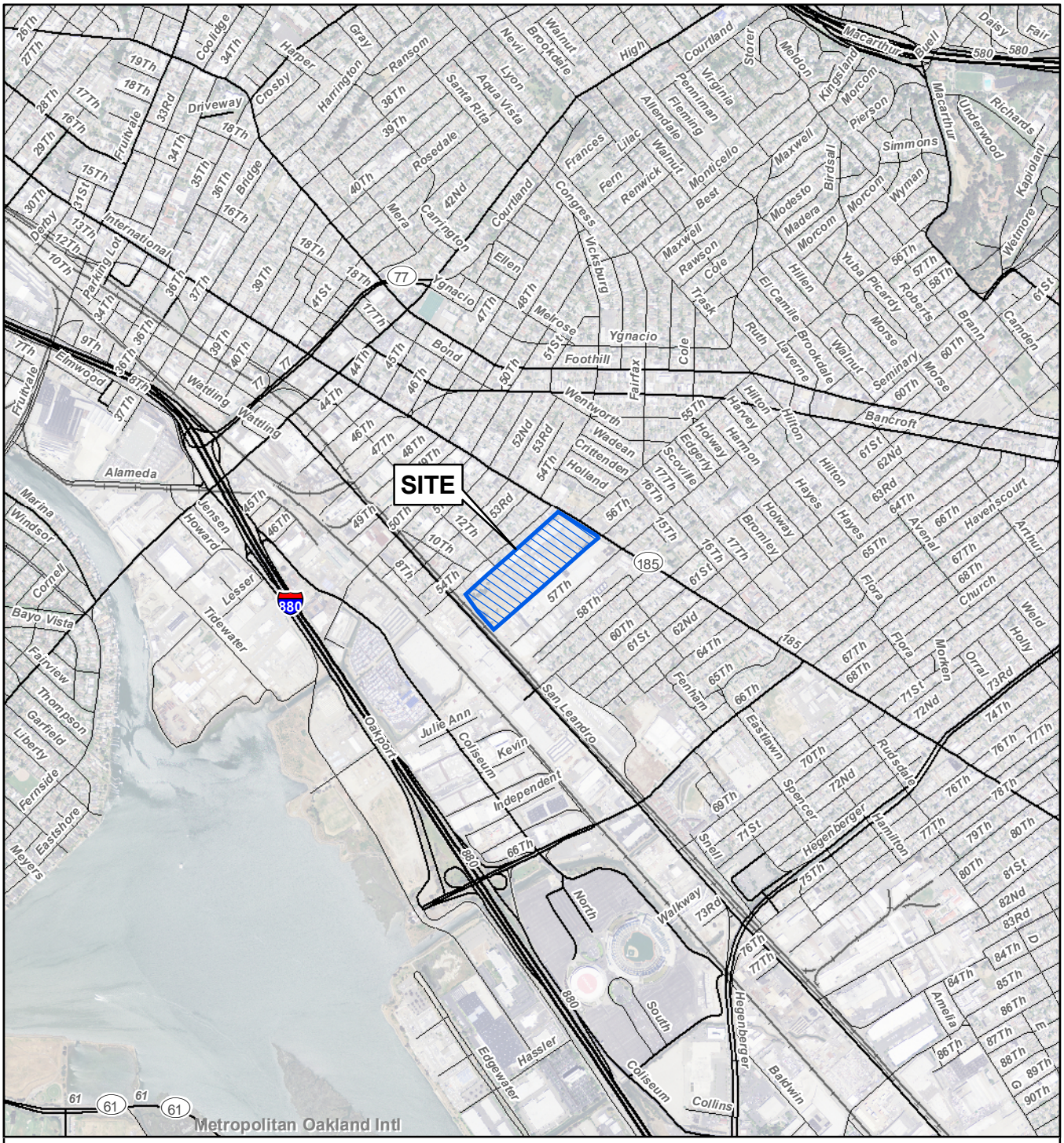
Notes

1. In 2019, groundwater monitoring will be conducted semi-annually (September and March), except for PCBs which will be biennially. Beginning in 2020, groundwater monitoring will be conducted annually, except for PCBs which will continue to be conducted biennially
2. Feet below ground surface (bgs).
3. During GETS shut down and for 1 year following GETS startup, groundwater samples will be collected quarterly for VOC analyses using U.S. EPA Method 8260B from all extraction and monitoring wells listed on the table that are accessible during GETs shut down .
4. During GETS shut down and for 1 year following GETS startup, groundwater samples will be collected quarterly from accessible A and B Zone wells for PCB analyses. After the first year of operation, groundwater samples will be collected semi-annually for two years, and annually thereafter.
5. Dissolved nitrate, nitrite, sulfate, and chloride.
6. Ethene, ethane, and methane.
7. Collected using a multi-parameter meter during purging.
8. Wells shown with "R" in the well identification are replacement wells.
9. Wells not in current monitoring program to be retained.
10. Well used for groundwater elevation contouring only.

Abbreviations

MNA = monitored natural attenuation
mV = millivolts
NA = not available
NS = not sampled
PCB = polychlorinated biphenyl
SI = International System of Units
SGZ = shallow groundwater zone
U.S. EPA = United States Environmental Protection Agency
VOC = volatile organic compound

FIGURES



Street map from ESRI, 2007. Aerial image from NAIP, 2012.



N

0 2,000 Feet

SITE LOCATION MAP
5441 International Boulevard
Oakland, California

wood.	By: KLU	Proj. No. 8618181202.01.02
	Date: 01/31/2019	Figure **F-1**

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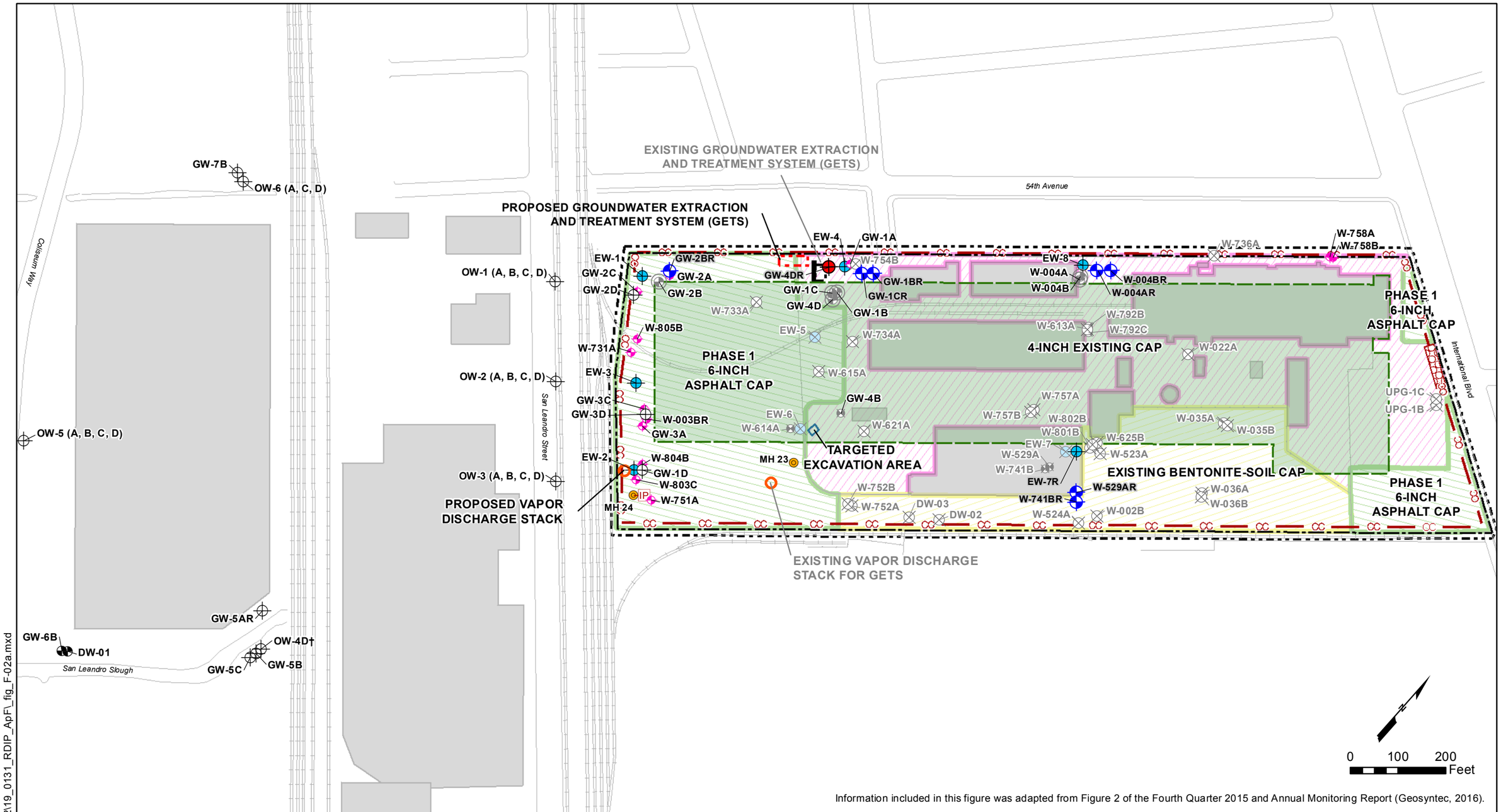

Information included in this figure was adapted from Figure 2 of the Fourth Quarter 2015 and Annual Monitoring Report (Geosyntec, 2016).

Legend

- MNA Monitoring Well Location
- Monitoring Well to be Destroyed, Well not part of Current Monitoring Network
- GETS Performance Monitoring Well Location
- Monitoring Well to be Destroyed
- Other Monitoring Well
- Monitoring Well to be Destroyed and Replaced
- Extraction Well
- Extraction Well to be Destroyed
- Proposed Location of Replacement MNA Monitoring Well
- Proposed Location of Replacement GETS Performance Monitoring Well
- IP — Manhole 24 (MH-24) and Catch Basin with Inlet Protection
- CC — Concrete Curb
- Property Boundary
- Security Fence
- Entrance/Exit (Asphalt Berm)
- 4-Inch Existing Cap
- 6-Inch Asphalt Cap
- Existing Bentonite-Soil Cap
- Buildings
- Proposed Warehouse Footprint
- † Resurveyed Well

SITE FEATURES
5441 International Boulevard
Oakland, California

wood.

By: KLU	Prj. No. 8618181202.01.02
Date: 08/22/2019	Figure F-2a

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54th Avenue

PROPOSED GROUNDWATER EXTRACTION AND TREATMENT SYSTEM (GETS)

EW-1
GW-2BR
GW-2A
GW-4DR
EW-4
GW-1A
GW-1BR
GW-1CR
EW-8
W-004BR
W-004AR
W-758A
W-758B
GW-2C
GW-2D
W-805B
W-731A
EW-3
GW-3C
GW-3D
W-003BR
GW-3A
EW-2
W-804B
GW-1D
W-803C
W-751A
EW-7 (to be relocated)
EW-7R
W-741B (to be relocated)
W-529A (to be relocated)
W-529AR
W-741BR
PROPOSED NEW LOCATIONS
PROPOSED UPGRADIENT WELL LOCATIONS (A, B ZONES)
International Blvd

Information included in this figure was adapted from Figure 2 of the Fourth Quarter 2015 and Annual Monitoring Report (Geosyntec, 2016).

Legend

- MNA Monitoring Well Location
- GETS Performance Monitoring Well Location
- Extraction Well
- GETS Performance Monitoring Well Location To Be Relocated
- Extraction Well To Be Relocated
- Proposed Location of Replacement MNA Monitoring Well
- Proposed Location of Replacement GETS Performance Monitoring
- Property Boundary
- Proposed Warehouse Footprint

0 60 120 Feet

PROPOSED GROUNDWATER MONITORING NETWORK
5441 International Boulevard
Oakland, California

wood.

By: KLU
Date: 08/22/2019

Prj. No. 8618181202.01.02
Figure **F-2b**

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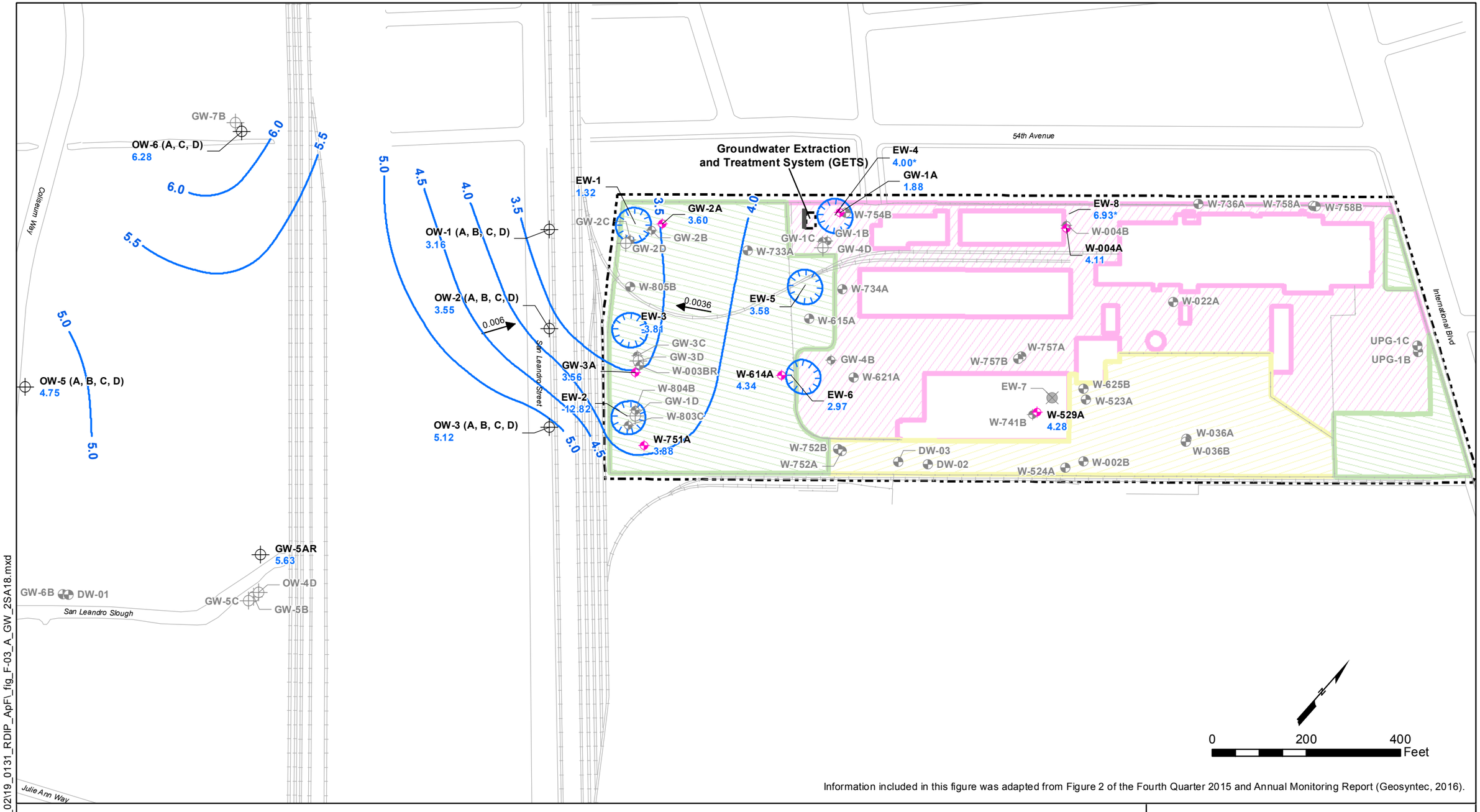

Information included in this figure was adapted from Figure 2 of the Fourth Quarter 2015 and Annual Monitoring Report (Geosyntec, 2016).

Explanation

- MNA Monitoring Well Location
- GETS Performance Monitoring Well Location
- Other Monitoring Well Location
- Extraction Well
- Extraction Well not screened in A-Zone
- 4.0 Groundwater Elevation Contour, feet NAVD88
- Groundwater depression
- 3.88 A-Zone Groundwater Elevation, feet NAVD88
- * Water level elevation not used for contouring
- 0.006 Groundwater Gradient (foot/foot) and General Flow Direction
- 4-Inch Existing Cap
- 6-Inch Asphalt Cap
- Existing Bentonite-Soil Cap
- Buildings
- Security Fence

POTENTIOMETRIC SURFACE A-ZONE
SEPTEMBER 2018
5441 International Boulevard
Oakland, California

wood.

By: KLU
Date: 01/31/2019
Project No. 8618181202.01.02
Figure F-3

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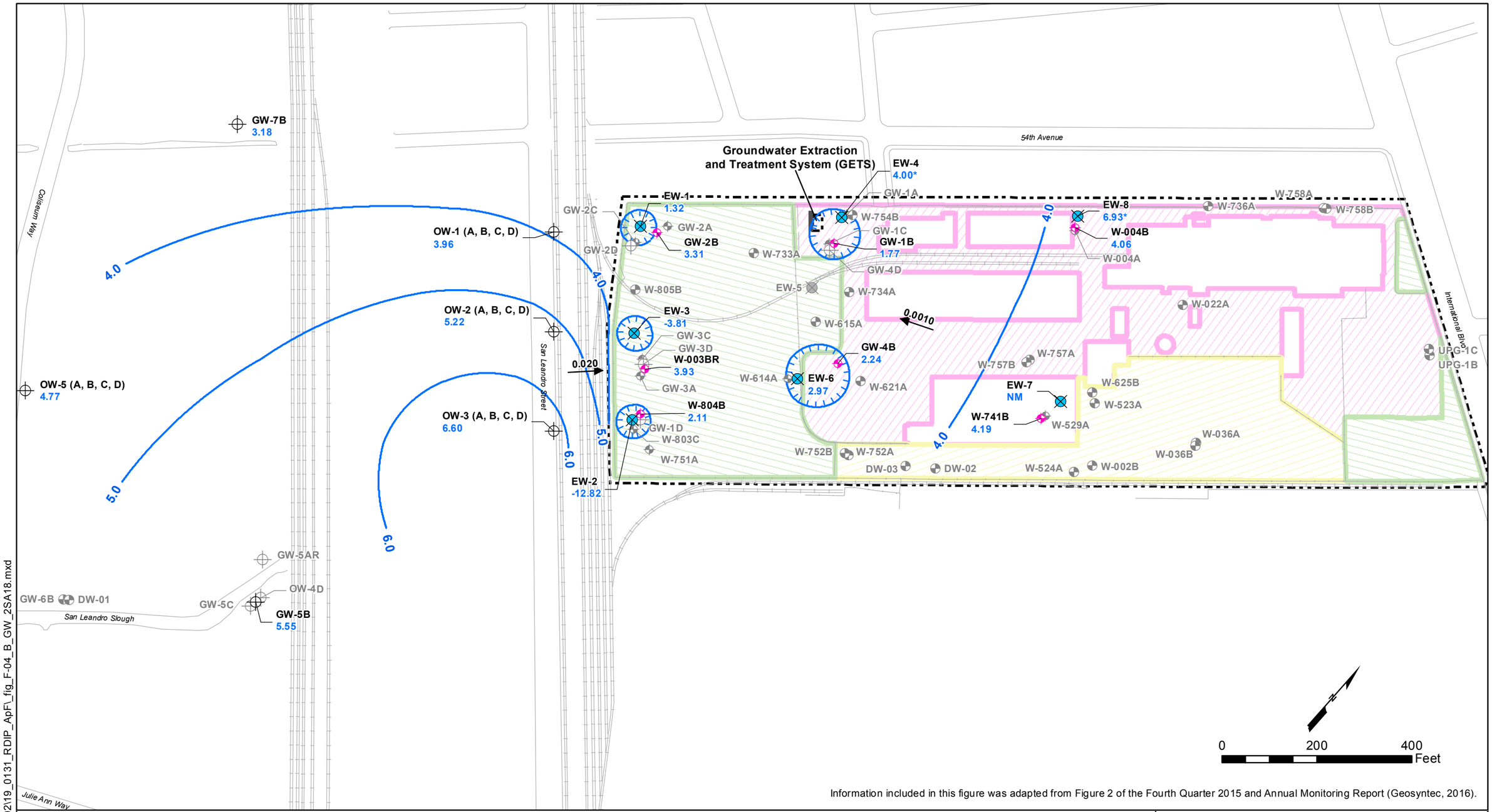

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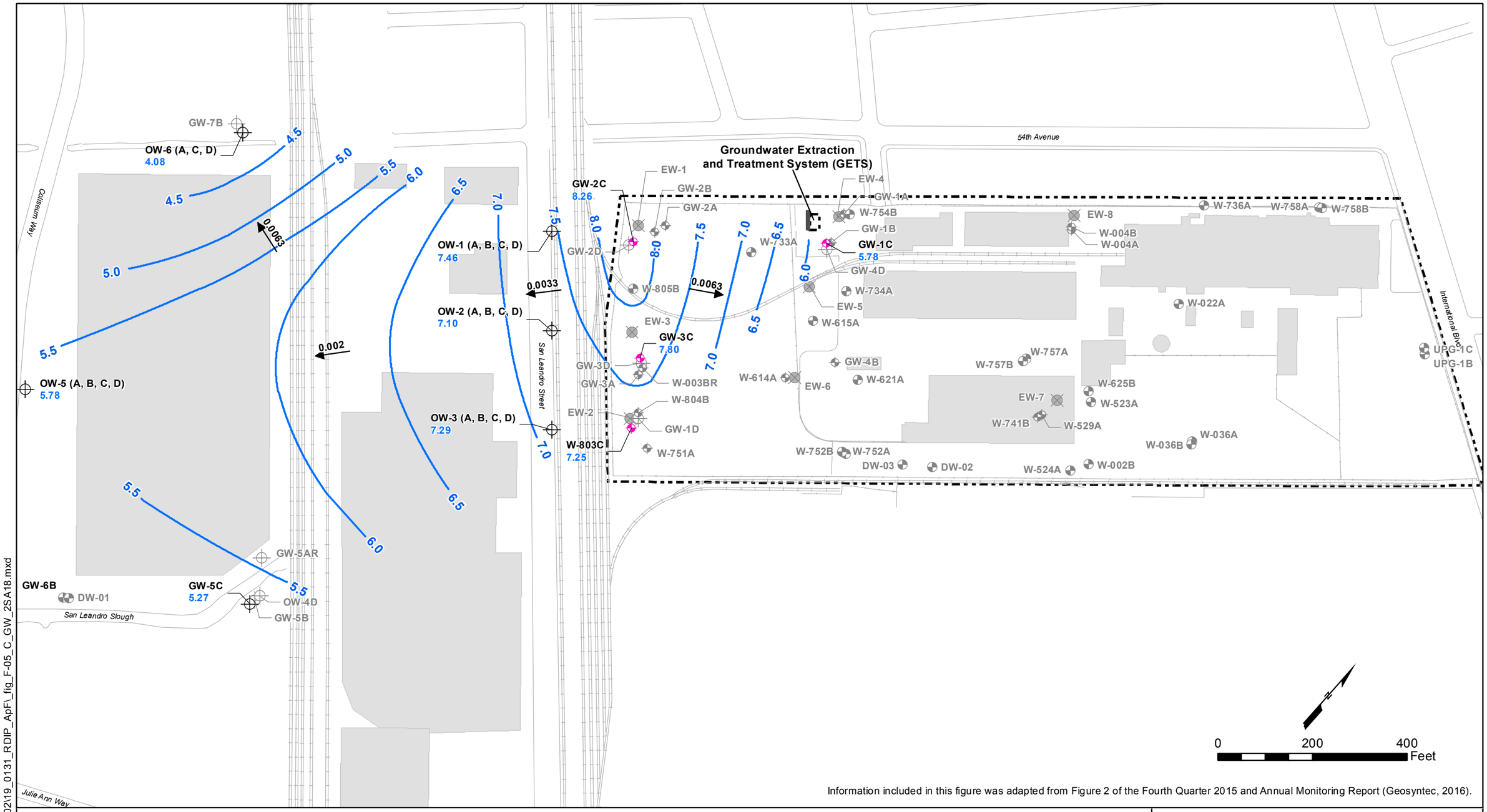
POTENTIOMETRIC SURFACE B-ZONE
SEPTEMBER 2018
5441 International Boulevard
Oakland, California

wood.

By: KLU
Date: 01/31/2019

Project No. 8618181202.01.02
Figure **F-4**



Information included in this figure was adapted from Figure 2 of the Fourth Quarter 2015 and Annual Monitoring Report (Geosyntec, 2016).

Explanation

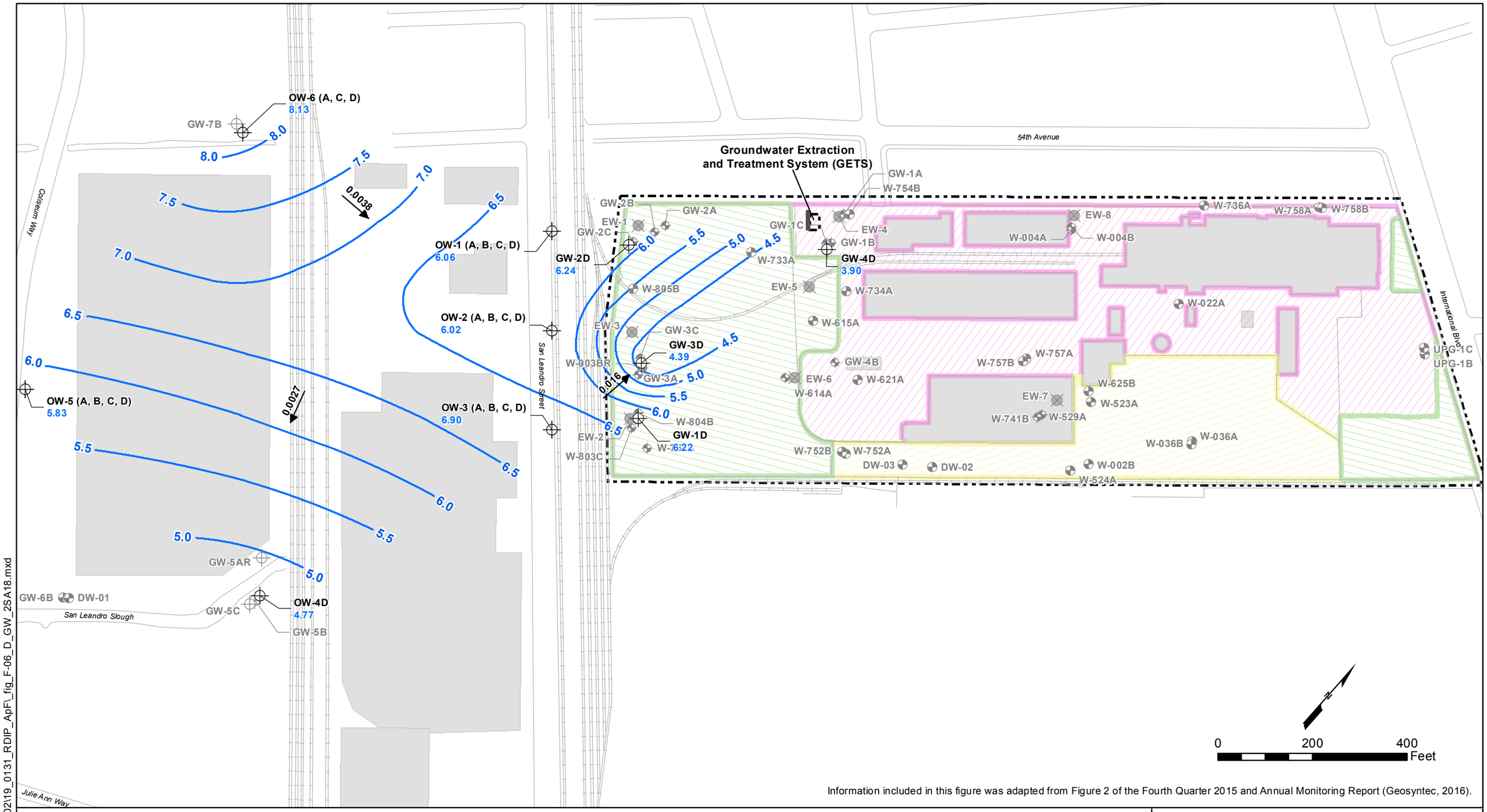
- MNA Monitoring Well Location
- GETS Performance Monitoring Well Location
- Other Monitoring Well Location
- Extraction Well not screened in C-Zone
- 7.0 — Groundwater Elevation Contour, feet NAVD88
- Groundwater depression
- 7.10 — C-Zone Groundwater Elevation, feet NAVD88
- * — Water level elevation not used for contouring
- 0.002 — Groundwater Gradient (foot/foot) and General Flow Direction
- 4-Inch Existing Cap
- 6-Inch Asphalt Cap
- Existing Bentonite-Soil Cap
- Buildings
- Security Fence

POTENTIOMETRIC SURFACE C-ZONE
SEPTEMBER 2018
5441 International Boulevard
Oakland, California

wood.

By: KLU	Project No. 8618181202.01.02
Date: 01/31/2019	Figure F-5

S:\18000\181202\phase_01_02\19_0131_RDIP_ApF_fig_F-05_C_GW_2SA18.mxd



Information included in this figure was adapted from Figure 2 of the Fourth Quarter 2015 and Annual Monitoring Report (Geosyntec, 2016).

Explanation

- MNA Monitoring Well Location
- GETS Performance Monitoring Well Location
- Other Monitoring Well Location
- Extraction Well not screened in D-Zone
- 6.5 — Groundwater Elevation Contour, feet NAVD88
- Groundwater depression
- 6.06 — D-Zone Groundwater Elevation, feet NAVD88
- * — Water level elevation not used for contouring
- 0.0027 — Groundwater Gradient (foot/foot) and General Flow Direction
- 4-Inch Existing Cap
- 6-Inch Asphalt Cap
- Existing Bentonite-Soil Cap
- Buildings
- Security Fence

POTENTIOMETRIC SURFACE D-ZONE
SEPTEMBER 2018
5441 International Boulevard
Oakland, California

wood.

By: KLU
Date: 01/31/2019
Project No. 8618181202.01.02
Figure **F-6**

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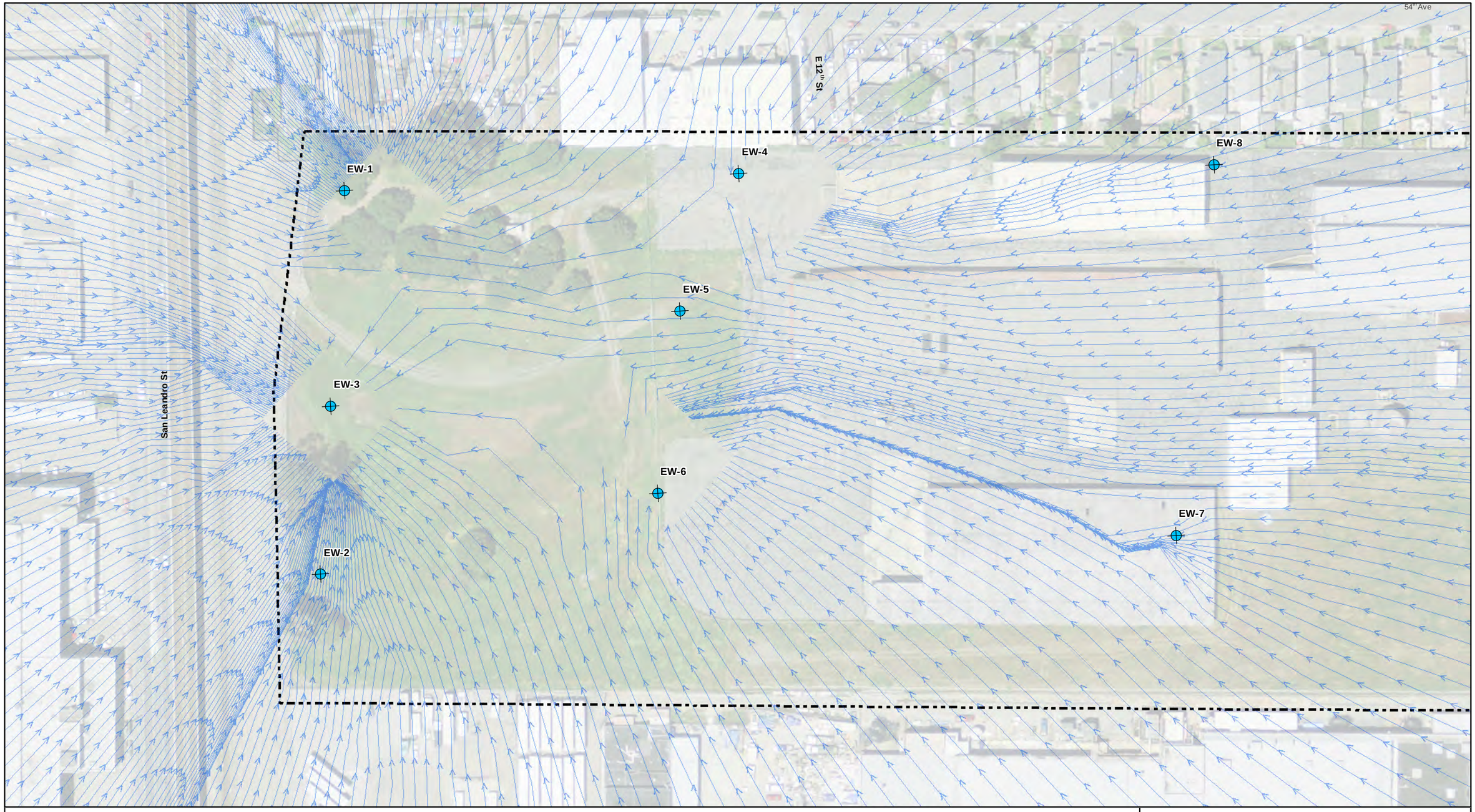

EXPLANATION

- Extraction Well
- Simulated Groundwater Flow Pathline in A-Zone and flow direction
- GE Site Boundary

Extraction Well	Input Flow Rate
EW-1	5.14 gpm
EW-2	1.86 gpm
EW-3	0.22 gpm
EW-4	1.30 gpm
EW-5	0.00 gpm
EW-6	1.46 gpm
EW-7	0.70 gpm
EW-8	0.18 gpm

0 50 100 Feet

SIMULATED GROUNDWATER CAPTURE IN A-ZONE
CURRENT CONDITIONS
5441 International Boulevard
Oakland, California

wood.

By: KLU
Date: 02/12/2019
Prj. No. WDC7012.400.402
Figure F-7

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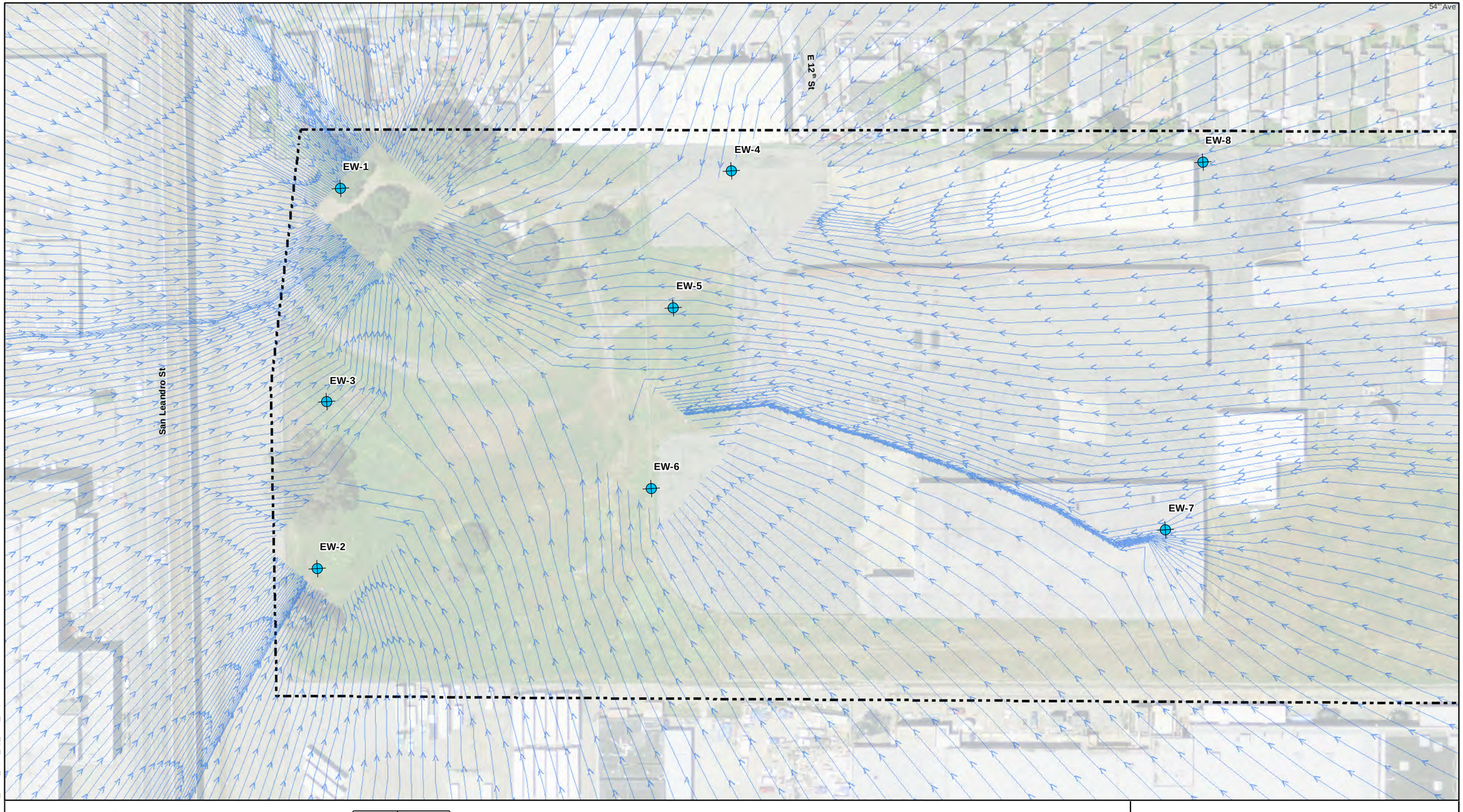

EXPLANATION

- Extraction Well
- Simulated Groundwater Flow Pathline in B-Zone and flow direction
- GE Site Boundary

Extraction Well	Input Flow Rate
EW-1	5.14 gpm
EW-2	1.86 gpm
EW-3	0.22 gpm
EW-4	1.30 gpm
EW-5	0.00 gpm
EW-6	1.46 gpm
EW-7	0.70 gpm
EW-8	0.18 gpm

0 50 100 Feet

SIMULATED GROUNDWATER CAPTURE IN B-ZONE
CURRENT CONDITIONS
5441 International Boulevard
Oakland, California

wood.

By: KLU
Date: 02/12/2019
Prj. No. WDC7012.400.402
Figure **F-8**

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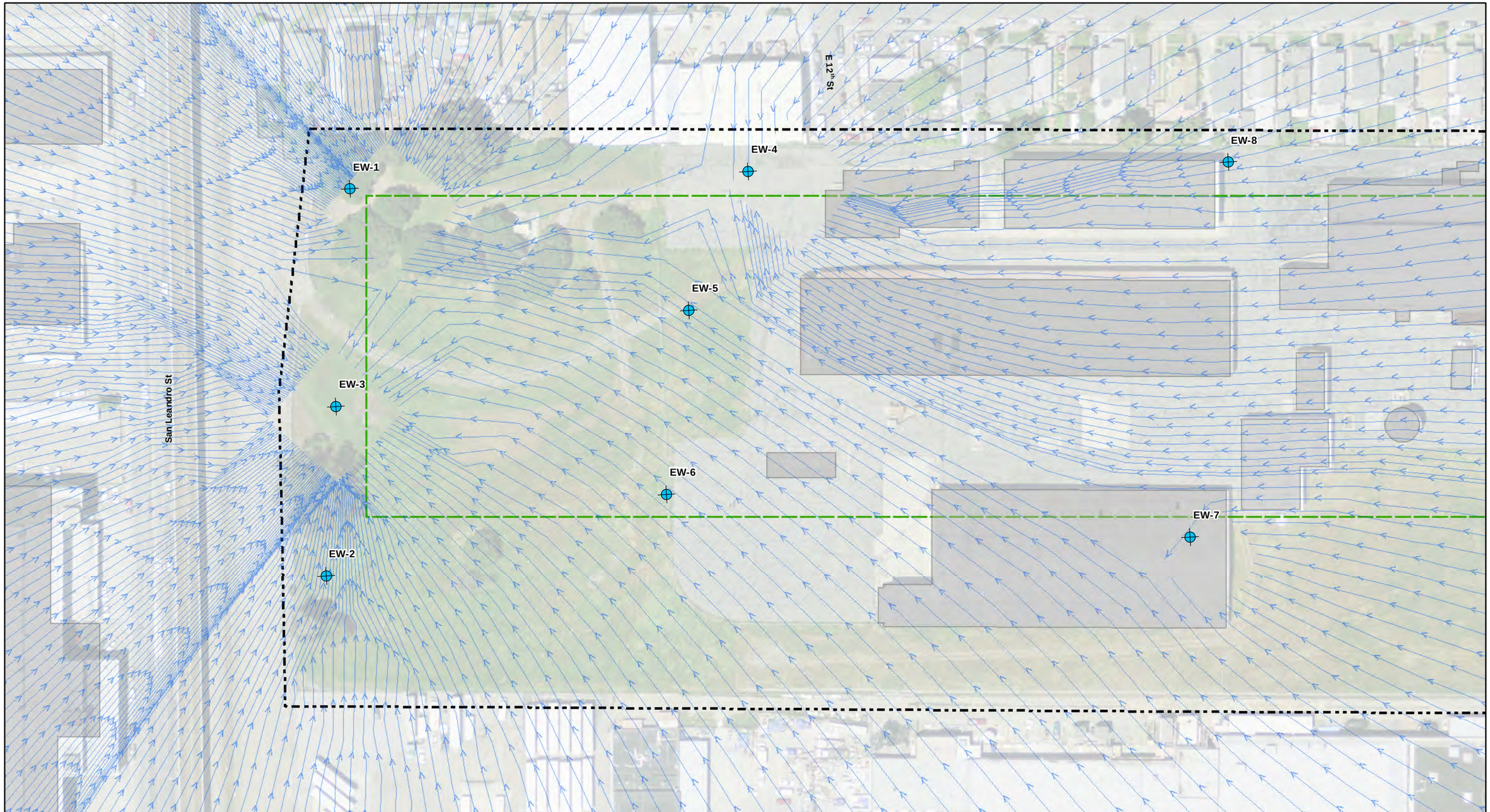

EXPLANATION

- Extraction Well (EW-6 Removed)
- Simulated Groundwater Flow Pathline in A-Zone and flow direction
- GE Site Boundary
- Buildings
- Approximate Footprint of Proposd Building

Extraction Well	Input Flow Rate
EW-1	5.14 gpm
EW-2	1.86 gpm
EW-3	0.22 gpm
EW-4	1.30 gpm
EW-5	0.00 gpm
EW-6	0.00 gpm
EW-7	0.70 gpm
EW-8	0.18 gpm

0 50 100 Feet

SIMULATED GROUNDWATER CAPTURE IN A-ZONE
EW-6 REMOVED
5441 International Boulevard
Oakland, California

wood.

By: KLU
Date: 02/12/2019
Prj. No. WDC7012.400.402
Figure **F-9**

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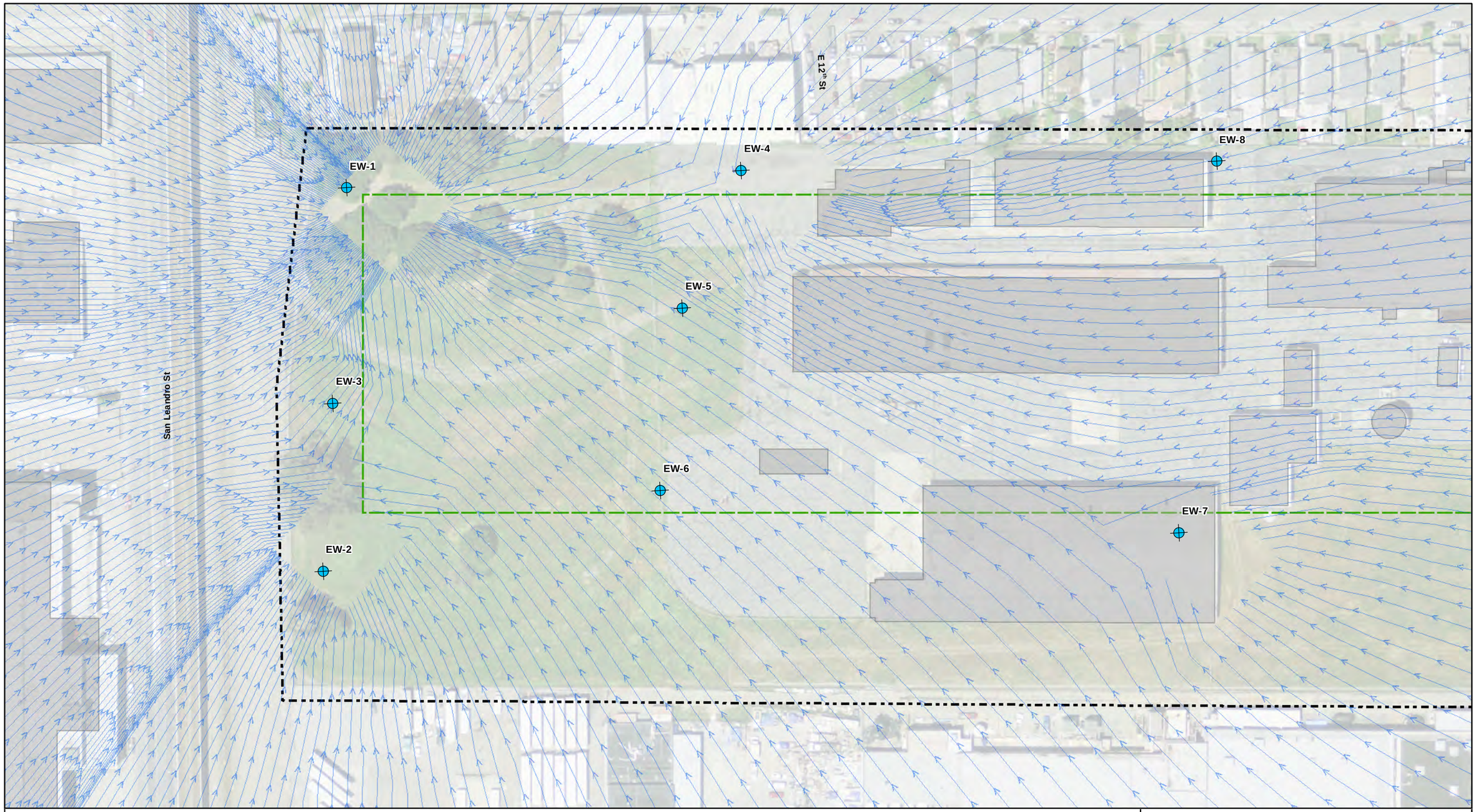

EXPLANATION

- Extraction Well (EW-6 Removed)
- Simulated Groundwater Flow Pathline in B-Zone and flow direction
- GE Site Boundary
- Buildings
- Approximate Footprint of Proposd Building

Extraction Well	Input Flow Rate
EW-1	5.14 gpm
EW-2	1.86 gpm
EW-3	0.22 gpm
EW-4	1.30 gpm
EW-5	0.00 gpm
EW-6	0.00 gpm
EW-7	0.70 gpm
EW-8	0.18 gpm

0 50 100 Feet

SIMULATED GROUNDWATER CAPTURE IN B-ZONE
EW-6 REMOVED
5441 International Boulevard
Oakland, California

wood.

By: KLU
Date: 02/12/2019

Prj. No. WDC7012.400.402
Figure **F-10**

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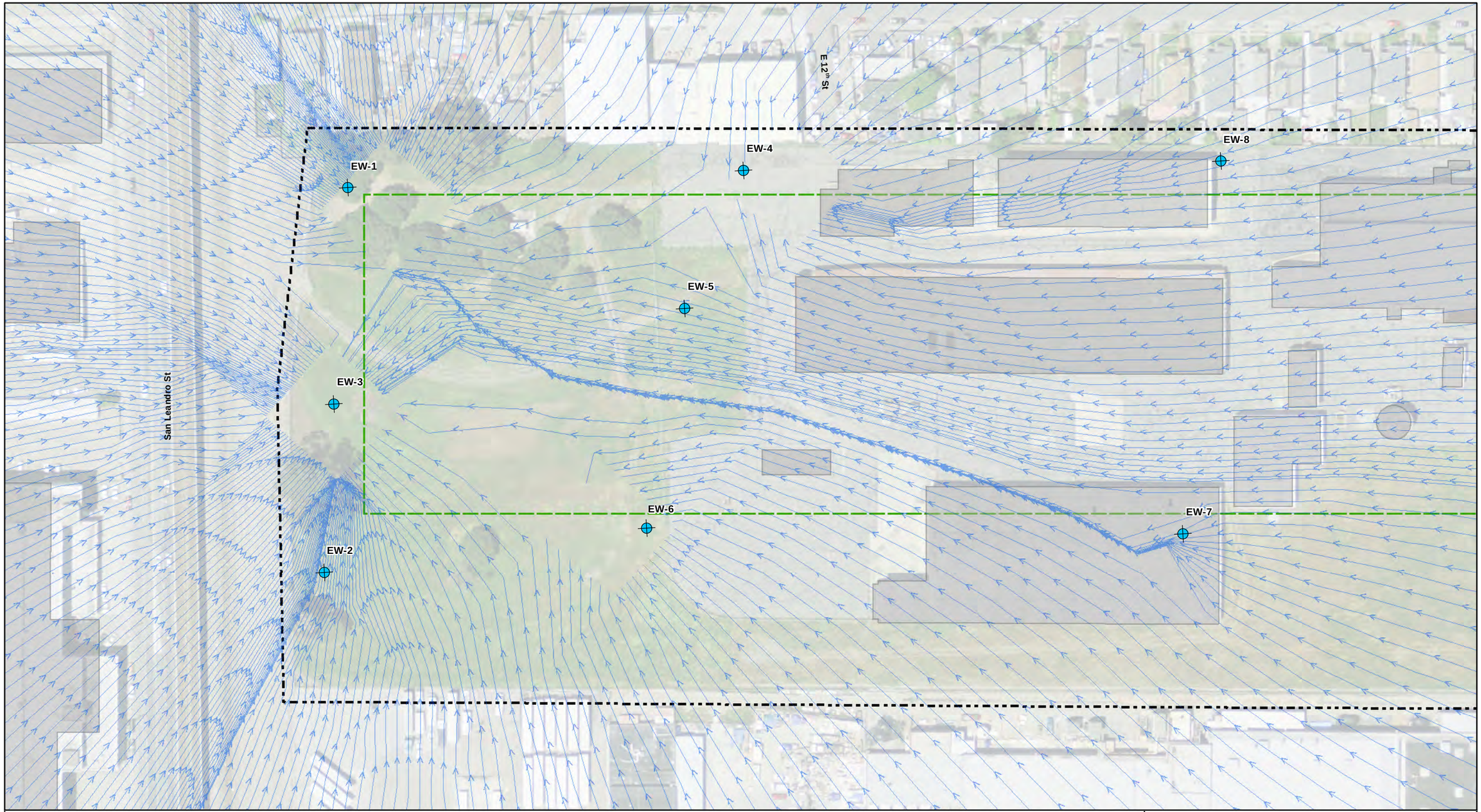

EXPLANATION

- Extraction Well (EW-6 Moved)
- Simulated Groundwater Flow Pathline in A-Zone and flow direction
- GE Site Boundary
- Buildings
- Approximate Footprint of Proposd Building

Extraction Well	Input Flow Rate
EW-1	5.14 gpm
EW-2	1.86 gpm
EW-3	0.22 gpm
EW-4	1.30 gpm
EW-5	0.00 gpm
EW-6	1.46 gpm
EW-7	0.70 gpm
EW-8	0.18 gpm

0 50 100 Feet

SIMULATED GROUNDWATER CAPTURE IN A-ZONE
EW-6 MOVED
5441 International Boulevard
Oakland, California

wood.

By: KLU
Date: 02/12/2019
Prj. No. WDC7012.400.402
Figure **F-11**

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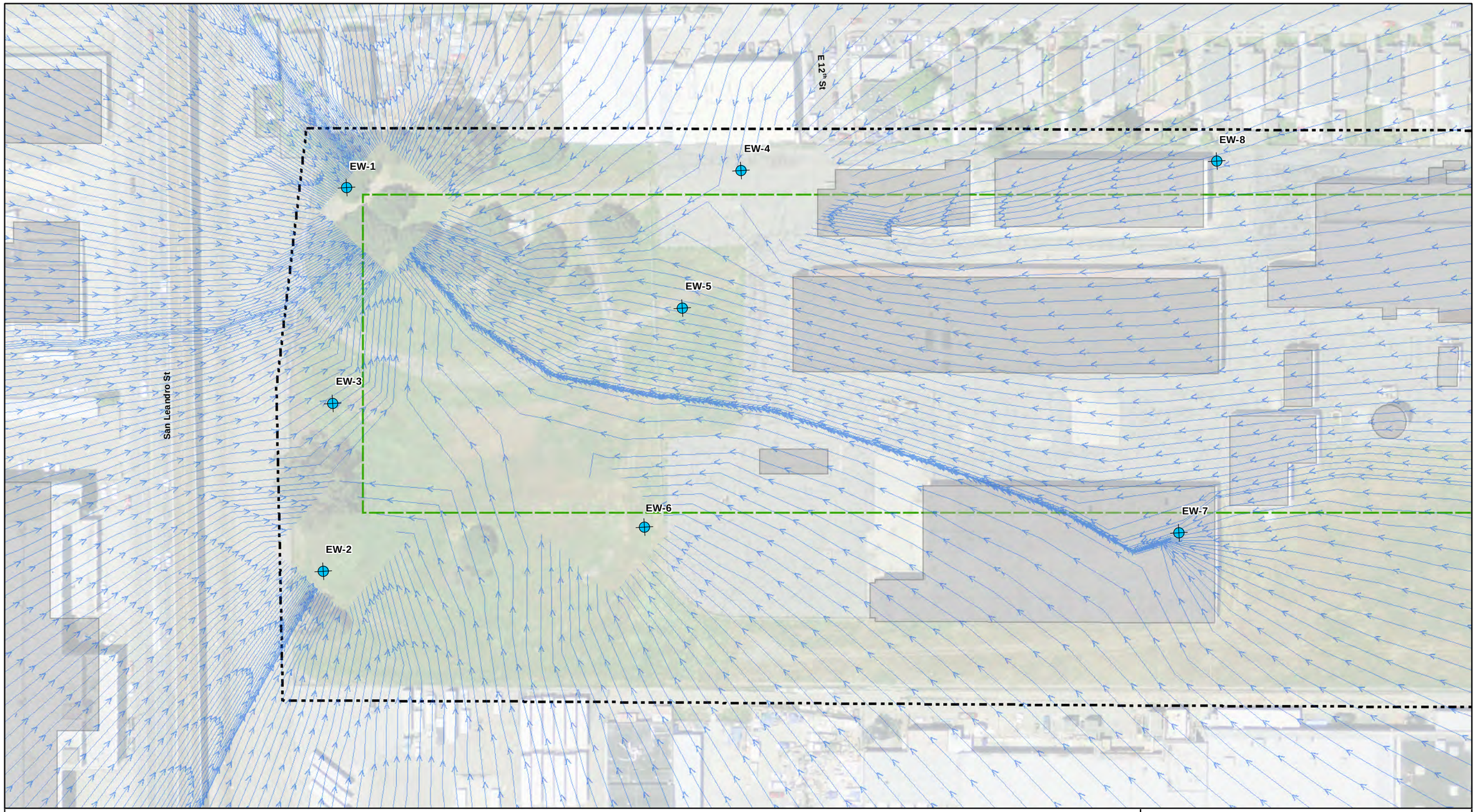


EXPLANATION

- Extraction Well (EW-6 Moved)
- Simulated Groundwater Flow Pathline in B-Zone and flow direction
- GE Site Boundary
- Capture Zone Boundary
- Buildings
- Approximate Footprint of Proposd Building

Extraction Well	Input Flow Rate
EW-1	5.14 gpm
EW-2	1.86 gpm
EW-3	0.22 gpm
EW-4	1.30 gpm
EW-5	0.00 gpm
EW-6	1.46 gpm
EW-7	0.70 gpm
EW-8	0.18 gpm

0 50 100 Feet

SIMULATED GROUNDWATER CAPTURE IN B-ZONE
EW-6 MOVED
5441 International Boulevard
Oakland, California

wood.

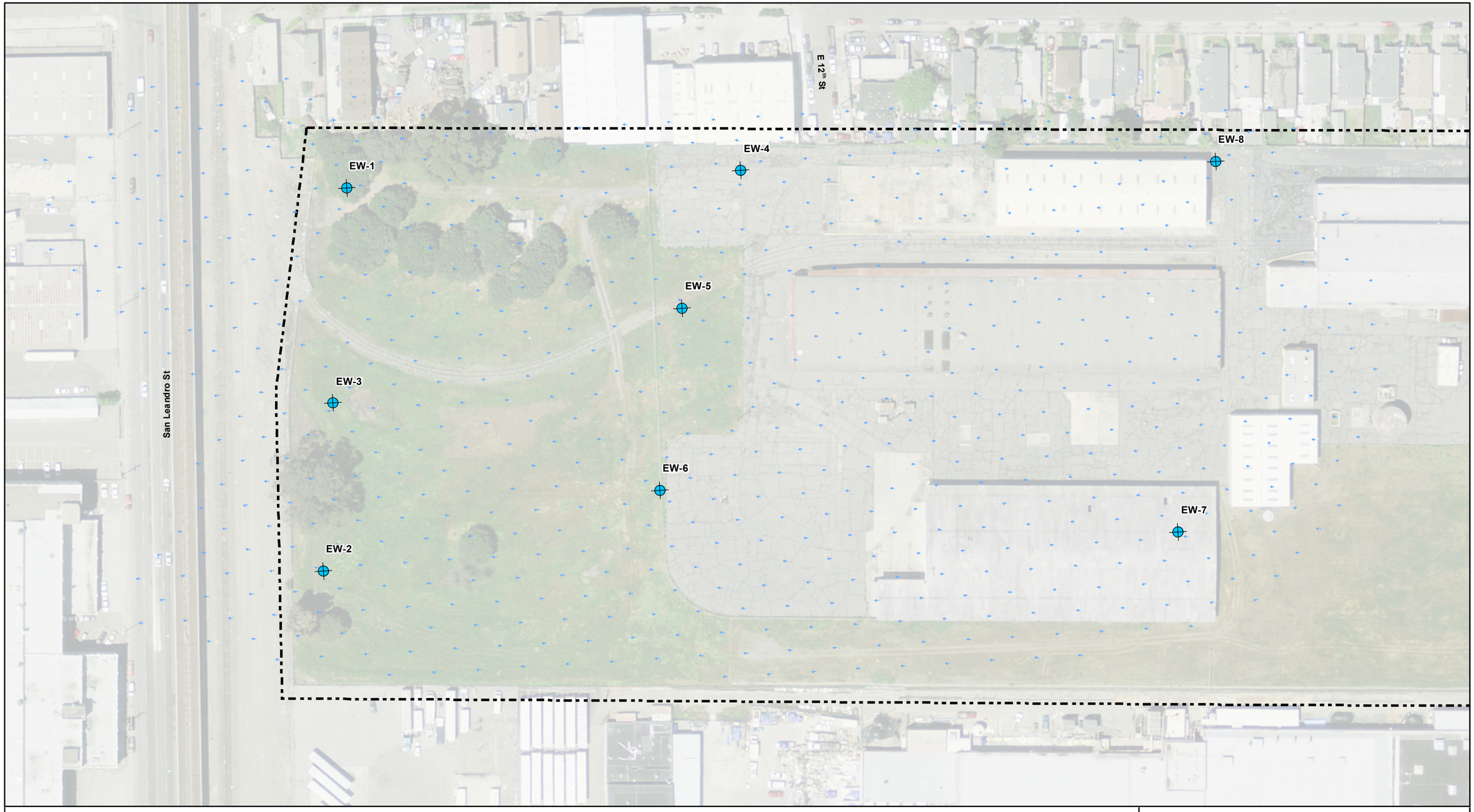
By: KLU

Date: 02/12/2019

Prj. No. WDC7012.400.402

Figure **F-12**

S:\180001\81202\phase_01_02\19_0131_RDIP_ApF_fig_F-12_CaptB.mxd



EXPLANATION

- Extraction Well
- Simulated Particle Track in B-Zone
- GE Site Boundary

Note:
Particle tracks simulate groundwater movement after one year, assuming that all extraction wells are shut down, and the groundwater head gradient approximates the background head gradient measured during the 2018 second semiannual monitoring event.

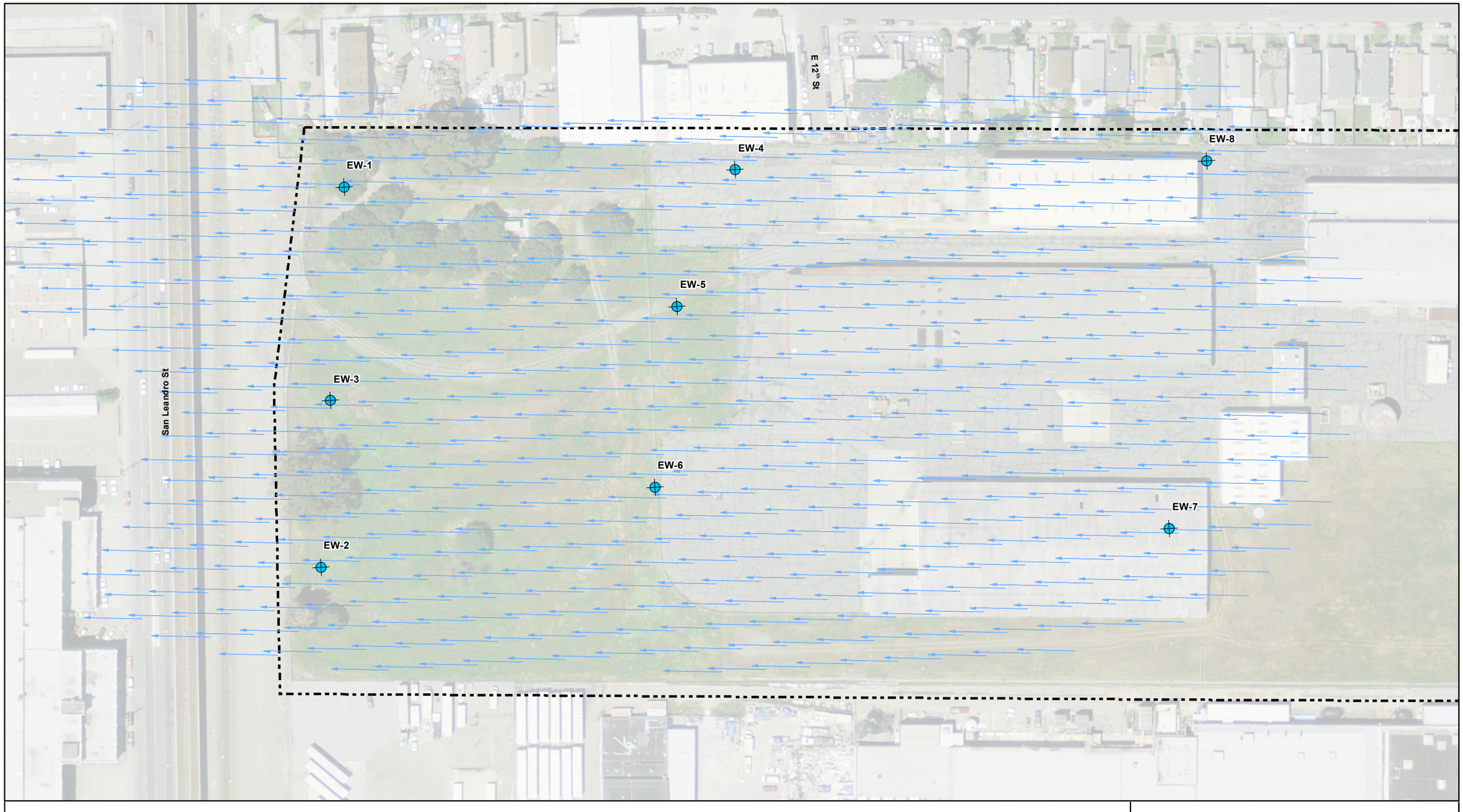
0 100 Feet

SIMULATED PARTICLE MOVEMENT IN B-ZONE:
LOW GRADIENT
5441 International Boulevard
Oakland, California

wood.

By: KLU	Prj. No. WDC7012.400.402
Date: 02/13/2019	Figure **F-13A**

S:\18000\181202\phase_01_02\19_0131_RDIP_ApF_fig_F-13A_Particle_Bzone_LG.mxd



EXPLANATION

- Extraction Well
- Simulated Particle Track in B-Zone
- GE Site Boundary

Note:
Particle tracks simulate groundwater movement after one year, assuming that all extraction wells are shut down, and the groundwater head gradient approximates the ground slope.

0 100 Feet

SIMULATED PARTICLE MOVEMENT IN B-ZONE:
HIGH GRADIENT
5441 International Boulevard
Oakland, California

wood.

By: KLU
Date: 02/13/2019
Prj. No. WDC7012.400.402
Figure **F-13B**

S:\180001\181202\phase_01_02\19_0131_RDIP_ApF_fig_F-13B_Particle_Bzone_HG.mxd

PROPOSED GETS COMPOUND

EW-1
EW-2
EW-3
EW-4
EW-7R
EW-7 (to be relocated)
EW-8
GW-4DR

GW-1A
GW-1BR
GW-1CR
GW-2A
GW-2BR
GW-2C
GW-2D
GW-3A
GW-3C
GW-3D
GW-1D
W-003BR
W-004BR
W-004AR
W-529A (to be relocated)
W-529AR
W-741B (to be relocated)
W-741BR
W-751A
W-803C
W-804B
W-805B

PROPOSED VAPOR DISCHARGE POINT

PROPOSED BUILDING FOOTPRINT

EXPLANATION

- EX — NEW EXTRACTION LINES (ONE PER WELL)
- (E)EX — EXISTING EXTRACTION LINE TO REUSE
- -V- — NEW VAPOR DISCHARGE LINE
- NEW JUNCTION BOX
- EXTRACTION WELL
- PROPOSED VAPOR DISCHARGE POINT
- MNA MONITORING WELL LOCATION
- GETS PERFORMANCE MONITORING WELL LOCATION
- PROPOSED LOCATION OF REPLACMENT MNA MONITORING WELL
- PROPOSED LOCATION OF REPLACEMENT GETS PERFORMANCE WELL
- PROPERTY LINE

N

0 80 160 Feet

GROUNDWATER EXTRACTION AND TREATMENT SYSTEM LAYOUT
5441 International Boulevard
Oakland, California

wood.

By: DMO
Date: 08/22/2019
Prj. No. WDC7012.200.202
Figure **F-14**

Plot Date: 08/22/19 - 10:23am Plotted by: kristin.uber
Drawing Path: S:\1800001\81202\phase_01_02\19_0131_RDIP_ApF\CAD_export\ Drawing Name: _fig_f_14_190822.dwg

ATTACHMENT 1

Modeling Parameters and Assumptions

ATTACHMENT 1
MODELING PARAMETERS AND ASSUMPTIONS
5441 International Boulevard
Oakland, California

For the capture zone and particle tracking analyses discussed in this Appendix, Wood used an existing numerical groundwater flow model. The model was created using the MODFLOW-2005 code (Harbaugh 2005). This attachment briefly describes the model, including its structure, parameters, and assumptions.

MODEL STRUCTURE, BOUNDARIES, AND PARAMETERS

The model consists of two layers, which represent the A-Zone (Model Layer 1) and B-Zone (Model Layer 2) at the site. The Model Layers are horizontal and of uniform thickness; the top of Model Layer 1 is set to a uniform elevation of 20 feet above mean sea level (ft msl), the boundary between Model Layers 1 and 2 is set to a uniform elevation of -18 ft msl, and the base of Model Layer 2 is set to a uniform elevation of -45 ft msl. The thickness of Model Layer 1 is 38 feet and the thickness of Model Layer 2 is 27 feet. Both layers are unconfined.

The horizontal extent of the model is 10,000 feet by 10,000 feet, consisting of 100 rows and 100 columns of cells that are 100 feet by 100 feet. The site is located at the approximate center of the model grid.

The upper and lower boundaries of the model grid are considered no-flow boundaries, meaning that no flux can occur through them; this assumes that recharge is negligible, and that groundwater exchange with underlying units is also negligible. The horizontal model boundaries are Constant Head Boundaries (CHDs); at these boundaries, a groundwater head value is specified, and groundwater is free to move in or out of the model to maintain this head value. The only other route for water to enter or leave the model is via the extraction well system. A brief discussion of the heads and fluxes specified along the model boundaries is included below.

The groundwater model is run in steady-state, which means that the model simulates groundwater conditions at infinite time. All model stresses are invariable.

Parameters utilized in the groundwater flow model are limited to the horizontal and vertical hydraulic conductivity of the aquifer materials. The Model Layer 1 horizontal hydraulic conductivity (K_h) is 0.05 feet per day (ft/d), and the vertical hydraulic conductivity (K_v) is 0.005 ft/d. The Model Layer 2 K_h is 11 ft/d, and the K_z is 0.01 ft/d. Because the model is run in steady-state, storage parameters are not used. Porosity, which affects the motion of particles (see below), is 0.3.

MODEL BOUNDARY VALUES

As noted above, the only model boundaries that allow for groundwater flow in or out of the model are the horizontal CHDs and the extraction wells. The CHD head values and extraction well pumping rates are set each time the model is updated to reflect a particular period of time. For extraction wells that are screened across multiple Model Layers, pumping is split between the layers based on the respective saturated transmissivity of the two layers, with approximately 0.7% of pumping assigned to Model Layer 1, and 99.3% assigned to Model Layer 2.

Typically, the model is used to construct capture zones for semi-annual reports; when this is done, the average extraction rate for each extraction well is calculated over the semi-annual period and applied to the model extraction well. The head values along the CHDs are then modified until the best fit is attained to the measurements collected from the monitoring wells on and near the site during the semi-annual event. Fit is measured by statistical means (minimizing average, standard deviation, and average absolute value of residual [difference between measured and simulated groundwater head] in each Model Layer) and by visual inspection (to prioritize fit in on-site wells).

CAPTURE ZONES

Capture zones for this and other reports are constructed using the MODFLOW-related particle tracking code MODPATH (e.g., Pollock 1994), which approximates the movement of completely conservative solutes based solely on three-dimensional groundwater flow. Because only part of the aquifer volume is available to groundwater flow, porosity (the proportion of the aquifer

volume consisting of open space) affects the distance that the particles move in a given period of time.

To the model capture zones, particles are introduced to the model along all of the horizontal boundaries (i.e., the CHDs). The particles are then tracked forward for infinite time until they leave the model, either by reaching a CHD, or being removed by an extraction well. Particle tracks that end at an extraction well together define the capture zone of that well. Capture zones for individual wells are combined to create the capture zone for the treatment system as a whole. Particle tracks that do not end at an extraction well, but instead end at a CHD, cover areas that are not captured.

MODEL ASSUMPTIONS

Many of the assumptions inherent in the groundwater model are stated above, but are listed here:

- The units are horizontal and of uniform thickness;
- Aquifer parameters (i.e., hydraulic conductivity and porosity) are uniform throughout each layer;
- Recharge is negligible;
- Vertical groundwater exchange with underlying layers is negligible;
- Extraction wells screened across both the A-Zone and B-Zone take groundwater dominantly from the B-Zone;
- Transient groundwater conditions can be adequately approximated by a steady-state model;
- The average extraction rate over the six-month period is adequately representative of the extraction rate leading up to the semi-annual monitoring event (alternatively, the water levels measured during the semi-annual monitoring event are sufficiently representative of the effects of groundwater extraction throughout the semi-annual period); and
- Groundwater capture can be represented by the movement of conservative particles.

REFERENCE

Harbaugh, A.W., 2005, MODFLOW-2005, the U.S. Geological Survey Modular Ground-Water Model – the Ground-Water Flow Process, U.S. Geological Survey Techniques and Methods 6-A16, 253p.Pollock, D.W., 1994, User's Guide for MODPATH/MODPATH-PLOT, version 3: A Particle-Tracking Post-Processing Package for MODFLOW, the U.S. Geological Survey Finite-Difference Ground-Water Flow Model, U.S. Geological Survey Open-File Report 94-464, 249p.

APPENDIX G

PHASE II BUILDING MATERIALS CHARACTERIZATION REPORT, GEOSYNTEC, 2010

5441 International Boulevard
Oakland, California

Draft Final - August 2019

(EKI B70123.01)

August 2019 Note to Reviewer from EKI

The following Phase II Building Materials Characterization Report (Geosyntec, 2010) was originally provided with a draft version of the Phase I Building Assessment Report (ARCADIS, January 2009) attached as Appendix A. For completeness, EKI has replaced the draft text, tables and figures of the ARCADIS report with finalized versions, dated January 2009. The Phase II Building Materials Characterization Report was also published by Geosyntec without Figures 1-3. These figures are not available to EKI; therefore, they are not included in this Appendix.

Prepared for

General Electric
Oakland, California

PHASE II BUILDING MATERIALS CHARACTERIZATION REPORT

GE FACILITY
OAKLAND, CALIFORNIA

Prepared by

Geosyntec consultants

engineers | scientists | innovators
10875 Rancho Bernardo Road, Suite 200
San Diego, California 92127

Project Number: SC0509

July 2010

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Appendix A: Portions of the Draft Phase I Building Assessment Report, ARCADIS, January 2009
Appendix B: Summary Report: Phase 2 Hazardous Materials Survey, SCA, June 2010

August 2019 Note to Reader: Appendix A had been replaced with the final report

1.0 INTRODUCTION

Geosyntec Consultants (Geosyntec) is pleased to present General Electric Company (GE) this *Phase II Building Materials Characterization Report* (Report) which describes the results of the additional building material sampling completed at the GE facility in Oakland, California. This Report was prepared by Jennifer Schwartz, P.E. and has been reviewed by Jim Cox in accordance with the peer review policy of the firm. This Report has been provided to summarize results of the additional sampling of building materials performed and to provide recommendations for where building materials should go during demolition.

1.1 Background

The GE Oakland facility is located at 5441 International Boulevard, Oakland, California (the Site). The Site consists of approximately 24 acres between International Boulevard and 54th Avenue (Figure 1). The property is bordered by commercial property to the southeast, railway to the southwest, and commercial and residential property to the northwest.

The property was formerly used for the manufacturing and servicing of transformers. Manufacturing is no longer performed at the facility, and the Site is currently undergoing remediation activities under a Consent Order (Docket # HAS 96/97-061) with the California Department of Toxic Substances Control (DTSC). The primary constituents of concern at the Site include polychlorinated biphenyls (PCBs) and volatile organic compounds (VOCs), including trichloroethene (TCE), cis-1,2-dichloroethene (cDCE), and vinyl chloride (VC).

The Site is being prepared to undergo building demolition. A *Phase I Building Assessment Report* was completed in 2009 by ARCADIS. Asbestos abatement activities were performed at the Site in October 2009, and tanks were removed from the Site by December 2009.

2.0 SAMPLING ACTIVITIES

The following sections describe the sampling activities performed during Phase I and Phase II building material investigations.

2.1 Phase I

The Phase I building assessment was completed by ARCADIS and their subcontractor, LFR, Inc., during September through November 2008. The results of the Phase I assessment were summarized in the *Draft Phase I Building Assessment Report* prepared by ARCADIS in January 2009. Portions of the Phase I report are included in this Report as Appendix A. This section summarizes the Phase I report.

The scope of the assessment activities was limited to facility structures and associated equipment and did not include soil, groundwater, or other environmental media; activities were performed to provide data for the conceptual understanding of the conditions and potential impacts to the building interiors. The structures that were subject to the assessment activities included: Building 1 (High Bay and first and second floor office areas), Buildings 2, 4, 8, 9, 17, 18, 20, and 21, Pump House, and exterior tanks. The following Phase I Pre-Demolition Building Assessment activities were completed:

- Historic document review;
- Verification of electric service disconnection and lockout/tagout of remaining energy sources during sampling activities;
- An asbestos survey;
- Building material sampling and analyses; and
- Visual observation of tanks.

2.2 Phase II

The objective for obtaining additional building material characterization data was to better determine how building materials will be handled during building demolition activities, and to meet the primary goals of building demolition:

1. Retain concrete floors as part of the proposed environmental cap.
2. Salvage or recycle materials where possible, thereby reducing the volume of material being disposed of in landfills.
3. Minimize hazardous material requiring disposal at a hazardous waste landfill.

The Phase II building material assessment was completed in May 2010. Sample collection was performed by SCA Environmental, Inc. (SCA). SCA prepared *Summary Report: Phase 2 Hazardous Materials Survey* to summarize the sampling activities and present the analytical data. SCA's report is included in this Report as Appendix B. SCA followed Geosyntec's protocol for sample collection and analysis as outlined in the *Phase II Building Material Characterization Sampling Plan* prepared by Geosyntec in May 2010. The sampling methodology is summarized below for each type of media.

2.2.1 Concrete Slabs

Concrete samples were collected by coring the upper 3 inches of the concrete surface. During Phase I, concrete samples typically targeted stained areas, and surficial residue/staining was included in the samples; therefore, for Phase II only the bottom 2 inches of the core was submitted for analysis to better determine the vertical extent of PCB impacts in concrete. Samples were placed in glass jars with Teflon-lined lids, labeled, and stored on ice. In general, most samples were analyzed for total PCBs. Two samples from stained concrete areas were analyzed for VOCs and semi-volatile organic compounds (SVOCs) based on Phase I data.

2.2.2 Wipe Samples

A limited number of wipe samples were collected from painted, metal, or glass surfaces. Wipe samples were collected using a sterile gauze pad which was moistened with hexane. A 10 centimeter by 10 centimeter area was wiped down with the sterile gauze pad in both directions (horizontally and vertically across the grid) and the gauze placed in a 4-ounce amber jar. Samples were analyzed for total PCBs.

2.2.3 Paint Chips

The following steps were followed for paint chip sample collection:

1. Lead was analyzed in paint using a portable XRF unit prior to paint chip removal.
2. Wipe sample was then collected, if applicable.
3. The painted surface was decontaminated using the double wash/rinse method per 40 CFR Part 761, Subpart S.
4. Paint was then physically removed (i.e., chipped or peeled away) from surfaces and collected in glass jars with Teflon-lined lids. Samples were labeled and stored on ice.
5. The final, paint-free area was screened with the XRF unit again, and final lead reading recorded.
6. In a few areas where paint was removed from metal surfaces, another wipe sample was collected to confirm PCB concentrations following paint removal.

Samples were analyzed for total PCBs. Approximately 25 percent of paint chip samples were also analyzed for Title 22 Metals (including lead).

2.2.4 Brick and Cinderblock Walls

Paint was removed from brick and cinderblock surfaces prior to core sample collection, if applicable. Brick/cinderblock material was chipped out and collected from the walls following paint removal. Buildings 1 and 2 have double-layered brick walls with a separate layer of bricks on the exterior from the interior layer. Cores were collected from both exterior and interior bricks. Samples were placed in glass jars with Teflon-lined lids, labeled, and stored on ice. Samples were analyzed for total PCBs.

2.2.5 Equipment

Paint on equipment (such as cranes) was screened for lead with an XRF unit, and paint chip samples were collected. A limited number of wipe samples were also collected prior to and following paint chip removal to evaluate effectiveness of paint removal activities. Paint chip and wipe samples were analyzed for total PCBs. Approximately 25 percent of paint chip samples were also analyzed for Title 22 Metals (including lead).

2.2.6 Wood Supports

Core samples were collected from wood supports in Building 17. Samples were placed in glass jars with Teflon-lined lids, labeled, and stored on ice. Samples collected from Building 17 support posts were analyzed for PCBs, VOCs, and SVOCs.

2.2.7 Other Surface Features/Appurtenances

Other site features sampled consisted of bollards, safety railings, and the water tank. These materials are painted metal. Paint was screened with the XRF unit and chip samples were collected. A limited number of wipe samples were collected prior to and following paint chip removal to evaluate effectiveness of paint removal activities. Paint chip and wipe samples were analyzed for total PCBs, and one paint chip sample was also analyzed for Title 22 Metals.

3.0 RESULTS

This section provides a general description of the building areas and a summary of the Phase I and II investigations for each building. The results are presented in Appendices A and B. The buildings are depicted on Figure 2.

3.1 Building 1

Building 1 consists of a concrete slab with sunken areas, gravel-filled pits, sumps, and secondary containment areas. The walls are double-layered brick; the majority of exterior walls are plain brick, with one painted wall, and the interior walls are painted. Steel structural supports are throughout the building with overhead cranes. An office area is located at the northeast end of the building.

3.1.1 Paint

Phase I

Paint chip samples were collected from walls, steel beams, and the wood ceiling during Phase I; PCBs were detected ranging from 17 to 63.5 ppm, and lead was detected ranging from 38 to 2,700 ppm (ARCADIS, 2009).

Phase II

During Phase II activities, an XRF unit was used to screen paint for lead at 72 locations in Building 1. Per the U.S. Department of Housing and Urban Development (HUD) criteria of XRF readings having a result greater than or equal to 1 mg/cm^2, 23 of the 72 locations are defined as lead-based paint.

Four wipe samples were collected from painted surfaces for PCB analysis during Phase II. One sample had PCBs detected at 0.0015 µg/cm^2 (0.15 µg/100 cm^2) on a structural steel column and the remaining samples had no PCBs detected. Two wipe samples were also collected from metal surfaces following paint removal; PCBs were detected at 0.045 µg/cm^2 (4.5 µg/100 cm^2) and 0.059 µg/cm^2 (5.9 µg/100 cm^2).

Following XRF screening and wipe sample collection, the paint was decontaminated during Phase II, per Section 2.2.3, and paint chip samples were collected. A total of 11 paint chip samples were collected. PCBs were not detected in one sample and PCB concentrations ranged from 3.9 ppm to 130 ppm in the remaining 10 samples. Four samples were also analyzed for Title 22 Metals; cadmium, chromium, lead, and zinc concentrations exceeded Total Threshold Limit Concentration (TTLC) criteria. Lead concentrations ranged from 1,400 ppm to 49,000 ppm and zinc ranged from 14,000 ppm to 51,000 ppm. Cadmium and chromium exceed TTLC limits in one sample at concentrations of 110 ppm and 2,200 ppm, respectively.

3.1.2 Brick

Phase I

Phase I core samples were collected from the interior brick and wood surfaces; paint adhered to the surface of the core sample was included in the sample. Most PCBs detected in brick and wood core samples were below 1 ppm; one sample contained 3.1 ppm and another contained 47.1 ppm of PCBs (ARCADIS, 2009). The exterior brick was not characterized during Phase I activities.

Phase II

Following paint removal (if applicable), samples of brick were collected during Phase II for PCB analysis. Six interior and six exterior samples were collected. PCBs were detected in two interior samples at concentrations of 0.73 ppm and 1.2 ppm; PCBs were not detected in the remaining samples.

3.1.3 Concrete

Phase I

Phase I concrete core sampling typically targeted stained concrete floor areas. PCBs were detected with concentrations ranging from 0.56 ppm to 460 ppm, and VOCs and SVOCs were detected above TTLC limits in the concrete floor (ARCADIS, 2009).

Phase II

During Phase II sampling activities, 41 concrete core samples were collected from Building 1. Of these samples, PCBs were not detected in eight samples and total PCBs ranged from 0.60 ppm to 1,600 ppm. VOCs and SVOCs were tested for in two samples; concentrations of VOC and SVOCs were below applicable trigger standards. Concrete core sampling results are summarized in Figure 3.

3.1.4 Sumps

During Phase I, two debris samples were collected from sumps located in Building 1. The materials in the sumps contain PCBs from 1.8 ppm to 1,004 ppm. No further characterization was completed during Phase II.

3.1.5 Equipment

Phase I

Out of three wipe samples collected during Phase I, one PCB detection occurred on the metal surface of a vent with a concentration of 16 µg/wipe (ARCADIS, 2009). PCBs were not detected in oil samples from each bridge crane.

Phase II

One wipe sample was collected from a bridge crane during Phase II; PCBs were not detected.

3.1.6 Wood

Phase I

Six wood core samples were collected during Phase I and were analyzed for PCBs. PCB concentrations ranged from non-detect to 1.1 ppm. One of the wood core samples was also analyzed for VOCs and SVOCs, which were detected below TTLC concentrations. One paint chip sample, which was analyzed for lead, had a concentration of 100 ppm.

Phase II

No wood core samples were collected during Phase II. Paint on wood surfaces was screened for lead with a portable XRF unit as discussed in the "Paint" section above. Five out of the 18 XRF wood samples contained lead above the HUD criteria.

3.1.7 Windows

One wipe sample was collected from glass in Building 1 in Phase I and one wipe sample was also collected during Phase II; PCBs were not detected.

3.2 Building 2

Building 2 consists of a concrete slab with sumps, a sunken area, and a secondary containment area. A small office area and bathrooms are also located in the building. The walls are constructed with double-layered brick for the first 5 feet of wall height, and windows for the final 10 feet of wall height.

3.2.1 Paint

Phase I

Paint chip samples were collected from walls, steel beams, and the wood ceiling during Phase I; PCBs were detected ranging from 3.4 to 280 ppm, and lead was detected ranging from 1,300 to 20,000 ppm (ARCADIS, 2009).

Phase II

During Phase II activities, an XRF unit was used to screen paint for lead at 47 locations in Building 2. Per the HUD criteria of XRF readings having a result greater than or equal to 1 mg/cm^2, 16 of the 47 locations are defined as lead-based paint.

Four wipe samples were collected from painted surfaces for PCB analysis during Phase II; PCBs were not detected. Two wipe samples were also collected from metal surfaces following paint removal; PCBs were detected in one sample at 0.011 $\mu g/cm^2$ (1.1 $\mu g/100\ cm^2$).

Following XRF screening and wipe sample collection, the paint was decontaminated during Phase II, per Section 2.2.3, and paint chip samples were collected. A total of 10 paint chip samples were collected from walls and structural supports. PCBs were detected in all samples and concentrations ranged from 1.8 ppm to 64 ppm. Three samples were also analyzed for Title 22 Metals; chromium (1,400 to 2,600 ppm), lead (7,200 to 18,000 ppm), and zinc (8,300 to 26,000 ppm) concentrations exceeded TTLC limits in each sample, and mercury (24 ppm) exceeded TTLC limits in one sample.

3.2.2 Brick

Phase I

Core samples were collected from the interior brick and wood surfaces; paint adhered to the surface of the core sample was included in the sample. PCBs detected in brick and wood core samples were below 1 ppm (ARCADIS, 2009). The exterior brick was not characterized during Phase I activities.

Phase II

Following paint removal (if applicable), samples of brick were collected during Phase II for PCB analysis. Six interior and six exterior samples were collected. PCBs were detected in each interior sample with concentrations ranging from 1.2 ppm to 2.5 ppm; PCBs were not detected in the exterior samples.

3.2.3 Concrete

Phase I

Phase I concrete core sampling typically targeted stained concrete floor areas. PCBs were detected at concentrations ranging from 0.051 to 6.3 ppm and VOCs and SVOCs were detected below TTLC limits in the concrete floor (ARCADIS, 2009).

Phase II

During Phase II sampling activities, 20 concrete core samples were collected from Building 2. Of these samples, PCBs were not detected in 13 samples, and total PCB concentrations ranged from 1.1 ppm to 23 ppm in the remaining samples. Concrete core sampling results are summarized in Figure 3.

3.2.4 Sumps

During Phase I, one debris sample was collected from one of the sumps located in Building 2. The materials in the sump contained PCBs at a concentration of 3.3 ppm. No further characterization of sumps was completed during Phase II.

3.2.5 Equipment

Phase I

PCBs were not detected in oil samples from each bridge crane. No further oil samples are anticipated at this time; however, waste characterization sampling may be required for additional parameters after equipment oil is drained and containerized.

Three wipe samples were collected during Phase I (from ceiling vents and a metal door); PCBs were detected from non-detect to 7.6 µg/wipe.

Phase II

One wipe sample and paint chip sample were collected from the central shop crane. PCBs were not detected in the wipe sample, but were detected at 2.4 ppm in the paint.

3.2.6 Wood

Phase I

Three wood core samples were collected from the ceiling; no PCBs were detected, and VOCs and SVOCs were detected below TTLC limits. A paint chip sample was collected from the wood ceiling and analyzed for PCBs and lead, which were detected at 280 ppm and 1,300 ppm, respectively.

Phase II

During Phase II, wood cores were not collected. Paint on wood surfaces was screened for lead with a portable XRF unit as discussed in the "Paint" section above. Two out of the nine XRF wood samples contained lead above the HUD criteria.

3.2.7 Windows

No samples were collected from glass surfaces during Phase I. Two wipe samples were collected from windows during Phase II; PCBs were not detected.

3.3 Building 8

Building 8 was formerly used for sandblasting. The building consists of a concrete floor and cinderblock walls. Sandblasting media remains in the building and was analyzed for metals. Sandblasting media will be removed and characterized separately during demolition activities.

3.3.1 Concrete

Phase I

During Phase I, PCBs were detected below 1 ppm in all but one sample (2.49 ppm) in the cinderblock walls, concrete floor, and sump. VOC concentrations were detected below TTLC limits. The sample that exceeded 1 ppm of PCBs included concrete floor and sandblasting media (ARCADIS, 2009).

Phase II

The above floor sample was resampled, without sandblasting material, during Phase II; PCBs were not detected in this sample. An additional concrete core sample was collected in Building 8 during Phase II and PCBs were not detected. Concrete core sampling results are summarized in Figure 3.

3.3.2 Paint

During Phase I, PCBs and lead were detected in one paint chip sample from a metal door frame at concentrations of 98 ppm and 1,100 ppm, respectively (ARCADIS, 2009). Additional waste characterization samples will be collected from painted surfaces during demolition activities.

3.3.3 Cinderblock

Two core samples were collected from the cinderblock walls of Building 8 during Phase II. PCBs were detected in each sample at concentrations of 0.96 ppm and 1.1 ppm.

3.4 Building 17

Building 17 is an open-sided, metal panel building with wooden supports throughout the building, with a concrete floor.

3.4.1 Concrete

Phase I

Two concrete core samples were collected during Phase I; PCBs were detected in one sample at a concentration of 0.052 ppm (ARCADIS, 2009).

Phase II

Three additional concrete samples were collected during Phase II; PCBs were not detected. Concrete core sampling results are summarized in Figure 3.

3.4.2 Paint

PCBs were not detected in the three wipe samples collected from the building in Phase I. Paint chip samples from a metal staircase had a PCB concentration of 2.0 ppm and lead concentration of 1,100 ppm (ARCADIS, 2009). No additional sampling was completed during Phase II. Additional sampling of paint may be required for salvage/disposal purposes during demolition activities.

3.4.3 Wood

Phase I

During Phase I, one wood core sample was collected from a wooden support post. PCBs were not detected. Pentachlorophenol was detected in the sample at a concentration exceeding the TTLC (ARCADIS, 2009).

Phase II

Five additional wood core samples were collected during Phase II; PCBs were not detected and pentachlorophenol was detected at concentrations exceeding the TTLC. Naphthalene, 4-methyl-2-pentanone, xylenes, isopropyl toluene, and toluene were detected in different combinations exceeding TTLC concentrations in some of the samples.

3.5 Building 18

Building 18 consists of a concrete floor with metal panel walls and a steel frame. This building is currently used to store metal shelving/racks.

3.5.1 Concrete

Phase I

PCBs were detected below 1 ppm in the concrete floor in three samples during Phase I. Based on a statistical analysis, two more samples were collected to verify PCB concentrations in the concrete floor (to achieve a 99 percent confidence level).

Phase II

During Phase II, PCBs were not detected in one sample and were detected at 12 ppm in the other sample. Concrete core sampling results are summarized in Figure 3.

3.5.2 Paint

During Phase I, PCBs and lead were detected in the one paint sample from the sliding door at a concentration of 5.3 ppm of PCBs and 400 ppm of lead. No additional paint chip samples were collected during Phase II. Additional sampling may be required for salvage/disposal purposes during demolition activities.

PCBs were detected in Phase I wipe samples from a structural beam at 14 and 22 µg/wipe. The samples were collected from an area with a "residue" (ARCADIS, 2009).

3.6 Building 20

Building 20 is a small, metal panel-sided building on a concrete slab.

3.6.1 Concrete

Phase I

Three concrete core samples were collected during Phase I; two samples were below 1 ppm and one sample had a PCB concentration of 1.03 ppm in the containment area.

Phase II

Two additional concrete core samples were collected in Phase II and PCBs were detected at concentrations of 0.56 ppm and 3.6 ppm. Concrete core sampling results are summarized in Figure 3.

3.6.2 Paint

Phase I

Lead was detected at a concentration of 7,500 ppm in a paint chip sample collected from a metal sliding door. No PCB analyses were done for the paint chip sample (ARCADIS, 2009).

Two wipe samples and one field duplicate were collected from building materials. PCB concentrations were up to 7.0 µg/wipe (ARCADIS, 2009).

Phase II

A paint chip was collected, from the same area as above, during Phase II and analyzed for PCBs; PCBs were detected at a concentration of 5.9 ppm.

3.7 Building 21

Building 21 formerly housed several aboveground storage tanks which were removed from the site by December 2009. The building consists of metal panel walls and a concrete floor.

PCBs were not detected in the concrete floor core samples, but were detected at 68 ppm in residue from a concrete sump. Levels of VOCs and SVOCs were detected in concrete samples below TTLC limits. No additional concrete floor samples were collected during the Phase II characterization activities in Building 21. Building 21 will be addressed during demolition and described in the Demolition Specifications.

PCBs and lead were detected in one paint chip sample collected at 0.29 ppm and 82 ppm, respectively. PCBs were not detected in three building material wipe samples (ARCADIS, 2009). No wipe or paint samples were collected during Phase II. Samples will be collected during demolition activities.

3.8 Other Features/Appurtenances

Exterior site features have not previously been characterized. During Phase II, exterior site features were selected for sampling based on the color of paint. Paint chip samples were collected from the water tank with silver and orange paint, a bollard with red paint, and safety rails with yellow paint. PCBs were detected in the safety rail paint and water tank paints at concentrations of 0.99 ppm and 3.3 ppm, respectively. PCBs were not detected in the bollard paint. The paint chip sample from the water tank was also analyzed for Title 22 Metals; chromium and lead were detected above the TTLC at 2,800 ppm and 46,000, respectively.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the data from the Phase I and Phase II building material assessments, the following sections will discuss options for materials handling during building demolition activities, and how to meet the primary goals of building demolition:

1. Retain concrete floors as part of the proposed environmental cap.
2. Salvage or recycle materials where possible, thereby reducing the volume of material being disposed of in landfills.
3. Minimize hazardous material requiring disposal at a hazardous waste landfill.

The following criteria apply for retaining materials onsite or for recycling/disposal offsite:

- For materials to remain on the Site:
  - If the material is to be place **under** the cap, it must already be in place (i.e., undisturbed concrete) or have less than 100 ppm PCBs (i.e., for brick to be used as fill material) (40 CFR Part 761.61(a)(4)(i)(B)(3))
- For materials removed from the Site:
  - Materials to be reused should have a PCB concentration of less than 10 µg/100 cm^2 (40 CFR Part 761.79) and based on individual acceptance criteria at recycling/salvaging facilities.
  - Materials having a PCB concentration greater than 50 ppm or wipe sample results greater than 10 µg/100 cm^2 will be disposed of offsite as Toxic Substances Control Act (TSCA) waste.
  - Materials containing lead, metals, VOCs, or SVOCs with concentrations exceeding the TTLC will be disposed of as Cal-Haz.
  - Materials with constituents that exceed Toxic Characteristic Leaching Procedure (TCLP) limits will be disposed of offsite as RCRA hazardous waste.
  - Materials containing asbestos will be disposed of at an approved facility.

4.1 Paint

Based on Phase I and Phase II characterization results, lead-based paints, as defined by HUD, were identified on a variety of substrates at the Site. Also, paint chip samples analyzed for Title 22 Metals contained levels of lead, zinc, chromium, cadmium, and mercury exceeding the TTLC. TCLP levels were also exceeded in some of the samples for different metals (mostly lead).

Onsite paint typically appears to be manufactured with lead and PCBs. The assumption that PCBs are in the paint is based on the low results during wipe samples, and the PCB concentrations in paint chip samples following decontamination of paints. Most PCB concentrations in paint were below 50 ppm; however, PCBs were detected above 50 ppm in some locations.

Therefore, paints at the Site should be treated as having PCBs in them and a lead content greater than 600 ppm, requiring dust control procedures in compliance with 8 CCR 1532.1. Loose and peeling paints will be removed prior to any demolition activities. Loose paint chips will be collected and drummed for disposal. Additional characterization samples from the drums should be collected prior to disposal.

Materials with paint securely adhered are likely unable to be recycled/salvaged due to PCB impacts and the costs associated with removing paint. Additional waste characterization samples may need to be collected prior to offsite disposal.

4.2 Brick/Masonry

Brick that is in good condition, not painted, and not impacted with PCBs can be re-used. Broken brick (clean from paint and PCB impacts) may be taken to local recyclers. The majority of the exterior brick on Buildings 1 and 2 may be able to be reused or recycled if separation from the interior brick is cost-effective and feasible. An appropriate recycling company will be found for accepting the brick, and their acceptance criteria will be followed.

Alternatives for physically removing paint from brick walls (i.e., sand-blasting) will be evaluated during preparation of Demolition Specifications. Removed paint will be treated as discussed in Section 4.1. Cleaned brick may be able to be recycled pending acceptance by the recycler. However, if it is unfeasible to remove paint, painted brick may be deposited onsite as fill material in lower concrete areas, or may be disposed of offsite.

Cinderblock is typically not recycled and will be used as fill material onsite or disposed of offsite.

4.3 Concrete

The concrete slabs at the Site were evaluated to be used as part of the cap. Concrete with PCB concentrations below 1 ppm that cannot reasonably be scarified will be left exposed on the Site and act as part of the cap. Concrete with PCB concentrations equal to or greater than 1 ppm will remain in place and will be capped over with the proposed asphalt cap.

Based on the data collected, the slab for Building 1 will be capped over. In the low-lying areas of the Site, crushed brick or other debris from the demolition activities may be able to be placed in the lower areas to make the slab level. The slab from Building 21 will also be placed under the cap. The elevated portions of concrete should be broken down and used to fill in the lower portions.

Additional sampling of concrete in Buildings 2, 18, and 20 may be required to confirm PCB concentrations and extent of impacts to better evaluate if the slabs should be left uncapped.

Buildings 4, 8, and 17 have concentrations below 1 ppm. A statistical analysis of the data for these slabs was performed using the Wilcoxon rank-sum test which indicated, with a 99 percent confidence level, that a sufficient number of samples were collected to support that the concentrations of PCBs in the concrete are below 1 ppm, and therefore the concrete slabs will remain onsite as part of the cap.

Being able to leave concrete materials onsite and being able to use demolition materials under the cap are pending acceptance by the regulatory agency (DTSC) and City of Oakland.

4.4 Metal

Painted metal items will most likely be disposed of offsite due to the PCB concentrations in the paint and the unfeasibility of removing paint. Prior to disposal, loose and peeling paint will be removed per Section 4.1. Additional paint samples may be required by the disposal facility.

Unpainted materials, such as metal siding on Building 17, may be accepted by metal salvagers for reuse or recycling.

4.5 Windows

Windows in Building 2 contain asbestos in the caulking (see Section 4.7 below) and will be disposed of at a facility qualified to accept asbestos materials. The majority of windows will likely be disposed of offsite as non-hazardous. If windows have paint on them, they will likely be disposed of offsite as hazardous due to the PCBs and lead in the paint.

4.6 Wood

Wood with no paint can be chipped and used either for fuel or mulch. Wood with lead and PCB paint will likely have to be disposed of at an appropriate landfill. The wood support posts in Building 17 are impacted with pentachlorophenol above TTLC limits and will need to be disposed of offsite at an appropriate landfill as Cal-Haz. Additional waste characterization samples may be required by the disposal facility.

4.7 Asbestos Abatement

Materials identified as asbestos-containing materials (ACM), asbestos-containing construction materials (ACCM), and light bulbs/ballast, switches, and debris during the Phase I assessment were removed and appropriately disposed of in 2009 to prepare the Site structures and features for demolition.

A limited amount of ACM was left onsite due to the difficulty of removing the material without demolishing the building:

- Shingles on the roof of Building 1;
- Window caulking in Building 2;
- Rolled composite and shingles on the roof of Building 8.

These materials will be removed and appropriately disposed of during demolition activities.

5.0 REFERENCES

ARCADIS, 2009. *Draft Phase I Building Assessment Report*. Prepared for General Electric, January.

Geosyntec, 2010. *Draft Phase II Building Material Characterization Sampling Plan*. Prepared for General Electric, May.

SCA, 2010. *Summary Report: Phase 2 Hazardous Materials Survey*. Prepared for Geosyntec Consultants, June.

APPENDIX A

Portions of the

Draft Phase I Building Assessment Report, ARCADIS, January 2009

August 2019 Note to Reader: The indicated draft report has been replaced with the final version in this copy.

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Phase I Building Assessment Report

East 14th Street Facility
Oakland, California

January 2009

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Phase I Building Assessment Report

East 14th Street Facility
Oakland, California

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Appendices

A Photo Log of Visible Site Features

B Historical File Index

C Sampling Logs

D Photo Log of Sampling Locations

E Laboratory Reports

F Limited Asbestos Survey

ACCM	Asbestos Containing Construction Materials
ACM	Asbestos Containing Materials
AHERA	Asbestos Hazard Emergency Response Act
ARCADIS	ARCADIS U.S., Inc
BAR	Building Assessment Report
BARMM	Building Assessment Report Memorandum (ARCADIS, October 8, 2008)
Cal OSHA	California Occupational Safety and Health Act
CCR	California Code of Regulations
CFR	Code of Federal Regulations
EMSL	EMSL Analytical, Inc.
GE	General Electric Company
Geosyntec	Geosyntec Consultants
LF	Linear Foot
LFR	LFR, Inc.
mg/kg	milligrams per kilogram
NESHAP	National Emission Standards for Hazardous Air Pollutants
OSHA	Occupational Safety and Health Act
PACM	Potential Asbestos Containing Materials
PCB	Polychlorinated biphenyl

ppb	parts per billion
ppm	part per million
RCRA	Resource Conservation and Recovery Act
SAP	Sampling and Analysis Plan (ARCADIS, October 2008)
SAP Addendum	Addendum No.1 Sampling and Analysis Plan (ARCADIS November 2008)
SES	Sevenson Environmental Services, Inc.
SF	Square Foot
STLC	Soluble Threshold Limits Concentrations
SVOC	Semi-Volatile Organic Compound
TCLP	Toxicity Characteristic Leaching Procedure
TEM	Transmission Electron Microscope
TestAmerica	TestAmerica Laboratories, Inc.
TSCA	Toxic Substance Control Act
TTLC	Total Threshold Limits Concentrations
$\mu g/cm^2$	Microgram per square centimeter
USEPA	United States Environmental Protection Agency
VFT	Vinyl Floor Tile
VOC	Volatile Organic Compound

1. Introduction

This Phase 1 Building Assessment Report (BAR) presents the results of the Phase 1 pre-demolition building assessment for the General Electric Company (GE) Oakland, California facility located at 5441 East 14th Street (also known as International Boulevard), Oakland, California (the site). This BAR has been prepared as part of the Phase I Pre-Demolition Building Assessment. The assessment activities were performed in general accordance with the following facility-specific documents:

- ARCADIS U.S., Inc.'s (ARCADIS') July 23, 2008 *Pre-Demolition Building Assessment Scope of Work* letter to GE.
- ARCADIS' October 28, 2008 *Scope of Work for Additional Pre-Demolition Building Assessment - Phase I* letter to GE.
- *Sampling and Analyses Plan (SAP)* (ARCADIS, October 2008).
- *Addendum No. 1 to Sampling and Analyses Plan* (SAP Addendum) (ARCADIS, November 2008).

Certain facility-related information has already been presented in the above-referenced documents and in the draft Building Assessment Report Memorandum (ARCADIS, October 8, 2008) (BARM). To avoid repetition, specific sections of these documents may be referenced in this BAR, as appropriate.

1.1 Site Description and Background

GE's East 14th Street Oakland facility originally consisted of five buildings and two radio towers. During the course of operations, the facility underwent expansions and modifications and currently ten buildings are present at the site. A more detailed description of the current site and facility structures is included in the BARM.

The facility operated as a transformer manufacturing facility from 1924 through 1975. Site activities included, but were not limited to, the manufacture of transformers containing polychlorinated biphenyl- (PCB-) oils and the importation and storage of PCB-oils to meet operational needs. After 1975 the facility's use was limited to serving as GE's Oakland Apparatus Service Shop and as a storage facility. Current site activities are limited to storage and soil/groundwater remediation.

1.2 Site Location and General Description

The facility is located at 5441 East 14th Street, also known as International Boulevard, in Oakland, California. The property consists of approximately 24 acres of land on the southwest side of International Boulevard and the southeast side of 54th Avenue. The property is bordered by a commercial/industrial property to the southeast, railway to the southwest and commercial and residential properties to the northwest. A site location is presented on Figure 1.

The site is surrounded by a perimeter fence and 24-hour security service is provided. Most of the site is covered by asphalt pavement; however, a grassy area is located on the western end of the property outside the fence.

The facility features ten building structures with the majority of process-related equipment previously removed. The approximate location of the facility structures is shown on Figure 2. A photo log of the existing visible site features is included as Appendix A.

1.3 Report Organization

Section	Description
1. Introduction	Presents a site description and background and organization of the report.
2. Pre-demolition Building Assessment Scope and Objectives	Presents the scope and objectives of the building assessment activities.
3. Phase I Visual Assessment Activities	Presents an account of the historic document review and visual observation of tanks.
4. Electric Disconnections	Describes the electric disconnections performed prior to and reconnections made following the assessment activities.
5. Sampling and Analyses	Presents the proposed and actual sample quantities and sampling protocol used to collect samples. Includes a discussion of regulatory criteria that should be considered in conjunction with the analytical results. Presents the sample analytical results.
6. Conclusions/ Recommendations	Presents conclusions and recommendations based on the results of the Phase I building assessment.

2. Pre-Demolition Building Assessment Scope and Objectives

2.1 Scope

The Phase I Pre-Demolition Building Assessment activities were conducted to furnish data which would provide a conceptual understanding of the conditions and potential impacts to the building interiors. The Phase 1 Pre-Demolition Building Assessment results will be used to facilitate preparation of conceptual level cost estimates for building demolition program, and to determine scope and cost of additional building characterization that will be needed prior to initiation of building demolition.

The scope of the assessment activities was limited to facility structures and associated equipment only and did not include soil, groundwater or other environmental media. Any environmental media-related data (i.e., soil, air) included in this BAR was collected to promote safe implementation of the work or to aid in proper characterization of the structures for demolition/removal purposes. The following structures were subject to the assessment activities described herein:

- Building 1 – High Bay and 1st and 2nd floor office areas.
- Buildings 2, 4, 8, 9, 17, 18, 20 and 21.
- Pump House.
- Exterior (Outer) Tanks.

The approximate location of the facility structures is presented on Figure 2.

Phase I Pre-Demolition Building Assessment field activities included the following:

- Historic document review.
- Verification of electric service disconnection and lockout/tagout of remaining energy sources during sampling activities.
- An asbestos survey.
- Building material sampling and analyses.

- Visual observation of tanks.

2.2 Objectives

The primary objective of the building assessment program was to generate data to support the following:

- Proper decontamination, decommissioning and demolition (D3) of the facility structures.
- Proper handling, segregation and disposition of waste materials generated during the D3 activities.
- Preparation of bid specifications for D3 of the facility structures.
- Determining minimum health and safety requirements to be followed during implementation of the project.

3. Phase 1 Visual Assessment Activities

3.1 Historic Document Review

Pursuant to GE's request, in September and October 2008 ARCADIS reviewed 9 site-related documents previously provided to us by GE. These documents are marked as "Reviewed" in a historical file index included as Appendix B to this BAR.

Based on the review of the 9 documents, ARCADIS did not identify any useful information that could be directly applied to aid in building material assessment. A record of several wipe and bulk samples collected in 1999 that contained Aroclor 1260 was identified, but locations from which these samples had been collected could not be determined based on the information presented in the reviewed documents.

Subsequently, per GE's request, on October 22, 2008, ARCADIS reviewed selected files associated with the site at Geosyntec Consultants' (Geosyntec's) office in Oakland, CA. Of specific interest to ARCADIS were files concerning historical building material sampling, specifically sampling pertaining to the tanks located in Building 21 and the gravel-filled pits located in Building 1. Reviewed files included previous Environmental Site Assessment Reports, schematics for the oil water separator, etc. ARCADIS marked information of potential reference to the buildings and future demolition.

ARCADIS copied files containing pictures of the floor pits in Building 1, sandblasting material analytical results from a floor pit in Building 1, paint chip sampling information from Building 2, wipe sampling information from Building 4 and tank inspection field logs and sampling records from Building 21. Additional information requested by ARCADIS during the October 22, 2008 file review was provided to ARCADIS by Geosyntec in November 2008. A list of information/files received and reviewed by ARCADIS is shown in Appendix B, marked as "Reviewed". The additional information consisted of the historical site information from previous environmental assessment reports, site sump sampling records, sewer system and fire line modification records, pyranol and 10C oil infrastructure records, previous tank farm demolition specifications, oil/water separator permitting and closure records and underground storage tank closure records. A summary of pertinent tank- and gravel-filled pit information identified during the historical document review is presented below.

3.1.1 Building 21 Tanks

Liquid contained in three of the Building 21 tanks: No. 3, No. 8 and No. 14 was sampled by Geosyntec in May 2001. The analytical laboratory results indicated that a sample collected from Tank 14 liquid contained PCBs at concentration of 4 parts per billion (ppb). No PCBs were detected at concentrations exceeding laboratory detection limits in samples collected from tanks No. 3 and No. 8. No volatile organic compounds (VOCs) were detected in samples collected from the 3 tanks at concentrations above laboratory detection limits (*Storage Containers in Building 21,* Geomatrix Consultants, 2001).

3.1.2 Building 1 Gravel-Filled Pits

Only one photograph and one sample result (sand blasting media) were available to address the prior status of the gravel-filled floor pits in Building 1. Based on this information, it appears that walls of the concrete pits were visibly clean prior to backfilling with gravel. A visible condition of pits' bottoms could not be determined based on the review of the photograph. In November 1996, bulk samples of sandblasting media collected from equipment and a sandblasting pit in Building 1 showed notable results for metals, including 3,300 ppm lead. PCB results ranged from 0.25 to 2.1 ppm in the equipment related samples and 3.2 ppm in the media from the pit. (*Sandblast Material - Building 1*, Geomatrix Consultants, November 1996).

3.1.3 Piping

Historical records describing the pyranol oil infrastructure removal at the site indicate that approximately 260 feet of former pyranol piping may still be present overhead in Building 1.

3.2 Visual Observations of Tanks

The storage tanks were visually observed by ARCADIS in November 2008. The tank inspection logs are included along with sampling logs in Appendix C. A summary of the observations is presented in Table 1.

4. Electric Disconnections

Since electrical power was still connected to portions of the site at the start of field activities, ARCADIS subcontracted Sevenson Environmental Services, Inc. (SES) to provide a California-licensed electrician to clear proposed core sampling locations. In order to eliminate electric hazards prior to initiating intrusive building material sampling in Buildings 2 and 4, the electrician disconnected power to the west end of Building 2 and all of Building 4.

Following the completion of sampling activities, the security guard requested that the power be restored to maintain functionality of the security lights on the exterior of Building 2, cameras on the exterior of Building 2 and lights on the exterior of Building 4. The electrician remobilized to the site and restored power to the west end of Building 2. Power was not restored to Building 4 as the previously existing electrical connection did not meet California Electrical Code (California Code of Regulations Title 24 Part 3) standards. Figure 3 documents the status of remaining electrical service at the site following the disconnection to Building 4, as observed by the electrician.

5. Sampling and Analyses

This section presents a description of the sampling and analyses activities performed under the pre-demolition building assessment along with a summary of associated laboratory analytical results.

All sampling activities were conducted in accordance with applicable federal, state, and local regulations including, but not limited to:

- Title 29 of the Code of Federal Regulations (Title 29 CFR) (Occupational Safety and Health Administration [OSHA] regulations).

- Title 40 CFR – Protection of the Environment (United States Environmental Protection Agency [USEPA] Regulations).

In accordance with State of California regulations, asbestos sampling was conducted by California-licensed asbestos inspectors, and laboratory analysis was performed by a State of California certified laboratory.

5.1 Sampling Activities

Sampling activities were conducted during October and November 2008 by ARCADIS and LFR, Inc. (LFR), as a subcontractor to ARCADIS. The following subsections summarize the matrix and sample quantities detailed in the SAP and the SAP Addendum that were to be collected and the actual sample quantities collected. Unless otherwise noted, building and equipment samples were sent to TestAmerica Laboratories Inc. (TestAmerica) located in Irvine, CA for analyses; and potential asbestos-containing material (PACM) samples were sent to EMSL Analytical, Inc. (EMSL) located in Pasadena, CA.

Sample data including sample identification, location, matrix sampled, sample date/time and visual conditions of sample and sample location were recorded on individual sampling logs. Sampling logs are presented in Appendix C. Sample identifications were marked at the sample locations using a piece of duct tape and the locations were photographed. A photo log of the sample locations is presented in Appendix D.

Following sample collection, sample locations in building concrete floor slab were patched with concrete patch and sample locations in exterior walls and ceilings were patched with sealant/caulk.

5.1.1 Equipment Oil

The SAP and SAP Addendum proposed the collection of up to 13 samples of oil from oil-containing equipment (bridge and jib cranes) present in Buildings 1 and 2. Samples were to be analyzed for PCBs using USEPA SW-846 Method 8082.

Fourteen (14) samples (including one duplicate) were collected. Bulk samples of oil from oil-containing equipment were collected by draining an appropriate amount of oil either directly into the laboratory provided sample container or using a sampling tool (i.e., pipette).

5.1.2 Residual Sludge and Debris

The SAP and SAP Addendum proposed the collection of samples of residual sludge and debris present in selected sumps and pits. The following samples were to be submitted to TestAmerica for analyses:

- One bulk debris sample for total RCRA metals using USEPA SW-846 Method 6010B.
- Four bulk debris samples for total PCBs using USEPA SW-846 Method 8082.
- Up to 5 grab samples of residual product (if any) present in the abovegrade storage tanks located in Building 21 and the two former used oil storage tanks adjacent to Building 1 for total PCBs using USEPA SW-846 Method 8082.

Seven samples were collected. Each bulk sample of debris/soil was collected using a hand trowel/scoop. After each sample was collected, the trowel/scoop was decontaminated. Bulk samples of residual sludge and oil were collected by dipping a sample jar or sampling tool into the liquid and placing into a laboratory-supplied sample container.

5.1.3 Building Material Core Samples

Full core samples were collected from selected building materials and submitted to TestAmerica for analysis as follows:

- Up to 30 full core building material samples were to be analyzed for RCRA hazardous waste determination and total concentration analyses using the following methods:
  - TCLP VOCS using USEPA SW-846 Method 1311/8260C.
  - TCLP SVOCs using USEPA SW-846 Method 1311/8270C.
  - TCLP metals using USEPA SW-846 Method 1311/6010B/7470A.
  - Corrosivity using USEPA Method 9045.
  - Ignitability using USEPA Method 1010.
  - Total metals (CCR Title 22 metals) using USEPA SW-846 Method 6010B/7470A.
  - Total SVOCs(CCR Title 22 SVOCs) using USEPA SW-846 Method 8270C.
  - Total VOCs(CCR Title 22 VOCs) using USEPA SW-846 Method 8260C.
  - Total PCBs using USEPA SW-846 Method 8082.

  If the total threshold limit concentrations (TTLC) for these samples indicates the potential to exceed soluble threshold limit concentrations (STLC), then STLC analyses was to be performed.

- Up to 53 full core building material samples were to be analyzed for total PCBs using USEPA SW-846 Method 8082.

86 building material cores were collected. Core samples were collected using a rotary drill with a one-inch core bit from the full depth of the material or to refusal, whichever encountered first. After each sample was collected, the bit was decontaminated. Samples were collected and placed into laboratory-supplied containers.

5.1.4 Wipes Samples

The SAP and SAP addendum proposed the collection of up to 23 wipe samples from selected equipment and building material surfaces. In addition, up to 12 wipe samples were to be collected from the interiors of the abovegrade storage tanks located in Building 21 and used oil storage tanks near Building 1. Wipe samples were to be analyzed for PCBs using USEPA SW-846 Method 8082.

A total of 37 wipe samples were collected. Samples of the building materials were collected in accordance with TSCA regulations with the exception of tank interiors, due to access limitations. Wipe samples were collected from equipment and building material surfaces for total PCB analysis. With the exception of samples collected from tank interiors, each wipe sample was collected from a 100-square-centimeter area using a sterile gauze pad moistened with hexane water prior to sampling. The moistened gauze pads were wiped over the sample area from top to bottom, and then left to right. The wipe samples were collected and placed into a laboratory-supplied sample containers.

The samples collected from the tank interiors did not meet TSCA requirements as a specific area could not be marked on the interior of the tanks without performing confined space entry.

5.1.5 Paint

The SAP and SAP Addendum proposed the collection of up to 30 paint chip samples to be sent for analysis for the following:

- 15 samples for total PCBs using USEPA SW-846 Method 8082.
- 15 samples for total lead and cadmium using USEPA SW-846 Method 6010B.

During field activities, 15 paint chip samples were collected and submitted for PCB analysis and 16 paint chip samples for lead and cadmium analysis. Samples were collected by removing loose paint with a metal scraper and placing the paint chips directly into a sample jar. When more than one color of paint was present at a location, composite samples were collected and the different paints were identified in the sampling logs (Appendix C). One proposed paint chip sample could not be collected in Building 20 because no paint chips could be removed from the specified location so a wipe sample was collected at this location instead.

5.1.6 Asbestos-Containing Materials

An asbestos survey complying with the requirements of California Occupational Safety and Health Act (Cal OSHA), EPA's Asbestos Hazard Emergency Response Act (AHERA) guidelines, and EPA's National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations was conducted. The survey did not include building

exteriors (i.e., features external to the buildings) or belowgrade features (e.g., utility piping, etc.).

5.2 Data Considerations

Various regulatory criteria/values are discussed below. If applicable, the analytical results were screened against these criteria and values. Because disposition of the buildings has not yet been determined, some of the criteria are not directly applicable at this time; however, the criteria provide a means for assessment of the data. Future use/disposition of the buildings will determine the applicability of the criteria and the need for further sampling, if warranted.

5.2.1 Hazardous Waste

5.2.1.1 Resource Conservation and Recovery Act Toxicity Limits

The RCRA maximum concentrations of contaminants for toxicity characteristic (toxicity limits) from Title 40 CFR Part 261 are applicable if buildings are demolished and removed for disposal or if building material is removed during renovation or building remediation (i.e., generated as a waste). The toxicity limits were used for comparison with TCLP values for preliminary assessment purposes.

Using values equal to 20 times the RCRA Toxicity Limit (20X RCRA Toxicity Limit) for comparison with totals analyses provides an indication of the potential for a waste to be characteristic. However, after the waste is generated, further testing (TCLP testing) will be required to determine if the waste is characteristically hazardous or not.

5.2.1.2 California Code of Regulations Title 22

Total constituent results are compared to the total threshold limit concentration for constituents listed in Table 2 of 22 CCR Section 66261. If any total constituent concentration exceeds the TTLC values, then the material is a non-RCRA hazardous waste (Cal-Haz) under the California hazardous waste regulations. If none of the total constituent results exceed the TTLC values, then the total constituent results for inorganic constituents are compared to the solubility threshold limit concentration (STLCs) listed in Table 2 of 22 CCR 66261 to determine if any of the total results exceed the values by more than 10 times. If any of the total constituent results exceed

10 times the STLC value, then the material would have the potential to be a non-RCRA hazardous waste.

5.2.2 TSCA

Under a scenario of a mothballed facility, the most applicable PCB criteria are the Toxic Substances Control Act (TSCA) PCB criteria for low occupancy areas presented in Title 40 CFR 761.61(a). A low occupancy area is defined as an area where occupancy for any individual not wearing dermal or respiratory protection during a calendar year is less than 840 hours for nonporous-surfaces and less than 335 hours for bulk PCB remediation waste. For low occupancy areas, the cleanup level for bulk PCB remediation waste is $\leq$25 parts per million (ppm) (roughly equivalent to milligrams per kilogram [mg/kg]), and for non-porous surfaces, the surface cleanup standard is $\leq$100 micrograms/100 square centimeters (100µg/100cm^2). Low occupancy areas may remain at concentrations >25 ppm and $\leq$50 ppm if access is restricted and the area is marked with a sign that includes the M_L mark [Large PCB Mark defined in Title 40 CFR 761.45(a)]. Under Title 40 CFR 761.30(p), PCB-impacted porous surfaces such as concrete flooring, brick, and wood, can remain "in service" provided the material surfaces are double washed and rinsed, covered by either a double coating or a solid barrier, and the surface is marked with the M_L mark.

If future use of the building involves high occupancy, the cleanup level for bulk PCB remediation waste in high occupancy areas is $\leq$1 ppm without further conditions. A high occupancy area is an area where occupancy for any individual not wearing dermal and respiratory protection for a calendar year is 840 hours or more for non-porous surfaces and 335 hours or more for bulk PCB remediation waste.

Under a demolition scenario, TSCA disposal criteria would be applicable. Please note that the TSCA-related disposal requirements presented below would become applicable when the materials are generated as a waste for disposal (through building demolition or building remediation). Bulk PCB remediation waste containing PCBs at concentrations >50 ppm requires TSCA-regulated disposal in a permitted hazardous waste landfill. Bulk PCB remediation waste that contains <50 ppm PCBs as the result of a release that occurred prior to the effective date of the TSCA regulations (April 1978) can be disposed in a non-TSCA-regulated nonhazardous permitted landfill. Bulk PCB remediation waste that contains PCBs as the result of a release that occurred after the effective date of the regulations may require USEPA notification prior to disposal at a nonhazardous landfill or may be disposed at a permitted hazardous waste landfill without agency notification.

PCB bulk product wastes are wastes derived from manufactured products containing PCBs in a non-liquid state and are regulated under different regulations than bulk PCB remediation waste. Window glaze and expansion joint compound would be considered PCB bulk product waste and as such would require disposal as a TSCA-regulated waste if they contain PCBs >50 ppm.

5.2.3 OSHA

Lead and cadmium in paint analytical results were compared to OSHA standards. A result greater than 600 parts per million (ppm) for lead and/or any concentration of cadmium above detection limits triggers worker protection provisions in Title 29 CFR 1926.62, Lead in Construction Standard, and/or Title 29 CFR 1926.1127 for Cadmium if these materials are disturbed during building maintenance, renovation, or building demolition.

5.3 Analytical Results

This section presents a summary of analytical results for building materials and equipment samples collected by ARCADIS in November 2008. For more details refer to figures and tables referenced in subsections below. A summary of the asbestos survey results is presented in Section 5.4.

The laboratory analytical reports are provided in Appendix E. The sampling results are discussed below on a building by building basis.

5.3.1 Building 1

Building 1 sample locations are presented on Figure 4.

Equipment Oil

ARCADIS collected three bulk oil samples (including one duplicate) from the overhead bridge cranes in Building 1. Oil samples were analyzed for total PCBs. Results obtained from the laboratory analysis are presented in Table 2A.

PCBs were not detected in any of the three samples at concentrations above the laboratory detection limits.

Residual Sludge and Debris

ARCADIS collected two bulk debris samples from two floor sumps in Building 1. Debris samples were analyzed for total PCBs. Results obtained from the laboratory analysis are presented in Table 2A.

PCBs were detected in both samples with concentrations of 1.8 mg/kg and 1,003.5 mg/kg.

Building Material Core Samples

ARCADIS collected 23 building material core samples from various concrete, wood and brick building materials in Building 1. Each of the core samples was analyzed for total PCBs. Eight of the core samples were also analyzed for RCRA hazardous waste determination and total concentration analyses. Results obtained from the laboratory analyses are presented in Tables 2A and 2D.

PCBs were detected in 20 of the core samples at concentrations ranging from 0.125 mg/kg to 460 mg/kg

Lead was detected in two samples at concentrations of 86 and 120 mg/kg, indicating a possibility for these samples to fail STLC analyses.

Wipe Samples

ARCADIS collected three wipe samples of building surfaces in Building 1. Wipe samples were analyzed for total PCBs. Results obtained from the laboratory analysis are presented in Table 2B.

PCBs were detected in one of the wipe samples at a concentration of 16 ug/wipe.

Paint

ARCADIS collected six paint samples of peeling paint in Building 1. Paint samples were analyzed for total PCBs, lead and cadmium. Results obtained from the laboratory analysis are presented in Table 2C.

Three samples were analyzed for total PCBs. PCBs were detected in each of the three samples at concentrations ranging from 17 mg/kg to 63.5 mg/kg.

Three samples were analyzed for lead and cadmium. Lead was detected in each of the three samples at concentrations ranging from 38 mg/kg to 2,700 mg/kg. Cadmium was detected in all three samples at concentrations ranging from 0.72 mg/kg to 36 mg/kg.

5.3.2 Building 2

Building 2 sample locations are presented on Figure 5.

Equipment Oil

ARCADIS collected eleven oil samples from the overhead bridge cranes in Building 2. Oil samples were analyzed for total PCBs. Results obtained from the laboratory analyses are presented in Table 3A.

PCBs were not detected in any of the samples at concentrations above the laboratory detection limits.

Residual Sludge and Debris

ARCADIS collected one bulk debris sample from a floor sump in Building 2. The debris sample was analyzed for total PCBs. Results obtained from the laboratory analysis are presented in Table 3A.

PCBs were detected in the sample at a concentration of 3.3 mg/kg.

Building Material Core Samples

ARCADIS collected 19 building material core samples and one duplicate sample from various concrete, wood and brick building materials in Building 2. Each of the core samples was analyzed for total PCBs. Five of the core samples were also analyzed for RCRA hazardous waste determination and total concentration analyses. Results obtained from the laboratory analysis are presented in Table 3A and 3D.

PCBs were detected in 16 of the samples at concentrations ranging from 0.051 mg/kg to 6.3 mg/kg.

Wipe Samples

ARCADIS collected three wipe samples of building material surfaces in Building 2. Wipe samples were analyzed for total PCBs. Results obtained from the laboratory analysis are presented in Table 3B.

PCBs were detected in two of the wipe samples at concentrations of 3.3 ug/wipe and 7.6 ug/wipe.

Paint

ARCADIS collected six paint samples and two duplicate samples of peeling paint in Building 2. Paint samples were analyzed for total PCBs, lead and cadmium. Results obtained from the laboratory analysis are presented in Table 3C.

Four samples were analyzed for total PCBs. PCBs were detected in each of the four samples at concentrations ranging from 3.4 mg/kg to 280 mg/kg.

Four samples were analyzed for lead and cadmium. Lead was detected in each of the four samples at concentrations ranging from 1,300 mg/kg to 20,000 mg/kg. Cadmium was detected in all four samples at concentrations ranging from 36 mg/kg to 64 mg/kg.

5.3.3 Building 4

Building 4 sample locations are presented on Figure 5.

Oil-Containing Equipment

No oil-containing equipment samples were collected in Building 4.

Residual Sludge and Debris

No residual sludge, debris or oil samples were collected in Building 4.

Building Material Core Samples

ARCADIS collected eight building material core samples from various concrete and wood building materials in Building 4. Each of the core samples was analyzed for total PCBs. Two of the core samples were also analyzed for RCRA hazardous waste

determination and total concentration analyses. Results obtained from the laboratory analysis are presented in Table 4A and 4D.

PCBs were detected in three of the core samples at concentrations ranging from 0.069 mg/kg to 0.410 mg/kg.

Wipe Samples

ARCADIS collected three wipe samples of building material surfaces from Building 4. Wipe samples were analyzed for total PCBs. Results obtained from the laboratory analysis are presented in Table 4B.

PCBs were detected in one of the wipe samples at a concentration of 3.1 ug/wipe.

Paint

ARCADIS collected six paint samples from peeling paint in Building 4. Paint samples were analyzed for total PCBs, lead and cadmium. Results obtained from the laboratory analysis are presented in Table 4C.

Three samples were analyzed for total PCBs. PCBs were detected in two of the samples at concentrations of 34.2 mg/kg and 38.3 mg/kg.

Three samples were analyzed for lead and cadmium. Lead was detected in each of the three samples at concentrations ranging from 14 mg/kg to 3,600 mg/kg. Cadmium was not detected at concentrations greater than the detection limit.

5.3.4 Building 8

Building 8 sample locations are presented on Figure 7.

Equipment Oil

No equipment oil samples were collected in Building 8.

Residual Sludge and Debris

ARCADIS collected one dust/debris sample from Building 8, B08-CW-B-003, and analyzed for total concentration of 8 RCRA metals. Results obtained from the laboratory analysis are presented in Table 5D.

Chromium was detected at a concentration of 150 mg/kg indicating a potential to fail STLC and/or TCLP analyses; and lead was detected at a concentration of 81 mg/kg indicating a potential to fail STLC analysis.

Building Material Core Samples

ARCADIS collected seven building material samples and two duplicate samples from various concrete and wood building materials in Building 8. Each of the core samples was analyzed for total PCBs. Four of the core samples were analyzed for RCRA hazardous waste determination and total concentration analyses. Results obtained from the laboratory analysis are presented in Table 5A and 5E.

PCBs were detected in three of the building material samples at concentrations ranging from 0.053 mg/kg to 2.494 mg/kg. Chromium was detected in one of the waste characterization samples and the duplicate of that sample at concentrations of 53 mg/kg and 56 mg/kg.

Wipe Samples

ARCADIS collected one wipe sample of a building material surface in Building 8. The wipe sample was analyzed for total PCBs. Results obtained from the laboratory analysis are presented in Table 5B.

PCBs were not detected at concentrations above detection levels in the wipe sample.

Paint

ARCADIS collected two paint samples from peeling paint in Building 8. Paint samples were analyzed for total PCBs, lead and cadmium. Results obtained from the laboratory analysis are presented in Table 5C.

One sample was analyzed for total PCBs. PCBs were detected at a concentration of 98 mg/kg.

One sample was analyzed for lead and cadmium. Lead was detected at a concentration of 1,100 mg/kg. Cadmium detected at a concentration of 1.7 mg/kg.

5.3.5 Building 9

Building 9 sample locations are presented on Figure 6.

Equipment Oil

No equipment oil samples were collected in Building 9.

Residual Sludge and Debris

No residual sludge, debris or oil samples were collected in Building 9.

Building Material Core Samples

ARCADIS collected one building material core sample from a railroad tie wood base in Building 9. The core sample was analyzed for total PCBs and RCRA hazardous waste determination and total concentration analyses. Results obtained from the laboratory analysis are presented in Table 6A and 6C.

PCBs were not detected at a concentration above the detection limit.

Wipe Samples

No wipe samples were collected from Building 9.

Paint

ARCADIS collected two paint samples from peeling paint in Building 9. Paint samples were analyzed for total PCBs, lead and cadmium. Results obtained from the laboratory analysis are presented in Table 6B.

One sample was analyzed for total PCBs. PCBs were not detected at a concentration above detection limits.

One sample was analyzed for lead and cadmium. Lead was detected at a concentration of 790 mg/kg. Cadmium was not detected at a concentration above detection limits.

5.3.6 Building 17

Building 17 sample locations are presented on Figure 6.

Equipment Oil

No equipment oil samples were collected in Building 17.

Residual Sludge and Debris

No residual sludge, debris, or oil samples were collected from Building 17.

Building Material Core Samples

ARCADIS collected seven building material core samples and one duplicate sample from various concrete and wood building materials in Building 17. Each of the core samples was analyzed for total PCBs. Three of the core samples were also analyzed for RCRA hazardous waste determination and total concentration analyses. Results obtained from the laboratory analysis are presented in Table 7A and 7D.

PCBs were detected in one of the core samples at a concentration of 0.052 mg/kg.

Pentachlorophenol was detected in one sample at a concentration of 4,500 mg/kg, which exceeds TTLC for California hazardous waste.

Wipe Samples

ARCADIS collected three wipe samples of building material surfaces in Building 17. Wipe samples were analyzed for total PCBs. Results obtained from the laboratory analysis are presented in Table 7B.

PCBs were not detected at concentrations above detection levels in the wipe samples.

Paint

ARCADIS collected two paint samples from peeling paint in Building 17. Paint samples were analyzed for total PCBs, lead and cadmium. Results obtained from the laboratory analysis are presented in Table 7C.

One sample was analyzed for total PCBs. PCBs were detected at a concentration of 2 mg/kg.

One sample was analyzed for lead and cadmium. Lead was detected at a concentration of 1,100 mg/kg. Cadmium was not detected at a concentration above the detection limit.

5.3.7 Building 18

Building 18 sample locations are presented on Figure 7.

Equipment Oil

No equipment oil samples were collected in Building 18.

Residual Sludge and Debris

No residual sludge, debris, or oil samples were collected from Building 18.

Building Material Core Samples

ARCADIS collected four building material core samples from various concrete and wood building materials in Building 18. Each of the core samples was analyzed for total PCBs. One of the core samples was also analyzed for RCRA hazardous waste determination and total concentration analyses. Results obtained from the laboratory analysis are presented in Table 8A and 8D.

PCBs were detected in each sample with concentrations ranging from 0.120 mg/kg to 0.590 mg/kg.

Wipe Samples

ARCADIS collected one wipe samples and one duplicate sample of building material surfaces in Building 18. Wipe samples were analyzed for total PCBs. Results obtained from the laboratory analysis are presented in Table 8B.

PCBs were detected in both samples at concentrations of 14 ug/wipe and 22 ug/wipe.

Paint

ARCADIS collected two paint samples from peeling paint in Building 18. Paint samples were analyzed for total PCBs, lead and cadmium. Results obtained from the laboratory analysis are presented in Table 8C.

One sample was analyzed for total PCBs. PCBs were detected at a concentration of 5.3 mg/kg.

One sample was analyzed for lead and cadmium. Lead was detected at a concentration of 400 mg/kg. Cadmium was not detected at a concentration above the detection limit.

5.3.8 Building 20

Building 20 sample locations are presented on Figure 7.

Equipment Oil

No equipment oil samples were collected in Building 20.

Residual Sludge and Debris

No residual sludge, debris, or oil samples were collected from Building 20.

Building Material Core Samples

ARCADIS collected three building material core samples from various concrete building materials in Building 20. Each of the core samples was analyzed for total PCBs. One of the core samples was also analyzed for RCRA hazardous waste

determination and total concentration analyses. Results obtained from the laboratory analysis are presented in Table 9A and 9D.

PCBs were detected in two samples at concentrations of 0.21 mg/kg and 1.03 mg/kg.

Wipe Samples

ARCADIS collected two wipe samples and one duplicate from building material surfaces in Building 20. Wipe samples were analyzed for total PCBs. Results obtained from the laboratory analysis are presented in Table 9B.

PCBs were detected in two samples at concentrations of 3.5 ug/wipe and 7 ug/wipe.

Paint

ARCADIS collected one paint sample from peeling paint in Building 20. The paint sample was analyzed for lead and cadmium. Results obtained from the laboratory analysis are presented in Table 9C.

Lead was detected at a concentration of 7,500 mg/kg. Cadmium was not detected at a concentration above the detection limit.

5.3.9 Building 21

Building 21 sample locations are presented on Figure 7.

Equipment Oil

No equipment oil samples were collected in Building 21.

Residual Sludge and Debris

ARCADIS collected one debris sample of dry dark brown crust-like material located in a sump in Building 21. The debris sample was analyzed for total PCBs. Results obtained from the laboratory analysis are presented in Table 10A.

PCBs were detected in the bulk sample at a concentration of 68 mg/kg.

Building Material Core Samples

ARCADIS collected seven building material samples and one duplicate sample from various concrete features in Building 21. Each of the core samples was analyzed for total PCBs. One of the core samples was also analyzed for RCRA hazardous waste determination and total concentration analyses. Results obtained from the laboratory analysis are presented in Table 10A and 10D.

PCBs were detected in two samples at concentrations of 0.18 mg/kg and 0.22 mg/kg.

Wipe Samples

ARCADIS collected 16 wipe samples of building material surfaces and the interior and exterior of tanks in Building 21. Wipe samples were analyzed for total PCBs. Results obtained from the laboratory analysis are presented in Table 10B.

PCBs were detected in two samples at concentrations of 1.1 ug/wipe (interior of Tank 9) and 23 ug/wipe (interior of Tank 10).

Paint

ARCADIS collected two paint samples from peeling paint in Building 21. Paint samples were analyzed for total PCBs, lead and cadmium. Results obtained from the laboratory analysis are presented in Table 10C.

One sample was analyzed for total PCBs. PCBs were detected at a concentration of 0.29 mg/kg.

One sample was analyzed for lead and cadmium. Lead was detected at a concentration of 82 mg/kg. Cadmium was not detected at a concentration above the detection limit.

5.3.10 The Outer Tanks

The Outer Tanks sample locations are presented on Figure 7.

Residual Sludge and Debris

ARCADIS collected one sample of black two phase liquid/sludge material from one of the Outer Tanks. The bulk debris sample was analyzed for total PCBs and RCRA 8 metals. Results obtained from the laboratory analysis are presented in Table 11A and 11C. PCBs were detected in the bulk sample at a concentration of 50 mg/kg.

Chromium and lead were detected at concentrations of 140 mg/kg and 250 mg/kg, respectively, indicating a potential to fail STLC and/or TCLP analyses.

Wipe Samples

ARCADIS collected one wipe sample each from the interior of the East and West Tanks. Wipe samples were analyzed for total PCBs. Results obtained from the laboratory analysis are presented in Table 11B.

PCBs were detected in both samples at concentrations of 14 ug/wipe and 31 ug/wipe.

5.3.11 Pump House

Pump House sample locations are presented on Figure 7.

Equipment Oil

ARCADIS collected one oil sample from a pump motor in the Pump House. The oil sample was analyzed for total PCBs. Results obtained from the laboratory analysis are presented in Table 12A.

PCBs were not detected in the oil sample at concentrations above the laboratory detection limits.

Residual Sludge and Debris

No residual sludge, debris or oil-containing equipment samples were collected from the Pump House.

Building Material Core Samples

ARCADIS collected two building material core samples from the concrete floors in the Pump House. Each of the core samples was analyzed for total PCBs. One of the core samples was also analyzed for RCRA hazardous waste determination and total concentration analyses. Results obtained from the laboratory analysis are presented in Table 12A and 12C.

PCBs were detected in both samples at concentrations of 0.14 mg/kg and 0.53 mg/kg.

Wipe Samples

ARCADIS collected one wipe sample of dust from the top of a water pipe in the Pump House. The wipe sample was analyzed for total PCBs. Results obtained from the laboratory analysis are presented in Table 12B.

PCBs were detected at a concentration of 1.7 ug/wipe.

Paint

No paint samples were collected from the Pump House.

5.4 Asbestos Survey Summary

This section summarized results of the asbestos survey performed by LFR on October 28, through 30, 2008. A copy of Building Material Survey Report (BMSR) is included as Appendix F. Please note that LFR in their report refers to Pump House as "Fire House".

The following asbestos-containing materials (ACMs) (i.e., materials containing more than 1% of asbestos) and asbestos-containing construction materials (ACCMs) (i.e., materials containing between 0.1 and 1% of asbestos) were identified in buildings 1, 2, 4, 8, 9, 17, 18 and Pump House:

Location	Description	Approx. Quantity SF	LF	Notes
Building 1				
ACM				
Roof	Dark gray shingles	70,000		
1st Floor Offices	White 12"x12" VFT and mastic	1,500		The tile is ACCM, mastic is ACM
1st Floor Offices	Light brown 12"x12" VFT and mastic	800		
Restroom	Brown 9"x9" tile	1,120		The tile is ACM, mastic is ACCM
2nd Floor Offices	Green 9"x9" VFT (beneath carpet) & mastic	2,700		
Office Addition	Green 9"x9" VFT (beneath gray VFT) & mastic	1,500		The tile is ACCM, mastic is ACM
ACCM				
Roof	Gray shingles and black rolled roofing	70,000		
1st & 2nd Floor Offices	Painted texture and joint compound	17,000		
Building 2				
ACM				
Building Interior	Gray window caulk		5,000	
Office Addition	Gray 12'x12' VFT and mastic	120		
Office Addition	Tan 12'x12' VFT and mastic	180		
Office Addition	Brown coverbase mastic		250	
Northern Restroom	9" cement pipe		30	
Northern Restroom	Red 9"x9" VFT and mastic	500		The tile is ACM, mastic is ACCM
Building 4				
ACM				
Roof	Black penetration mastic	500		
Kitchen	Sink undercoating	4		
Building 8				
ACM				
Interior	White pipe insulation		100	Fair condition
Roof	Black rolled comp. shingle/mastic	1,800		
Building 9				
ACM				
Concrete pad	Beige 9"x9" VFT and mastic	900		Fair condition
ACCM				
Restroom	Sheet flooring: paper backing	150		Fair condition

Location	Description	Approx. Quantity SF	LF	Notes
Building 17				
ACCM				
Roof	Rolled comp; felt paper	50,000		
Building 18				
ACCM				
Office Area	Clear mastic	150		
Office Area	Brown 4" covebase and mastic		100	
Fire House Building				
ACM				
Building Exterior	Wall/Roof board and gray caulk	650		
	Total SF:	**219,574**		
	Total LF:		**5480**	

No ACMs or ACCMs were identified in Buildings 20 and 21.

For sampling methodology, analytical methods, regulatory overview and more detailed survey results refer to the BMSR (Appendix F).

6. Conclusions/Recommendations

6.1 Recommendations based on Historic Document Review and Visual Assessment

6.1.1 Pyranol Piping

The historical records describing the pyranol oil infrastructure removal at the site indicate that approximately 260 feet of former pyranol piping may still be present overhead in Building 1. As pyranol was a known source of PCBs, ARCADIS recommends that any remaining pyranol piping be removed and disposed of appropriately prior to building demolition.

6.1.2 Gravel-Filled Pits

During the historic record review, only one photograph and one sample result (sand blasting media) were available to address the prior status of the gravel-filled floor pits in Building 1. ARCADIS recommends additional samples of the pit construction material be collected and analyzed for PCBs and hazardous waste characteristics once the gravel is removed.

6.1.3 Loose/Separated Paint Chips

Large accumulations of loose/separated paint chips were observed on floor and other surfaces in Building 2. In addition, following a rain event in November 2008, approximately 2 to 4 inches of rainwater was observed by ARCADIS on the building floor. Most of the water disappeared from the building floor within approximately 2 – 3 days.

As indicated by the laboratory analyses, paint samples collected from Building 2 contained lead at concentrations ranging from 1,300 mg/kg to 20,000 mg/kg; and cadmium at concentrations ranging from 36 mg/kg to 64 mg/kg.

ARCADIS recommends removal of loose/separated paint chips from Building 2 to minimize a potential for human exposure and/or uncontrolled release of lead/cadmium into the environment.

6.2 Equipment Oil

PCBs were not detected at concentrations above the laboratory detection limits in any of the oil samples collected from the 2 cranes in Building 1, 11 cranes in Building 2, and the pump motor in Pump House. The corresponding laboratory detection limits were 5 ppm for samples collected from Building 1 and Pump House, and 5 ppb for samples collected from Building 2.

Based on the existing analytical results, management, handling and disposal of the equipment oil is not regulated under TSCA or under California hazardous waste regulations. However, if oil contains PCBs at concentrations greater than or equal to 2 ppm, it may be regulated for disposal and/or distribution in commerce under TSCA, depending on a source of PCBs in oil. As such, GE may consider additional sampling of equipment oil in Buildings 1 and Pump House to confirm that it does not contain PCB at concentration at or above 2 ppm. No further sampling of equipment oil is recommended for cranes located in Building 2.

If the oil-containing equipment is designated for demolition/removal and offsite disposal, non-PCB oil must be drained and managed under used oil regulations in accordance with 40 CFR 279, 22 CCR 66279, and California Health and Safety Code (HSC), Chapter 6.5, Article 13.

6.3 Residual Sludge and Debris

6.3.1 Floor Sumps

A total of four debris samples were collected from sumps located in Building 1 (two samples), Building 2 (one sample), and Building 21 (one sample). PCBs were detected in all the four samples at concentrations ranging from 1.8 to 1,003.5 ppm. The highest concentration of PCBs was detected in black-colored debris collected from Building 1 sump near column 12 (1,003.5 ppm), followed by dark brown debris collected from Building 21 sump near Tank 9 ((68 ppm). Debris collected from the remaining two sumps, one in Building 1 and one in Building 2, contained PCBs at concentrations of 1.8 ppm and 3.3 ppm, respectively.

Based on the existing analytical data, ARCADIS recommends removal and offsite disposal of debris accumulated in the two Building 1 and 21 sumps that contains PCBs at concentrations above 50 ppm. As a conservative measure, GE may consider removal and offsite disposal of debris from the remaining 2 sumps as well.

Additional investigation activities should be conducted to determine if inlet/outlet piping exist in the sump and the physical condition of the sump pit. Additional sampling should be conducted to determine if PCBs are present in piping and the sump structure.

No sufficient data was available to ARCADIS at this time to allow for providing additional recommendations for addressing other sumps and sub-grade building features. ARCADIS recommends conducting an additional investigation of subsurface building features to generate data pertaining to current condition of subsurface features (e.g., electric conduit/piping sumps inside and immediately adjacent to the buildings, drainage piping, below-grade conduits, foundations, etc.).

6.3.2 Residual Oil/Sludge in Outer Tank

PCBs were detected at concentration of 50 ppm in the two phase liquid/sludge sample collected from one of the outer tanks. Although, per the laboratory report, the sample results may be biased high, based on the existing analytical data, management, handling and disposal of the liquid/sludge contained in the outer tank is regulated under TSCA (40 CFR 761) and California hazardous waste regulations (22 CCR 66261).

In addition, the liquid/sludge sample contained chromium and lead at concentrations of 140 ppm and 250 ppm, respectively, indicating a possibility to fail STLC and/or TCLP hazardous waste toxicity characteristics for chromium and/or lead.

ARCADIS recommends additional analysis of the liquid/sludge sample for STLC and TCLP chromium and lead to determine if the liquid/sludge exhibits federal and/or California toxicity characteristic(s) due to these metals. In addition, ARCADIS recommends removal and offsite disposal of the liquid/sludge in accordance with federal and California regulations (a full extent of these regulations will be determined based on the additional STLC and TCLP analytical results), and cleaning tank interior prior to tank disposition, as required by TSCA regulations. Alternatively, the tank may be disposed of as a bulk remediation waste under TSCA, without additional cleaning.

6.4 PCB-Related Considerations

A total of 86 building material core samples, including five duplicate samples; 35 wipe samples, including 1 duplicate sample; and 16 paint chip samples were collected from the onsite buildings for total PCB analyses. The samples were collected from various building materials, including building floors, sumps/containment areas, walls, ceilings,

support wood beams and columns, glass, non-porous surfaces (glass, non-painted metal, etc.). A summary of the PCB-related findings and recommendations is presented below, on a building-by-building basis.

6.4.1 Building 1

PCBs were detected in 20 of the 23 building material core samples at concentrations ranging from 0.125 mg/kg to 460 mg/kg. The highest concentrations of PCBs were detected in samples collected from the concrete floor of train loading bay located in southwest end of the building (460 ppm); the concrete floor located in mid section of the building (one sample adjacent to the sump containing PCB-impacted debris) (49 ppm, 38 ppm and 28 ppm, respectively); and the painted brick wall in southwest portion of the building.

As summarized above, only one core sample contained PCBs at concentration above 50 ppm. The presence of PCBs at concentrations greater than or equal to 50 ppm indicates that the building materials would be regulated for disposal as a TSCA PCB waste. In addition, depending on the date and source of the PCB release, other PCB-impacted building materials may also be regulated as a PCB remediation waste for disposal purposes. Additional delineation sampling is required to refine the presence/absence, concentration and extent of PCBs in building materials.

PCBs were detected in one of the three wipe samples collected from Building 1 at a concentration of 16 ug/wipe. The presence of PCBs in wipe samples at concentrations exceeding 10 μg/ 100cm² indicate that the material should be either decontaminated to less than 10 μg/ 100cm² or managed for disposal as a TSCA-regulated waste.

PCBs were detected in each of the three paint chip samples collected from Building 1 at concentrations ranging from 17 mg/kg to 63.5 mg/kg. The presence of PCBs in paint at concentrations greater than or equal to 50 ppm indicates that the paint would be regulated as PCB bulk product waste for disposal purposes if PCBs were included in the paint formulation during manufacture. If PCBs are present in the paint as the result of a spill or release, the paint could be regulated as a PCB remediation waste for disposal purposes. Additional evaluation and/or sampling of painted surfaces are recommended to determine if the presence of PCBs in paint is due to spills and/or manufacture.

6.4.2 Building 2

PCBs were detected in 15 of the 19 building material core samples and in one duplicate sample at concentrations ranging from 0.051 mg/kg to 6.3 mg/kg. Only 5 samples, including one duplicate, all collected from the concrete floor of the building, contained PCBs at concentrations above 1 ppm. The highest concentration of PCBs was detected in the duplicate sample collected from the concrete floor (PCB concentration in the corresponding core sample was 1.8 ppm).

Based on the existing analytical data, PCBs are present in building materials and there is a potential to be regulated for disposal. Depending on the date and source of the PCB release, the building materials could be regulated as a PCB remediation waste for disposal purposes. Additional delineation sampling is required to refine the extent of PCBs in building materials.

PCBs were detected in two of the three wipe samples collected from Building 2 surfaces at concentrations of 3.3 ug/wipe and 7.6 ug/wipe. No additional sampling is recommended at this time.

PCBs were detected in each of the four paint chip samples collected from Building 2 at concentrations ranging from 3.4 mg/kg to 280 mg/kg. The presence of PCBs in paint at concentrations greater than or equal to 50 ppm indicates that the paint would be regulated as PCB bulk product waste for disposal purposes if PCBs were included in the paint formulation during manufacture. If PCBs are present in the paint as the result of a spill or release, the paint could be regulated as a PCB remediation waste for disposal purposes. Additional evaluation and/or sampling of painted surfaces are recommended to determine if the presence of PCBs in paint is due to spills and/or manufacture.

6.4.3 Building 4

PCBs were detected in three of the eight building material core samples at concentrations ranging from 0.069 mg/kg to 0.410 mg/kg. No additional sampling is recommended.

PCBs were detected in one of the three wipe samples at a concentration of 3.1 ug/wipe. No additional sampling is recommended.

PCBs were detected in two of the three paint chip samples at concentrations of 34.2 mg/kg and 38.3 mg/kg. If PCBs are present in the paint as the result of a spill or release, the paint could be regulated as a PCB remediation waste for disposal purposes. Additional evaluation and/or sampling of painted surfaces are recommended to determine if the presence of PCBs in paint is due to spills and/or manufacture.

6.4.4 Building 8

PCBs were detected in three of the 7 building material samples at concentrations ranging from 0.053 mg/kg to 2.494 mg/kg. The concentrations indicate that PCBs are present in building materials and there is a potential to be regulated for disposal. Depending on the date and source of the PCB release, the building materials could be regulated as a PCB remediation waste for disposal purposes. Additional delineation sampling is required to refine the extent of PCBs in building materials.

PCBs were not detected at concentrations above detection levels in one wipe sample collected from Building 8 metal ceiling vent. No additional wipe sampling is recommended.

PCBs were detected in the one paint chip sample collected from Building 8 at a concentration of 98 mg/kg. The presence of PCBs in paint at concentrations greater than or equal to 50 ppm indicates that the paint would be regulated as PCB bulk product waste for disposal purposes if PCBs were included in the paint formulation during manufacture. If PCBs are present in the paint as the result of a spill or release, the paint could be regulated as a PCB remediation waste for disposal purposes. Additional evaluation and/or sampling of painted surfaces are recommended to determine if the presence of PCBs in paint is due to spills and/or manufacture.

6.4.5 Building 9

PCBs were not detected in the railroad tie wood sample at a concentration above the detection limit. No additional sampling is recommended.

PCBs were not detected at a concentration above the detection limit in the one paint sample collected in Building 9. No wipe samples were collected in Building 9.

6.4.6 Building 17

PCBs were detected in one of the seven core samples at a concentration of 0.052 mg/kg. No additional sampling is recommended.

PCBs were not detected at concentrations above detection levels in any of the three wipe samples collected from Building 17. No additional sampling is recommended.

PCBs were detected in the one paint chip sample collected from Building 17 at a concentration of 2 mg/kg. If PCBs are present in the paint as the result of a spill or release, the paint could be regulated as a PCB remediation waste for disposal purposes. Additional evaluation and/or sampling of painted surfaces are recommended to determine if the presence of PCBs in paint is due to spills and/or manufacture.

6.4.7 Building 18

PCBs were detected in each of the four building material samples collected in Building 18 at concentrations ranging from 0.120 mg/kg to 0.590 mg/kg. No additional sampling is recommended.

ARCADIS collected one wipe samples and one duplicate sample of building material surfaces in Building 18. PCBs were detected in both the sample and the duplicate at concentrations of 14 ug/wipe and 22 ug/wipe, respectively. The presence of PCBs in wipe samples at concentrations exceeding 10 μg/ 100cm² indicate that the material should be either decontaminated to less than 10 μg/ 100cm² or managed for disposal as a TSCA-regulated waste.

PCBs were detected in the one paint chip sample collected from the Building 18 sliding door at a concentration of 5.3 mg/kg. If PCBs are present in the paint as the result of a spill or release, the paint could be regulated as a PCB remediation waste for disposal purposes. Additional evaluation and/or sampling of painted surfaces are recommended to determine if the presence of PCBs in paint is due to spills and/or manufacture.

6.4.8 Building 20

PCBs were detected in two of the three concrete floor samples at concentrations of 0.21 mg/kg and 1.03 mg/kg. The concentrations indicate that PCBs are present in building materials and there is a potential to be regulated for disposal. Depending on the date and source of the PCB release, the building materials could be regulated as a

PCB remediation waste for disposal purposes. Additional delineation sampling is required to refine the extent of PCBs in building materials.

PCBs were detected in one of the two wipe samples collected from Building 20 and corresponding duplicate at concentrations of 7 ug/wipe and 3.5 ug/wipe, respectively. No additional sampling is recommended. No paint chip samples for PCB analyses were collected in Building 20.

6.4.9 Building 21

PCBs were detected in two of the 7 core and one duplicate samples collected from Building 21 at concentrations of 0.18 mg/kg and 0.22 mg/kg. No additional sampling is recommended.

PCBs were detected in two of the 16 wipe samples collected from Building 21 tanks and building material surfaces at concentrations of 1.1 ug/wipe (interior of Tank 9) and 23 ug/wipe (interior of Tank 10). The presence of PCBs in wipe samples at concentrations exceeding 10 μg/ 100cm² indicate that the material should be either decontaminated to less than 10 μg/ 100cm² or managed for disposal as a TSCA-regulated waste. However, due to the access limitations, the wipe samples collected from the tank interiors did not comply with TSCA requirements (i.e., sampled surface area was not as required by TSCA). As such, further evaluation of the tank 9 and 10 interiors is needed to determine if the PCBs area present on tank surfaces at regulated concentrations. Alternatively, GE may chose to assume that PCBs are present on the tank interior surfaces at regulated concentrations and act accordingly.

PCBs were detected in the one paint chip sample collected from Building 21 at a concentration of 0.29 mg/kg. No additional sampling is recommended.

6.4.10 Pump House

PCBs were detected in two concrete floor samples collected from Pump House at concentrations of 0.14 mg/kg and 0.53 mg/kg. No additional sampling is recommended.

PCBs were detected in the one wipe sample collected from Pump House at a concentration of 1.7 ug/wipe. No additional sampling is recommended. No paint chip samples were collected from Pump House.

6.5 Hazardous Waste Determination

6.5.1 Building 1

Two samples, both collected from the painted brick walls in the office area, contained lead at concentrations indicating a potential to fail STLC California hazardous waste analysis (86 and 120 mg/kg, respectively). In addition, one of the two samples contained lead at concentration indicating a potential to fail federal TCLP hazardous waste analyses. If GE elects to demolish the building, additional analyses of these two samples are recommended to determine if the brick walls in the office area exhibit RCRA and/or California hazardous waste characteristic due to lead toxicity.

6.5.2 Building 2

Although several metals, VOCs and SVOCs were detected at low concentrations in the samples collected from Building 2, none of these samples exhibited any of the hazardous waste characteristics or potential to fail hazardous waste determination analyses. Nor further sampling is recommended at this time.

6.5.3 Building 4

Although several metals and one VOC were detected at low concentrations in the samples collected from Building 4, none of these samples exhibited any of the hazardous waste characteristics or potential to fail hazardous waste determination analyses. No further sampling is recommended at this time.

6.5.4 Building 8

The sample of dust/debris (white sand blasting media) collected from the building floor contained chromium at concentration indicating a potential to fail federal TCLP hazardous waste analysis (150 mg/kg). In addition, this sample contained lead at concentration indicating a potential to fail California STLC hazardous waste analyses (81 mg/kg). ARCADIS recommends conducting additional analyses of the sampled material to determine if the white sand blasting media exhibits federal and/or California hazardous waste toxicity characteristic(s) due to chromium and/or lead. GE may consider removal and offsite disposal of the blasting media as a separate waste stream in accordance with federal and California regulations (a full extent of these regulations will be determined based on the additional STLC and TCLP analytical results) prior to building demolition.

6.5.5 Building 9

Although several metals, VOCs and SVOCs were detected at low concentrations in the railroad tie wood sample collected from Building 2, the sample did not exhibit any of the hazardous waste characteristics or potential to fail hazardous waste determination analyses. No further sampling is recommended at this time.

6.5.6 Building 17

Pentachlorophenol was detected in a sample of a wood support in Building 17 at a concentration of 4,500 mg/kg. This concentration exceeds the California hazardous waste TTLC indicating that this waste stream would be a California hazardous waste.

6.5.7 Building 18

Although several metals were detected at low concentrations in the concrete floor sample collected from Building 18, the sample did not exhibit any of the hazardous waste characteristics or potential to fail hazardous waste determination analyses. No further sampling is recommended at this time.

6.5.8 Building 20

Although several metals were detected at low concentrations in the concrete floor samples collected from Building 20, the samples did not exhibit any of the hazardous waste characteristics or potential to fail hazardous waste determination analyses. No further sampling is recommended at this time.

6.5.9 Building 21

Although several metals, VOCs and one SVOC were detected at low concentrations in the samples collected from Building 20, the samples did not exhibit any of the hazardous waste characteristics or potential to fail hazardous waste determination analyses. No further sampling is recommended at this time.

6.5.10 Pump House

Although several metals and one VOC were detected at low concentrations in the samples collected from Pump House, the samples did not exhibit any of the hazardous

waste characteristics or potential to fail hazardous waste determination analyses. No further sampling is recommended at this time.

6.6 Lead and Cadmium in Paint

Lead was detected in all 16 paint chip samples collected from the site buildings at concentrations ranging from 38 ppm to 20,000 ppm, with 11 of these samples containing lead at concentration greater than 600 ppm (samples collected from Buildings 1, 2, 4, 8, 9, 17 and 20); and cadmium was detected at concentrations above the laboratory detection limits in 8 of the 16 paint chip samples (Buildings Buildings 1, 2 and 8).

Based on the analytical results, if demolition or renovation is conducted in Buildings 1, 2, 4, 8, 9, 17 and/or 20, the worker protection provisions in Title 29 CFR 1926.62 and/or 1926.1127 would apply.

Some of the lead and chromium concentrations exceed the TTLC indicating that this waste stream, if removed and disposed of as separately, would be classified as a California hazardous waste. In addition, based on total concentrations of lead and/or cadmium, selected paints, if removed and handled separately, have a potential to fail federal TCLP and/or California STLC hazardous waste determination analyses. ARCADIS recommends additional analyses for selected paints to determine if they exhibit hazardous waste characteristic(s) due to lead and/or cadmium, if these paints are removed and handled as a separate waste stream. Alternatively, GE may assume that removed/collected paint exhibits RCRA hazardous waste toxicity characteristics due to lead and cadmium, and handle these materials accordingly. The alternative approach would eliminate the need for additional paint sampling and analyses.

6.7 Asbestos

Asbestos-related conclusions and recommendations are presented in BMSR, included in Appendix F. For convenience, these conclusions and recommendations are also summarized in this section.

ACMs were identified at six of the ten onsite building: Buildings 1, 2, 4, 8, 9 and Pump Hose (referred to as “Fire House Building” in Appendix F); and ACCMs were identified at 4 of the ten buildings: Buildings 1, 9, 17 and 18. Based on the above, ACMs and/or ACCMs were not identified in two buildings: Buildings 20 and 21.

Main categories of ACMs and ACCMs identified at the buildings include roofing materials, VFT and associated mastic, and window caulk.

Recommendations for addressing the ACMs and ACCMs include the following:

- Collect additional samples of window glazing and VFT mastic from Building 1 and submit the samples for 1,000 point counting and transmission electron microscope (TEM) analyses, respectively. The additional sampling is being recommended to verify that these materials do not contain asbestos at regulated concentrations.

- Prior to initiating any demolition, renovation or other activities that could disturb these materials, all ACMs and ACCMs should be abated from the buildings. The abatement activities should be conducted by a California-licensed abatement contractor, and the abatement work should be performed under the oversight of a CalOSHA Certified Asbestos Consultant.

- If removed, non-asbestos VFT associated with asbestos-containing mastic should be treated as asbestos-containing and managed accordingly, unless complete removal of mastic from the VFT can be accomplished during abatement.

6.8 All Buildings

Based on visual review of the facility buildings, buildings should be made weatherproof if buildings will remain in place for an extended period of time to prevent rain/surface water entering the building and potentially migrating outside the building and offsite.

ARCADIS

Tables

Table 1

Phase 1 Pre-Demolition Building Assessment Report
Summary of Tank Survey

General Electric Company
East 14th Street Facility
Oakland, California

Location	Tank Number	Tank Capacity or Exterior Dimensions	Former Tank Contents (as marked on exterior)	Current Tank Contents	Visible Condition of Tank Interior
Building 21	3	~10,000 gallons (9'1" diameter x 22' length)	Not Marked	None	Clean with rust (red and black)
Building 21	4	~5,000 gallons (7'7" diameter x 16' length)	Not Marked	None	Clean with rust (red and black)
Building 21	5	~5,000 gallons (7'7" diameter x 16'1" length)	Not Marked	None	Clean with rust (red and black)
Building 21	6	~5,000 gallons (7'7" diameter x 16'1" length)	Not Marked	None	Clean with rust (red and black)
Building 21	7	~5,000 gallons (7'7" diameter x 16'1" length)	Not Marked	None	Clean with rust (red and black)
Building 21	8	~10,000 gallons (9'1" diameter x 21'11" length)	Not Marked	None	Clean with rust (red and black)
Building 21	9	~10,000 gallons (9'35" diameter x 20'9" length)	Not Marked	None	Clean with rust (red and black)
Building 21	10	~10,000 gallons (9'35" diameter x 20'9" length)	Not Marked	None	Clean with rust (red and black)
Building 21	11	~10,000 gallons (9'1" diameter x 22' length)	Not Marked	None	Clean with rust (red and black)
Building 21	14	~1000 gallons (4' diameter x 11' length)	Not Marked	None	Yellow staining, rust
PHT	-	~100 gallons (2' diameter x 4' length)	Not Marked	~5" of product resembling gasoline	Interior of tank could not be observed due to small access opening
Exterior Tanks	Exterior 1	~5,000 gallons (6' diameter x 27')	Not Marked	<1% black oil and sludge	Sidewalls are rusted
Exterior Tanks	Exterior 2	~5,000 gallons (6' diameter x 27')	Not Marked	None	Clean but heavily rusted

Notes:
1. ' = feet
2. " = inches
3. < = less than

Table 2A
Phase I Pre-Demolition Building Assessment Report
Building 1 - Core/Bulk Sample PCB Analytical Results

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID	Date Collected	Sample Location	Depth (in)	Aroclor(s) Detected	Total PCBs (mg/kg)	Notes
Debris						
1BH-SMP-B-008	11/4/2008	Gray sandy dirt with moisture clumps. Covered 1' dia. floor sump. North end.	30	1260	1.8	-
1BH-SMP-B-009	11/4/2008	Soil, black colored debris. Rectangular floor sump near Column 12.	12	1260	1003.5	A-01, RL1
Building Materials						
1BH-WC-CP-012	11/7/2008	Painted wood ceiling of middle high bay.	1.5	NA	ND(0.68)	RL1
1BH-WC-CHWP-013	11/7/2008	Painted wood ceiling high bay and wood support beam.	1.5	1260	0.87	RL1
1BH-WC-CP-014	11/7/2008	Painted wood ceiling east end high bay.	1.5	1260	0.75	RL1
1BH-WW-CP-015	11/11/2008	Painted wood plank wall. West end.	2	NA	ND(0.15)	RL1
1BH-CF-CP-016	11/11/2008	Concrete floor. Train loading bay. West end.	6-8	1242, 1260	460	A-01
1BH-BW-CP-017	11/11/2008	Painted brick wall. Southwest.	3-4	1248, 1260	47.1	A-01
1BH-CF-CP-018	11/11/2008	Concrete floor. West-central. Black oil-like stain under jib crane.	6-8	1260	19	-
1BH-CF-CHWP-019	11/11/2008	Concrete floor. 1/4" sealant layer present.	6-8	1260	0.56	-
1BH-BW-CHWP-020	11/11/2008	Painted brick wall. South central. Newer brick used to replace window.	3-4	1260	0.65	-
1BH-CF-CP-021	11/11/2008	Concrete floor in fenced area. North-central. Dark staining.	6-8	1260	38	-
1BH-CF-CP-022	11/11/2008	Concrete floor in containment near tank saddles. North-central. Very dark staining.	6-8	1242, 1254, 1260	49	A-01
1BH-BW-CP-023	11/11/2008	Painted brick wall. South central. Black scuff stain.	3-4	1260	3.1	-
1BH-CF-CHWP-024	11/11/2008	Concrete floor. East central. Thin slab. 1/8" thick sealant.	2	1260	28	-
1BH-BW-CHWP-025	11/11/2008	Painted brick wall. Northeast.	3-4	1260	0.37	-
1BH-CF-CP-026	11/11/2008	Concrete floor near sump. Northeast.	6-8	1260	0.24	-
1BH-CF-CP-027	11/11/2008	Concrete floor. Southeast.	6-8	1260	0.38	-
1BH-BW-CP-028	11/11/2008	Painted brick wall. High bay/office dividing wall.	3-4	1260	0.29	-
1B1-BW-CHWP-029	11/12/2008	Painted brick wall. Office building. South end. Double layer of brick.	6-8	1260	0.31	A-01
1B1-BW-CP-031	11/12/2008	Painted brick wall. Stairwell hallway.	6-8	1254, 1260	0.125	A-01
1B2-BW-CHWP-032	11/12/2008	Painted brick wall. Second story north.	6-8	1254, 1260	0.191	A-01
1B2-WF-CHWP-033	11/17/2008	Wood floor where tile missing. Second story hallway. Black stain.	6	1260	1.1	-
1BH-WW-CP-035	11/17/2008	Painted wood wall of middle high bay near ceiling.	6	NA	ND(0.15)	RL1
1BH-BW-CP-038	11/18/2008	Painted brick wall. Northwest.	5-6	1260	0.2	-
Equipment Oil						
1BH-CR-B-036	11/17/2008	Oil from 15,000 lb. bridge crane spanning middle high bay.	NA	NA	ND(5)	C-7
1BH-CR-B-036DUP	11/17/2008	Duplicate of 1BH-CR-B-036	NA	NA	ND(5)	C-7
1BH-CR-B-037	11/17/2008	Oil from 2,000 lb. bridge crane. North high bay.	NA	NA	ND(5)	-

Notes:
1. Samples were collected by ARCADIS on the dates indicated.
2. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for polychlorinated biphenyls (PCBs) using USEPA SW-846 Method 8082.
3. ND() = Constituent not detected at a concentration above the reported detection limit in parentheses.
4. A-01 = Sample result might be biased high due to coelution of Aroclors.
5. RL1 = Reporting limit raised due to sample matrix effects.
6. C-7 = Calibration verification recovery was below the method control limit.
7. DUP = Duplicate sample
8. in = inches
9. mg/kg = milligrams per kilogram
10. NA = Not Applicable

Table 2B

Phase I Pre-Demolition Building Assessment Report
Building 1 - Wipe Sample PCB Analytical Results

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID	Date Collected	Sample Location	Aroclor(s) Detected	Total PCBs (mg/wipe)
Building Materials				
1BH-BW-WP-005	11/4/2008	Painted brick wall, south, brown drips present.	NA	ND(0.001)
1BH-HV-WP-006	11/4/2008	Metal surface of wall-mounted vent. Southeast. Very dusty.	1260	0.016
1BH-GW-WP-007	11/4/2008	Glass window. Office area hallway.	NA	ND(0.001)

Notes:
1. Samples were collected by ARCADIS on the dates indicated.
2. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for polychlorinated biphenyls (PCBs) using USEPA SW-846 Method 8082.
3. ND() = Constituent not detected at a concentration above the reported detection limit in parentheses.
4. mg/wipe = milligrams per wipe sample area (wipe sample area was 10 centimeters by 10 centimeters)
5. NA = Not Applicable

Table 2C

Phase I Pre-Demolition Building Assessment Report
Building 1 - Paint Sample Analytical Results

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID	Date Collected	Sample Location	Color	Aroclor(s) Detected	Total PCBs (mg/kg)	Lead (mg/kg)	Cadmium (mg/kg)
1BH-BW-PLC-001	11/4/2008	Peeling paint from interior brick wall. South.	White/aqua	NA	NA	38	1
1BH-SS-PP-002	11/4/2008	Peeling paint from structural steel beam, metal wall, control box.	Aqua/orange	1260	47	NA	NA
1B1-BW-PLC-003	11/4/2008	Peeling paint from brick wall and wood door frame.	Cream	NA	NA	2700	36
1B1-SS-PP-004	11/4/2008	Peeling paint from structural steel column. Office area.	Cream	1248, 1260	63.5 A-01	NA	NA
1BH-WC-PLC-010	11/5/2008	Peeling paint, wood ceiling. North.	White	NA	NA	100	0.72
1BH-SS-PP-011	11/5/2008	Peeling paint from metal steel beam and pipe at ceiling.	White	1260	17	NA	NA

Notes:
1. Samples were collected by ARCADIS on the dates indicated.
2. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for polychlorinated biphenyls (PCBs) using USEPA SW-846 Method 8082, and lead and cadmium using USEPA SW-846 Method 601
3. A-01 = Sample result might be biased high due to coelution of Aroclors.
4. NA = Not analyzed
5. mg/kg = milligram per kilogram (parts per million)

Value exceeds criteria. For lead results greater than 600 ppm (roughly equivalent to mg/kg), worker protection provisions in Title 29 of the Code of Federal Regulations (CFR) 1926.62 would apply. For cadmium results greater than 0 ppm, worker protection provisions of Title 29 CFR 1926.1127 would apply.

Table 2D

Phase I Pre-Demolition Building Assessment Report
Building 1 - Waste Characterization Sample Analytical Results - Building Material

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID		Criteria		1BH-WC-CHWP-013	1BH-CF-CHWP-019	1BH-BW-CHWP-020	1BH-CF-CHWP-024	1BH-BW-CHWP-025	1B1-BW-CHWP-029	1B2-BW-CHWP-032	1B2-WF-CHWP-033
Analytical Test	**Units**	**RCRA Toxicity Limits**	**CA Regulatory Limits**								
TCLP Metals			CA Toxicity Limits								
Barium	mg/L	100	100	ND	0.34	0.70	0.42	0.46	0.30	0.47	ND
Total Metals			10xSTLC/TTLC for mg/kg								
Mercury	mg/kg	NA	2/20	ND	0.026	0.046	0.069	ND	0.34	0.030	ND
Arsenic	mg/kg	NA	50/500	ND	4.2	7.3	4.1	2.3	2.9	2.3	ND
Barium	mg/kg	NA	1,000/10,000	740	100	570	100	200	290	460	7.2
Cadmium	mg/kg	NA	10/100	0.74	ND	ND	0.70	ND	0.76	ND	ND
Chromium	mg/kg	NA	50/500	ND	37	25	44	24	36	18	ND
Cobalt	mg/kg	NA	800/8,000	ND	6.5	3.5	9.2	3.5	3.2	2.6	ND
Copper	mg/kg	NA	250/2500	ND	25	12	86	6.1	6.0	4.2	ND
Lead	mg/kg	NA	50/1000	17	4.8	43	14	49	86	120	ND
Nickel	mg/kg	NA	200/2,000	2.8	31	16	47	15	17	10	ND
Silver	mg/kg	NA	50/500	ND	ND	ND	1.8	ND	ND	ND	ND
Vanadium	mg/kg	NA	24/2400	ND	30	31	33	18	21	14	ND
Zinc	mg/kg	NA	250/5000	380	41	270	59	130	180	330	ND
TCLP VOCs			CA Toxicity Limits								
p-Isopropyltoluene	mg/L	NS	NS	0.025	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	mg/L	NS	NS	ND	0.030	ND	ND	ND	ND	ND	ND
Trichloroethene	mg/L	0.5	0.5	ND	0.27	ND	ND	ND	ND	ND	ND
Total VOCs			10xSTLC/TTLC for mg/kg								
p-Isopropyltoluene	mg/kg	NA	NS	13 A-01, RL1	ND	ND	ND	ND	ND	ND	7.6
Naphthalene	mg/kg	NA	NS	1.3 A-01, RL1	ND	ND	ND	ND	ND	ND	1.6
n-Propylbenzene	mg/kg	NA	NS	0.52 A-01, RL1	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	mg/kg	NA	NS	1.4 A-01, RL1	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	mg/kg	NA	NS	0.73 A-01, RL1	ND	ND	0.25	ND	ND	ND	ND
1,3,5-Trimethylbenzene	mg/kg	NA	NS	ND	ND	ND	0.11	ND	ND	ND	ND
m,p-Xylenes	mg/kg	NA	NS	2.1 A-01, RL1	4	ND	1	ND	ND	ND	ND
o-Xylene	mg/kg	NA	NS	0.69 A-01, RL1	11	ND	0.68	ND	ND	ND	ND
1,1-Dichloroethene	mg/kg	NA	NS	ND	2	ND	ND	ND	ND	ND	ND
Ethylbenzene	mg/kg	NA	NS	ND	1	ND	0.19	ND	ND	ND	ND
Toluene	mg/kg	NA	NS	ND	0.96	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	mg/kg	NA	NS	ND	40	ND	ND	ND	ND	ND	ND
Trichloroethene	mg/kg	NA	2,040/2,040	ND	63	ND	ND	ND	ND	ND	ND
TCLP SVOCs			CA Toxicity Limits								
4-Methylphenol	mg/L	200	200	2.1	ND	ND	ND	ND	ND	ND	0.83 T5
Benzyl alcohol	mg/L	NS	NS	ND	1.5 M1	ND	ND	ND	ND	ND	ND
Total SVOCs			10xSTLC/TTLC for mg/kg								
4-Methylphenol	mg/kg	NA	NS	51	ND	ND	ND	ND	ND	ND	15
Benzyl alcohol	mg/kg	NA	NS	ND	54	ND	ND	ND	ND	ND	ND
Butyl benzyl phthalate	mg/kg	NA	NS	ND	ND	ND	ND	ND	0.54	0.58	ND
Di-n-butyl phthalate	mg/kg	NA	NS	ND	ND	ND	ND	ND	ND	0.62	ND
Ignitability, Corrosivity											
Ignitability	SU	NS	<140°F	ND	ND	ND	ND	ND	ND	ND	ND
pH	pH units	NS	<2 or >12.5	3.27	12.2	10.5	9.49	10.7	11.4	12.0	4.27 HFT

Notes:
1. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for:
   -TCLP VOCs using United States Environmental Protection Agency (USEPA) SW-1311 Method 8260
   -TCLP SVOCs using USEPA SW-1311 Method 8270
   -TCLP Metals using USEPA SW-1311 Methods 7470, 6010
   -Ignitability using USEPA SW-1010
   -Corrosivity using USEPA SW-9045
   -VOCs using USEPA SW-846 Method 8260.
   -SVOCs using USEPA SW-846 Method 8270.
   -Metals using USEPA SW-846 Method 6010.
2. ND = Constituent not detected at a concentration above the reported detection limit.
3. A-01 = Sample result might be biased high due to coelution of Aroclors.
4. RL1 = Reporting limit raised due to sample matrix effects.
5. T5 = Less than the prescribed sample amount was available to perform the leachate extraction. The volume of extraction fluid was adjusted proportionately based on the method prescribed ratio of extraction fluid to sample weight.
6. M1 = The MS and/or MSD were above the acceptance limits due to sample matrix interference. See Blank Spike (LCS).
7. HFT = The holding time for this test is immediate. It was analyzed in the laboratory as soon as possible after receipt.
8. TCLP = Toxicity Characteristic Leaching Procedure
9. SU = Standard units
10. NS = No Standard
11. VOCs = Volatile organic compounds
12. SVOCs = Semi-volatile organic compounds
13. mg/kg = milligram per kilogram (parts per million)
14. mg/L = milligram per liter
15. NA = Not Applicable.
16. Only detected constituents are listed in the Waste Characterization Analytical Results table above.
17. RCRA Toxicity Limit = the Resource Conservation and Recovery Act (RCRA) maximum concentration for characteristis of TCLP toxicity.
18. CA toxicity limit = the maximum concentration for toxicity characteristics from 22 CCR 66261.24.
19. STLC = Soluble Threshold Limit Concentration from 22 CCR 66261.24.
20. TTLC = Total Threshold Limit Concentration from 22 CCR 66261.24.

= indicates potential to fail STLC

Table 3A

Phase I Pre-Demolition Building Assessment Report
Building 2 - Core/Bulk Sample PCB Analytical Results

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID	Date Collected	Sample Location	Depth (in)	Aroclor(s) Detected	Total PCBs (mg/kg)	Notes
Building Materials						
B2-WC-CP-010	11/7/2008	Painted wood ceiling.	2	NA	ND(0.61)	RL1
B2-WC-CP-011	11/7/2008	Painted wood ceiling. Center of building.	2	NA	ND(0.62)	RL1
B2-WC-CHWP-012	11/7/2008	Painted wood ceiling. East end of building.	2	NA	ND(0.68)	RL1
B2-SW-CP-013	11/7/2008	Sheetrock wall. North office building. Black mold.	NA	NA	ND(0.15)	RL1
B2-BW-CHWP-014	11/12/2008	Painted brick wall. East. Double layer of brick.	6-8	1260	0.17	-
B2-BW-CP-015	11/12/2008	Painted brick wall. Southeast.	6	1260	0.32	-
B2-CF-CP-016	11/12/2008	Concrete floor. Containment area. East end. Dark staining and paint chips.	6-8	1260	4.1	-
B2-BW-CP-017	11/12/2008	Painted brick wall. Northeast.	6	1260	0.19	-
B2-CF-CHWP-018	11/12/2008	Concrete floor. Central location. Light staining.	6-8	1260	2.1	-
B2-CF-CP-019	11/13/2008	Concrete floor. Central location. Black oily staining, paint chips.	6-8	1260	1.8	-
B2-CF-CP-019 DUP	11/13/2008	Duplicate of B2-CF-CP-019	6-8	1260	6.3	-
B2-BW-CHWP-020	11/13/2008	Painted brick wall. South central. Double layer of brick.	6	1260	0.12	-
B2-BW-CP-021	11/13/2008	Painted brick wall. South central. Near jib crane.	4	1260	0.2	-
B2-CF-CP-022	11/13/2008	Concrete floor. Center of building. Fresh oil stain under jib crane.	6-8	1260	1.9	-
B2-CF-CP-023	11/13/2008	Concrete floor. West central. Old liquid-like stain.	6-8	1260	0.087	-
B2-CF-CP-024	11/13/2008	Concrete floor. Sunken area. West central. Light darkness liquid-like staining.	6-8	1260	0.051	-
B2-BW-CP-025	11/13/2008	Painted brick wall. Northwest. Double layer of brick.	6	1260	0.24	-
B2-CF-CHWP-026	11/13/2008	Painted brick wall. West central.	6	1260	0.063	-
B2-BW-CP-027	11/13/2008	Concrete floor. West end. Paint chips present.	6-8	1260	0.12	-
B2-CF-CP-028	11/13/2008	Concrete floor. Southeast. Water's edge to sump. Paint chips present.	6-8	1260	0.39	-
Debris						
B2-SMP-B-029	11/13/2008	Wet rust chips, paint chips, black dirt/bio debris from sump. Sump filled with water.	15	1260	3.3	-
Equipment Oil						
B2-CR-B-030	11/18/2008	Oil from 4 ton bridge crane No. 1. Southeast.	NA	NA	ND(0.005)	C-7
B2-CR-B-031	11/18/2008	Oil from 0.5 ton jib crane. Southeast.	NA	NA	ND(0.005)	C-7
B2-CR-B-032	11/18/2008	Oil from 3 ton bridge crane No. 2. South central.	NA	NA	ND(0.005)	C-7
B2-CR-B-034	11/18/2008	Oil from 4 ton bridge crane No. 4. Center.	NA	NA	ND(0.005)	C-7
B2-CR-B-035	11/18/2008	Oil from 3 ton bridge crane No. 5. Center.	NA	NA	ND(0.005)	C-7
B2-CR-B-036	11/18/2008	Oil from 2 ton crane No. 3. Southwest.	NA	NA	ND(0.005)	C-7
B2-CR-B-037	11/18/2008	Oil from 1 ton bridge crane No. 6. West end.	NA	NA	ND(0.005)	C-7
B2-CR-B-038	11/18/2008	Oil from 0.5 ton bricge crane. Northwest.	NA	NA	ND(0.005)	C-7
B2-CR-B-039	11/18/2008	Oil from 2 ton bridge crane. No. 7. Northwest.	NA	NA	ND(0.005)	C-7
B2-CR-B-040	11/18/2008	Oil from 1 ton bridge crane No. 11. Northwest.	NA	NA	ND(0.005)	C-7
B2-CR-B-042	11/18/2008	Oil from 1 ton bridge crane. Northwest.	NA	NA	ND(0.005)	C-7

Notes:
1. Samples were collected by ARCADIS on the dates indicated.
2. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for polychlorinated biphenyls (PCBs) using USEPA SW-846 Method 8082.
3. ND() = Constituent not detected at a concentration above the reported detection limit in parentheses.
4. RL1 = Reporting limit raised due to sample matrix effects.
6. C-7 = Calibration verification recovery was below the method control limit.
6. DUP = Duplicate sample
7. in = inches
8. mg/kg = milligrams per kilogram
9. NA = Not Applicable
10. B2-WC-CHWP-012 was entered by the lab with the incorrect sample ID. The sample corresponds to B2-WC-CP-012.

Table 3B

Phase I Pre-Demolition Building Assessment Report
Building 2 - Wipe Sample PCB Analytical Results

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID	Date Collected	Sample Location	Aroclor(s) Detected	Total PCBs (mg/wipe)
Building Materials				
B2-MD-WP-001	11/5/2008	Interior surface of metal rollup door. Dusty.	NA	ND(0.001)
B2-HV-WP-006	11/5/2008	Ceiling vent vertical metal surface. Central location.	1260	0.0033
B2-HV-WP-007	11/5/2008	Ceiling vent vertical metal surface. North location.	1260	0.0076

Notes:
1. Samples were collected by ARCADIS on the dates indicated.
2. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for polychlorinated biphenyls (PCBs) using USEPA SW-846 Method 8082.
3. ND() = Constituent not detected at a concentration above the reported detection limit in parentheses.
4. mg/wipe = milligrams per wipe sample area (wipe sample area was 10 centimeters by 10 centimeters)
5. NA = Not Applicable

Table 3C

Phase I Pre-Demolition Building Assessment Report
Building 2 - Paint Sample Analytical Results

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID	Date Collected	Sample Location	Color	Aroclor(s) Detected	Total PCBs (mg/kg)	Lead (mg/kg)	Cadmium (mg/kg)
B2-BW-PLC-002	11/5/2008	Peeling paint interior brick wall. South end.	Brown and green.	NA	NA	19,000	40
B2-BW-PLC-002DUP	11/5/2008	Duplicate of B2-BW-PLC-002	Brown and green.	NA	NA	20,000	53
B2-SS-PP-003	11/5/2008	Vertical surface of steel I-beam.	Brown and light brown	1260	3.4	NA	NA
B2-SS-PP-003DUP	11/5/2008	Duplicate of B2-SS-PP-003	Brown and light brown	1260	33	NA	NA
B2-BW-PLC-004	11/5/2008	Peeling paint interior brick wall. Northwest.	Brown	NA	NA	10,000	64
B2-WC-PP-005	11/5/2008	Peeling paint from surface of wood beam. Northwest.	White	1260	280	NA	NA
B2-WC-PLC-008	11/5/2008	Peeling paint from wooden ceiling. East.	Off-white	NA	NA	1,300	36
B2-SS-PP-009	11/5/2008	Peeling paint from steel I-beam horizontal surface. East	Light brown	1248, 1254, 1260	62.1	NA	NA

Notes:
1. Samples were collected by ARCADIS on the dates indicated.
2. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for polychlorinated biphenyls (PCBs) using USEPA SW-846 Method 8082, and lead and cadmium using USEPA SW-846 Method 601
3. NA = Not analyzed
4. mg/kg = milligram per kilogram (parts per million)

Value exceeds criteria. For lead results greater than 600 ppm (roughly equivalent to mg/kg), worker protection provisions in Title 29 of the Code of Federal Regulations (CFR) 1926.62 would apply. For cadmium results greater than 0 ppm, worker protection provisions of Title 29 CFR 1926.1127 would apply.

Table 3D

Phase I Pre-Demolition Building Assessment Report
Building 2 - Waste Characterization Sample Analytical Results - Building Material

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID			Criteria	B2-WC-CHWP-012	B2-BW-CHWP-014	B2-CF-CHWP-018	B2-BW-CHWP-020	B2-CF-CHWP-026
Analytical Test	**Units**	**RCRA Toxicity Limit**	**CA Regulatory Limits**					
TCLP Metals			CA Toxicity Limits					
Barium	mg/L	100	100	ND	0.40	0.21	0.40	0.56
Total Metals			10xSTLC/TTLC for mg/kg					
Mercury	mg/kg	NA	2/20	ND	0.11	0.024	0.051	0.043
Arsenic	mg/kg	NA	50/500	ND	6.9	4.2	6.4	4.4
Barium	mg/kg	NA	1000/10,000	620	230	110 M2	140	150
Chromium	mg/kg	NA	50/500	ND	20	46	19	45
Cobalt	mg/kg	NA	800/8,000	ND	2.3	6.5 M2	1.8	7.6
Copper	mg/kg	NA	250/2500	ND	4.8	21	4.9	26
Lead	mg/kg	NA	50/1000	3.2	35	4.1 M2	16	6.9
Molybdenum	mg/kg	NA	3500/3500	ND	ND	ND	ND	2.0
Nickel	mg/kg	NA	200/2000	ND	12	39 M2	12	46
Vanadium	mg/kg	NA	240/2400	ND	15	33	17	34
Zinc	mg/kg	NA	2500/5000	180	82	30 M2	44	27
TCLP VOCs			CA Toxicity Limits					
p-Isopropyltoluene	mg/L	NS	NS	0.034	ND	ND	ND	ND
Total VOCs			10xSTLC/TTLC for mg/kg					
p-Isopropyltoluene	mg/kg	NA	NS	18 A-01, RL1	ND	ND	ND	ND
TCLP SVOCs			CA Toxicity Limits					
4-Methylphenol	mg/L	200	200	1.1 M-3	ND	ND	ND	ND
Total SVOCs			10xSTLC/TTLC for mg/kg					
4-Methylphenol	mg/kg	NA	NS	21	ND	ND	ND	ND
Isophorone	mg/kg	NA	NS	ND	ND	18 RL3	ND	ND
Ignitability, Corrosivity			CA Toxicity Limits					
Ignitability	SU	NS	<140^{0}F	ND	ND	ND	ND	ND
pH	pH units	NS	≤2 or ≥12.5	3.43	9.09	12.2 H-1	8.58 H-1	12.3 H-1

Notes:

1. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for:
   -TCLP VOCs using United States Environmental Protection Agency (USEPA) SW-1311 Method 8260
   -TCLP SVOCs using USEPA SW-1311 Method 8270
   -TCLP Metals using USEPA SW-1311 Methods 7470, 6010
   -Ignitability using USEPA SW-1010
   -Corrosivity using USEPA SW-9045
   -VOCs using USEPA SW-846 Method 8260.
   -SVOCs using USEPA SW-846 Method 8270.
   -Metals using USEPA SW-846 Method 6010.
2. ND = Constituent not detected at a concentration above the reported detection limit.
3. A-01 = Sample result might be biased high due to coelution of Aroclors.
4. RL1 = Reporting limit raised due to sample matrix effects.
5. M - 3 = Results exceeded the linear range in the MS/MSD and therefore are not available for reporting.
6. M2 = The MS and/or MSD were below the acceptance limits due to sample matrix interference. See Blank Spike (LCS)
7. RL3 = Reporting limit raised due to high concentrations of non-target analytes.
8. H - 1 = Sample analysis performed past the method-specified holding time per client's approval.
9. TCLP = Toxicity Characteristic Leaching Procedure
10. SU = Standard units
11. NS = No Standard
12. VOCs = Volatile organic compounds
13. SVOCs = Semi-volatile organic compounds
14. mg/kg = milligram per kilogram (parts per million)
15. mg/L = milligram per liter
16. NA = Not Applicable
17. Only detected constituents are listed in the Waste Characterization Analytical Results table above.
18. RCRA Toxicity Limit = the Resource Conservation and Recovery Act (RCRA) maximum concentration for characteristis of TCLP toxicity.
19. CA toxicity limit = the maximum concentration for toxicity characteristics from 22 CCR 66261.24.
20. STLC = Soluble Threshold Limit Concentration from 22 CCR 66261.24.
21. TTLC = Total Threshold Limit Concentration from 22 CCR 66261.24.

Table 4A

Phase I Pre-Demolition Building Assessment Report
Building 4 - Core/Bulk Sample PCB Analytical Results

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID	Date Collected	Sample Location	Depth (in)	Aroclor(s) Detected	Total PCBs (mg/kg)	Notes
Building Materials						
B4-CF-CP-008	11/10/2008	Concrete floor. Southeast. Light color fading.	6	NA	ND(0.05)	
B4-CF-CHWP-009	11/10/2008	Concrete floor. East-central.	6	1260	0.41	R-1
B4-CF-CP-010	11/10/2008	Concrete floor. Northeast. White water-like stains.	6-7	NA	ND(0.05)	
B4-CF-CP-011	11/10/2008	Concrete floor. Northwest. Minor cracking.	6	1254, 1260	0.15	A-01
B4-CF-CHWP-012	11/10/2008	Concrete floor. West-central. Light color fading.	6	NA	ND(0.05)	
B4-CF-CP-013	11/10/2008	Concrete floor. Southwest. Light color fading.	6	1254	0.069	
B4-WW-CP-014	11/10/2008	Vertical surface of wood floor running board. South. Treated.	2.5	NA	ND(0.25)	RL1
B4-PW-CP-015	11/10/2008	Plywood under cargo racks. Northwest. Stained.	1	NA	ND(0.25)	RL1

Notes:
1. Samples were collected by ARCADIS on the dates indicated.
2. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for polychlorinated biphenyls (PCBs) using USEPA SW-846 Method 808
3. ND() = Constituent not detected at a concentration above the reported detection limit in parentheses
4. A-01 = Sample result might be biased high due to coelution of Aroclors.
5. RL1 = Reporting limit raised due to sample matrix effects.
6. R-1 = Relative percent difference between the primary and confirmatory analysis exceeded 40%. Higher value is reported
7. in = inches
8. mg/kg = milligrams per kilogram
9. NA = Not Applicable

Table 4B

Phase I Pre-Demolition Building Assessment Report
Building 4 - Wipe Sample PCB Analytical Results

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID	Date Collected	Sample Location	Aroclor(s) Detected	Total PCBs (mg/wipe)
B4-EQ-WP-001	11/4/2008	Horizontal surface of orange cargo racks.	NA	ND(0.001)
B4-SP-WP-004	11/4/2008	Dusty horizontal surface of metal fire pipe.	1254, 1260	0.0031 A-01
B4-PG-WP-007	11/4/2008	Plexiglas window of office area.	NA	ND(0.001)

Notes:
1. Samples were collected by ARCADIS on the dates indicated.
2. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for polychlorinated biphenyls (PCBs) using USEPA SW-846 Method 8082.
3. ND() = Constituent not detected at a concentration above the reported detection limit in parentheses.
4. A-01 = Sample result might be biased high due to coelution of Aroclors.
5. mg/wipe = milligrams per wipe sample area (wipe sample area was 10 centimeters by 10 centimeters)
6. NA = Not Applicable

Table 4C

Phase I Pre-Demolition Building Assessment Report
Building 4 - Paint Sample Analytical Results

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID	Date Collected	Sample Location	Color	Aroclor(s) Detected	Total PCBs (mg/kg)	Lead (mg/kg)	Cadmium (mg/kg)
B4-EQ-PLC-002	11/4/2008	Metal cargo racks in center of building.	Orange and green	NA	NA	3,600	ND(5.0) RL-1
B4-EQ-PP-003	11/4/2008	Metal cargo racks in center of building.	Orange and green	Aroclor 1248, 1254, 1260	34.2 A-01, RL-1	NA	NA
B4-SS-PLC-005	11/4/2008	Vertical surface of structural steel beams	Cream	NA	NA	14	ND(0.5)
B4-SS-PP-006	11/4/2008	Vertical surface of structural steel beams	Cream	Aroclor 1248, 1254, 1260	38.3 A-01, R-1	NA	NA
B4-MD-PLC-008	11/5/2008	Peeling paint exterior metal sliding door	White	NA	NA	830	ND(7.9)
B4-MD-PP-009	11/5/2008	Peeling paint exterior metal sliding door	White	NA	ND(0.36)	NA	NA

Notes:
1. Samples were collected by ARCADIS on the dates indicated.
2. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for polychlorinated biphenyls (PCBs) using USEPA SW-846 Method 8082, and lead and cadmium using USEPA SW-846 Method 6010
3. ND() = Constituent not detected at a concentration above the reported detection limit in parentheses
4. RL1 = Reporting limit raised due to sample matrix effects.
5. R-1 = Relative percent difference between the primary and confirmatory analysis exceeded 40%. Higher value is reported
6. NA = Not analyzed
7. mg/kg = milligram per kilogram (parts per million)

Value exceeds criteria. For lead results greater than 600 ppm (roughly equivalent to mg/kg), worker protection provisions in Title 29 of the Code of Federal Regulations (CFR) 1926.62 would apply. For cadmium results greater than 0 ppm, worker protection provisions of Title 29 CFR 1926.1127 would apply.

Table 4D

Phase I Pre-Demolition Building Assessment Report
Building 4 - Waste Characterization Sample Analytical Results - Building Material

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID			Criteria	B4-CF-CHWP-009	B4-CF-CHWP-012
Analytical Test	**Units**	**RCRA Toxicity Limit**	**CA Regulatory Limits**		
TCLP Metals					
Barium	mg/L	100	100	0.43	0.46
Total Metals			10xSTLC/TTLC for mg/kg		
Mercury	mg/kg	NA	2/20	0.020	0.028
Arsenic	mg/kg	NA	50/500	2.5	4.1
Barium	mg/kg	NA	1000/10,000	79	100
Chromium	mg/kg	NA	50/500	19	30
Cobalt	mg/kg	NA	800/8,000	4.2	5.9
Copper	mg/kg	NA	250/2,500	23	29
Lead	mg/kg	NA	50/1,000	2.3	4.1
Nickel	mg/kg	NA	200/2,000	22	33
Vanadium	mg/kg	NA	240/2400	14	24
Zinc	mg/kg	NA	2500/5,000	38	49
Total SVOCs			10xSTLC/TTLC for mg/kg		
Isophorone	mg/kg	NA	NS	17 RL3	12 RL3
Ignitability, Corrosivity					
Ignitability	SU	NS	<140°F	ND	ND
pH	pH units	NS	≤2 or ≥12.5	12.2	12.2

see notes on Page 2.

Table 4D

Phase I Pre-Demolition Building Assessment Report
Building 4 - Waste Characterization Sample Analytical Results - Building Material

General Electric Company
East 14th Street Facility
Oakland, California

Notes:

1. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for:
   -TCLP VOCs using United States Environmental Protection Agency (USEPA) SW-1311 Method 8260
   -TCLP SVOCs using USEPA SW-1311 Method 8270
   -TCLP Metals using USEPA SW-1311 Methods 7470, 6010
   -Ignitability using USEPA SW-1010
   -Corrosivity using USEPA SW-9045
   -VOCs using USEPA SW-846 Method 8260.
   -SVOCs using USEPA SW-846 Method 8270.
   -Metals using USEPA SW-846 Method 6010.
2. ND = Constituent not detected at a concentration above the reported detection limit.
3. A-01 = Sample result might be biased high due to coelution of Aroclors.
4. RL1 = Reporting limit raised due to sample matrix effects.
5. T5 = Less than the prescribed sample amount was available to perform the leachate extraction. The volume of extraction fluid was adjusted proportionately based on the method prescribed ratio of extraction fluid to sample weight.
6. M1 = The MS and/or MSD were above the acceptance limits due to sample matrix interference. See Blank Spike (LCS).
7. HFT = The holding time for this test is immediate. It was analyzed in the laboratory as soon as possible after receipt.
8. TCLP = Toxicity Characteristic Leaching Procedure
9. SU = Standard units
10. NS = No Standard
11. VOCs = Volatile organic compounds
12. SVOCs = Semi-volatile organic compounds
13. mg/kg = milligram per kilogram (parts per million)
14. mg/L = milligram per liter
15. NA = Not Applicable.
16. Only detected constituents are listed in the Waste Characterization Analytical Results table above.
17. RCRA Toxicity Limit = the Resource Conservation and Recovery Act (RCRA) maximum concentration for characteristis of TCLP toxicity.
18. CA toxicity limit = the maximum concentration for toxicity characteristics from 22 CCR 66261.24.
19. STLC = Soluble Threshold Limit Concentration from 22 CCR 66261.24.
20. TTLC = Total Threshold Limit Concentration from 22 CCR 66261.24.

Table 5A

Phase I Pre-Demolition Building Assessment Report
Building 8 - Core/Bulk Sample PCB Analytical Results

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID	Date Collected	Sample Location	Depth (in)	Aroclor(s) Detected	Total PCBs (mg/kg)	Notes
Building Materials						
B8-WC-CHWP-005	11/6/2008	Wood support beam. Ceiling. Treated.	1.5	NA	ND(0.6)	RL1
B8-CF-CP-006	11/6/2008	Concrete floor. South room.	6	NA	ND(0.05)	-
B8-CF-CP-006 DUP	11/6/2008	Duplicate of B8-CF-CP-006	5	NA	ND(0.05)	-
B8-WW-CP-007	11/7/2008	Plywood separation wall. Treated and sandblasted.	0.5	NA	ND(0.5)	RL1
B8-CW-CP-008	11/12/2008	Concrete block wall. South. White powder.	3	1254, 1260	0.139	A-01
B8-CW-CHWP-009	11/12/2008	Concrete block wall. East.	6	1254, 1260	0.148	A-01
B8-CF-CHWP-010	11/12/2008	Concrete floor. North room. Sandblasting media.	6	1254	0.053	-
B8-CF-CHWP-010 DUP	11/12/2008	Duplicate of B8-CF-CHWP-010	6	1016, 1254	2.494	-
B8-SMP-CP-011	11/14/2008	Concrete trench leading to sump. North. Yellow staining on trench sides. Dust	6	1260	0.083	-

Notes:
1. Samples were collected by ARCADIS on the dates indicated.
2. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for polychlorinated biphenyls (PCBs) using USEPA SW-846 Method 8082
3. ND() = Constituent not detected at a concentration above the reported detection limit in parentheses.
4. A-01 = Sample result might be biased high due to coelution of Aroclors.
5. RL1 = Reporting limit raised due to sample matrix effects.
6. DUP = Duplicate sample
7. in = inches
8. mg/kg = milligrams per kilogram
9. NA = Not Applicable

Table 5B

Phase I Pre-Demolition Building Assessment Report
Building 8 - Wipe Sample PCB Analytical Results

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID	Date Collected	Sample Location	Aroclor(s) Detected	Total PCBs (mg/wipe)
B8-HV-WP-004	11/6/2008	Metal ceiling vent.	NA	ND(0.001)

Notes:
1. Sample was collected by ARCADIS on the date indicated.
2. Sample was analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for polychlorinated biphenyls (PCBs) using USEPA SW-846 Method 8082.
3. ND() = Constituent not detected at a concentration above the reported detection limit in parentheses.
4. mg/wipe = milligrams per wipe sample area (wipe sample area was 10 centimeters by 10 centimeters)
5. NA = Not Applicable

Table 5C

Phase I Pre-Demolition Building Assessment Report
Building 8 - Paint Sample Analytical Results

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID	Date Collected	Sample Location	Color	Aroclor(s) Detected	Total PCBs (mg/kg)	Lead (mg/kg)	Cadmium (mg/kg)
B08-DF-PP-001	11/3/2008	Peeling paint from metal door frame.	Cream	Aroclor 1254, 1260	98 A-01	NA	NA
B08-DF-PLC-002	11/3/2008	Peeling paint from metal door frame.	Cream	NA	NA	1,100	1.7

Notes:
1. Samples were collected by ARCADIS on the dates indicated.
2. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for polychlorinated biphenyls (PCBs) using USEPA SW-846 Method 8082, and lead and cadmium using USEPA SW-846 M
3. A-01 = Sample result might be biased high due to coelution of Aroclors.
4. NA = Not analyzed
5. mg/kg = milligram per kilogram (parts per million)

Value exceeds criteria. For lead results greater than 600 ppm (roughly equivalent to mg/kg), worker protection provisions in Title 29 of the Code of Federal Regulations (CFR) 1926.62 would apply. For cadmium results greater than 0 ppm, worker protection provisions of Title 29 CFR 1926.1127 would apply.

Table 5D

Phase I Pre-Demolition Building Assessment Report
Building 8 - Bulk Sample Metals Analytical Results - Building Material

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID	Date Collected	Sample Location	Metal	20X RCRA Toxicity Limit	10xSTLC/TTLC for mg/kg	Result (mg/kg)	Notes
B08-CW-B-003	11/4/2008	White sand blasting media. West.	Mercury	4	2/20	0.062	-
			Arsenic	100	50/500	6.2	-
			Barium	2000	1000/10,000	75	-
			Cadmium	20	10/100	1.5	-
			Chromium	100	50/500	**150**	-
			Lead	100	50/1000	**81**	-
			Selenium	20	10/100	ND(4.0)	RL1
			Silver	100	50/500	ND(2.0)	RL1

Notes:
1. Sample was collected by ARCADIS on the date indicated.
2. Sample was analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for metals using USEPA SW-846 Method 6010.
3. ND = Constituent not detected at a concentration above the reported detection limit.
4. mg/kg = milligram per kilogram (parts per million)
5. RL1 = Reporting limit raised due to sample matrix effects.
6. Bolded value indicates potential to fail STLC.

Value exceeds 20X RCRA toxicity limit.

Table 5E

Phase I Pre-Demolition Building Assessment Report
Building 8 - Waste Characterization Sample Analytical Results - Building Material

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID			Criteria	B8-WC-CHWP-005	B8-CW-CHWP-009	B8-CF-CHWP-010	B8-CF-CHWP-010 DUP
Analytical Test	**Units**	**RCRA Toxicity Limit**	**CA Regulatory Limits**				
TCLP Metals			CA Toxicity Limit				
Barium	mg/L	100	100	ND	0.39	1.1	1.3
Chromium	mg/L	5	5	ND	ND	0.11	0.10
Total Metals			10xSTLC/TTLC for mg/kg				
Mercury	mg/kg	NA	2/20	ND	0.026	0.045	0.034
Arsenic	mg/kg	NA	50/500	ND	6.1	3.8	4.4
Barium	mg/kg	NA	1,000/10,000	5.5	160	230	340
Chromium	mg/kg	NA	50/500	ND	46	53	56
Cobalt	mg/kg	NA	800/8,000	ND	5.6	7.5	6.9
Copper	mg/kg	NA	250/2,500	ND	34	21	25
Lead	mg/kg	NA	50/1,000	ND	3.2	4.7	4.6
Nickel	mg/kg	NA	200/2,000	ND	37	47	43
Vanadium	mg/kg	NA	240/2,400	ND	33	48	55
Zinc	mg/kg	NA	2,500/5,000	ND	38	37	36
Total VOCs			10xSTLC/TTLC for mg/kg				
Ethylbenzene	mg/kg	NA	NS	ND	ND	0.37	0.22
p-Isopropyltoluene	mg/kg	NA	NS	3.2 RL1	ND	ND	ND
1,2,4-Trimethylbenzene	mg/kg	NA	NS	ND	ND	0.17	0.11
m,p-Xylenes	mg/kg	NA	NS	ND	ND	1.4	0.83
o-Xylene	mg/kg	NA	NS	ND	ND	0.24	0.14
TCLP SVOCs			CA Toxicity Limit				
4-Methylpheno	mg/L	200	200	1.2	ND	ND	ND
Phenol	mg/L	NS	NS	0.15	ND	0.31	0.10
Total SVOCs			10x				
Isophorone	mg/kg	NA	10xSTLC/TTLC for mg/kg	ND	ND	ND	10 RL3
4-Methylpheno	mg/kg	NA	NS	22	ND	ND	ND
Phenol	mg/kg	NA	NS	4.4	ND	ND	ND
Ignitability, Corrosivity							
Ignitability	SU	NS	<140^{0}F	ND	ND	ND	ND
pH	pH units	NS	<2 or >12.5	3.69	12.1	12.1	12.2

see notes on Page 2.

Table 5E

Phase I Pre-Demolition Building Assessment Report
Building 8 - Waste Characterization Sample Analytical Results - Building Material

General Electric Company
East 14th Street Facility
Oakland, California

Notes:

1. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for
   -TCLP VOCs using United States Environmental Protection Agency (USEPA) SW-1311 Method 826(
   -TCLP SVOCs using USEPA SW-1311 Method 827(
   -TCLP Metals using USEPA SW-1311 Methods 7470, 601(
   -Ignitability using USEPA SW-101(
   -Corrosivity using USEPA SW-9045
   -VOCs using USEPA SW-846 Method 8260.
   -SVOCs using USEPA SW-846 Method 8270.
   -Metals using USEPA SW-846 Method 6010.
2. ND() = Constituent not detected at a concentration above the reported detection limit in parentheses
3. A-01 = Sample result might be biased high due to coelution of Aroclors
4. RL1 = Reporting limit raised due to sample matrix effects.
5. T5 = Less than the prescribed sample amount was available to perform the leachate extraction. The volume of extraction fluid was adjusted proportionately based on the method prescribed ratio of extraction fluid to sample weigl
6. M1 = The MS and/or MSD were above the acceptance limits due to sample matrix interference. See Blank Spike (LCS)
7. HFT = The holding time for this test is immediate. It was analyzed in the laboratory as soon as possible after receipt
8. TCLP = Toxicity Characteristic Leaching Procedure
9. SU = Standard units
10. NS = No Standard
11. VOCs = Volatile organic compounds
12. SVOCs = Semi-volatile organic compounds
13. mg/kg = milligram per kilogram (parts per million)
14. NA = Not Applicable
15. mg/L = milligram per liter
16. Only detected constituents are listed in the Waste Characterization Analytical Results table above.
17. RCRA Toxicity Limit = the Resource Conservation and Recovery Act (RCRA) maximum concentration for characteristis of TCLP toxicity.
18. CA toxicity limit = the maximum concentration for toxicity characteristics from 22 CCR 66261.24.
19. STLC = Soluble Threshold Limit Concentration from 22 CCR 66261.24.
20. TTLC = Total Threshold Limit Concentration from 22 CCR 66261.24.

= indicates potential to fail STLC

Table 6A

Phase I Pre-Demolition Building Assessment Report
Building 9 - Core/Bulk Sample PCB Analytical Results

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID	Date Collected	Sample Location	Depth (in)	Aroclor(s) Detected	Total PCBs (mg/kg)	Notes
Building Material						
B9-WW-CHWP-003	11/10/2008	Railroad tie wood base. Treated. Creosote odor.	5	NA	ND(0.15)	RL1

Notes:
1. Sample was collected by ARCADIS on the date indicated.
2. Sample was analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for polychlorinated biphenyls (PCBs) using USEPA SW-846 Method 8082.
3. ND() = Constituent not detected at a concentration above the reported detection limit in parentheses.
4. RL1 = Reporting limit raised due to sample matrix effects.
5. in = inches
6. mg/kg = micrograms per kilogram
7. NA = Not Applicable

Table 6B

Phase I Pre-Demolition Building Assessment Report
Building 9 - Paint Sample Analytical Results

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID	Date Collected	Sample Location	Color	Aroclor(s) Detected	Total PCBs (mg/kg)	Lead (mg/kg)	Cadmium (mg/kg)
B9-MW-PLC-001	11/4/2008	Peeling paint from metal building exterior. South.	Cream	NA	NA	790	ND(15) RL1
B9-MW-PP-002	11/4/2008	Peeling paint from metal building exterior. South.	Cream	NA	ND(0.38) RL4	NA	NA

Notes:
1. Samples were collected by ARCADIS on the dates indicated.
2. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for polychlorinated biphenyls (PCBs) using USEPA SW-846 Method 8082, and lead and cadmium using USEPA SW-846 Method 6010
3. ND() = Constituent not detected at a concentration above the reported detection limit in parentheses
4. A-01 = Sample result might be biased high due to coelution of Aroclors.
5. RL1 = Reporting limit raised due to sample matrix effects.
6. RL4 = Reporting limit raised due to insufficient sample volume.
7. NA = Not analyzed
8. mg/kg = milligram per kilogram (parts per million)

Value exceeds criteria. For lead results greater than 600 ppm (roughly equivalent to mg/kg), worker protection provisions in Title 29 of the Code of Federal Regulations (CFR) 1926.62 would apply. For cadmium results greater than 0 ppm, worker protection provisions of Title 29 CFR 1926.1127 would apply.

Table 6C

Phase I Pre-Demolition Building Assessment Report
Building 9 - Waste Characterization Sample Analytical Results - Building Material

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID				B9-WW-CHWP-003
Analytical Test	**Units**	**RCRA Toxicity Limit**	**CA Regulatory Limits**	
Total Metals			10XSTLC/TTLC for mg/kg	
Nickel	mg/kg	NA	200/2000	5.2
Vanadium	mg/kg	NA	240/2400	6.0
Zinc	mg/kg	NA	2500/5000	7.1
TCLP VOCs			CA Toxicity Limit	
Toluene	mg/L	NS	NS	0.033
1,2,4-Trimethylbenzene	mg/L	NS	NS	0.025
Total VOCs			10XSTLC/TTLC for mg/kg	
tert-Butylbenzene	mg/kg	NA	NS	2.1 A-01, RL1
sec-Butylbenzene	mg/kg	NA	NS	16 A-01, RL1
Ethylbenzene	mg/kg	NA	NS	0.61 A-01, RL1
Isopropylbenzene	mg/kg	NA	NS	2.1 A-01, RL1
n-Propylbenzene	mg/kg	NA	NS	2.9 A-01, RL1
Styrene	mg/kg	NA	NS	0.89 A-01, RL1
Toluene	mg/kg	NA	NS	3.1 A-01, RL1
1,2,4-Trimethylbenzene	mg/kg	NA	NS	40 A-01, RL1
o-Xylene	mg/kg	NA	NS	1.2 A-01, RL1
TCLP SVOCs			CA Toxicity Limit	
Acenaphthene	mg/L	NS	NS	0.42
2-Methylnaphthalene	mg/L	NS	NS	0.40
2-Methylphenol	mg/L	200	200	1.3
4-Methylphenol	mg/L	200	200	4.7
Naphthalene	mg/L	NS	NS	4.5
Phenol	mg/L	NS	NS	3.7
Total SVOCs			10XSTLC/TTLC for mg/kg	
Acenaphthene	mg/kg	NA	NS	1,400
Anthracene	mg/kg	NA	NS	820
Benzo(a)anthracene	mg/kg	NA	NS	260
Chrysene	mg/kg	NA	NS	290
2,4-Dimethylphenol	mg/kg	NA	NS	0.0012
Fluoranthene	mg/kg	NA	NS	1,900
Fluorene	mg/kg	NA	NS	990
2-Methylnaphthalene	mg/kg	NA	NS	780
Naphthalene	mg/kg	NA	NS	2,300
Phenanthrene	mg/kg	NA	NS	3,900
Pyrene	mg/kg	NA	NS	1,100
Ignitability, Corrosivity				
Ignitability	SU	NS	<140°F	ND
pH	pH units	NS	≤2 or ≥12.5	4.57

see notes on Page 2.

Table 6C

Phase I Pre-Demolition Building Assessment Report
Building 9 - Waste Characterization Sample Analytical Results - Building Material

General Electric Company
East 14th Street Facility
Oakland, California

Notes:

1. Sample was analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for:
   -TCLP VOCs using United States Environmental Protection Agency (USEPA) SW-1311 Method 8260
   -TCLP SVOCs using USEPA SW-1311 Method 8270
   -TCLP Metals using USEPA SW-1311 Methods 7470, 6010
   -Ignitability using USEPA SW-1010
   -Corrosivity using USEPA SW-9045
   -VOCs using USEPA SW-846 Method 8260.
   -SVOCs using USEPA SW-846 Method 8270.
   -Metals using USEPA SW-846 Method 6010.
2. ND = Constituent not detected at a concentration above the reported detection limit.
3. A-01 = Sample result might be biased high due to coelution of Aroclors.
4. RL1 = Reporting limit raised due to sample matrix effects.
5. CA = California.
6. TCLP = Toxicity Characteristic Leaching Procedure
7. SU = Standard units
8. NS = No Standard
9. VOCs = Volatile organic compounds
10. SVOCs = Semi-volatile organic compounds
11. mg/kg = milligram per kilogram (parts per million)
12. Not Applicable
13. mg/L = milligram per liter
14. Only detected constituents are listed in the Waste Characterization Analytical Results table above.
15. RCRA Toxicity Limit = the Resource Conservation and Recovery Act (RCRA) maximum concentration for characteristis of TCLP toxicity.
16. CA toxicity limit = the maximum concentration for toxicity characteristics from 22 CCR 66261.24.
17. STLC = Soluble Threshold Limit Concentration from 22 CCR 66261.24.
18. TTLC = Total Threshold Limit Concentration from 22 CCR 66261.24.

Table 7A

Phase I Pre-Demolition Building Assessment Report
Building 17 - Core/Bulk Sample PCB Analytical Results

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID	Date Collected	Sample Location	Depth (in)	Aroclor(s) Detected	Total PCBs (mg/kg)	Notes
Building Materials						
B17-WC-CP-006	11/6/2008	Treated wood ceiling support beam.	5	NA	ND(0.1)	RL1
B17-WC-CHWP-007	11/6/2008	Wood ceiling of building. Treated or stained.	4	NA	ND(0.3)	RL1
B17-WS-CHWP-008	11/6/2008	Wood support column. Treated.	5	NA	ND(0.62)	RL1
B17-WS-CP-009	11/6/2008	Wood support column. Treated. East.	5	NA	ND(0.37)	RL1
B17-CF-CP-010	11/10/2008	Concrete floor. Near trasformer. East. Oil-like stain.	6	NA	ND(0.05)	-
B17-CF-CP-010 DUP	11/10/2008	Duplicate of B17-CF-CP-010	6	NA	ND(0.05)	-
B17-WW-CHWP-011	11/10/2008	Concrete floor. Northeast.	6-8	NA	ND(0.05)	-
B17-CF-CP-012	11/10/2008	Concrete floor. Central. Staining present.	6-8	1260	0.052	-

Notes:
1. Samples were collected by ARCADIS on the dates indicated.
2. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for polychlorinated biphenyls (PCBs) using USEPA SW-846 Method 8082.
3. ND() = Constituent not detected at a concentration above the reported detection limit in parentheses.
4. RL1 = Reporting limit raised due to sample matrix effects.
5. DUP = Duplicate sample
6. in = inches
7. mg/kg = milligrams per kilogram
8. NA = Not Applicable
9. B17-WW-CHWP-011 was entered by the lab with the incorrect sample ID. The sample corresponds to B17-CF-CHWP-011, and is from a concrete floor, not wooden wall.

Table 7B

Phase I Pre-Demolition Building Assessment Report
Building 17 - Wipe Sample PCB Analytical Results

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID	Date Collected	Sample Location	Aroclor(s) Detected	Total PCBs (mg/wipe)
B17-MW-WP-001	11/4/2008	Interior surface of sheet metal wall. North.	NA	ND(0.001)
B17-MW-WP-002	11/4/2008	Vertical metal panel. South side of room structure. Black splotching.	NA	ND(0.001)
B17-SP-WP-005	11/6/2008	6" diameter fire pipe. Ceiling. Rust and dust.	NA	ND(0.001)

Notes:
1. Samples were collected by ARCADIS on the dates indicated.
2. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for polychlorinated biphenyls (PCBs) using USEPA SW-846 Method 8082.
3. ND() = Constituent not detected at a concentration above the reported detection limit in parentheses.
4. mg/wipe = milligrams per wipe sample area (wipe sample area was 10 centimeters by 10 centimeters)
5. NA = Not Applicable

Table 7C

Phase I Pre-Demolition Building Assessment Report
Building 17 - Paint Sample Analytical Results

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID	Date Collected	Sample Location	Color	Aroclor(s) Detected	Total PCBs (mg/kg)	Lead (mg/kg)	Cadmium (mg/kg)
B17-MS-PLC-003	11/4/2008	Peeling paint. Metal staircase. West.	Yellow	NA	NA	1,100	ND(10) RL1
B17-MS-PP-004	11/4/2008	Peeling paint. Metal staircase. West.	Yellow	1260	2 R-1	NA	NA

Notes:

1. Samples were collected by ARCADIS on the dates indicated.
2. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for polychlorinated biphenyls (PCBs) using USEPA SW-846 Method 8082, and lead and cadmium using USEPA SW-846 Method 6010.
3. ND() = Constituent not detected at a concentration above the reported detection limit in parentheses.
4. RL1 = Reporting limit raised due to sample matrix effects.
5. R-1 = Relative percent difference between the primary and confirmatory analysis exceeded 40%. Higher value is reported
6. NA = Not analyzed
7. mg/kg = milligram per kilogram (parts per million)

Value exceeds criteria. For lead results greater than 600 ppm (roughly equivalent to mg/kg), worker protection provisions in Title 29 of the Code of Federal Regulations (CFR) 1926.62 would apply. For cadmium results greater than 0 ppm, worker protection provisions of Title 29 CFR 1926.1127 would apply.

Table 7D

Phase I Pre-Demolition Building Assessment Report
Building 17 - Waste Characterization Sample Analytical Results - Building Material

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID		Criteria		B17-WC-CHWP-007	B17-WS-CHWP-008	B17-WW-CHWP-011
Analytical Test	**Units**	**RCRA Toxicity Limit**	**CA Regulatory Limits**			
TCLP Metals			CA Toxicity Limits			
Barium	mg/L	100	100	ND	ND	0.48
Total Metals			10xSTLC/TTLC for mg/kg			
Mercury	mg/kg	NA	2/20	ND	ND	0.037
Arsenic	mg/kg	NA	50/500	ND	ND	3.7
Barium	mg/kg	NA	1000/10,000	4.2	6.1	110
Chromium	mg/kg	NA	50/500	ND	ND	37
Cobalt	mg/kg	NA	800/8,000	ND	ND	6.7
Copper	mg/kg	NA	250/2500	ND	ND	20
Lead	mg/kg	NA	50/1000	ND	ND	3.0
Nickel	mg/kg	NA	200/2000	ND	ND	33
Vanadium	mg/kg	NA	240/2400	ND	ND	34
Zinc	mg/kg	NA	2500/5000	ND	ND	30
TCLP VOCs			CA Toxicity Limits			
Naphthalene	mg/L	NS	NS	ND	0.058 T-5	ND
Total VOCs			10xSTLC/TTLC for mg/kg			
p-Isopropyltoluene	mg/kg	NA	NS	5.7 A-01, RL1	3.2 A-01, RL1	ND
Naphthalene	mg/kg	NA	NS	ND	22 A-01, RL1	ND
TCLP SVOCs			CA Toxicity Limits			
4-Methylphenol	mg/L	200	NS	0.16 T-5	ND	ND
Pentachlorophenol	mg/L	100	100	ND	3.3 T-5	ND
Total SVOCs			10xSTLC/TTLC for mg/kg			
2-Methylnaphthalene	mg/kg	NA	NS	ND	230	ND
Pentachlorophenol	mg/kg	NA	1.7/17	ND	**4,500**	ND
Ignitability, Corrosivity						
Ignitability	SU	NS	<140°F	ND	ND	ND
pH	pH units	NS	≤2 or ≥12.5	4.88	3.87	12.1

see notes on Page 2.

Table 7D

Phase I Pre-Demolition Building Assessment Report
Building 17 - Waste Characterization Sample Analytical Results - Building Material

General Electric Company
East 14th Street Facility
Oakland, California

Notes:

1. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for
   -TCLP VOCs using United States Environmental Protection Agency (USEPA) SW-1311 Method 8260
   -TCLP SVOCs using USEPA SW-1311 Method 8270
   -TCLP Metals using USEPA SW-1311 Methods 7470, 6010
   -Ignitability using USEPA SW-1010
   -Corrosivity using USEPA SW-9045
   -VOCs using USEPA SW-846 Method 8260.
   -SVOCs using USEPA SW-846 Method 8270.
   -Metals using USEPA SW-846 Method 6010.
2. ND() = Constituent not detected at a concentration above the reported detection limit in parentheses
3. A-01 = Sample result might be biased high due to coelution of Aroclors
4. RL1 = Reporting limit raised due to sample matrix effects.
5. T5 = Less than the prescribed sample amount was available to perform the leachate extraction. The volume of extraction fluid was adjusted proportionately based on the method prescribed ratio of extraction fluid to sample weight.
6. M1 = The MS and/or MSD were above the acceptance limits due to sample matrix interference. See Blank Spike (LCS)
7. HFT = The holding time for this test is immediate. It was analyzed in the laboratory as soon as possible after receipt
8. TCLP = Toxicity Characteristic Leaching Procedure
9. SU = Standard units
10. NS = No Standard
11. VOCs = Volatile organic compounds
12. SVOCs = Semi-volatile organic compounds
13. mg/kg = milligram per kilogram (parts per million)
14. NA = Not Available
15. mg/L = milligram per liter
16. Only detected constituents are listed in the Waste Characterization Analytical Results table above.
17. RCRA Toxicity Limit = the Resource Conservation and Recovery Act (RCRA) maximum concentration for characteristics of TCLP toxicity.
18. 20X RCRA toxicity limit = 20 times the RCRA maximum concentration for characteristics of TCLP toxicity.
19. CA toxicity limit = the maximum concentration for toxicity characteristics from 22 CCR 66261.24.
20. STLC = Soluble Threshold Limit Concentration from 22 CCR 66261.24.
21. TTLC = Total Threshold Limit Concentration from 22 CCR 66261.24.
22. Bolded value indicates exceedence of TTLC.

Table 8A

Phase I Pre-Demolition Building Assessment Report
Building 18 - Core/Bulk Sample PCB Analytical Results

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID	Date Collected	Sample Location	Depth (in)	Aroclor(s) Detected	Total PCBs (mg/kg)	Notes
Building Materials						
B18-CF-CP-004	11/7/2008	Concrete floor. North. White staining.	6	1260	0.12	-
B18-CF-CHWP-005	11/7/2008	Concrete floor. Center.	6	1260	0.59	R-1
B18-SW-CP-006	11/7/2008	Sheetrock wall. East wall office room.	NA	1260	0.32	RL1, R-1
B18-CF-CP-007	11/7/2008	Concrete floor. South.	6	1260	0.26	R-1

Notes:
1. Samples were collected by ARCADIS on the dates indicated.
2. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for polychlorinated biphenyls (PCBs) using USEPA SW-846 Method 8082.
3. ND() = Constituent not detected at a concentration above the reported detection limit in parentheses.
4. RL1 = Reporting limit raised due to sample matrix effects.
5. R-1 = Relative percent difference between the primary and confirmatory analysis exceeded 40%. Higher value is reported.
6. in = inches
7. mg/kg = milligrams per kilogram
8. NA = Not Applicable

Table 8B

Phase I Pre-Demolition Building Assessment Report
Building 18 - Wipe Sample PCB Analytical Results

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID	Date Collected	Sample Location	Aroclor(s) Detected	Total PCBs (mg/wipe)
B18-SS-WP-003	11/4/2008	Horizontal surface of structural steel beam. North. Dusty.	1260	0.022
B18-SS-WP-003DUP	11/4/2008	Duplicate of B18-SS-WP-003	1260	0.014

Notes:
1. Samples were collected by ARCADIS on the dates indicated
2. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for polychlorinated biphenyls (PCBs) using USEPA SW-846 Method 8082
3. mg/wipe = milligrams per wipe sample area (wipe sample area was 10 centimeters by 10 centimeters)

Table 8C

Phase I Pre-Demolition Building Assessment Report
Building 18 - Paint Sample Analytical Results

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID	Date Collected	Sample Location	Color	Aroclor(s) Detected	Total PCBs (mg/kg)	Lead (mg/kg)	Cadmium (mg/kg)
B18-MD-PLC-001	11/3/2008	Peeling paint from sliding door exterior.	White	NA	NA	400	ND(5.0) RL1
B18-MW-PP-002	11/3/2008	Peeling paint from sliding door exterior.	White	1254, 1260	5.3 A-01	NA	NA

Notes:
1. Samples were collected by ARCADIS on the dates indicated
2. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for polychlorinated biphenyls (PCBs) using USEPA SW-846 Method 8082, and lead and cadmium using USEPA SW-846 Me
3. A-01 = Sample result might be biased high due to coelution of Aroclors
4. RL1 = Reporting limit raised due to sample matrix effects.
5. NA = Not analyzed
6. mg/kg = milligram per kilogram (parts per million)

Value exceeds criteria. For lead results greater than 600 ppm (roughly equivalent to mg/kg), worker protection provisions in Title 29 of the Code of Federal Regulations (CFR) 1926.62 would apply. For cadmium results greater than 0 ppm, worker protection provisions of Title 29 CFR 1926.1127 would apply.

Table 8D

Phase I Pre-Demolition Building Assessment Report
Building 18 - Waste Characterization Sample Analytical Results - Building Material

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID		Criteria		B18-CF-CHWP-005
Analytical Test	**Units**	**RCRA Toxicity Limit**	**CA Regulatory Limits**	
TCLP Metals			CA Toxicity Limit	
Barium	mg/L	100	100	0.29
Chromium	mg/L	5	5	0.15
Total Metals			10xSTLC/TTLC for mg/kg	
Mercury	mg/kg	NA	2/20	0.024
Arsenic	mg/kg	NA	50/500	4.2
Barium	mg/kg	NA	1000/10000	130
Chromium	mg/kg	NA	50/500	39 M2
Cobalt	mg/kg	NA	800/8000	9.2 M2
Copper	mg/kg	NA	250/2500	32 M2
Lead	mg/kg	NA	50/1000	4.4 M2
Nickel	mg/kg	NA	200/2000	40 M2
Vanadium	mg/kg	NA	240/2400	33 M2
Zinc	mg/kg	NA	2500/5000	48 M2
Ignitability, Corrosivity				
Ignitability	SU	NS	<140°F	ND
pH	pH units	NS	≤2 or ≥12.5	12.0

see notes on Page 2.

Table 8D

Phase I Pre-Demolition Building Assessment Report
Building 18 - Waste Characterization Sample Analytical Results - Building Material

General Electric Company
East 14th Street Facility
Oakland, California

Notes:

1. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for:
   -TCLP VOCs using United States Environmental Protection Agency (USEPA) SW-1311 Method 8260
   -TCLP SVOCs using USEPA SW-1311 Method 8270
   -TCLP Metals using USEPA SW-1311 Methods 7470, 6010
   -Ignitability using USEPA SW-1010
   -Corrosivity using USEPA SW-9045
   -VOCs using USEPA SW-846 Method 8260.
   -SVOCs using USEPA SW-846 Method 8270.
   -Metals using USEPA SW-846 Method 6010.
2. ND = Constituent not detected at a concentration above the reported detection limit.
3. M2 = The MS and/or MSD were below the acceptance limits due to sample matrix interference. See Blank Spike (LCS).
4. TCLP = Toxicity Characteristic Leaching Procedure
5. SU = Standard units
6. NS = No Standard
7. mg/kg = milligram per kilogram (parts per million)
8. NA = Not Applicable
9. mg/L = milligram per liter
10. Only detected constituents are listed in the Waste Characterization Analytical Results table above.
11. RCRA Toxicity Limit = the Resource Conservation and Recovery Act (RCRA) maximum concentration for characteristic of TCLP toxicity.
12. CA toxicity limit = the maximum concentration for toxicity characteristics from 22 CCR 66261.24.
13. STLC = Soluble Threshold Limit Concentration from 22 CCR 66261.24.
14. TTLC = Total Threshold Limit Concentration from 22 CCR 66261.24.

Table 9A

Phase I Pre-Demolition Building Assessment Report
Building 20 - Core/Bulk Sample PCB Analytical Results

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID	Date Collected	Sample Location	Depth (in)	Aroclor(s) Detected	Total PCBs (mg/kg)	Notes
Building Materials						
B20-CF-CP-004	11/10/2008	Concrete floor. Northwest. Dark staining.	6	1260	0.21	R-1
B20-CF-CHWP-005	11/10/2008	Concrete floor. Center. Containment area.	6	1254, 1260	1.03	A-01
B20-CF-CP-006	11/10/2008	Concrete floor. Southeast. Dry black tar-like material	6	NA	ND(0.05)	-

Notes:
1. Samples were collected by ARCADIS on the dates indicated.
2. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for polychlorinated biphenyls (PCBs) using USEPA SW-846 Method 8082.
3. ND() = Constituent not detected at a concentration above the reported detection limit in parentheses.
4. A-01 = Sample result might be biased high due to coelution of Aroclors.
5. R-1 = Relative percent difference between the primary and confirmatory analysis exceeded 40%. Higher value is reported.
6. in = inches
7. mg/kg = milligrams per kilogram
8. NA = Not Applicable

Table 9B

Phase I Pre-Demolition Building Assessment Report
Building 20 - Wipe Sample PCB Analytical Results

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID	Date Collected	Sample Location	Aroclor(s) Detected	Total PCBs (mg/wipe)
B20-MD-MP-002	11/4/2008	Exterior surface of metal sliding door. Dusty.	NA	ND(0.001)
B20-SS-WP-003	11/10/2008	Horizontal surface of steel beam. Northeast. Black staining, dust.	1254, 1260	0.007 A-01
B20-SS-WP-003 DUP	11/10/2008	Duplicate sample of B20-SS-WP-003	1254, 1260	0.0035 A-01

Notes:
1. Samples were collected by ARCADIS on the dates indicated
2. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for polychlorinated biphenyls (PCBs) using USEPA SW-846 Method 8082
3. ND() = Constituent not detected at a concentration above the reported detection limit in parentheses
4. mg/wipe = milligrams per wipe sample area (wipe sample area was 10 centimeters by 10 centimeters)
5. NA = Not Applicable

Table 9C

Phase I Pre-Demolition Building Assessment Report
Building 20 - Paint Sample Analytical Results

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID	Date Collected	Sample Location	Color	Lead (mg/kg)	Cadmium (mg/kg)
B20-MD-PLC-001	11/3/2008	Edge of metal sliding door.	Light brown	7,500	ND(5.0) RL1

Notes:
1. Samples were collected by ARCADIS on the dates indicated.
2. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for lead and cadmium using USEPA SW-846 Method 6010.
3. ND() = Constituent not detected at a concentration above the reported detection limit in parentheses.
4. RL1 = Reporting limit raised due to sample matrix effects.
5. mg/kg = milligram per kilogram (parts per million)

Federal Regulations (CFR) 1926.62 would apply. For cadmium results greater than 0 ppm, worker protection provisions of Title 29 CFR 1926.1127 would apply.

Table 9D

Phase I Pre-Demolition Building Assessment Report
Building 20 - Waste Characterization Sample Analytical Results - Building Material

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID		Criteria		B20-CF-CHWP-005
Analytical Test	**Units**	**RCRA Toxicity Limit**	**CA Regulatory Limits**	
TCLP Metals			CA Toxicity Limit	
Barium	mg/L	100	100	0.34
Total Metals			10xSTLC/TTLC for mg/kg	
Mercury	mg/kg	NA	2/200	0.026
Arsenic	mg/kg	NA	50/500	3.8
Barium	mg/kg	NA	1000/10000	110
Chromium	mg/kg	NA	50/500	29
Cobalt	mg/kg	NA	800/8000	7.0
Copper	mg/kg	NA	250/2500	29
Lead	mg/kg	NA	50/1000	3.6
Nickel	mg/kg	NA	200/2000	30
Vanadium	mg/kg	NA	240/2400	26
Zinc	mg/kg	NA	2500/5000	49
Ignitability, Corrosivity				
Ignitability	SU	NS	<140°F	ND
pH	pH units	NS	≤2 or ≥12.5	12.2

Notes:

1. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for:
   -TCLP VOCs using United States Environmental Protection Agency (USEPA) SW-1311 Method 8260
   -TCLP SVOCs using USEPA SW-1311 Method 8270
   -TCLP Metals using USEPA SW-1311 Methods 7470, 6010
   -Ignitability using USEPA SW-1010
   -Corrosivity using USEPA SW-9045
   -VOCs using USEPA SW-846 Method 8260.
   -SVOCs using USEPA SW-846 Method 8270.
   -Metals using USEPA SW-846 Method 6010.
2. ND = Constituent not detected at a concentration above the reported detection limit.
3. TCLP = Toxicity Characteristic Leaching Procedure
4. SU = Standard units
5. NS = No Standard
6. mg/kg = milligram per kilogram (parts per million)
7. NA = Not Applicable
8. mg/L = milligram per liter
9. Only detected constituents are listed in the Waste Characterization Analytical Results table above.
10. RCRA Toxicity Limit = the Resource Conservation and Recovery Act (RCRA) maximum concentration for characteristis of TCLP toxicity.
11. CA toxicity limit = the maximum concentration for toxicity characteristics from 22 CCR 66261.24.
12. STLC = Soluble Threshold Limit Concentration from 22 CCR 66261.24.
13. TTLC = Total Threshold Limit Concentration from 22 CCR 66261.24.

Table 10A

Phase I Pre-Demolition Building Assessment Report
Building 21 - Core/Bulk Sample PCB Analytical Results

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID	Date Collected	Sample Location	Depth (in)	Aroclor(s) Detected	Total PCBs (mg/kg)	Notes
Debris						
B21-SMP-B-009	11/4/2008	Dry dark brown crust-like material. Sump in Tank 9 containment.	12	1260	68	R-1
Building Materials						
B21-CF-CHWP-010	11/13/2008	Painted/sealed concrete floor. North central. Slab >6" thick	6	NA	ND(0.05)	-
B21-SMP-CP-011	11/13/2008	Concrete bottom of 15" deep sump. North. Dust/debris.	15	1260	0.18	-
B21-CF-CHWP-012	11/14/2008	Painted/sealed concrete floor. North. Near oil receiving tank. Refusal.	8	NA	ND(0.075)	RL1
B21-SMP-CP-013	11/14/2008	Concrete bottom of 36" deep sump. South of oil/water separator. Dust/debris.	36	1260	0.22	-
B21-CF-CHWP-014	11/14/2008	Painted/sealed concrete containment. Near Tank 3. 1/2" thick layer of extra concrete/seal. Thin slab.	3-4	NA	ND(0.05)	-
B21-CF-CP-015	11/14/2008	Painted/sealed concrete containment. Between Tank 5-6. 1/2" thick layer of extra concrete/seal. Thin slab. Staining	3-4	NA	ND(0.05)	-
B21-CF-CP-016	11/14/2008	Painted/sealed concrete containment. Near Tank 9. 1/2" thick layer of extra concrete/seal. Thin slab. Staining.	3-4	NA	ND(0.05)	-
B21-CF-CP-016 DUP	11/14/2008	Duplicate of B21-CF-CP-016	3-4	NA	ND(0.05)	-

Notes:
1. Samples were collected by ARCADIS on the dates indicated.
2. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for polychlorinated biphenyls (PCBs) using USEPA SW-846 Method 8082.
3. ND() = Constituent not detected at a concentration above the reported detection limit in parentheses.
4. R-1 = Relative percent difference between the primary and confirmatory analysis exceeded 40%. Higher value is reported.
5. RL1 = Reporting limit raised due to sample matrix effects.
6. DUP = Duplicate sample
7. in = inches
8. mg/kg = milligrams per kilogram
9. NA = Not Applicable

Table 10B

Phase I Pre-Demolition Building Assessment Report
Building 21 - Wipe Sample PCB Analytical Results

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID	Date Collected	Sample Location	Aroclor(s) Detected	Total PCBs (mg/wipe)
B21-EQ-WP-003	11/4/2008	Vertical surface of metal storage cabinet.	NA	ND(0.001)
B21-MW-WP-004	11/4/2008	Interior sheet metal wall. South.	NA	ND(0.001)
B21-MW-WP-005	11/4/2008	Interior sheet metal wall. West.	NA	ND(0.001)
B21-TK-WP-006	11/4/2008	Exterior metal surface of Tank 4. Dust.	NA	ND(0.001)
B21-SP-WP-007	11/4/2008	Exterior surface of steel pipe. Brown drip.	NA	ND(0.001)
B21-TK-WP-008	11/4/2008	Exterior metal surface of Tank 9.	NA	ND(0.001)
B21-TK-WP-017	11/17/2008	Interior of Tank 14. Yellow staining. Non-TSCA wipe.	NA	ND(0.001)
B21-TK-WP-018	11/17/2008	Interior of Tank 10. Non-TSCA wipe.	1260	0.023
B21-TK-WP-019	11/17/2008	Interior of Tank 9. Non-TSCA wipe.	1260	0.0011
B21-TK-WP-020	11/17/2008	Interior of Tank 8. Non-TSCA wipe.	NA	ND(0.001)
B21-TK-WP-021	11/17/2008	Interior of Tank 7. Non-TSCA wipe.	NA	ND(0.001)
B21-TK-WP-022	11/17/2008	Interior of Tank 6. Non-TSCA wipe.	NA	ND(0.001)
B21-TK-WP-023	11/17/2008	Interior of Tank 5. Non-TSCA wipe.	NA	ND(0.001)
B21-TK-WP-024	11/17/2008	Interior of Tank 11. Non-TSCA wipe.	NA	ND(0.001)
B21-TK-WP-025	11/17/2008	Interior of Tank 3. Non-TSCA wipe.	NA	ND(0.001)
B21-TK-WP-026	11/17/2008	Interior of Tank 4. Non-TSCA wipe.	NA	ND(0.001)

Notes:
1. Samples were collected by ARCADIS on the dates indicated
2. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for polychlorinated biphenyls (PCBs) using USEPA SW-846 Method 8082
3. ND() = Constituent not detected at a concentration above the reported detection limit in parentheses
4. mg/wipe = milligrams per wipe sample area (wipe sample area was 10 centimeters by 10 centimeters)
5. NA = Not Applicable

Table 10C

Phase I Pre-Demolition Building Assessment Report
Building 21 - Paint Sample Analytical Results

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID	Date Collected	Sample Location	Color	Aroclor(s) Detected	Total PCBs (mg/kg)	Lead (mg/kg)	Cadmium (mg/kg)
B21-SP-PP-001	11/3/2008	Peeling paint from steel pipe in secondary containment.	Mint green	1260	0.29 R-1	NA	NA
B21-SP-PLC-002	11/3/2008	Peeling paint from steel pipe in secondary containment.	Mint green	NA	NA	82	ND(2.5) RL1

Notes:
1. Samples were collected by ARCADIS on the dates indicated.
2. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for polychlorinated biphenyls (PCBs) using USEPA SW-846 Method 8082, and lead and cadmium using USEPA SW-846 Method 6010
3. ND() = Constituent not detected at a concentration above the reported detection limit in parentheses
4. R-1 = Relative percent difference between the primary and confirmatory analysis exceeded 40%. Higher value is reported
5. RL1 = Reporting limit raised due to sample matrix effects.
6. NA = Not analyzed
7. mg/kg = milligram per kilogram (parts per million)

Value exceeds criteria. For lead results greater than 600 ppm (roughly equivalent to mg/kg), worker protection provisions in Title 29 of the Code of Federal Regulations (CFR) 1926.62 would apply. For cadmium results greater than 0 ppm, worker protection provisions of Title 29 CFR 1926.1127 would apply.

Table 10D

Phase I Pre-Demolition Building Assessment
Building 21 - Waste Characterization Sample Analytical Results - Building Material

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID		Criteria		B21-CF-CHWP-010	B21-CF-CHWP-012	B21-CF-CHWP-014
Analytical Test	**Units**	**RCRA Toxicity Limit**	**CA Regulatory Limits**			
TCLP Metals			CA Toxicity Limits			
Barium	mg/L	100	100	0.49	0.44	0.89
Total Metals			10xSTLC/TTLC for mg/kg			
Mercury	mg/kg	NA	2/20	0.032	0.023	0.068
Arsenic	mg/kg	NA	50/500	3.5	ND	ND
Barium	mg/kg	NA	1000/10,000	130	120	160
Chromium	mg/kg	NA	50/500	43	38	44
Cobalt	mg/kg	NA	800/8,000	7.9	6.5	6.4
Copper	mg/kg	NA	250/2,500	23	19	22
Lead	mg/kg	NA	50/1,000	3.4	3.3	2.9
Nickel	mg/kg	NA	200/2,000	38	45	48
Vanadium	mg/kg	NA	240/2,400	45	33	44
Zinc	mg/kg	NA	2,500/5,000	32	28	32
Total VOCs			10xSTLC/TTLC for mg/kg			
Isopropylbenzene	mg/kg	NA	NS	0.14	ND	0.33
n-Propylbenzene	mg/kg	NA	NS	ND	ND	0.49
1,2,4-Trimethylbenzene	mg/kg	NA	NS	1.4 L	0.76 L	4.9 L
1,3,5-Trimethylbenzene	mg/kg	NA	NS	1.3	0.58	2.3
o-Xylene	mg/kg	NA	NS	ND	ND	0.18
Total SVOCs			10xSTLC/TTLC for mg/kg			
Isophorone	mg/kg	NA	NS	14 RL3	ND	ND
Ignitability, Corrosivity						
Ignitability	SU	NS	<140°F	ND	ND	ND
pH	pH units	NS	≤2 or ≥12.5	12.2 H-1	12.2 H-1	8.55 H-1

see notes on Page 2.

Table 10D

Phase I Pre-Demolition Building Assessment
Building 21 - Waste Characterization Sample Analytical Results - Building Material

General Electric Company
East 14th Street Facility
Oakland, California

Notes:

1. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for:
   -TCLP VOCs using United States Environmental Protection Agency (USEPA) SW-1311 Method 8260
   -TCLP SVOCs using USEPA SW-1311 Method 8270
   -TCLP Metals using USEPA SW-1311 Methods 7470, 6010
   -Ignitability using USEPA SW-1010
   -Corrosivity using USEPA SW-9045
   -VOCs using USEPA SW-846 Method 8260.
   -SVOCs using USEPA SW-846 Method 8270.
   -Metals using USEPA SW-846 Method 6010.
2. ND() = Constituent not detected at a concentration above the reported detection limit in parentheses.
3. H - 1 = Sample analysis performed past the method-specified holding time per client's approval.
4. RL3 Reporting limit raised due to high concentrations of non-target analytes
5. L = Laboratory Control Sample and/or Laboratory Control Sample Duplicate recovery was above acceptance limits.
6. TCLP = Toxicity Characteristic Leaching Procedure
7. SU = Standard units
8. NS = No Standard
9. NA = Not Applicable
10. VOCs = Volatile organic compounds
11. SVOCs = Semi-volatile organic compounds
12. mg/kg = milligram per kilogram (parts per million)
13. mg/L = milligram per liter
14. Only detected constituents are listed in the Waste Characterization Analytical Results table above.
15. RCRA Toxicity Limit = the Resource Conservation and Recovery Act (RCRA) maximum concentration for characteristics of TCLP toxicity.
16. CA toxicity limit = the maximum concentration for toxicity characteristics from 22 CCR 66261.24.
17. STLC = Soluble Threshold Limit Concentration from 22 CCR 66261.24.
18. TTLC = Total Threshold Limit Concentration from 22 CCR 66261.24.

Table 11A

Phase I Pre-Demolition Building Assessment Report
Outer Tanks - Core/Bulk Sample PCB Analytical Results

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID	Date Collected	Sample Location	Aroclor(s) Detected	Total PCBs (mg/kg)	Notes
Debris					
OT1-TK-B-002	11/17/2008	East Tank. Black two phase liquid/sludge material. Oily	1254, 1260	50	A-01, C-7, R-1

Notes:
1. Sample was collected by ARCADIS on the date indicated.
2. Sample was analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for polychlorinated biphenyls (PCBs) using USEPA SW-846 Method 8082.
3. A-01 = Sample result might be biased high due to coelution of Aroclors.
4. R-1 = Relative percent difference between the primary and confirmatory analysis exceeded 40%. Higher value is reported.
5. RL1 = Reporting limit raised due to sample matrix effects.
6. C-7 = Calibration verification recovery was below the method control limit.
7. mg/kg = milligrams per kilogram
8. NA = Not Applicable

Table 11B

Phase I Pre-Demolition Building Assessment Report
Outer Tanks - Wipe Sample PCB Analytical Results

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID	Date Collected	Sample Location	Aroclor(s) Detected	Total PCBs (mg/wipe)
OT1-TK-WP-001	11/17/2008	Interior of East Tank. Dry surfaces. Non-TSCA wipe.	1260	0.031
OT2-TK-WP-001	11/17/2008	Interior of West Tank. Rusty metal. Non-TSCA wipe.	1260	0.014

Notes:
1. Samples were collected by ARCADIS on the dates indicated
2. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for polychlorinated biphenyls (PCBs) using USEPA SW-846 Method 8082
3. mg/wipe = milligrams per wipe sample area (wipe sample area was 10 centimeters by 10 centimeters)

Table 11C

Phase I Pre-Demolition Building Assessment Report
Outer Tanks - Bulk Sample Metals Analytical Results

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID	Date Collected	Sample Location	Metal	20X RCRA (mg/kg)	10xSTLC/TTLC for mg/kg	Result (mg/kg)
OT1-TK-B-002	11/17/2008	East Tank. Black two phase liquid/sludge material. Oily	Mercury	4	2/20	ND(0.020)
			Arsenic	100	50/500	ND(2.0)
			Barium	2000	1000/10,000	31
			Cadmium	20	10/100	ND(0.50)
			Chromium	100	50/500	**140**
			Lead	100	50/1000	**250**
			Selenium	20	10/100	ND(2.0)
			Silver	100	50/500	ND(1.0)

Notes:
1. Sample was collected by ARCADIS on the date indicated.
2. Sample was analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for metals using USEPA SW-846 Method 6010.
3. ND = Constituent not detected at a concentration above the reported detection limit.
4. mg/kg = milligram per kilogram (parts per million)
5. Bolded value indicates the potential to fail STLC.

Value exceeds 20X RCRA toxicity limit.

Table 12A

Phase I Pre-Demolition Building Assessment Report
Pump House - Core/Bulk Sample PCB Analytical Results

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID	Date Collected	Sample Location	Depth (in)	Aroclor(s) Detected	Total PCBs (mg/kg)	Notes
Building Materials						
PHT-CF-CHWP-002	11/10/2008	Concrete floor. Center. Dusty.	6	1260	0.14	R-1
PHT-CF-CP-003	11/10/2008	Concrete floor. Near pump. Oil-like stain.	6-7	1260	0.53	A-01
Equipment Oil						
PHT-EQ-B-004	11/18/2008	Pump motor oil.	NA	NA	ND(5)	-

Notes:
1. Samples were collected by ARCADIS on the dates indicated.
2. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for polychlorinated biphenyls (PCBs) using USEPA SW-846 Method 8082.
3. ND() = Constituent not detected at a concentration above the reported detection limit in parentheses.
4. A-01 = Sample result might be biased high due to coelution of Aroclors.
5. R-1 = Relative percent difference between the primary and confirmatory analysis exceeded 40%. Higher value is reported.
6. in = inches
7. mg/kg = milligrams per kilogram
8. NA = Not Applicable

Table 12B

Phase I Pre-Demolition Building Assessment Report
Pump House - Wipe Sample PCB Analytical Results

General Electric Company
East 14th Street Facility
Oakland, California

Sample ID	Date Collected	Sample Location	Aroclor(s) Detected	Total PCBs (mg/wipe)
PHT-EQ-WP-001	11/4/2008	Top surface of water pipe. Northeast. Brown dust.	1260	1.7

Notes:

1. Sample was collected by ARCADIS on the date indicated.
2. Sample was analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for polychlorinated biphenyls (PCBs) using USEPA SW-846 Method 8082.
3. mg/wipe = micrograms per wipe sample area (wipe sample area was 10 centimeters by 10 centimeters)

Table 12C

Phase I Pre-Demolition Building Assessment Report
Pump House - Waste Characterization Sample Analytical Results

General Electric Company
East 14th Street Facility
Oakland, California

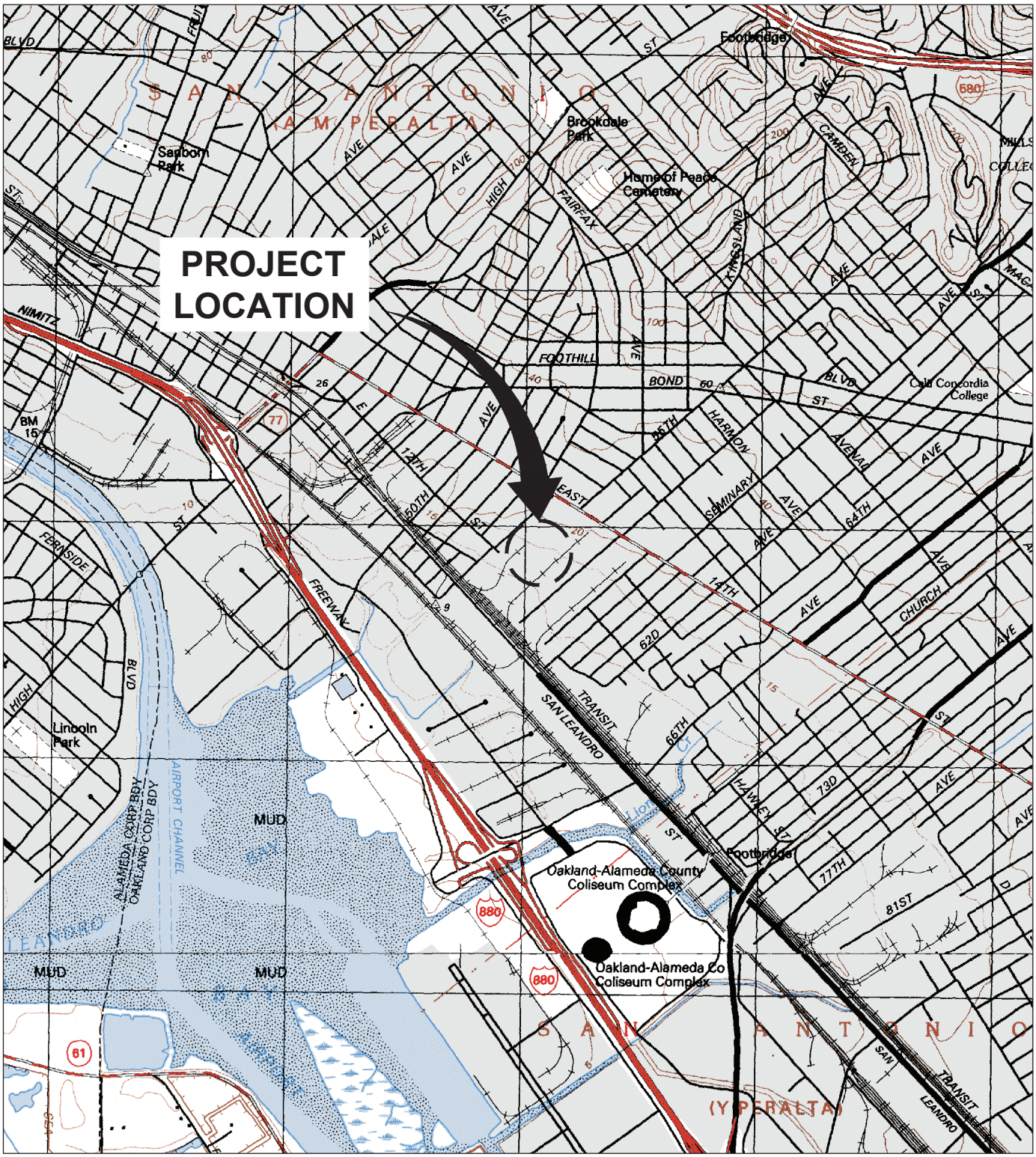
Sample ID		Criteria		PHT-CF-CHWP-002
Analytical Test	**Units**	**RCRA Toxicity Limit**	**CA Regulatory Limits**	
TCLP Metals			CA Toxicity Limits	
Barium	mg/L	100	100	0.34
Chromium	mg/L	5	5	0.20
Total Metals			10xSTLC/TTLC for mg/kg	
Mercury	mg/kg	NA	2/20	0.025
Arsenic	mg/kg	NA	50/500	3.0
Barium	mg/kg	NA	1,000/10,000	140
Chromium	mg/kg	NA	50/500	35
Cobalt	mg/kg	NA	800/8,000	6.9
Copper	mg/kg	NA	250/2,500	24
Lead	mg/kg	NA	50/1,000	4.5
Nickel	mg/kg	NA	200/2,000	34
Vanadium	mg/kg	NA	240/2,400	54
Zinc	mg/kg	NA	2,500/5,000	33
Total SVOCs			10xSTLC/TTLC for mg/kg	
Isophorone	mg/kg	NA	NS	10 RL3
Ignitability, Corrosivity				
Ignitability	SU	NS	<140°F	ND
pH	pH units	NS	≤2 or ≥12.5	12.3

Notes:

1. Samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for:
   -TCLP VOCs using United States Environmental Protection Agency (USEPA) SW-1311 Method 8260
   -TCLP SVOCs using USEPA SW-1311 Method 8270
   -TCLP Metals using USEPA SW-1311 Methods 7470, 6010
   -Ignitability using USEPA SW-1010
   -Corrosivity using USEPA SW-9045
   -VOCs using USEPA SW-846 Method 8260.
   -SVOCs using USEPA SW-846 Method 8270.
   -Metals using USEPA SW-846 Method 6010.
2. ND() = Constituent not detected at a concentration above the reported detection limit in parentheses.
3. RL3 = Reporting limit raised due to sample matrix effects.
4. TCLP = Toxicity Characteristic Leaching Procedure
5. SU = Standard units
6. NS = No Standard
7. VOCs = Volatile organic compounds
8. SVOCs = Semi-volatile organic compounds
9. mg/kg = milligram per kilogram (parts per million)
10. NA = Not Applicable
11. mg/L = milligram per liter
12. Only detected constituents are listed in the Waste Characterization Analytical Results table above.
13. RCRA Toxicity Limit = the Resource Conservation and Recovery Act (RCRA) maximum concentration for characteristis of TCLP toxicity.
14. CA toxicity limit = the maximum concentration for toxicity characteristics from 22 CCR 66261.24.
15. STLC = Soluble Threshold Limit Concentration from 22 CCR 66261.24.
16. TTLC = Total Threshold Limit Concentration from 22 CCR 66261.24.

ARCADIS

Figures



REFERENCE: BASE MAP USGS 7.5. MIN. TOPO. QUAD.,OAKLAND EAST., CA, 1997, AND SAN LEANDRO, CA., 1993.

0 2000' 4000'

Approximate Scale: 1 in. = 2000 ft.



GENERAL ELECTRIC COMPANY
54411 INTERNATIONAL BLVD., OAKLAND, CALIFORNIA
PHASE 1 BUILDING ASSESSMENT REPORT

SITE LOCATION MAP

ARCADIS

FIGURE 1

CITY:SYRACUSE, NY DIV/GROUP: ENV/141 DB:KLS KEW KLS LD:BKD PIC:(Opt) PM:(Reqd) TM:E.LUNIN LYR:(Opt)ON=*;OFF=*REF*
G:\GE\ENVCAD\SYRACUSE\ACTIVE\B0031045\0000\0004\PHASE1\BAR31045B01.dwg LAYOUT: 1 SAVED: 3/5/2013 5:14 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: --- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 3/5/2013 5:14 PM BY: DECLERCQ, BRIAN
XREFS: IMAGES: PROJECTNAME: ---
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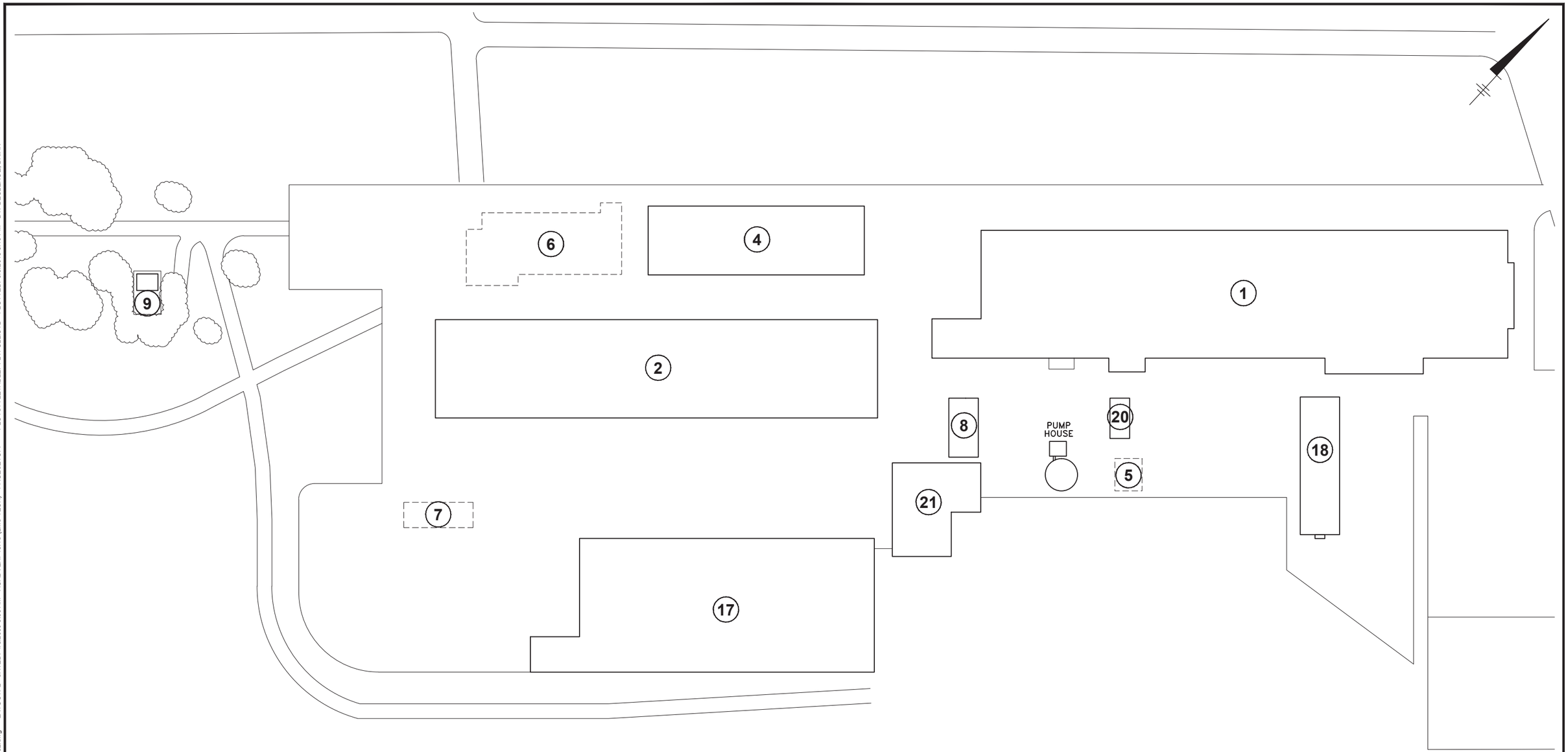
31045X03.tif



LEGEND:

17 BUILDING NUMBER

ONLY BUILDING SLAB REMAINS

0 50' 100'
GRAPHIC SCALE

NOTES:

1. DRAWING WAS PREPARED BASED ON GEOSYNTEC DRAWING TITLED "TRICHLOROETHENE IN GROUNDWATER", GENERAL ELECTRIC CO., OAKLAND CA. THE DRAWING HAS BEEN MODIFIED BASED ON VISUAL OBSERVATIONS MADE BY ARCADIS ON SEPTEMBER 10 AND 11, 2008.
2. ALL FEATURES, DIMENSIONS AND LOCATIONS ARE APPROXIMATE AND MAY NOT BE ALL INCLUSIVE AND/OR ACCURATE.

GENERAL ELECTRIC COMPANY
54411 INTERNATIONAL BLVD., OAKLAND, CALIFORNIA
PHASE I BUILDING ASSESSMENT REPORT

SITE MAP

ARCADIS

FIGURE
2

CITY: SYRACUSE DIV/GROUP: ENV/141 DB: RLP KEW KMD LD: PIC: PM: TM: LYR:ON=*;OFF=*REF*
G:\GE\ENVCAD\SYRACUSE\ACTIVE\B003104\0000\000004\PHASEIIBAR\31045B02.dwg LAYOUT: 2 SAVED: 1/6/2009 9:09 AM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULLCTB PLOTTED: 3/5/2013 5:16 PM BY: DECLERCQ, BRIAN
XREFS:
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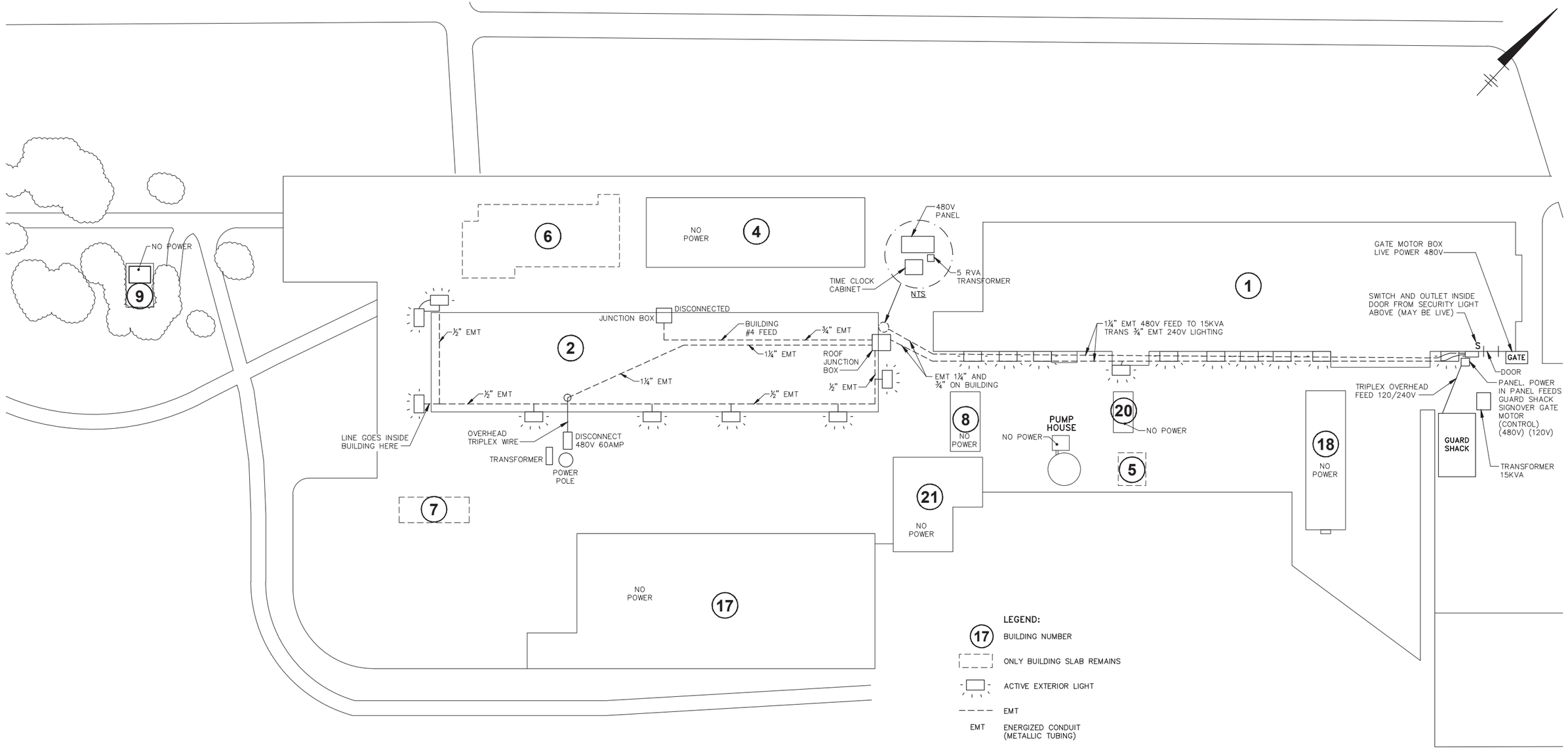
IMAGES:
PROJECTNAME: ----



LEGEND:

- (17) BUILDING NUMBER
- ONLY BUILDING SLAB REMAINS
- ACTIVE EXTERIOR LIGHT
- EMT
- EMT ENERGIZED CONDUIT (METALLIC TUBING)

NOTES:

1. DRAWING WAS PREPARED BASED ON GEOSYNTEC DRAWING TITLED "TRICHLOROETHENE IN GROUNDWATER", GENERAL ELECTRIC CO., OAKLAND CA. THE DRAWING HAS BEEN MODIFIED BASED ON VISUAL OBSERVATIONS MADE BY ARCADIS ON SEPTEMBER 10 AND 11, 2008.
2. THE PRESENCE AND APPROXIMATE LAYOUT OF ACTIVE ELECTRICAL CONDUITS, JUNCTION BOXES, FEEDS, DISCONNECTS, LAMPS AND OTHER ELECTRIC EQUIPMENT IS BASED ON VISUAL OBSERVATIONS MADE BY A LICENSED ELECTRICIAN ON NOVEMBER 5, 2008.
3. ALL FEATURES, DIMENSIONS AND LOCATIONS ARE APPROXIMATE AND MAY NOT BE ALL INCLUSIVE AND/OR ACCURATE.
4. INFORMATION PRESENTED ON THIS DRAWING IS FOR PLANNING PURPOSES ONLY AND SHOULD NOT BE USED FOR ANY OTHER PURPOSE. OTHER ENERGIZED ELECTRIC CONDUITS, IN ADDITION TO THOSE SHOWN ON THIS DRAWING, MAY EXIST.

0 50' 100'
GRAPHIC SCALE

GENERAL ELECTRIC COMPANY
54411 INTERNATIONAL BLVD., OAKLAND, CALIFORNIA
PHASE I BUILDING ASSESSMENT REPORT

ACTIVE ELECTRIC SERVICE REMAINING AT THE SITE

ARCADIS

FIGURE
3

CITY: SYRACUSE DIV/GROUP: ENV/141 DB: RLP KEW KMD LD: PIC: PM: TM: LYR:ON=*;OFF=*REF*
G:\GE\ENV\CAD\SYRACUSE\ACTIVE\B003104\0000\000004\PHASEIBAR\31045E01.dwg LAYOUT: 3 SAVED: 1/8/2009 1:45 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULLCTB PLOTTED: 3/5/2013 5:17 PM BY: DECLERCQ, BRIAN
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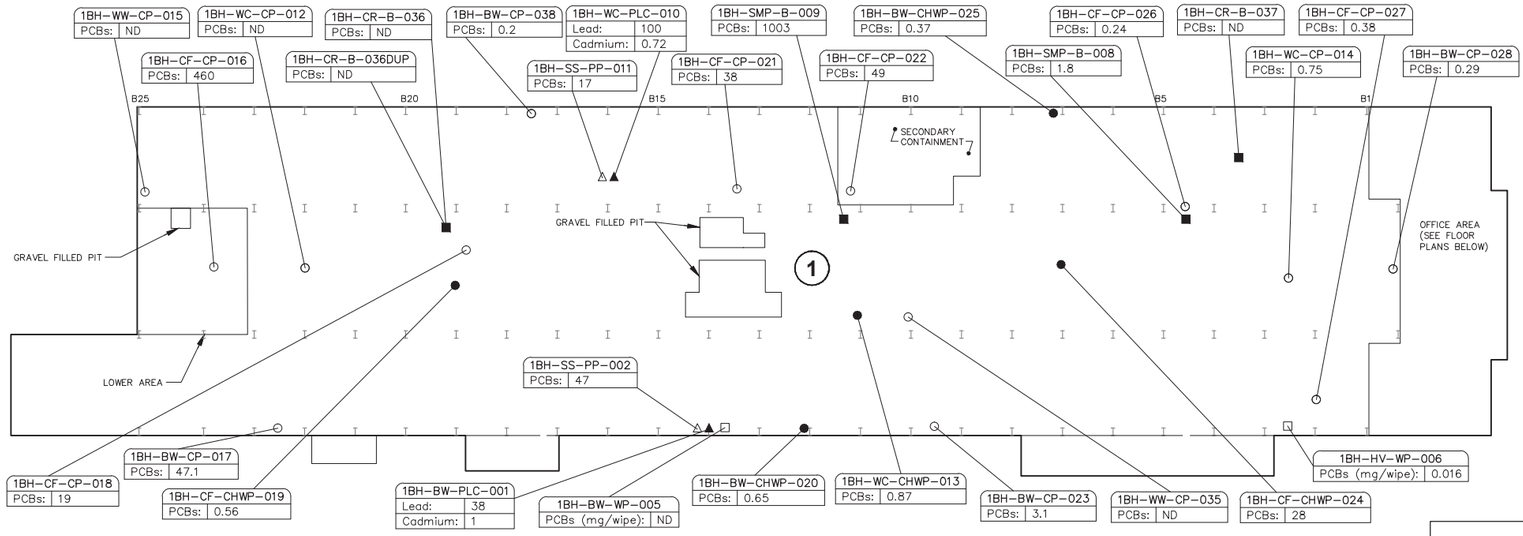
31045X00 overhead photo.jpg



HIGH BAY AREA

0 30' 60'
GRAPHIC SCALE

SAMPLE LEGEND:

- □ WIPE SAMPLE FOR TOTAL PCB ANALYSIS
- ■ BULK SAMPLE FOR TOTAL PCB ANALYSIS
- △ PAINT CHIP SAMPLE FOR TOTAL PCB ANALYSIS
- ▲ PAINT CHIP SAMPLE FOR TOTAL LEAD AND CADMIUM ANALYSIS
- ○ FULL DEPTH CORE FOR TOTAL PCB ANALYSIS
- ● FULL DEPTH CORE FOR FEDERAL AND CA HAZARDOUS WASTE CHARACTERIZATION AND TOTAL PCB ANALYSIS

LEGEND:

(1) BUILDING NUMBER

SAMPLE DESIGNATION SYSTEM

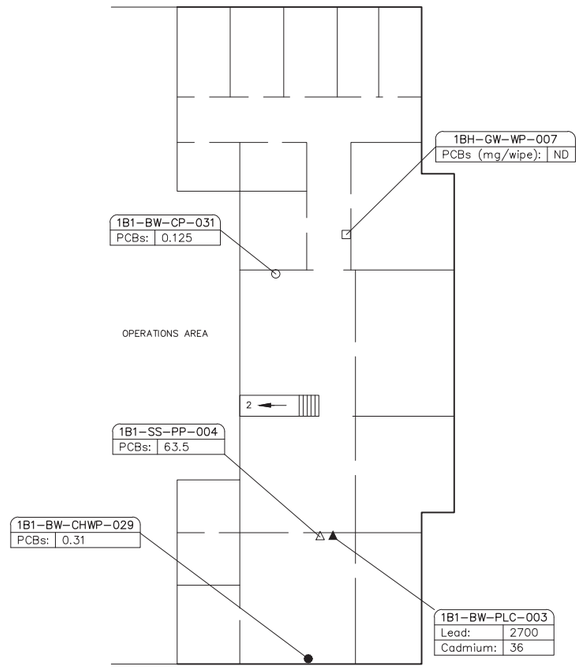
SAMPLING AREA	SAMPLE MATRIX	SAMPLE TYPE	LOCATION NUMBER
1BH = BUILDING 1 HIGH BAY	BD = BULK DEBRIS	CHWP = CORE–HAZARDOUS WASTE CHARACTERIZATION AND PCB	001, 002, 003, 004 ETC.
1B1 = BUILDING 1 OFFICE AREA 1ST FLOOR	CR = CRANE OIL	CP = CORE PCB	
1B2 = BUILDING 1 OFFICE AREA 2ND FLOOR	DF = DOOR FRAME	PLC = LEAD/CADMIUM PAINT	
B2 = BUILDING 2	EQ = EQUIPMENT	PP = PCB PAINT	
B4 = BUILDING 4	CF = CONCRETE FLOOR	WP = WIPE PCB	
B8 = BUILDING 8	WF = WOOD FLOOR		
B9 = BUILDING 9	GW = GLASS WINDOW		
B17 = BUILDING 17	HV = HVAC SYSTEM		
B18 = BUILDING 18	MP = METAL PANEL		
B20 = BUILDING 20	SP = STEEL PIPE		
B21 = BUILDING 21	SMP = SUMP		
PHT = PUMP HOUSE AND TANK	TK = TANK		
OT1 = OUTSIDE TANK 1	BW = BRICK WALL		
OT2 = OUTSIDE TANK 2	CW = CONCRETE WALL		
	MD = METAL WALL		
	SW = SHEETROCK WALL		
	SS = STRUCTURAL WALL		
	WW = WOOD WALL		
	WC = WOOD CEILING		
	WS = WOOD SUPPORT		

1BH-CF-CHWP-024 — SAMPLE IDENTIFICATION NUMBER
PCBs (mg/kg): 28 — CONCENTRATION

ND: SAMPLE DID NOT CONTAIN THE ANALYZED COMPOUND AT CONCENTRATIONS GREATER THAN THE LABORATORY DETECTION LIMIT

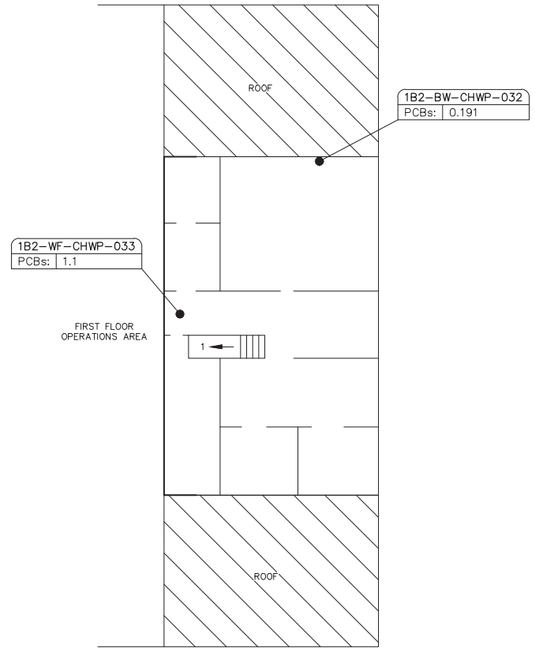
EXAMPLE:

1BH-WW-CP-035
- 035 — SAMPLE LOCATION NUMBER
- CP — SAMPLE TYPE
- WW — SAMPLE MATRIX
- 1BH — SAMPLING AREA
- SYMBOL OF SAMPLE TYPE



OFFICE AREA FIRST FLOOR

0 15' 30'
GRAPHIC SCALE



OFFICE AREA SECOND FLOOR

0 15' 30'
GRAPHIC SCALE

NOTES:

1. DRAWING WAS PREPARED BASED ON GEOSYNTEC DRAWING TITLED "TRICHLOROETHENE IN GROUNDWATER", GENERAL ELECTRIC CO., OAKLAND CA. THE DRAWING HAS BEEN MODIFIED BASED ON VISUAL OBSERVATIONS MADE BY ARCADIS ON SEPTEMBER 10 AND 11, 2008.
2. ALL FEATURES, DIMENSIONS AND LOCATIONS ARE APPROXIMATE AND MAY NOT BE ALL INCLUSIVE AND/OR ACCURATE.
3. WASTE CHARACTERIZATION RESULTS ARE INCLUDED IN TABLE 1D OF THIS PHASE 1 BUILDING ASSESSMENT REPORT.
4. CONCENTRATIONS ARE IN mg/kg UNLESS OTHERWISE STATED.

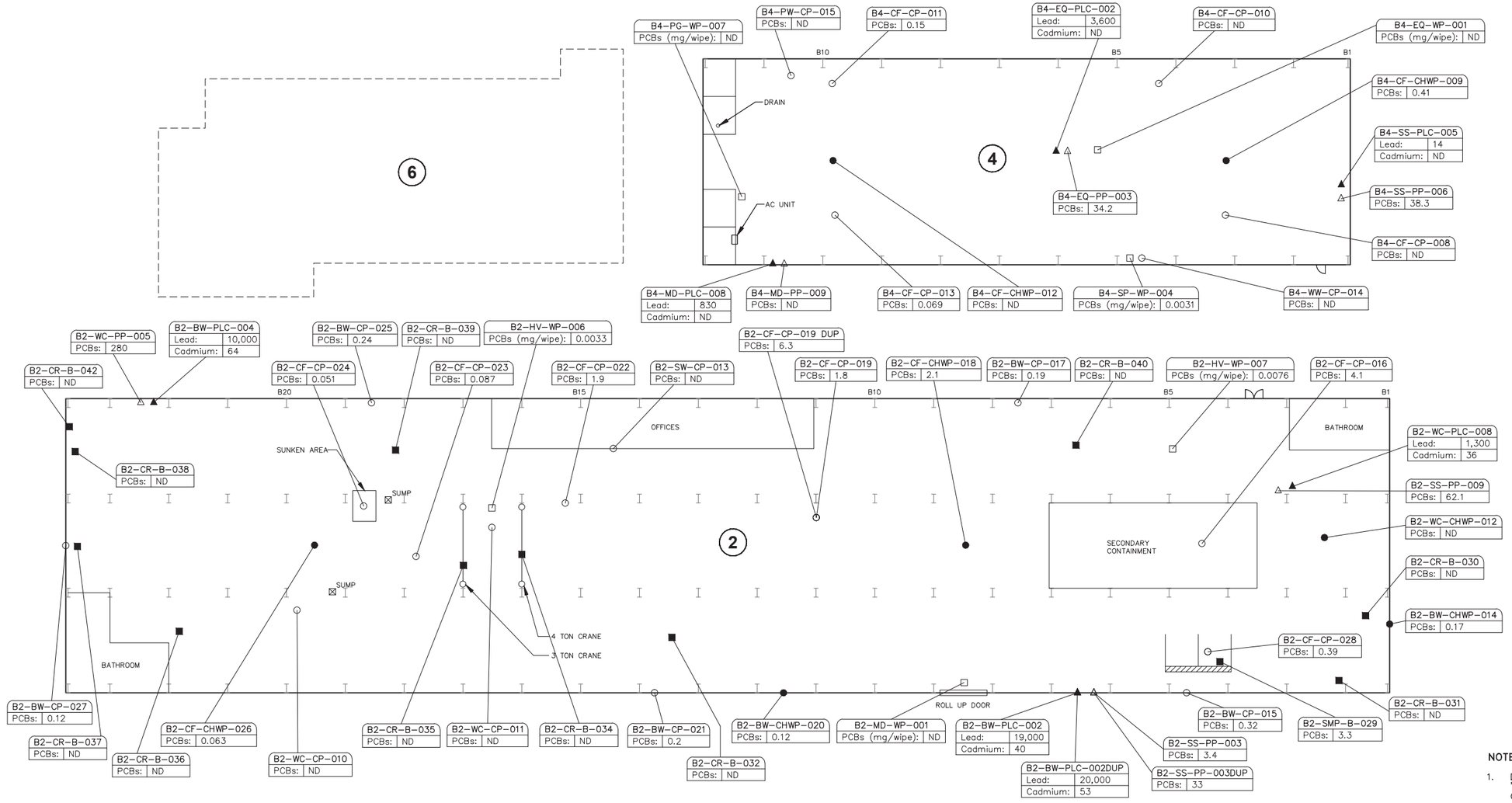
GENERAL ELECTRIC COMPANY
54411 INTERNATIONAL BLVD., OAKLAND, CALIFORNIA
PHASE I BUILDING ASSESSMENT REPORT

SAMPLE LOCATION MAP PCB AND LEAD/CADMIUM IN PAINT BUILDING 1

ARCADIS

FIGURE 4

CITY: SYRACUSE,NY DIV/GROUP: ENV/141 DB: BKD KEW LAF KLS LD: PIC: PM: TM:E.LUNIN LYR:ON=*;OFF=*REF*
G:\GE\ENVCAD\SYRACUSE\ACTIVE\B0031045\0000\000004\PHASEIIBAR\31045G03.dwg LAYOUT: 4 SAVED: 3/5/2013 5:18 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: ----
XREFS: IMAGES: PROJECTNAME: ----
31045X00
PLOTTED: 3/5/2013 5:18 PM BY: DECLERCQ, BRIAN
PLOTSTYLETABLE: PLTFULL.CTB



SAMPLE LEGEND:

- □ WIPE SAMPLE FOR TOTAL PCB ANALYSIS
- ■ BULK SAMPLE FOR TOTAL PCB ANALYSIS
- △ PAINT CHIP SAMPLE FOR TOTAL PCB ANALYSIS
- ▲ PAINT CHIP SAMPLE FOR TOTAL LEAD AND CADMIUM ANALYSIS
- ○ FULL DEPTH CORE FOR TOTAL PCB ANALYSIS
- ● FULL DEPTH CORE FOR FEDERAL AND CA HAZARDOUS WASTE CHARACTERIZATION AND TOTAL PCB ANALYSIS

LEGEND:

4 BUILDING NUMBER

ONLY BUILDING SLAB REMAINS

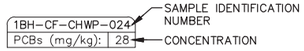
NOTES:

1. DRAWING WAS PREPARED BASED ON GEOSYNTEC DRAWING TITLED "TRICHLOROETHENE IN GROUNDWATER", GENERAL ELECTRIC CO., OAKLAND CA. THE DRAWING HAS BEEN MODIFIED BASED ON VISUAL OBSERVATIONS MADE BY ARCADIS ON SEPTEMBER 10, 11 AND 12, 2008.
2. ALL FEATURES, DIMENSIONS AND LOCATIONS ARE APPROXIMATE AND MAY NOT BE ALL INCLUSIVE AND/OR ACCURATE.
3. WASTE CHARACTERIZATION RESULTS ARE INCLUDED IN TABLE 1D OF THIS PHASE 1 BUILDING ASSESSMENT REPORT.
4. CONCENTRATIONS ARE IN mg/kg UNLESS OTHERWISE NOTED.

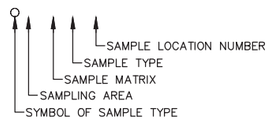
0 20' 40'
GRAPHIC SCALE

SAMPLE DESIGNATION SYSTEM

SAMPLING AREA	SAMPLE MATRIX	SAMPLE TYPE	LOCATION NUMBER
1BH = BUILDING 1 HIGH BAY 1B1 = BUILDING 1 OFFICE AREA 1ST FLOOR 1B2 = BUILDING 1 OFFICE AREA 2ND FLOOR B2 = BUILDING 2 B4 = BUILDING 4 B8 = BUILDING 8 B9 = BUILDING 9 B17 = BUILDING 17 B18 = BUILDING 18 B20 = BUILDING 20 B21 = BUILDING 21 PHT = PUMP HOUSE AND TANK OT1 = OUTSIDE TANK 1 OT2 = OUTSIDE TANK 2	BD = BULK DEBRIS CR = CRANE OIL DF = DOOR FRAME EQ = EQUIPMENT CF = CONCRETE FLOOR WF = WOOD FLOOR GW = GLASS WINDOW HV = HVAC SYSTEM MP = METAL PANEL SP = STEEL PIPE SMP = SUMP TK = TANK BW = BRICK WALL CW = CONCRETE WALL MD = METAL WALL SW = SHEETROCK WALL SS = STRUCTURAL WALL WW = WOOD WALL WC = WOOD CEILING WS = WOOD SUPPORT	CHWP = CORE-HAZARDOUS WASTE CHARACTERIZATION AND PCB CP = CORE PCB PLC = LEAD/CADMIUM PAINT PP = PCB PAINT WP = WIPE PCB	001, 002, 003, 004 ETC.



ND: SAMPLE DID NOT CONTAIN THE ANALYZED COMPOUND AT CONCENTRATIONS GREATER THAN THE LABORATORY DETECTION LIMIT



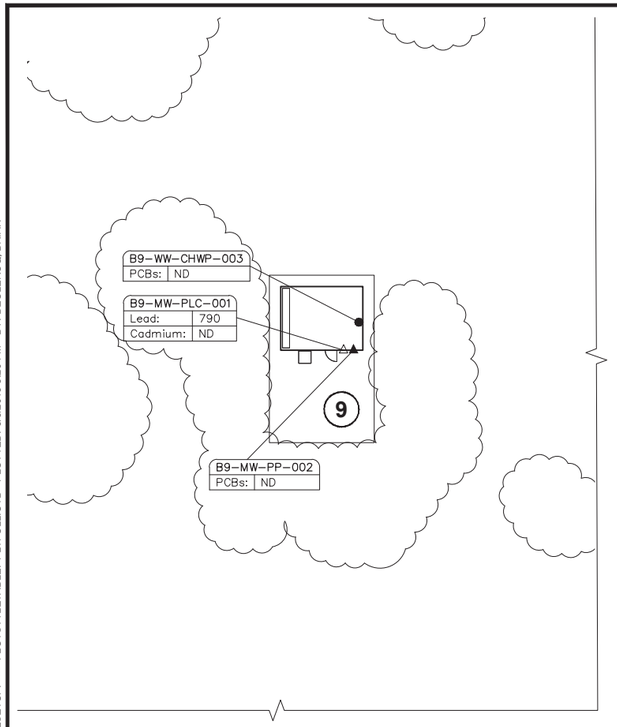
GENERAL ELECTRIC COMPANY
54411 INTERNATIONAL BLVD., OAKLAND, CALIFORNIA
PHASE I BUILDING ASSESSMENT REPORT

SAMPLE LOCATION MAP PCB AND LEAD/CADMIUM IN PAINT BUILDINGS 2 AND 4

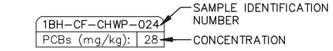
ARCADIS

FIGURE 5

CITY: SYRACUSE DIV/GROUP: ENV/141 DB: BKD LAF KMD LD: PIC: PM: TM: LYR:ON=*:OFF=*REF*
G:\GE\ENVCAD\SYRACUSE\ACTIVE\NIB003104500000004\PHASEIBAR\31045G04.dwg LAYOUT: 5 SAVED: 1/8/2009 1:37 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---
XREFS: IMAGES: PROJECTNAME: ---
31045X00

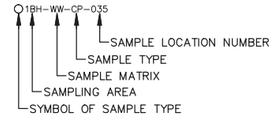


SAMPLE DESIGNATION SYSTEM			
SAMPLING AREA	SAMPLE MATRIX	SAMPLE TYPE	LOCATION NUMBER
1BH = BUILDING 1 HIGH BAY 1B1 = BUILDING 1 OFFICE AREA 1ST FLOOR 1B2 = BUILDING 1 OFFICE AREA 2ND FLOOR B2 = BUILDING 2 B4 = BUILDING 4 B8 = BUILDING 8 B9 = BUILDING 9 B17 = BUILDING 17 B18 = BUILDING 18 B20 = BUILDING 20 B21 = BUILDING 21 PHT = PUMP HOUSE AND TANK OT1 = OUTSIDE TANK 1 OT2 = OUTSIDE TANK 2	BD = BULK DEBRIS CR = CRANE OIL DF = DOOR FRAME EQ = EQUIPMENT CF = CONCRETE FLOOR WF = WOOD FLOOR GW = GLASS WINDOW HV = HVAC SYSTEM MP = METAL PANEL SP = STEEL PIPE SMP = SUMP TK = TANK BW = BRICK WALL CW = CONCRETE WALL MD = METAL WALL SW = SHEETROCK WALL SS = STRUCTURAL WALL WW = WOOD WALL WC = WOOD CEILING WS = WOOD SUPPORT	CHWP = CORE-HAZARDOUS WASTE CHARACTERIZATION AND PCB CP = CORE PCB PLC = LEAD/CADMIUM PAINT PP = PCB PAINT WP = WIPE PCB	001, 002, 003, 004 ETC.



ND: SAMPLE DID NOT CONTAIN THE ANALYZED COMPOUND AT CONCENTRATIONS GREATER THAN THE LABORATORY DETECTION LIMIT

EXAMPLE:



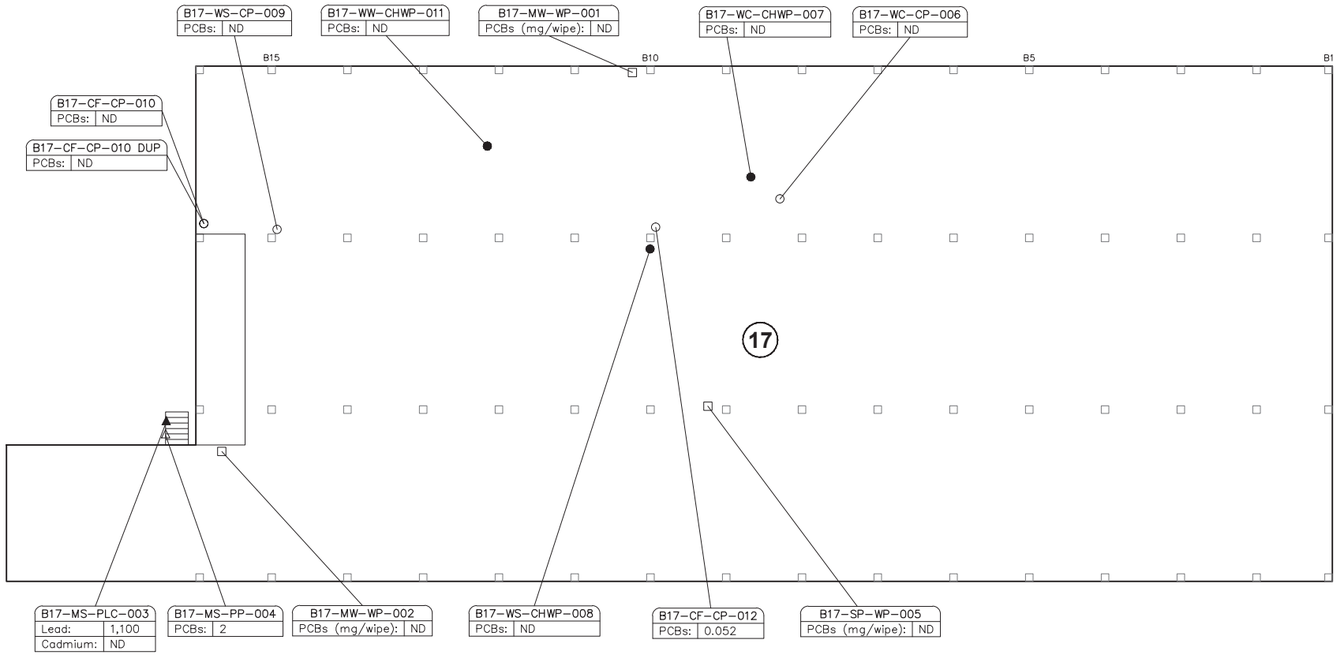


SAMPLE LEGEND:

- □ WIPE SAMPLE FOR TOTAL PCB ANALYSIS
- ■ BULK SAMPLE FOR TOTAL PCB ANALYSIS
- △ PAINT CHIP SAMPLE FOR TOTAL PCB ANALYSIS
- ▲ PAINT CHIP SAMPLE FOR TOTAL LEAD AND CADMIUM ANALYSIS
- ○ FULL DEPTH CORE FOR TOTAL PCB ANALYSIS
- ● FULL DEPTH CORE FOR FEDERAL AND CA HAZARDOUS WASTE CHARACTERIZATION AND TOTAL PCB ANALYSIS

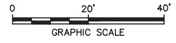
LEGEND:

(9) BUILDING NUMBER



NOTES:

1. DRAWING WAS PREPARED BASED ON GEOSYNTEC DRAWING TITLED "TRICHLOROETHENE IN GROUNDWATER", GENERAL ELECTRIC CO., OAKLAND CA. THE DRAWING HAS BEEN MODIFIED BASED ON VISUAL OBSERVATIONS MADE BY ARCADIS ON SEPTEMBER 10 AND 11, 2008.
2. ALL FEATURES, DIMENSIONS AND LOCATIONS ARE APPROXIMATE AND MAY NOT BE ALL INCLUSIVE AND/OR ACCURATE.
3. SAMPLE B17-WW-CHWP-011 IS A CONCRETE FLOOR SAMPLE. SAMPLE ID WAS LOGGED IN INCORRECTLY BY LABORATORY.
4. WASTE CHARACTERIZATION RESULTS ARE INCLUDED IN TABLE 1D OF THIS PHASE 1 BUILDING ASSESSMENT REPORT.
5. CONCENTRATIONS ARE IN mg/kg UNLESS OTHERWISE NOTED.



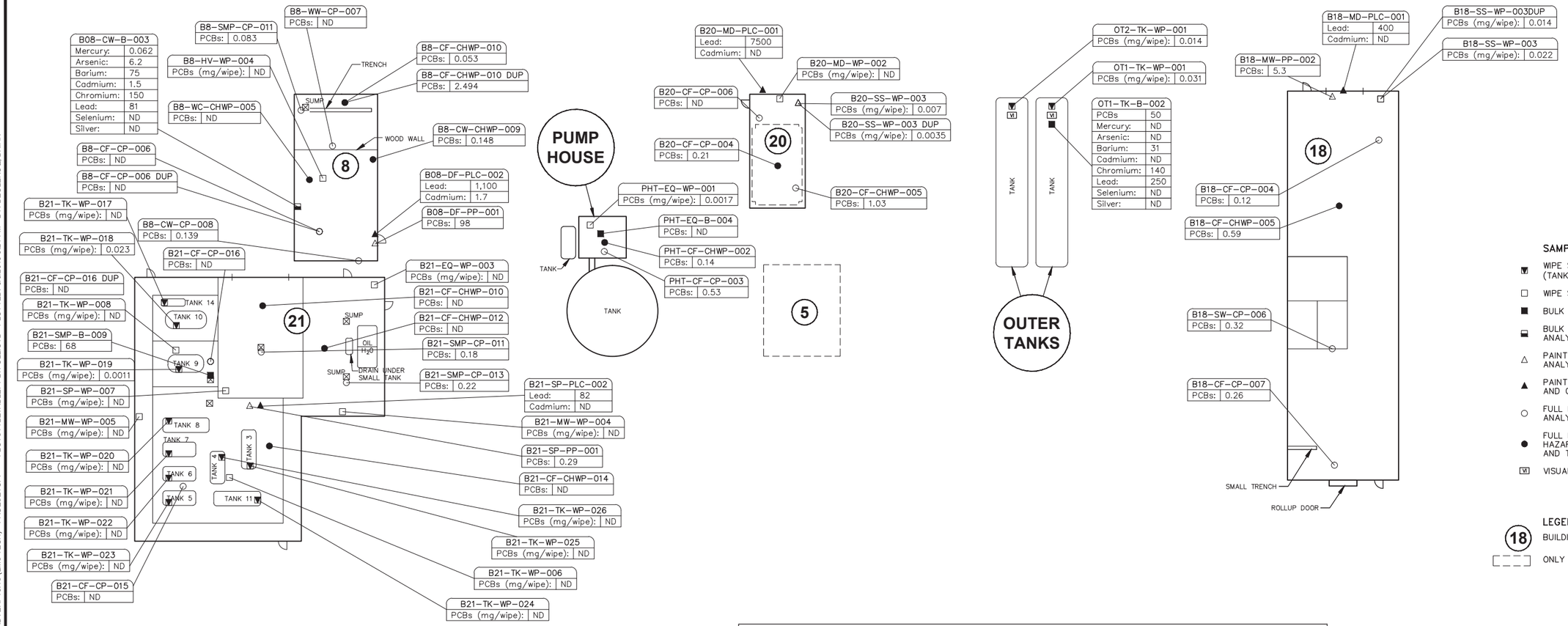
GENERAL ELECTRIC COMPANY
54411 INTERNATIONAL BLVD., OAKLAND, CALIFORNIA
PHASE I BUILDING ASSESSMENT REPORT

SAMPLE LOCATION MAP PCB AND LEAD/CADMIUM IN PAINT BUILDINGS 9 AND 17

ARCADIS

FIGURE 6

CITY: SYRACUSE DIV/GROUP: ENV/141 DB: BKD KEW LD: PIC: PM: TM: LYR:ON=*;OFF=*REF*
G:\GE\ENV\CAD\SYRACUSE\ACTIVE\TNB003104\0000\0000004\PHASEIBAR\31045G05.dwg LAYOUT: 6 SAVED: 3/5/2013 5:20 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---
XREFS: IMAGES: PROJECTNAME: ---
31045X00
PLOTTED: 3/5/2013 5:20 PM BY: DECLERCQ, BRIAN
PLOTSTYLETABLE: PLTFULL.CTB



SAMPLE DESIGNATION SYSTEM

SAMPLING AREA	SAMPLE MATRIX	SAMPLE TYPE	LOCATION NUMBER
1BH = BUILDING 1 HIGH BAY	BD = BULK DEBRIS	CHWP = CORE-HAZARDOUS WASTE CHARACTERIZATION AND PCB	001, 002, 003, 004 ETC.
1B1 = BUILDING 1 OFFICE AREA 1ST FLOOR	CR = CRANE OIL	CP = CORE PCB	
1B2 = BUILDING 1 OFFICE AREA 2ND FLOOR	DF = DOOR FRAME	PLC = LEAD/CADMIUM PAINT	
B2 = BUILDING 2	EQ = EQUIPMENT	PP = PCB PAINT	
B4 = BUILDING 4	CF = CONCRETE FLOOR	WP = WIPE PCB	
B8 = BUILDING 8	WF = WOOD FLOOR		
B9 = BUILDING 9	GW = GLASS WINDOW		
B17 = BUILDING 17	HV = HVAC SYSTEM		
B18 = BUILDING 18	MP = METAL PANEL		
B20 = BUILDING 20	SP = STEEL PIPE		
B21 = BUILDING 21	SMP = SUMP		
PHT = PUMP HOUSE AND TANK	TK = TANK		
OT1 = OUTSIDE TANK 1	BW = BRICK WALL		
OT2 = OUTSIDE TANK 2	CW = CONCRETE WALL		
	MD = METAL WALL		
	SW = SHEETROCK WALL		
	SS = STRUCTURAL WALL		
	WW = WOOD WALL		
	WC = WOOD CEILING		
	WS = WOOD SUPPORT		

1BH-CF-CHWP-024 — SAMPLE IDENTIFICATION NUMBER
PCBs (mg/kg): 28 — CONCENTRATION

ND: SAMPLE DID NOT CONTAIN THE ANALYZED COMPOUND AT CONCENTRATIONS GREATER THAN THE LABORATORY DETECTION LIMIT

EXAMPLE:
1BH-WW-CP-035
- 035 — SAMPLE LOCATION NUMBER
- CP — SAMPLE TYPE
- WW — SAMPLE MATRIX
- 1BH — SAMPLING AREA
- SYMBOL OF SAMPLE TYPE

NOTES:

1. DRAWING WAS PREPARED BASED ON GEOSYNTEC DRAWING TITLED "TRICHLOROETHENE IN GROUNDWATER", GENERAL ELECTRIC CO., OAKLAND CA. THE DRAWING HAS BEEN MODIFIED BASED ON VISUAL OBSERVATIONS MADE BY ARCADIS ON SEPTEMBER 10 AND 11, 2008.
2. ALL FEATURES, DIMENSIONS AND LOCATIONS ARE APPROXIMATE AND MAY NOT BE ALL INCLUSIVE AND/OR ACCURATE.
3. WASTE CHARACTERIZATION RESULTS ARE INCLUDED IN TABLE 1D OF THIS PHASE 1 BUILDING ASSESSMENT REPORT.
4. CONCENTRATIONS ARE IN mg/kg UNLESS OTHERWISE NOTED.

0 20' 40'
GRAPHIC SCALE

GENERAL ELECTRIC COMPANY
54411 INTERNATIONAL BLVD., OAKLAND, CALIFORNIA
PHASE I BUILDING ASSESSMENT REPORT

SAMPLE LOCATION MAP PCB AND LEAD/CADMIUM IN PAINT BUILDINGS 8, 18, 20, 21, PUMP HOUSE, AND OUTER TANKS

ARCADIS

FIGURE 7

CITY: SYRACUSE DIV/GROUP: ENV/141 DB: BKD KEW LAF LD: PIC: PM: TM: LYR:ON=*;OFF=*REF*
G:\GE\ENV\CAD\SYRACUSE\ACTIVE\00310450000\00004\PHASE\BAR\31045G06.dwg LAYOUT: 7 SAVED: 3/5/2013 5:21 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---
XREFS: IMAGES: PROJECTNAME: ---
31045X00

APPENDIX B

Summary Report: Phase 2 Hazardous Materials Survey, SCA, June 2010

SUMMARY REPORT: PHASE 2 HAZARDOUS MATERIALS SURVEY
CONFIDENTIAL SITE
OAKLAND, CALIFORNIA

PREPARED FOR:

GEOSYNTEC CONSULTANTS
10875 RANCHO BERNARDO ROAD, SUITE 200
SAN DIEGO, CA 92127

PREPARED BY:

SCA

ENVIRONMENTAL, INC.

334 19TH STREET
OAKLAND, CA 94612
TEL: (510) 645-6200
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SCA PROJECT NO.: K-9866

JUNE 7, 2010
REVISED: JUNE 8, 2010
2ND REVISION: JUNE 17, 2010

SUMMARY REPORT
PHASE 2 HAZARDOUS MATERIALS SURVEY
CONFIDENTIAL SITE
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JUNE 7, 2010
REVISED: JUNE 8, 2010
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Appendix

A. Representative Lead-Based Paint XRF Sampling Results
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C. Summary of Core and Wipe Sampling Results
D. Core and Wipe Sampling Locations
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List of Common Acronyms and Abbreviations

BK	= black paints
BL	= blue paints
BR	= brown paints
Cal/OSHA	= the California Division of Industrial Safety and Health
Cal/EPA	= the California Environmental Protection Agency
CCR	= California Code of Regulations
CDPH	= the California Department of Public Health
CERCLA	= Comprehensive Environmental Response, Compensation, and Liability Act
CFR	= Code of Federal Regulations
CHMM	= Certified Hazardous Materials Manager
CIH	= Certified Industrial Hygienist
CPSC	= Consumer Product Safety Commission
CR	= cream-colored paints
EPA	= the U.S. Environmental Protection Agency
EPRI	= Electric Power Research Institute
FIFRA	= Federal Insecticide, Fungicide, and Rodenticide Act
ft^2	= square feet
GR	= green paints
GY	= gray paints
HUD	= the U.S. Department of Housing and Urban Development
LBP	= Lead-Based Paints
LF	= linear feet
$\mu g/cm^2$	= micrograms per centimeter squared
µg/g	= microgram per gram or equivalent to parts per million
$\mu g/m^3$	= micrograms per cubic meter
µm	= microns
mg/cm^2	= milligrams per squared centimeter
mg/kg	= milligrams per kilogram
MR	= maroon paints
OL	= olive paints
OR	= orange paints
OSHA	= the federal Occupational Safety and Health Administration
OW	= off white paints
PCB	= Polychlorinated Biphenyl
PEL	= Permissible Exposure Level
Penta	= Pentachlorophenol
PK	= pink paints
ppm	= parts per million
QA/QC	= Quality Assurance/Quality Control
RCRA	= Resource Conservation Recovery Act
RCW	= Regulated Controlled Waste
RD	= red paints
REA	= Registered Environmental Assessor
RWQCB	= the Regional Water Quality Control Board
SF	= square feet
TN	= tan paints
WAC	= Washington Administrative Code
WH	= white paints
YW	= yellow paints

1.0 Executive Summary

SCA Environmental, Inc. (SCA) conducted a Phase 2 hazardous materials survey for lead-based paints, polychlorinated biphenyls (PCB), volatile organic compounds (VOCs), semi-volatile organic compounds, (SVOCs), CAM-17 metals and associated environmental hazards at a Confidential Site in Oakland, CA (hereafter referred to as "the Buildings") on May 17, 2010 - May 27, 2010.

Sampling by SCA in May 2010 found the following results over the project standards as defined herein:

Building.	Sample Locations	Materials	Contaminant(s)	Concentrations
1	All	Interior Perimeter Brick Walls Surface Paints	PCBs	<50 ppm
	009 & 011	Interior Structural Steel and Crane Paints	PCB	72 to 130 ppm
	018, 024, 026, 030, 034, 044, 046, 048, 049 & 052	Interior Concrete Floors	PCB	52 to 1,600 ppm
	001-EXT	Exterior Masonry Wall Paints	Cadmium, Chromium, Lead & Zinc	Greater than TTLC and/or STLC
	004	Interior Masonry Wall Paints	Lead & Zinc	Greater than TTLC and/or STLC
	010 & 011	Interior Structural Steel Column Paints	Lead & Zinc	Greater than TTLC and/or STLC
	016 & 032	Interior Concrete Floor	Various VOCs & SVOCs	Varies
2	All	Interior Perimeter Brick Walls Surface Paints	PCBs	<50 ppm
	006	Interior Structural Steel and Crane Paints	PCB	64 ppm
	All	Interior Concrete Floors	PCB	<50 ppm
	004	Interior Structural Steel Column Paints	Chromium, Lead & Zinc	Greater than TTLC and/or STLC
	008 & 010	Interior Masonry Wall Paints	Chromium, Lead, Mercury & Zinc	Greater than TTLC and/or STLC
17	Throughout	Structural Timbers	Various VOCs & SVOCs	Varies
18	All	Interior Concrete Floor	PCB	<50 ppm
20	All	Interior Structural Steel Paints	PCB	<50 ppm
Tank	Throughout	Exterior Paints	Chromium & Lead	Greater than TTLC and/or STLC
Through-out	Throughout	Interior & Exterior Loose & Peeling Paints	LBPs & LCPs	>600 ppm

Note that many of the substrates have PCB concentrations greater than 1.0 ppm but less than 50 ppm making them unsuitable for recycling, particularly in Buildings 1 and 2 (see Summary Tables).

2.0 Introduction

This report summarizes the results of the pre-demolition Phase 2 hazardous materials survey conducted at a Confidential Site in Oakland, CA (hereafter referred to as "the Buildings") on May 17, 2010 - May 27, 2010. The purpose of the survey was to determine the presence of regulated and/or potentially hazardous building materials in the buildings, which is slated for demolition. Materials addressed in the survey include:

- Lead-based paints (LBP);
- Polychlorinated biphenyls (PCB) in paints, brick, concrete masonry units (CMU) and surface contamination;
- Volatile Organic Compounds in treated timbers and stained concrete substrates;
- Semi-Volatile Organic Compounds (SVOCs) in treated timbers and stained concrete;
- CAM-17 metals in various paints; and
- Other environmental hazards as noted.

Individuals involved in the survey, and their technical certifications, include:

SCA Staff	Role	Certifications
Glenn R. Cass, PE, CIH, CAC	Senior Consultant	• Certified Asbestos Consultant (CAC #92-0092); • Certified Industrial Hygienist (CIH #A4847); • California Dept. of Public Health Certified Lead Inspector/Assessor, Project Designer & Project Monitor (DHS #I/D/M-717); • Professional (Mechanical) Engineer (PE #M18976), since 1978; • OSHA 40-hr. HAZWOPER Training per 29 CFR 191.120; • Registered Environmental Assessor (REA-06164); and • Radiation Safety Specialist (Scitec & Niton XRF's).
Jerry Cook, CAC	Sr. Project Manager	• Cal/OSHA Certified Asbestos Consultant (CAC #01-2925). • California Dept. of Public Health Certified Lead Inspector/Assessor (DHS #I-9083). • OSHA 40-hr HAZWOPER Training per 29 CFR 1910.120(e).

The contract laboratory that provided analytical services for the project was:

Laboratory	Analysis Type	Accreditation
McCampbell Analytical, Inc.	PCBs, VOCs, SVOCs, & CAM-17 Metals	• California Environmental Laboratory Accreditation Program (ELAP #1644).

Building 1 consists of a long industrial building with brick perimeter walls, concrete floor and wooden roof decking. A small portion of the building is 2 stories for former offices and administrative functions. All interior masonry walls are painted; however, only about 25% of the exterior masonry is painted. Windows occur throughout most facades with several outboard additions added to the building over time. Structural steel supports run at about 20-ft. centers with several overhead cranes. The concrete slab includes on sunken area, a walled sump and several gravel-filled pits.

Building 2 consists of a large 1-story industrial building with masonry perimeter walls, steel casement windows, concrete floors and wooden roof decking. Several interior partitions occur at former office and storage areas. Structural steel supports run at about 20-ft. centers with several overhead cranes.

Building 8 was formerly used for sandblasting and consists of concrete floors and concrete masonry unit (CMU) walls. The building is presently subdivided into 2 rooms.

Building 17 is an open-sided, metal panel building with wooden timber supports and a concrete floor throughout.

Building 18 consists of a concrete floor with corrugated metal walls and steel framing. This building is currently used to store metal shelving and racks.

Building 20 is a metal paneled building with a concrete slab.

Other site features include a water tank, bollard, fire hydrants and railings within the yard. These features are typically painted.

3.0 Methodology

Sampling methodologies, sampling frequencies, sampling locations, analytical parameters, and sample handling procedures were established by Geosyntec Consultants in their report *"Phase II Building Material Characterization Sampling Plan, GE Facility, Oakland, CA,"* Geosyntec Consultants Project No. WR1336, dated May 2010. Sampling locations and constituents were confirmed in the field by Geosyntec's on-site technician.

Prior to mobilizing on-site SCA's Field Technicians reviewed the Sampling Plan and Geosyntec's Health & Safety Plan to determine potential hazards to be encountered.

Following collection, except for in-situ lead-based paint readings, sample jars were labeled, sealed in plastic bags, stored on ice, and transported to the laboratory in a cooler.

A Chain-of-Custody form was used to record possession of the samples from the time of collection to arrival at the laboratory. The samples were released to the laboratory by signature on the chain-of-custody form. The laboratory control officer verified all samples listed were present, verified sample integrity and assured that proper preservation procedures were utilized.

Sample labeling and identification followed prior protocols established by Arcadis during the Phase 1 investigations. The table below indicates the typical notations used:

Building No.	Sample Matrix	Sample Type	Location No.	Suffix Designation	Date
B1 = Building 1 B2 = Building 2 B8 = Building 8 B17 = Building 17 B20 = Building 20 B21 – Building 21 TK = Tank YD = Yard	BD = Bulk Debris CF = Concrete Floor CW = CMU Wall EQ = Equipment MW = Metal Wall SMP = Sump SS = Structural Support WS = Wood Support	CHWP – Core hazardous waste characterization and PCB CP = Core PCB PP = PCB Paint WP = Wipe PCB	001, 002, 003, etc.	PRE = Pre-Decontamination Wipe POST = Post-Decontamination Wipe EX = Exterior	Year/Month/Day, e.g. 20100518 thru 20100527

For example, a concrete core sample collected from the floor of Building 1 for PCB analyses on May 25, 2010 read "B1-CF-CP-013-20100525."

3.1 Lead-Based Paints (LBPs)

Samples were analyzed of representative building finishes using a Niton XL-700 X-Ray Fluorescence (XRF) spectrum analyzer. The XRF analyzer can measure lead contents of several layers of paint without disturbing the surfaces, thus giving immediate feedback on lead contents of paint without destructive testing. The XRF is sensitive to 0.1 milligrams per square centimeter (mg/cm^2) of lead, or well below HUD guideline levels of 1.0 mg/cm^2 of lead in paints.

XRF analysis data are reported as L-shell values. The L-shell value is the lower energy fluorescence showing the level of the surface layer that is readily disturbed and potentially made airborne, thereby posing a potential construction health hazard.

Please note that although LBP were defined against the HUD standard, Cal/OSHA's Construction Lead Standard, 8 CCR 1532.1, applies to all paints with any measured lead content, requiring demolition dust control measures to reduce airborne and ingestion lead dust hazards.

3.2 Polychlorinated Biphenyls (PCBs)

PCB sampling included a mix of wipe, paint, brick, concrete, concrete masonry unit and surface contaminant sampling.

Prior to sampling of paints, tested substrates were analyzed by the XRF for lead content and then decontaminated using a 3-bucket wash process, including a preliminary or first wash with distilled water, a second wash using Alconox detergent and distilled water, and a final rinse with distilled water. Gloves were worn at all times during sample collection and were changed between sample collections to prevent cross-contamination of tools, sampling vials, etc.

Pre- and post-wipe samples were collected from various painted substrates to determine surface concentrations before and after paint sampling, as noted. Wipe samples were collected using sterilized gauze pads moistened with hexane. Samples were collected from a 10-centimeter by 10-centimeter area by rubbing the gauze in both a horizontal and vertical direction across the grid, then placing the gauze within a 4-ounce sampling glass vial.

Masonry samples were collected by decontaminating the surface paints, where applicable, after collecting surface wipe samples, where indicated. Masonry samples were then collected by removing surface paints using a scraper in advance of chipping the surface layers of brick with a masonry hammer.

Concrete floor cores were sampled at 2 to 3-inches depth to determine embedded concrete conditions.

Samples were analyzed for total PCBs per EPA Method 8082 by McCampbell Analytical, Inc.'s ELAP-accredited laboratory.

Quality control analyses were completed daily on the rinsate from the sampling tools to confirm proper decontamination procedures and efficiency.

3.3 Volatile Organic Compounds (VOCs)

Bulk timber samples were collected for VOC analyses using a hand-driven drill to collect surface cores. Extracted materials were stored in clean jars with Teflon-coated lids for analyses by McCampbell Analytical Inc.'s ELAP-accredit laboratory by EPA Analytical Method SW8260B.

Stained areas of concrete were cored with the surface top inch disposed of and only the underlying 2-inches of depth forwarded to McCampbell Analytical Inc. for analyses. Concrete floor cores were sampled at 2 to 3-inches depth to determine embedded concrete conditions.

3.4 Semi-Volatile Organic Compounds (SVOCs)

Bulk timber samples were collected for SVOC analyses using a hand-driven drill to collect surface cores. Extracted materials were stored in clean jars with Teflon-coated lids for analyses by McCampbell Analytical Inc.'s ELAP-accredit laboratory by EPA Analytical Method SW8270C.

Stained areas of concrete were cored with the surface top inch disposed of and only the underlying 2-inches of depth forwarded to McCampbell Analytical Inc. for analyses. Concrete floor cores were sampled at 2 to 3-inches depth to determine embedded concrete conditions.

3.5 CAM-17 Metals

Paint chip samples were collected from various painted substrates as well as miscellaneous substrate sampling for analyses of metal contaminants. Analyses were completed to determine the total threshold limit concentration of the CAM-17 metals. Toxicity Characteristic Leaching Procedures (TCLP) and Soluble Threshold Limit Concentrations were run for all samples with specific TTLC metal concentrations 10 times the Title 22 STLC limits.

CAM-17 analyses were performed by McCampbell Analytical, Inc using EPA Method 6010B.

4.0 Applicable Standards

4.1 Lead-Based Paints (LBPs)

Since elemental lead is a suspect carcinogen and known teratogen and neurotoxic in high doses, lead-containing materials need to be identified prior to the on-set of demolition activities. Using combinations of engineering controls and personal protective equipment, lead-containing materials can be remediated safely. Several sources of applicable standards are listed as follows:

1. Occupational Exposure: Lead exposures in the workplace are regulated by Cal/OSHA, which has certain regulatory requirements for identifying and controlling potential lead exposures. Currently applicable regulations for the construction industry have been adopted by Cal/OSHA (8 CCR 1532.1) from the Federal OSHA regulations. The current OSHA 8-hour Permissible Exposure Level (PEL) for lead is 50 $\mu g/m^3$.

2. Lead Waste: The regulatory standards regarding lead waste disposal are confusing at best, inconsistent, and continually fluctuating, to varying degrees. No consistent pattern exists regarding whether the trend is for a more or less conservative standard. A myriad of recommended and regulatory standards exist characterizing land use planning objectives and hazardous waste disposal requirements.

   In California, effective from January 1, 1999 to July 1, 2006, loose and peeling LBP or other wastes require characterization and testing for leachability, following the standards noted below:

   a. If the Total Threshold Level Concentration (TTLC) is <50 ppm, it is considered non-RCRA, non-hazardous waste since it is impossible to exceed the WET test limit of 5 mg/l using the 10 to 1 ratio.
   b. If the TTLC is <350 ppm and the WET test is <5 mg/l then the waste has low leachability and is classified non-RCRA non-hazardous waste.
   c. If the TTLC is >350 ppm and the WET test is <5 mg/l then it again has low leachability and is classified as non-RCRA, non-hazardous waste.
   d. If the TTLC is >350 ppm and the WET test results are >5 mg/l, then the TCLP must be run. Then if the TCLP is >5 mg/l the waste must be stabilized and if <5-mg/l stabilization is not required. Whether stabilized or not, both conditions are classified as RCRA hazardous waste.

   The 350 ppm limit under Health & Safety Code §25157.8 sunset on July 1, 2006 and reverted to the previous 1,000 ppm TTLC limit identified under Title 22 §66261.34. Nevertheless, SCA recommends maintaining the 350 ppm standard for waste characterization purposes as the likelihood of this level being reestablished is high.

   Please note that in the above scenario, loose and peeling paints are treated as a separate waste stream; whereas, intact paints may be combined for disposal purposes and classified as 'architectural waste.' This has allowed for disposal of painted concrete in a Class 3 landfill for many years without limitations. In essence, the total weight of the paint versus the weight of a concrete substrate for intact paints is negligible. One must keep in mind that because of the heterogeneity of typical waste streams, some subsamples or components of that waste steam may exceed hazardous waste thresholds if subsamples or components are small enough. To account for this heterogeneity, waste classification decisions are normally made by DTSC for the 'average' properties of an identified waste stream.

   The EPA in 1998 passed a rule which suspended temporarily the applicability of the Resource Conservation and Recovery Act (RCRA) Toxicity Characteristic (TC) Rule (40 CFR 261.24) to debris generated during lead-based paint (LBP) abatement projects conducted at target housing; deleading projects conducted at public or commercial buildings; and renovation or remodeling and demolition activities at target housing, public buildings, or commercial buildings. Instead of

being subject to the TC Rule, LBP debris resulting from the above-mentioned activities would be subject to the management and disposal standards being proposed today under Title IV of the Toxic Substances Control Act (TSCA). The EPA proposed this temporary suspension of the TC rule in accordance with RCRA sections 1006(b)(1) and 2002 to avoid duplication and inconsistent regulation of LBP debris and to allow the Agency sufficient time to assess whether any RCRA requirements, in addition to TSCA Title IV requirements, are necessary to assure proper management and disposal of such debris.

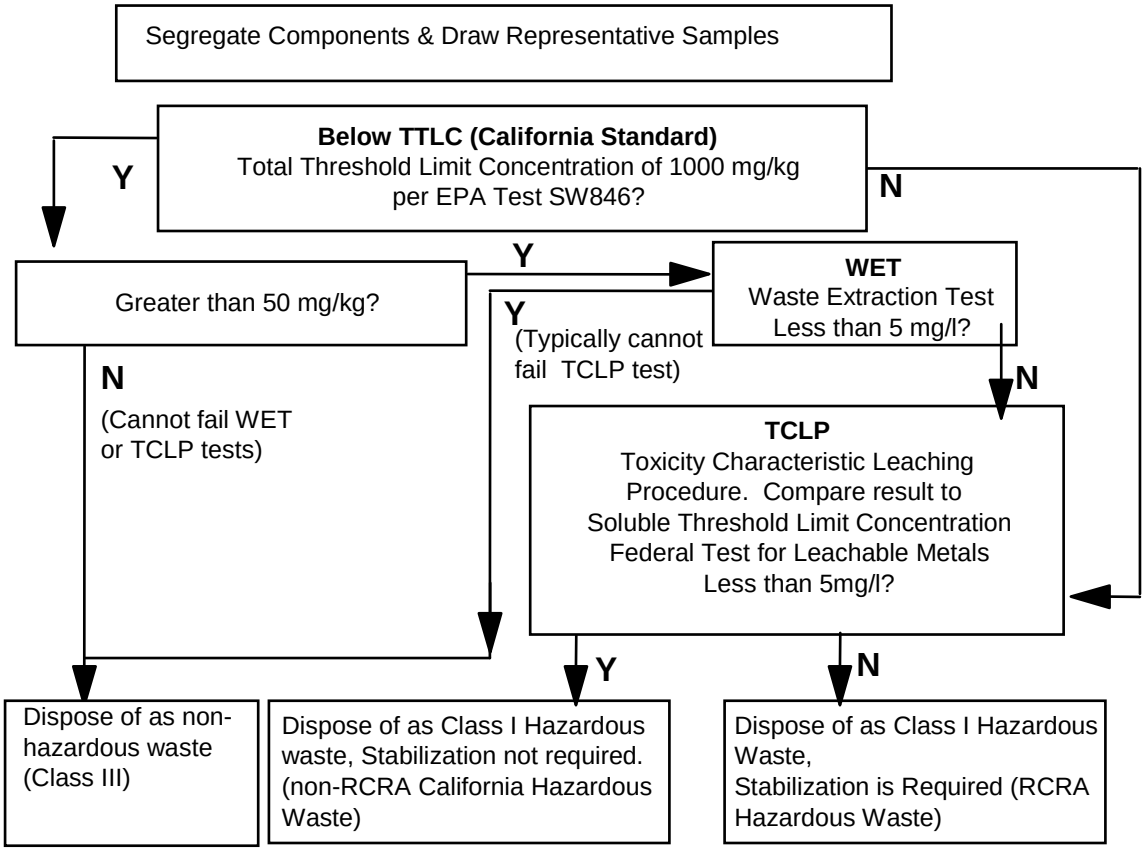
In 1998, the California Department of Toxic Substance Control (DTSC) also reclassified lead construction debris waste from RCRA to TSCA. At that time DTSC retracted their earlier statement allowing for disposal of 'architectural waste' in Class 3 landfills, but they failed to fully clarify the disposal requirements since the sunset of Health and Safety Code §25157.8 on July 1, 2006, as mentioned above. While a number of generators, including Fort Ord, have run pilot programs to quantify the impacts of crushing and reuse of painted concrete on-site, DTSC has failed to fully analyze these data and fully clarify its earlier ruling.

Dilution of RCRA hazardous waste for this purpose is specifically disallowed under 40 CFR Part 261. In the case of recycling of 'architectural waste' from Fort Ord, CA, the DTSC stated that the waste stream was not being diluted, since no materials were being added to the waste stream. DTSC further went on to encourage recycling and reuse of waste materials as much as possible. The Fort Ord operations did, however, occur on federal lands and to that extent they were not necessarily bound to state regulations.

While DTSC encourages the recycling of painted substrates, where feasible, many local concrete recycler are now hesitant to accept any painted substrates. Waste disposal in such cases must assess the economic impacts of substrate stripping for recycling versus the disposal as of painted substrates within an approved landfill. Local ordinance requirement for waste recycling may have bearing on the ultimate determination of the handling and disposal of intact painted substrate.

For disposal purposes, the following characterizations standards apply:

Characterization of Lead Waste



Test		Standard
SW84	California test for total lead concentration	Total Threshold Limit Concentration (TTLC) 1000 mg/kg
WET	Waste Extraction Test - CALIF test for leachable lead	Soluble Threshold Limit Concentration (STLC): 5 mg/l
TCLP	Toxicity Characteristic Leaching Procedure. Federal test for leachability of lead	Soluble Threshold Limit Concentration (STLC): 5 mg/l

Disposal Options:
Class I – Hazardous:
Non-RCRA (California Hazardous) if total lead >1,000 mg/kg or WET >5mg/l & TCLP <5 mg/l
RCRA if TCLP > 5 mg/l (requires stabilization)
Class II – non-Hazardous w/ WET between 1.5 & 5 mg/l
Class III – non-Hazardous, including Intact Painted Architectural Components, or Non-Designated Waste w/STLC <1.5 mg/l

Characterization of Lead Waste

3. Definitions & Notifications: The major definitions of LBP or lead-coated surfaces are listed as follows:

   a. HUD defines LBP as paint that contains either $\geq$0.5% by weight of lead, or $\geq$1 mg/cm^2.

   b. Consumer Product Safety Commission (CPSC) prohibits the manufacturing of paint that contains more than 600 ppm (0.06%) of lead.

   Given the myriad of confusing definitions and regulations, this report uses the HUD's definition for the purpose of identifications, but compliance to Cal/OSHA's Construction Lead Standard is required for all paints with any measurable lead content.

4. California Proposition 65: Lead is on the "Proposition 65" list, given its toxic potential in causing reproductive hazards.

5. Worker Certification: The California Department of Public Health (CDPH) requires the use of Certified Lead Workers and Supervisors for lead abatement projects at public buildings with a greater than 20 years expected life or whenever work is completed specifically to abate lead-based paints as defined by HUD. The CDPH certification requirements do not apply to industrial sites; however, dust controls and personnel protection are still required under 17 CCR Section 35001 through 36100.

6. New Renovation, Repair and Painting Rules finalized by the U.S. Environmental Protection Agency on June 23, 2008, authorized under section 402(c)(3) of the Toxic Substances Control Act (TSCA) require any Contractor or Maintenance Personnel disturbing more than 6 sq. ft. of interior or 20 sq. ft. of exterior lead-based paints (LBPs) in pre-1978 housing or child-occupied facilities to complete EPA-accredited training or 4-hr. EPA-accredited refresher training, as applicable, for lead safe work practices. Persons performing renovations, repairs and/or painting projects in target housing or child-occupied facilities must provide “Renovate Right” brochures to the Owners and occupants after December 22, 2008. Window replacements are subject to the standards. These standards prohibit certain dangerous work practices, such as open flame burning or torching of lead-based paints. Required work practices include posting of warning signs, restricting occupants from work areas, containing work areas to prevent dust and debris from spreading, conducting a thorough cleanup and verifying that the cleanup is effective. Additional rules and information are available at www.epa.gov/lead.

   “Certified Renovators” shall perform the following tasks:
   - Perform or direct uncertified workers performing regulated renovation activities;
   - Provide training to uncertified workers on lead safe work practices;
   - Be on-site during key stages of the renovation and otherwise be available on-site or by telephone at other times;
   - Use an acceptable lead test kit to determine whether lead-based paints are present in an affected area.

   Firms may apply for certification beginning in October 2009 and must be certified by April 22, 2010. The EPA RR&P rules are not applicable to industrial sites.

4.2 Polychlorinated Biphenyls (PCBs)

Cal/EPA regulates disposal polychlorinated biphenyls (PCBs). Under the objectives set in the Waste Characterization, Minimization and Management Plan adopted by Geosyntec Consultants in May 2010, the design goals for disposal standards for PCBs are set as follows:

- Concrete floors with a PCB concentration greater than 1 ppm can not be retained as an environmental cap and must be disposed as hazardous waste.

- Materials must have a surface concentration of less than 1 ppm or less than 10 µg/100 cm^2 on their surface for recycling.

- Materials having a PCB concentration greater than 50 ppm or a wipe concentration greater than 10 g/100 cm^2 shall be disposed off-site as Toxic Substances Control Act (TSCA) waste.

4.3 CAM-17 Metals

Cal/EPA regulates disposal of waste with threshold limit concentrations exceeding the Title 22 California Code of Regulation (CCR) standards as Cal-Haz waste.

Metal	Title 22 Hazardous Waste TTLC Standard*	Title 22 Hazardous Waste STLC Standard*
Antimony	500	1.5
Barium	10,000	100
Beryllium	75	0.75
Cadmium	100	1.0
Chromium	500 (CrVI)	5
Cobalt	8,000	80
Copper	2,500	25
Lead	1,000	5.0
Molybdenum	3,500	350
Nickel	2,000	20
Silver	500	5
Vanadium	5,000	24
Zinc	2,400	250
Arsenic	500	5.0
Selenium	100	1.0
Thallium	700	7.0
Mercury	20	0.2

TTLC = Total Threshold Limit Concentration in ppm or mg/kg
STLC = Soluble Threshold Limit Concentration in mg/liter

4.4 Volatile Organic Compounds (VOCs) and semi-Volatile Organic Compounds (SVOCs)

Tested concentrations in the Phase 2 sampling are all below applicable trigger standards and are not considered a significant issue regarding recycling or concrete or capping the site without remediation.

5.0 Results and Conclusions

Summaries of test results are shown in the attached Appendices

5.1 Lead-Based Paints (LBPs)

Lead-based paints (LBP), as defined by U.S. Department of Housing and Urban Development (HUD), were identified at the site, for a variety of substrates noted in Appendix A and shown in locations in Appendix B.

Most site paints were found to be below the HUD LBP criteria, although dust control procedures are required throughout the demolition of painted elements to comply with the Cal/OSHA regulations under 8 CCR 1532.1. All site paints shall be treated as having a lead content greater than 600 ppm requiring dust control procedures in compliance with 8 CCR 1532.1.

Loose and peeling paints should be removed under controlled procedures prior to any demolition of the structure. None of the applicable regulations require removal of LBP prior to demolition or renovation if the paints are securely adhered to the substrates (i.e., non-flaking or non-peeling). Disposal of the demolition debris in this case can be handled as non-hazardous and non-RCRA waste after the loose and flaking paints have been removed, as long as demolition practices do not compromise worker safety.

Conventional demolition techniques should be employed for all painted surfaces with the Contractor complying with applicable OSHA and Cal/OSHA statutes regarding:

- Worker awareness training;
- Exposure monitoring, as needed;
- Medical examinations, including blood lead level testing; and
- Establishing a written respiratory protection program.

5.2 Polychlorinated Biphenyls (PCBs)

Substrates with a PCB concentration greater than 50 ppm or greater than 0.10 µg/cm^2 are summarized below, as shown in Appendix C. Sampling locations are denoted in Appendix D.

Building.	Sample Locations	Materials	Contaminant(s)	Concentrations
1	All	Interior Perimeter Brick Walls Surface Paints	PCBs	<50 ppm
	009 & 011	Interior Structural Steel and Crane Paints	PCB	72 to 130 ppm
	018, 024, 026, 030, 034, 044, 046, 048, 049 & 052	Interior Concrete Floors	PCB	52 to 1,600 ppm
2	All	Interior Perimeter Brick Walls Surface Paints	PCBs	<50 ppm
	006	Interior Structural Steel and Crane Paints	PCB	64 ppm
	All	Interior Concrete Floors	PCB	<50 ppm
18	All	Interior Concrete Floor	PCB	<50 ppm
20	All	Interior Structural Steel Paints	PCB	<50 ppm

Note that many of the substrates have PCB concentrations greater than 1.0 ppm but less than 50 ppm making them unsuitable for recycling, particularly in Buildings 1 and 2 (see Summary Tables).

5.3 CAM-17 Metals

Substrates with metal concentrations above the Title 22 TTLC and STLCs are shown in Appendix C. Sampling locations are denoted in Appendix D.

Building.	Sample Locations	Materials	Contaminant(s)	Concentrations
1	001-EXT	Exterior Masonry Wall Paints	Cadmium, Chromium, Lead & Zinc	Greater than TTLC and/or STLC
	004	Interior Masonry Wall Paints	Lead & Zinc	Greater than TTLC and/or STLC
	010 & 011	Interior Structural Steel Column Paints	Lead & Zinc	Greater than TTLC and/or STLC
2	004	Interior Structural Steel Column Paints	Chromium, Lead & Zinc	Greater than TTLC and/or STLC
	008 & 010	Interior Masonry Wall Paints	Chromium, Lead, Mercury & Zinc	Greater than TTLC and/or STLC
Tank	Throughout	Exterior Paints	Chromium & Lead	Greater than TTLC and/or STLC

5.4 Other Hazardous Materials

Tested concentrations in the Phase 2 sampling are all below applicable VOC and SVOC trigger standards and are not considered a significant issue regarding recycling or concrete or capping the site without remediation. Locations of surface staining included the following:

Building.	Sample Locations	Materials	Contaminant(s)	Concentrations
1	016 & 032	Interior Concrete Floor	Various VOCs & SVOCs	Varies
17	Throughout	Structural Timbers	Various VOCs & SVOCs	Varies

Appendix A

Representative XRF Lead-Based Paint Sampling Results

REPRESENTATIVE SAMPLING OF LEAD-BASED PAINTS
CONFIDENTIAL FACILITY, OAKLAND, CA
SAMPLED BY SCA ENVIRONMENTAL, INC. ON MAY 14, 2010
SCA PROJECT NO.:K-9866

Bldg.	Sample I.D.	Sub No.	Location	Floor	Surface Color	Substrate Component	Substrate Material	L-Shell Value mg/cm^2	LBP per HUD Criteria*	Condition
B1	TN-01	1	Offices	1st	Tan	Wall	Brick	1.00 ± 0.40	Yes	Intact
B1	OW-02	1	Offices	1st	Off-White	Column	Steel	1.80 ± 1.60	Yes	Intact
B1	BE-03	1	Offices	1st	Beige	Door Frame	Wood	0.16 ± 0.22	No	Intact
B1	GY-04	1	Offices	1st	Gray	Door	Metal	5.40 ± 2.80	Yes	Intact
B1	OW-05	1	Offices	1st	Off-White	Wall	Brick	0.40 ± 0.30	No	Intact
B1	BR-06	1	Offices	1st	Brown	Stair	Wood	3.60 ± 1.70	Yes	Intact
B1	CR-07	1	Offices	1st	Cream	Window Sill	Wood	1.70 ± 1.50	Yes	Peeling
B1	BE-08	1	Offices	1st	Beige	Radiator	Metal	0.40 ± 0.20	No	Chipped & Peeling
B1	TN-01	2	Offices	1st	Tan	Wall	Brick	1.20 ± 1.10	Yes	Intact
B1	WH-09	1	Offices	1st	White	Door Frame	Wood	0.30 ± 0.35	No	Intact
B1	TN-10	1	Offices	1st	Tan	Wall	Wood	0.80 ± 0.22	No	Intact
B1	GY-11	1	Toilet	1st	Gray	Wall	Wood	0.01 ± 0.03	No	Intact
B1	GR-12	1	Shop	1st	Green	Wall	Brick	1.10 ± 0.20	Yes	Intact
B1	GR-12	2	Shop	1st	Green	Wall	CMU	0.00 ± 0.02	No	Intact
B1	GR-12	3	Shop	1st	Green	Door	Metal	0.01 ± 0.03	No	Intact
B1	RD-13	1	Shop	1st	Red	Column	Steel	3.10 ± 1.30	Yes	Intact
B1	OR-14	1	Shop	1st	Orange	Electrical Cabinet	Steel	1.40 ± 1.40	Yes	Intact
B1	YW-15	1	Crane 7	1st	Yellow	Crane	Metal	4.00 ± 2.00	Yes	Intact
B1	GR-12	4	Shop	1st	Green	Column	Steel	1.00 ± 0.30	Yes	Intact
B1	OW-16	1	Shop	1st	Off-White	Deck	Wood	0.03 ± 0.08	No	Peeling
B1	YW-17	1	Shop	1st	Yellow	Floor	Concrete	3.20 ± 1.70	Yes	Peeling & Chipped Striping
B1	YW-18	1	Shop	1st	Yellow	Railing	Metal	0.10 ± 0.03	No	Intact
B1	OW-19	1	Shop	1st	Off-White	Window Frame	Metal	2.00 ± 0.90	Yes	Intact
B1	GR-12	5	Shop	1st	Green	Wall	CMU	0.03 ± 0.10	No	Intact
B1	OW-19	2	Shop	1st	Off-White	Wall	CMU	0.02 ± 0.06	No	Intact
B1	OW-19	3	Offices	1st	Off-White	Wall	Brick	0.01 ± 0.02	No	Intact
B1	GR-12	6	Shop	1st	Green	Column	Steel	1.70 ± 0.60	Yes	Peeling
B1	RD-20	1	Shop	1st	Red	Pipe	Steel	0.25 ± 1.80	No	Intact
B1	YW-18	2	Lower Pit	1st	Yellow	Railing	Metal	0.40 ± 0.20	No	Chipped

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Bldg.	Sample I.D.	Sub No.	Location	Floor	Surface Color	Substrate Component	Substrate Material	L-Shell Value mg/cm^2	LBP per HUD Criteria*	Condition
B1	GR-12	7	Shop	1st	Green	Wall	Wood	0.00 ± 0.02	No	Intact
B1	OW-19	3	Shop	1st	Off-White	Wall	Wood	0.00 ± 0.02	No	Intact
B1	OW-19	4	Shop	1st	Off-White	Column	Steel	0.90 ± 0.15	No	Intact
B1	OR-21	1	Shop	1st	Green	Column	Steel	2.50 ± 0.90	Yes	Intact
B1	GR-22	1	Shop	1st	Green	Column	Steel	2.20 ± 0.90	Yes	Intact
B1	OW-16	2	Shop	1st	Off-White	Deck	Wood	0.09 ± 0.03	No	Severely Chipped & Peeling
B1	BR-23	1	Offices	2nd	Brown	Floor	Wood	0.03 ± 0.10	No	Intact Varnish
B1	CR-24	1	Offices	1st	Cream	Window Sash	Wood	3.80 ± 3.90	Yes	Intact
B1	CR-24	2	Offices	1st	Cream	Wall	Brick	1.00 ± 1.20	Yes	Peeling
B1	BE-08	2	Offices	1st	Beige	Wall	Wood	0.08 ± 0.13	No	Intact
B1	TN-25	1	Offices	1st	Tan	Door Frame	Wood	0.16 ± 0.22	No	Intact
B1	GR-26	1	Exterior East	1st	Green	Window Sill	Wood	6.60 ± 2.10	Yes	Chipped & Peeling
B1	BE-27	1	Exterior East	1st	Beige	Window Sill	Concrete	0.40 ± 0.30	No	Chipped & Peeling
B1	BE-28	1	Toilet	1st	Beige	Floor	Concrete	0.26 ± 0.08	No	Chipped
B1	BE-29	1	Toilet	1st	Beige	Wall	Plaster	0.19 ± 0.16	No	Chipped & Peeling
B1	BE-29	2	Exterior South	1st	Beige	Baseboard	Wood	0.30 ± 0.14	No	Chipped & Peeling
B1	BE-30	1	Exterior South	1st	Beige	Foundation	Concrete	1.30 ± 0.20	No	Intact
B1	BE-27	2	Exterior South	1st	Beige	Window Sill	Concrete	0.50 ± 0.30	Yes	Chipped & Peeling
B1	BE-30	2	Exterior South	1st	Beige	Door	Metal	0.00 ± 0.02	No	Intact
B1	OR-31	1	Exterior South	1st	Orange	Wall	CMU	0.00 ± 0.02	No	Intact
B1	BE-32	1	Exterior South	1st	Beige	Wall	Wood	0.02 ± 0.09	No	Intact
B1	YW-18	3	Yard South	1st	Yellow	Railing	Metal	2.60 ± 1.00	Yes	Intact
B1	GR-33	1	Yard South	1st	Green	Cabinet	Metal	0.50 ± 0.20	No	Rusty
B1	BL-34	1	Yard South	1st	Blue	Sump	Metal	0.00 ± 0.02	No	Peeling & Rusty

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Bldg.	Sample I.D.	Sub No.	Location	Floor	Surface Color	Substrate Component	Substrate Material	L-Shell Value mg/cm^2	LBP per HUD Criteria*	Condition
B1	SI-35	1	Exterior South	1st	Silver	Window Mullion	Metal	0.60 ± 0.30	No	Peeling & Rusty
B1	GY-36	1	Exterior South	1st	Gray	Cabinet	Metal	0.02 ± 0.04	No	Peeling & Rusty
B1	SI-35	2	Exterior South	1st	Silver	Stairs	Metal	2.30 ± 1.10	Yes	Peeling & Rusty
B1	RO-37	1	Exterior South	1st	Rose	Wall	CMU	0.07 ± 0.06	No	Intact
B1	WH-38	1	Exterior South	1st	White	Door	Metal	0.30 ± 0.28	No	Peeling & Rusty
B1	GY-39	1	Exterior South	1st	Gray	Wall	Brick	0.03 ± 0.05	No	Intact
B1	YW-40	1	Exterior South	1st	Yellow	Wall	Metal	0.04 ± 0.13	No	Intact
B1	PK-41	1	Exterior South	1st	Pink	Wall	Metal	0.10 ± 0.03	No	Intact
B1	YW-18	4	Exterior West	1st	Yellow	Railing	Metal	0.50 ± 0.30	No	Intact
B1	OW-42	1	Exterior West	1st	Off-White	Column	Steel	0.01 ± 0.03	No	Intact
B1	OW-42	2	Exterior West	1st	Off-White	Door	Metal	0.05 ± 0.16	No	Intact
B1	RD-43	1	Exterior West	1st	Red	Loading Dock	Metal	0.00 ± 0.02	No	Rusty
B1	SI-35	3	Exterior West	1st	Silver	Window Frame	Metal	0.40 ± 0.20	No	Peeling & Rusty
B1	BE-30	3	Exterior North	1st	Beige	Foundation	Concrete	0.50 ± 0.20	No	Intact
B1	SI-35	4	Exterior North	1st	Silver	Wall	Brick	1.50 ± 0.50	Yes	Intact
B1	RD-44	1	Exterior North	1st	Red	Door	Wood	7.50 ± 5.30	Yes	Chipped & Peeling
B1	RD-44	2	Exterior North	1st	Red	Wall	CMU	0.10 ± 0.02	No	Intact
B1	RD-44	3	Exterior North	1st	Red	Wall	Brick	1.30 ± 0.20	Yes	Chipped & Peeling
B1	OW-45	1	Exterior North	1st	Off-White	Door	Metal	0.10 ± 0.02	No	Intact

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Note: Paints and glazing with a detectable lead content are subject to the Contractor's compliance with Cal/OSHA regulation 8 CCR 1532.1 during demolition, scraping of loose and peeling paints, spot abatement prior to torching or cutting, etc.
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Bldg.	Sample I.D.	Sub No.	Location	Floor	Surface Color	Substrate Component	Substrate Material	L-Shell Value mg/cm^2	LBP per HUD Criteria*	Condition
B2	GY-39	1	Exterior South	1st	Gray	Downspout	Metal	0.03 ± 0.06	No	Intact
B2	GY-40	1	Exterior South	1st	Gray	Electrical Box	Metal	0.08 ± 0.22	No	Intact
B2	YW-41	1	Exterior West	1st	Yellow	Pipe	Metal	0.11 ± 0.05	No	Intact
B2	RD-42	1	Exterior West	1st	Red	Wall	Concrete	0.00 ± 0.02	No	Intact
B2	RD-42	2	Exterior West	1st	Red	Wall	Brick	0.00 ± 0.02	No	Intact
B2	SI-43	1	Exterior North	1st	Silver	Door	Metal	2.70 ± 0.60	Yes	Intact
B2	YW-44	1	Exterior North	1st	Yellow	Step	Metal	0.06 ± 0.07	No	Chipped
B2	SI-45	1	Exterior North	1st	Silver	Window Frame	Metal	0.09 ± 0.09	No	Intact
B2	BE-46	1	Exterior North	1st	Beige	Window Sill	Concrete	0.01 ± 0.03	No	Intact
B2	YW-47	1	Exterior North	1st	Yellow	Railing	Metal	10.10 ± 0.70	Yes	Intact
B2	OW-48	1	Exterior North	1st	Off-White	Door	Wood	2.70 ± 1.30	Yes	Peeling
B2	OW-48	2	Exterior North	1st	Off-White	Door Frame	Metal	1.40 ± 0.40	Yes	Chipped
B2	OW-49	1	Exterior North	1st	Off-White	Door	Metal	0.00 ± 0.02	No	Intact
B2	TN-50	1	Exterior North	1st	Tan	Door Frame	Wood	0.00 ± 0.02	No	Intact
B2	YW-51	1	Exterior North	1st	Yellow	Floor	Concrete	4.40 ± 2.20	Yes	Chipped
B2	GY-52	1	Exterior North	1st	Gray	Wall	Wood	0.00 ± 0.02	No	Intact
B2	RD-53	1	Exterior East	1st	Red	Post	Metal	0.00 ± 0.02	No	Intact
B2	BR-54	1	Interior North	1st	Brown	Wall	Brick	0.50 ± 0.20	No	Peeling
B2	OW-55	1	Interior North	1st	Off-White	Column	Metal	2.00 ± 0.60	Yes	Intact
B2	BR-54	2	Interior North	1st	Brown	Column	Metal	4.10 ± 2.40	Yes	Intact
B2	YW-56	1	Interior North	1st	Yellow	Crane	Metal	1.70 ± 0.40	Yes	Chipped
B2	RD-57	1	Interior North	1st	Red	Column	Metal	2.80 ± 1.20	Yes	Intact
B2	OW-58	1	Interior West	1st	Off-White	Ceiling	Wood	0.06 ± 0.17	No	Intact
B2	OW-59	1	Bathroom 1	1st	Off-White	Wall	Sheetrock	0.00 ± 0.02	No	Intact
B2	TN-60	1	Bathroom 1	1st	Tan	Partition	Metal	0.00 ± 0.02	No	Intact
B2	TN-61	1	Bathroom 1	1st	Tan	Wall	Sheetrock	0.00 ± 0.02	No	Intact
B2	WH-62	1	Bathroom 2	1st	White	Wall	Brick	1.10 ± 0.20	Yes	Peeling
B2	WH-63	1	Bathroom 2	1st	White	Window Sill	Concrete	0.03 ± 0.05	No	Peeling
B2	OR-64	1	Interior South	1st	Orange	Electrical Panel	Metal	2.70 ± 1.10	Yes	Peeling
B2	OW-65	1	Office 2	1st	Off-White	Bench Post	Wood	0.00 ± 0.02	No	Intact

REPRESENTATIVE SAMPLING OF LEAD-BASED PAINTS
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Bldg.	Sample I.D.	Sub No.	Location	Floor	Surface Color	Substrate Component	Substrate Material	L-Shell Value mg/cm^2	LBP per HUD Criteria*	Condition
B2	WH-66	1	Office 2	1st	White	Wall	Sheetrock	0.00 ± 0.02	No	Intact
B2	BR-67	1	Office 1	1st	Brown	Wall	Wood	0.00 ± 0.02	No	Intact
B2	BR-68	1	Interior North	1st	Brown	Door	Wood	3.10 ± 1.60	Yes	Chipped
B2	GY-69	1	Interior North	1st	Gray	Floor	Concrete	0.03 ± 0.06	No	Intact
B2	BR-70	1	Interior North	1st	Brown	Partition	Metal	1.30 ± 0.40	Yes	Intact
B2	GY-71	1	Interior North	2nd	Gray	Door Frame	Metal	0.00 ± 0.02	No	Intact
B2	GY-71	2	Interior North	1st	Gray	Door	Metal	0.00 ± 0.02	No	Intact
B2	GY-72	1	Bathroom 3	1st	Gray	Floor	Concrete	0.03 ± 0.09	No	Chipped
B2	BR-73	1	Bathroom 3	1st	Brown	Partition	Metal	1.80 ± 0.50	Yes	Intact
B2	BR-73	2	Bathroom 3	1st	Brown	Window Sill	Concrete	0.50 ± 0.20	No	Peeling
B2	BR-73	3	Bathroom 3	1st	Brown	Wall	Brick	0.40 ± 0.30	No	Peeling
B2	BE-74	1	Bathroom 3	1st	Beige	Wall	Brick	0.60 ± 0.20	No	Intact
B2	BE-74	2	Bathroom 3	1st	Beige	Pipe	Metal	0.13 ± 0.15	No	Intact
B2	BR-67	2	Office 3	1st	Brown	Wall	Wood	0.07 ± 0.11	No	Intact
B2	BE-54	3	Interior East	1st	Beige	Column	Metal	6.90 ± 0.60	Yes	Intact
B2	YW-55	1	Interior East	1st	Yellow	Crane	Metal	6.40 ± 3.80	Yes	Chipped
B2	OW-58	2	Interior South	1st	Off-White	Ceiling	Wood	0.08 ± 0.05	No	Intact

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Note: Paints and glazing with a detectable lead content are subject to the Contractor's compliance with Cal/OSHA regulation 8 CCR 1532.1 during demolition, scraping of loose and peeling paints, spot abatement prior to torching or cutting, etc.
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Bldg.	Sample I.D.	Sub No.	Location	Floor	Surface Color	Substrate Component	Substrate Material	L-Shell Value mg/cm^2	LBP per HUD Criteria*	Condition
B8	BE-24	1	Exterior East	1st	Beige	Wall	CMU	0.01 ± 0.02	No	Chipped
B8	BE-24	2	Exterior East	1st	Beige	Door Frame	Metal	0.04 ± 0.06	No	Chipped
B8	WH-25	1	Exterior East	1st	White	Door Frame	Metal	0.00 ± 0.02	No	Intact
B8	GY-26	1	Exterior East	1st	Gray	Door Frame	Metal	0.00 ± 0.02	No	Intact
B8	GY-27	1	Interior	1st	Gray	Floor	Concrete	0.02 ± 0.05	No	Chipped
B8	RD-28	1	Interior West	1st	Red	Pipe	Metal	0.01 ± 0.02	No	Intact
B8	RD-29	1	Exterior North	1st	Red	Frame	Metal	0.02 ± 0.04	No	Intact
B8	SI-30	1	Exterior North	1st	Silver	Sprinkler Standpipe	Metal	1.50 ± 0.50	Yes	Intact

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Bldg.	Sample I.D.	Sub No.	Location	Floor	Surface Color	Substrate Component	Substrate Material	L-Shell Value mg/cm^2	LBP per HUD Criteria*	Condition
B17	GY-31	1	Interior East	1st	Gray	Electrical Box	Metal	0.00 ± 0.02	No	Intact
B17	YW-32	1	Interior East	1st	Yellow	Floor	Concrete	1.10 ± 0.10	Yes	Peeling
B17	GR-33	1	Interior West	1st	Green	Electrical Box	Metal	0.00 ± 0.02	No	Intact
B17	WH-34	1	Exterior West	1st	White	Wall	Sheetrock	0.01 ± 0.05	No	Intact
B17	WH-34	2	Office West	1st	White	Baseboard	Wood	0.02 ± 0.08	No	Intact
B17	WH-34	3	Office West	1st	White	Door Frame	Wood	0.11 ± 0.11	No	Intact
B17	BR-35	1	Office West	1st	Brown	Door Frame	Wood	0.02 ± 0.02	No	Intact
B17	SI-36	1	Office West	1st	Silver	Wall	Metal	0.00 ± 0.02	No	Intact
B17	RD-37	1	Interior South	1st	Red	Floor	Concrete	0.01 ± 0.02	No	Chipped
B17	YW-38	1	Interior South	1st	Yellow	Stair	Metal	0.04 ± 0.07	No	Chipped
B17	YW-38	2	Exterior South	1st	Yellow	Frame	Metal	0.01 ± 0.02	No	Intact

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Bldg.	Sample I.D.	Sub No.	Location	Floor	Surface Color	Substrate Component	Substrate Material	L-Shell Value mg/cm^2	LBP per HUD Criteria*	Condition
B18	BE-01	1	Exterior North	1st	Beige	Wall	Metal	0.01 ± 0.04	No	Intact
B18	WH-02	1	Exterior North	1st	White	Door	Metal	0.14 ± 0.41	No	Peeling
B18	WH-02	2	Exterior North	1st	White	Door Frame	Metal	0.03 ± 0.09	No	Intact
B18	TN-03	1	Exterior West	1st	Tan	Downspout	Metal	0.02 ± 0.07	No	Chipped
B18	RD-04	1	Exterior North	1st	Red	Post	Metal	1.60 ± 0.40	Yes	Peeling
B18	SI-05	1	Exterior North	1st	Silver	Sprinkler Standpipe	Metal	7.10 ± 4.10	Yes	Peeling
B18	YW-06	1	Exterior West	1st	Yellow	Post	Metal	0.80 ± 1.00	No	Chipped
B18	BE-07	1	Interior North	1st	Beige	Wall	Metal	0.01 ± 0.03	No	Intact
B18	RD-08	1	Room 5 East	1st	Red	Beam	Metal	0.00 ± 0.02	No	Intact
B18	OW-09	1	Room 5 East	1st	Off-White	Wall	Sheetrock	0.00 ± 0.02	No	Intact
B18	RD-08	2	Room 5 West	1st	Red	Column	Metal	0.00 ± 0.02	No	Intact
B18	RD-10	1	Room 5 South	1st	Red	Pipe	Metal	0.40 ± 0.20	No	Intact
B18	WH-11	1	Room 5 North	1st	White	Rack	Metal	0.00 ± 0.02	No	Intact
B18	GY-12	1	Room 5 North	1st	Gray	Rack	Metal	0.00 ± 0.02	No	Intact
B18	WH-11	2	Room 5 North	1st	White	Shelf	Wood	0.00 ± 0.02	No	Intact

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SAMPLED BY SCA ENVIRONMENTAL, INC. ON MAY 17, 2010
SCA PROJECT NO.:K-9866

Bldg.	Sample I.D.	Sub No.	Location	Floor	Surface Color	Substrate Component	Substrate Material	L-Shell Value mg/cm^2	LBP per HUD Criteria*	Condition
B20	TN-12	1	Exterior North	1st	Tan	Wall	Metal	0.24 ± 0.17	No	Intact
B20	TN-13	1	Exterior North	1st	Tan	Downspout	Metal	0.21 ± 0.17	No	Intact
B20	OW-14	1	Exterior North	1st	Off-White	Door	Metal	0.02 ± 0.05	No	Peeling
B20	TN-15	1	Exterior North	1st	Tan	Door Frame	Metal	0.09 ± 0.10	No	Peeling
B20	TN-12	2	Exterior South	1st	Tan	Wall	Metal	0.20 ± 0.15	No	Intact
B20	RD-16	1	Interior North	1st	Red	Beam	Metal	0.00 ± 0.02	No	Intact
B20	OW-17	1	Interior South	1st	Off-White	Wall	Metal	0.03 ± 0.13	No	Intact
B20	GY-18	1	Interior East	1st	Gray	Wall	CMU	0.01 ± 0.06	No	Intact
B20	GY-18	2	Interior East	1st	Gray	Floor	Concrete	0.00 ± 0.02	No	Intact
B20	GY-19	1	Interior West	1st	Gray	Door Frame	Metal	0.01 ± 0.04	No	Intact
B20	SI-20	1	Exterior Water Tank	1st	Silver	Tank	Metal	1.30 ± 0.30	Yes	Intact
B20	RD-21	1	Exterior Water Tank	1st	Red	Tank Base	Concrete	0.40 ± 0.20	No	Chipped
B20	GY-22	1	Pump House	1st	Gray	Frame	Metal	2.10 ± 1.00	Yes	Chipped
B20	RD-23	1	Pump House	1st	Red	Window Mullion	Metal	1.20 ± 0.20	Yes	Intact

* HUD definition for Lead-Based Paints is ≥1.0 mg/cm^2 or ≥0.5% lead by weight.
Note: Paints and glazing with a detectable lead content are subject to the Contractor's compliance with Cal/OSHA regulation 8 CCR 1532.1 during demolition, scraping of loose and peeling paints, spot abatement prior to torching or cutting, etc.
Figures in bold represent lead-based paints (LBP) per HUD definition.
Table indicates representative samples only; treat all similarly painted surfaces in kind.

Appendix B

Representative Lead-Based Paint Sampling Locations

54TH AVENUE

EAST 12TH STREET

INTERNATIONAL BOULEVARD

FORMER BUILDING 9

FORMER BUILDING 6

BUILDING 4

BUILDING 1

BUILDING 2

BUILDING 8

BUILDING 20

BUILDING 18

BUILDING 21

BUILDING 17

WATER TANK

SECONDARY CONTAINMENT

SUMP

GRAVEL FILLED PITS

GRAVEL FILLED PIT

LOWER AREA

OFFICE AREA

LEGEND:
(+) = HUD-DEFINED LEAD-BASED PAINT (LBP)
(-) = LEAD-CONTAINING PAINT (LCP)

Legend
- Proposed Wall Sampling Location
- Proposed Support Structure Sampling Location
- Arcadis Sampling Location
- Former Building
- Existing Building

Data Source: ARCADIS, 2009. Draft Phase I Building Assessment Report. Prepared for General Electric, January 2009.

CONFIDENTIAL

100 50 0 100 Feet

Lead-Based Paint Sampling Locations
5441 International Boulevard
Oakland, California

Geosyntec consultants

Figure

San Diego | May 2010

Appendix C

Summary of Core and Wipe Sampling Results

SUMMARY OF SAMPLING RESULTS
CONFIDENTIAL LOCATION, OAKLAND, CA
SCA. PROJECT NO. K-9866

Building	Floor	Location & Description	Date	Sample I.D.	Wipe PCB Results	Paint PCB Results	Brick PCB Results	Concrete Floor PCB Results	CAM 17 Metals (TTLC (mg/kg) / TCLP (mg/kg) / STLC (mg/L)++																VOCs	SVOCs	Pre-Sampling Lead Concentration (mg/cm^2)+	Post-Sampling Lead Concentration (mg/cm^2)+
									An	Ar	Ba	Be	Ca	Ch	Co	Cu	Pb	Hg	Mo	Ni	Se	Si	Th	Va	Zn				
Standards					*0.1 µg/cm²*	*50 mg/kg*	*50 mg/kg*	*50 mg/kg*	*500 / 15*	*500 / 5*	*10000/ 100*	*75/ 0.75*	*100/ 1*	*500 / 5*	*8000 / 80*	*2500 / 25*	*1000 / 5*	*20 / 0.2*	*3500 / 350*	*2000 / 20*	*100 / 1*	*500 / 5*	*700 / 7*	*5000 / 24*	*2400 / 250*			*1.0 mg/cm²*	*1.0 mg/cm²*
B1	1st	Shop Northeast Perimeter Brick Wall	5/14/2010	B1-BW-WP-001-20100514	ND																							
B1	1st	Shop Northeast Perimeter Brick Wall w/Green Paints	5/14/2010	B1-BW-PP-001-20100514		**7.6 mg/kg Aroclor 1260**																						**1.8 ± 0.7**	0.0 ± 0.2
B1	1st	Shop Northeast Perimeter Brick Wall	5/14/2010	B1-BW-CP-001-20100514			ND																					
B1	1st	Shop Exterior Northeast Perimeter Brick Wall w/Red & Green Paints	5/18/2010	B1-BW-PP-001-20100518-EX		**3.9 mg/mg Aroclor 1260**			310 mg/kg / ND / 2.0 mg/L	15 / /	250 / /	ND / /	**110 mg/kg / 0.17 mg/L / 1.2 mg/L**	**2200 mg/kg / ND / 12 mg/L**	260 / /	140 / /	**19000 mg/kg / 4.3 mg/L / 220 mg/L**	0.55 / /	7.7 / /	38 / /	ND / /	ND / /	ND / /	280 / /	**51000 mg/kg / 130 mg/L / 620 mg/L**			**1.4 ± 0.3**	0.07 ± 0.06
B1	1st	Shop Exterior Northeast Perimeter Brick Wall	5/18/2010	B1-BW-CP-001-20100518-EX			ND																					
B1	1st	Shop South Central Perimeter Brick Wall	5/14/2010	B1-BW-WP-002-20100514	ND																							
B1	1st	Shop South Central Perimeter Brick Wall w/Green Paints	5/14/2010	B1-BW-PP-002-20100514		**8.2 mg/kg Aroclor 1260**																						0.3 ± 0.1	0.05 ± 0.06
B1	1st	Shop South Central Perimeter Brick Wall	5/14/2010	B1-BW-CP-002-20100514			**1.2 mg/kg Aroclor 1260**																					
B1	1st	Shop Exterior South Central Perimeter Brick Wall	5/17/2010	B1-BW-CP-002-20100517-EX			ND																				0.01 ± 0.03	0.01 ± 0.02
B1	1st	Shop Southwest Perimeter Brick Wall w/Green Paints	5/14/2010	B1-BW-PP-003-20100514		**4.2 mg/kg Aroclor 1260**																					0.22 ± 0.14	0.02 ± 0.02
B1	1st	Shop Southwest Perimeter Brick Wall	5/14/2010	B1-BW-CP-003-20100514			ND																					
B1	1st	Shop Southwest Perimeter Brick Wall w/No Paints	5/18/2010	B1-BW-CP-003-20100518-EX			ND																				0.00 ± 0.02	---
B1	1st	Shop Northwest Perimeter Brick Wall	5/14/2010	B1-BW-PP-004-20100514		**13 mg/kg Aroclor 1260**			6 / /	3.8 / /	3000 mg/kg / ND / 1.6 mg/l	ND / /	7.1 /	80 mg/kg / ND / 2.1 mg/L	200 / /	100 / /	**1400 mg/kg /1.6 mg/L / 68 mg/L**	0.99 / /	5.7 / /	35 / /	ND / /	2.1 / /	ND / /	96 / /	**14000 mg/kg / 57 mg/L / 270 mg/L**			0.13 ± 0.06	0.01 ± 0.02
B1	1st	Shop Northwest Perimeter Brick Wall	5/14/2010	B1-BW-CP-004-20100514			ND																					
B1	1st	Shop Northwest Perimeter Brick Wall w/Silver & Green Paints	5/18/2010	B1-BW-PP-004-20100518-EX		ND																					**2.13 ± 1.2**	0.05 ± 0.03
B1	1st	Shop Northwest Perimeter Brick Wall	5/18/2010	B1-BW-CP-004-20100518-EX			ND																					
B1	1st	Shop Southeast Perimeter Brick Wall w/Green Paints	5/14/2010	B1-BW-PP-005-20100514		**9.5 mg/kg Aroclor 1260**																					**1.3 ± 0.3**	0.14 ± 0.07

SUMMARY OF SAMPLING RESULTS
CONFIDENTIAL LOCATION, OAKLAND, CA
SCA. PROJECT NO. K-9866

Building	Floor	Location & Description	Date	Sample I.D.	Wipe PCB Results	Paint PCB Results	Brick PCB Results	Concrete Floor PCB Results	CAM 17 Metals (TTLC (mg/kg) / TCLP (mg/kg) / STLC (mg/L)[++]																VOCs	SVOCs	Pre-Sampling Lead Concentration (mg/cm^2)$^+$	Post-Sampling Lead Concentration (mg/cm^2)$^+$
									An	Ar	Ba	Be	Ca	Ch	Co	Cu	Pb	Hg	Mo	Ni	Se	Si	Th	Va	Zn				
Standards					*0.1 µg/cm^2*	*50 mg/kg*	*50 mg/kg*	*50 mg/kg*	*500 / 15*	*500 / 5*	*10000/ 100*	*75/ 0.75*	*100/ 1*	*500 / 5*	*8000 / 80*	*2500 / 25*	*1000 / 5*	*20 / 0.2*	*3500 / 350*	*2000 / 20*	*100 / 1*	*500 / 5*	*700 / 7*	*5000 / 24*	*2400 / 250*			*1.0 mg/cm^2*	*1.0 mg/cm^2*
B1	1st	Shop Southeast Perimeter Brick Wall	5/14/2010	B1-BW-CP-005-20100514			0.73 mg/kg Aroclor 1260																					
B1	1st	Shop Southeast Perimeter Brick Wall w/No Paints	5/18/2010	B1-BW-CP-005-20100518-EX			ND																				0.02 ± 0.03	
B1	1st	Office East Perimeter Brick Wall @ Entry Door w/Beige Paints	5/14/2010	B1-BW-PP-006-20100514		**18 mg/kg Aroclor 1260**																					**1.3 ± 1.5**	0.00 ± 0.02
B1	1st	Office East Perimeter Brick Wall @ Entry Door	5/14/2010	B1-BW-CP-006-20100514			ND																					
B1	1st	Office East Perimeter Brick Wall @ Entry Door	5/18/2010	B1-BW-CP-006-20100518-EX			ND																				0.03 ± 0.08	---
B1	1st	Shop Crane 7 w/Yellow Paints	5/14/2010	B1-BW-WP-007-20100514	ND																						**4.7 ± 2.4**	---
B1	1st	Shop Interior Central East Structural Steel Column	5/14/2010	B1-SS-PP-008-20100514		**28 mg/kg Aroclor 1260**																					**4.0 ± 1.3**	1.4 ± 0.3
B1	1st	Shop Interior Central West Structural Steel Column	5/14/2010	B1-SS-PP-009-20100514		**72 mg/kg Aroclor 1260**																					**2.2 ± 0.9**	0.15 ± 0.12
B1	1st	Shop Interior Central West Structural Steel Column	5/14/2010	B1-SS-WP-009-20100514-PRE	0.0015 µg/cm^2 Aroclor 1260																							
B1	1st	Shop Interior Central West Structural Steel Column	5/14/2010	B1-SS-WP-009-20100514-POST	0.045 µg/cm^2 Aroclor 1260																							
B1	1st	Shop Interior Structural Steel Column at Lower Pit North Perimeter	5/14/2010	B1-SS-PP-010-20100514		**18 mg/kg Aroclor 1260**			ND / /	ND / /	2400 mg/kg / ND / ND	ND / /	ND / /	93 mg/kg / ND / 0.51 mg/L	300 / /	130 / /	**49000 mg/kg / 390 mg/L / 2400 mg/L**	ND / /	ND / /	ND / /	ND / /	ND / /	ND / /	ND / /	**51000 mg/kg / 43 mg/L / 490 mg/L**			**3.3 ± 1.5**	0.45 ± 0.2
B1	1st	Shop Interior Central North Perimeter Structural Steel Column	5/17/2010	B1-SS-PP-011-20100517		**130 mg/kg Aroclor 1260**			180 / /	4.9 / /	840 mg/kg / ND / 2.3 mg/L	ND / /	23 / /	2800 mg/kg / ND / 3.2 mg/L	220 / /	180 / /	**39000 mg/kg /110 mg/L / 1400 mg/L**	0.55 / /	1.7 / /	15 / /	0.5 /	5 / /	ND / /	9.6 / /	**23000 mg/kg / 460 mg/L / 460 mg/L**			**2.3 ± 0.9**	
B1	1st	Shop Interior Central North Perimeter Structural Steel Column	5/17/2010	B1-SS-WP-011-20100514-PRE	ND																							
B1	1st	Shop Interior Central North Perimeter Structural Steel Column	5/17/2010	B1-SS-WP-011-20100514-POST	0.059 µg/cm^2 Aroclor 1260																							
B1	1st	Shop Perimeter Central North Glass Window (Wire-Glass)	5/17/2010	B1-GW-WP-012-20100517	ND																						0.00 ± 0.02	---
B1	1st	Shop Interior Central East Concrete Floor	5/20/2010	B1-CF-CP-013-20100520				**9.8 mg/kg Aroclor 1260**																				

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									An	Ar	Ba	Be	Ca	Ch	Co	Cu	Pb	Hg	Mo	Ni	Se	Si	Th	Va	Zn				
Standards					*0.1 µg/cm²*	*50 mg/kg*	*50 mg/kg*	*50 mg/kg*	*500 / 15*	*500 / 5*	*10000/ 100*	*75/ 0.75*	*100/ 1*	*500 / 5*	*8000 / 80*	*2500 / 25*	*1000 / 5*	*20 / 0.2*	*3500 / 350*	*2000 / 20*	*100 / 1*	*500 / 5*	*700 / 7*	*5000 / 24*	*2400 / 250*			*1.0 mg/cm²*	*1.0 mg/cm²*
B1	1st	Shop Interior Central East Concrete Floor	5/20/2010	B1-CF-CP-014-20100520				**11 mg/kg Aroclor 1260**																				
B1	1st	Shop Interior Central East Concrete Floor	5/20/2010	B1-CF-CP-015-20100520				**6.8 mg/kg Aroclor 1260**																				
B1	1st	Shop Interior Central East Concrete Floor	5/20/2010	B1-CF-CP-016-20100520				ND																	0.0013 mg/kg Stryene, 0.0012 mg/kg 1,2-Dichlorobenzene, 0.00057 mg/kg Ethylbenzene & 0.0035 mg/kg Xylenes	3.3 mg/kg Phenol		
B1	1st	Shop Interior Central East Concrete Floor	5/20/2010	B1-CF-CP-017-20100520				**1.1 mg/kg Aroclor 1260**																				
B1	1st	Shop Interior Central East Concrete Floor	5/20/2010	B1-CF-CP-018-20100520				**63 mg/kg Aroclor 1260**																				
B1	1st	Shop Interior Central East Concrete Floor	5/20/2010	B1-CF-CP-019-20100520				ND																				
B1	1st	Shop Interior Central East Concrete Floor	5/20/2010	B1-CF-CP-020-20100520				**28 mg/kg Aroclor 1260**																				
B1	1st	Shop Interior Central Concrete Floor	5/20/2010	B1-CF-CP-021-20100520				**26 mg/kg Aroclor 1260**																				
B1	1st	Shop Interior Central Concrete Floor	5/20/2010	B1-CF-CP-022-20100520				ND																				
B1	1st	Shop Interior Central Concrete Floor	5/20/2010	B1-CF-CP-023-20100520				**34 mg/kg Aroclor 1260**																				
B1	1st	Shop Interior Central Concrete Floor	5/20/2010	B1-CF-CP-024-20100520				**52 mg/kg Aroclor 1260**																				
B1	1st	Shop Interior Central Concrete Floor	5/20/2010	B1-CF-CP-025-20100520				0.6 mg/kg Aroclor 1260																				
B1	1st	Shop Interior Central West Concrete Floor	5/20/2010	B1-CF-CP-026-20100520				**55 mg/kg Aroclor 1260**																				
B1	1st	Shop Interior Central Concrete Floor	5/20/2010	B1-CF-CP-027-20100520				**8.4 mg/kg Aroclor 1260**																				
B1	1st	Shop Interior Central West Concrete Floor	5/20/2010	B1-CF-CP-028-20100520				**23 mg/kg Aroclor 1260**																				

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									An	Ar	Ba	Be	Ca	Ch	Co	Cu	Pb	Hg	Mo	Ni	Se	Si	Th	Va	Zn				
Standards					*0.1 µg/cm²*	*50 mg/kg*	*50 mg/kg*	*50 mg/kg*	*500 / 15*	*500 / 5*	*10000/ 100*	*75/ 0.75*	*100/ 1*	*500 / 5*	*8000 / 80*	*2500 / 25*	*1000 / 5*	*20 / 0.2*	*3500 / 350*	*2000 / 20*	*100 / 1*	*500 / 5*	*700 / 7*	*5000 / 24*	*2400 / 250*			*1.0 mg/cm²*	*1.0 mg/cm²*
B1	1st	Shop Interior Central Concrete Floor	5/20/2010	B1-CF-CP-029-20100520				**40 mg/kg Aroclor 1260**																					
B1	1st	Shop Interior Central Concrete Floor	5/20/2010	B1-CF-CP-030-20100520				**220 mg/kg Aroclor 1260**																					
B1	1st	Shop Interior Central Concrete Floor	5/20/2010	B1-CF-CP-031-20100520				ND																					
B1	1st	Shop Interior Central West Concrete Floor	5/20/2010	B1-CF-CP-032-20100520				**2.4 mg/kg Aroclor 1260**																		0.0034 mg/kg Naphthalene, 0.0010 mg/kg 1,2,4-Trimethylbenzene	ND		
B1	1st	Shop Interior Central West Concrete Floor	5/20/2010	B1-CF-CP-033-20100520				**2.4 mg/kg Aroclor 1260**																					
B1	1st	Shop Interior Central West Concrete Floor	5/20/2010	B1-CF-CP-034-20100520				**290 mg/kg Aroclor 1260**																					
B1	1st	Shop Interior Central West Concrete Floor	5/20/2010	B1-CF-CP-035-20100520				**21 mg/kg Aroclor 1260**																					
B1	1st	Shop Interior Central West Concrete Floor	5/20/2010	B1-CF-CP-036-20100520				**1.7 mg/kg Aroclor 1260**																					
B1	1st	Shop Interior Central West Concrete Floor	5/21/2010	B1-CF-CP-037-20100521				**22 mg/kg Aroclor 1260**																					
B1	1st	Shop Interior Central West Concrete Floor	5/21/2010	B1-CF-CP-038-20100521				ND																					
B1	1st	Shop Interior Central West Concrete Floor	5/21/2010	B1-CF-CP-039-20100521				ND																					
B1	1st	Shop Interior Central West Concrete Floor	5/20/2010	B1-CF-CP-040-20100520				**1.7 mg/kg Aroclor 1260**																					
B1	1st	Shop Interior Central Concrete Floor	5/20/2010	B1-CF-CP-041-20100520				**4.7 mg/kg Aroclor 1260**																					
B1	1st	Shop Interior Central West Concrete Floor	5/21/2010	B1-CF-CP-042-20100521				ND																					
B1	1st	Shop Interior Central West Concrete Floor	5/20/2010	B1-CF-CP-043-20100520				**12 mg/kg Aroclor 1260**																					
B1	1st	Shop Interior Central West Concrete Floor	5/20/2010	B1-CF-CP-044-20100520				**1600 mg/kg Aroclor 1260**																					

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									An	Ar	Ba	Be	Ca	Ch	Co	Cu	Pb	Hg	Mo	Ni	Se	Si	Th	Va	Zn				
Standards					*0.1 µg/cm²*	*50 mg/kg*	*50 mg/kg*	*50 mg/kg*	*500 / 15*	*500 / 5*	*10000/ 100*	*75/ 0.75*	*100/ 1*	*500 / 5*	*8000 / 80*	*2500 / 25*	*1000 / 5*	*20 / 0.2*	*3500 / 350*	*2000 / 20*	*100 / 1*	*500 / 5*	*700 / 7*	*5000 / 24*	*2400 / 250*			*1.0 mg/cm²*	*1.0 mg/cm²*
B1	1st	Shop Interior Central Concrete Floor	5/20/2010	B1-CF-CP-045-20100520				**12 mg/kg Aroclor 1260**																					
B1	1st	Shop Interior Central Concrete Floor	5/20/2010	B1-CF-CP-046-20100520				**62 mg/kg Aroclor 1260**																					
B1	1st	Shop Interior Central Concrete Floor	5/20/2010	B1-CF-CP-047-20100520				ND																					
B1	1st	Shop Interior Central East Concrete Floor	5/21/2010	B1-CF-CP-048-20100521				**59 mg/kg Aroclor 1232 & 65 mg/kg Aroclor 1260**																					
B1	1st	Shop Interior Central East Concrete Floor	5/21/2010	B1-CF-CP-049-20100521				**520 mg/kg Aroclor 1254 & 210 mg/kg Aroclor 1260**																					
B1	1st	Shop Interior Central East Concrete Floor	5/21/2010	B1-CF-CP-050-20100521				1.5 mg/kg Aroclor 1254 & 0.98 mg/kg Aroclor 1260																					
B1	1st	Shop Interior Central East Concrete Floor	5/21/2010	B1-CF-CP-051-20100521				2.3 mg/kg Aroclor 1260																					
B1	1st	Shop Interior Central Concrete Floor	5/20/2010	B1-CF-CP-052-20100520				**280 mg/kg Aroclor 1260**																					
B1	1st	Shop Interior Central East Concrete Floor	5/21/2010	B1-CF-CP-053-20100521				**17 mg/kg Aroclor 1260**																					

Note: Items in shaded cells represent sampling results over the identified hazardous materials standards; item in bold type only are over the recycling standards
+ Paints with a lead content > 1.0 mg/cm2 are classified as HUD-defined LBPs requiring stabilization of loose and peeling paints prior to demolition and some limitations on recycling potential; full abatement is not deemed necessary
++Per Title 22 California Code of Regulations (CCR) 66261.24 whereby TTLC = Total Threshold Limit Concentration, TCLP = Toxicity Characteristic Leaching Procedures and STLC = Soluble Threshold Limit Concentration

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CONFIDENTIAL LOCATION, OAKLAND, CA
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									An	Ar	Ba	Be	Ca	Ch	Co	Cu	Pb	Hg	Mo	Ni	Se	Si	Th	Va	Zn		
Standards					*0.1 µg/cm²*	*50 mg/kg*	*50 mg/kg*	*50 mg/kg*	*500 / 15*	*500 / 5*	*10000/ 100*	*75/ 0.75*	*100/ 1*	*500 / 5*	*8000 / 80*	*2500 / 25*	*1000 / 5*	*20 / 0.2*	*3500 / 350*	*2000 / 20*	*100 / 1*	*500 / 5*	*700 / 7*	*5000 / 24*	*2400 / 250*	*1.0 mg/cm²*	*1.0 mg/cm²*
B2	1st	Shop Northwest Perimeter Brick Wall	5/17/2010	B2-BW-WP-001-20100517	ND																						
B2	1st	Shop Northwest Perimeter Brick Wall w/Green Paints	5/17/2010	B2-BW-PP-001-20100517		**3.3 mg/kg Aroclor 1260**																				0.6 ± 0.1	0.26 ± 0.09
B2	1st	Shop Northwest Perimeter Brick Wall	5/17/2010	B2-BW-CP-001-20100517			**2.5 mg/kg Aroclor 1260**																				
B2	1st	Shop Exterior Northwest Perimeter Brick Wall w/No Paints	5/18/2010	B2-BW-CP-001-20100518-EX			ND																			0.01 ± 0.07	---
B2	1st	Shop Southwest Perimeter Brick Wall w/Green Paints	5/17/2010	B2-BW-PP-002-20100517		**8.1 mg/kg Aroclor 1260**																				0.18 ± 0.1	0.03 ± 0.12
B2	1st	Shop Southwest Perimeter Brick Wall	5/17/2010	B2-BW-CP-002-20100517			**1.4 mg/kg Aroclor 1260**																				
B2	1st	Shop Exterior Southwest Perimeter Brick Wall w/No Paints	5/18/2010	B2-BW-CP-002-20100518-EX			ND																			0.07 ± 0.21	---
B2	1st	Shop West Central Perimeter Brick Wall	5/17/2010	B2-BW-PP-003-20100517		**1.8 mg/kg Aroclor 1260**																				0.5 ± 0.01	0.08 ± 0.11
B2	1st	Shop West Central Perimeter Brick Wall	5/17/2010	B2-BW-CP-003-20100517			**1.2 mg/kg Aroclor 1260**																				
B2	1st	Shop Exterior West Central Perimeter Brick Wall w/Red & Brown Paints	5/18/2010	B2-BW-PP-003-20100518-EX																						0.4 ± 0.02	0.02 ± 0.07
B2	1st	Shop Exterior West Central Perimeter Brick Wall	5/18/2010	B2-BW-CP-003-20100518-EX			ND																				
B2	1st	Shop Interior Northwest Structural Steel Column	5/17/2010	B2-SS-WP-004-20100517-PRE	ND																						
B2	1st	Shop Interior Northwest Structural Steel Column	5/17/2010	B2-SS-WP-004-20100517-POST	0.011 µg/cm² Aroclor 1260																						
B2	1st	Shop Interior Northwest Structural Steel Column w/Green Paints	5/17/2010	B2-SS-PP-004-20100517		**16 mg/kg Aroclor 1260**			11 / /	5.4 / /	470 / /	ND / ND / ND	49 / /	**1900 mg/kg / 0.48 mg/L / 51 mg/L**	130 / /	83 / /	**18000 mg/kg / 45 mg/L / 850 mg/L**	ND / /	5.4 / /	14 / /	0.8 / /	1.2 / /	ND / /	7.4 / /	**26000 mg/kg / 160 mg/L / 510 mg/L**	1.3 ± 0.4	0.06 ± 0.07
B2	1st	Shop Interior South Central Structural Steel Column w/Green Paints	5/17/2010	B2-SS-PP-005-20100517		**29 mg/kg Aroclor 1260**																				2.3 ± 1.1	0.02 ± 0.04

SUMMARY OF SAMPLING RESULTS
CONFIDENTIAL LOCATION, OAKLAND, CA
SCA. PROJECT NO. K-9866

Building	Floor	Location & Description	Date	Sample I.D.	Wipe PCB Results	Paint PCB Results	Brick PCB Results	Concrete Floor PCB Results	CAM 17 Metals (TTLC (mg/kg) / STLC (mg/L)++																	Pre-Sampling Lead Concentration $(mg/cm^2)^+$	Post-Sampling Lead Concentration $(mg/cm^2)^+$
									An	Ar	Ba	Be	Ca	Ch	Co	Cu	Pb	Hg	Mo	Ni	Se	Si	Th	Va	Zn		
Standards					*0.1 µg/cm²*	*50 mg/kg*	*50 mg/kg*	*50 mg/kg*	*500 / 15*	*500 / 5*	*10000/ 100*	*75/ 0.75*	*100/ 1*	*500 / 5*	*8000 / 80*	*2500 / 25*	*1000 / 5*	*20 / 0.2*	*3500 / 350*	*2000 / 20*	*100 / 1*	*500 / 5*	*700 / 7*	*5000 / 24*	*2400 / 250*	*1.0 mg/cm²*	*1.0 mg/cm²*
B2	1st	Shop Interior Central Northeast Structural Steel Column w/Green Paints	5/17/2010	B2-SS-PP-006-20100517		**64 mg/kg Aroclor 1260**																				1.2 ± 0.4	0.02 ± 0.06
B2	1st	Shop Interior Central Southeast Structural Steel Column	5/17/2010	B2-SS-WP-007-20100517-PRE	ND																						
B2	1st	Shop Interior Central Southeast Structural Steel Column	5/17/2010	B2-SS-WP-007-20100517-POST	ND																						
B2	1st	Shop Interior Central Southeast Structural Steel Column w/Green Paints	5/17/2010	B2-SS-PP-007-20100517		**27 mg/kg Aroclor 1260**																				1.6 ± 0.5	0.14 ± 0.2
B2	1st	Shop Southeast Perimeter Brick Wall	5/18/2010	B2-BW-WP-008-20100518	ND																						
B2	1st	Shop Southeast Perimeter Brick Wall w/ Silver & Green Paints	5/18/2010	B2-BW-PP-008-20100518		**2.4 mg/kg Aroclor 1260**			120 / /	7 / /	1200 mg/kg / ND / ND	ND / /	18 mg/kg / ND / 0.36 mg/L	**2600 mg/kg / ND / 18 mg/L**	46 / /	49 / /	**12000 mg/kg / 0.57 mg/L / 110 mg/L**	5.6 mg/kg / ND / ND	ND / /	6.7 / /	ND / /	16 / /	ND / /	34 / /	**11000 mg/kg / 42 mg/L / 210 mg/L**	1.1 ± 0.2	0.03 ± 0.06
B2	1st	Shop Southeast Perimeter Brick Wall	5/18/2010	B2-BW-CP-008-20100518			**1.2 mg/kg Aroclor 1260**																				
B2	1st	Shop Exterior Southeast Perimeter Brick Wall w/Efflorescence & No Paints	5/18/2010	B2-BW-CP-008-20100518-EX			ND																			0.01 ± 0.02	---
B2	1st	Shop Northeast Perimeter Brick Wall	5/18/2010	B2-BW-PP-009-20100518		**8.3 mg/kg Aroclor 1260**																				0.4 ± 0.1	0.3 ± 0.1
B2	1st	Shop Northeast Perimeter Brick Wall	5/18/2010	B2-BW-CP-009-20100518			**1.6 mg/kg Aroclor 1260**																				
B2	1st	Shop Exterior Northeast Perimeter Brick Wall w/No Paints	5/18/2010	B2-BW-CP-009-20100518-EX			ND																			0.00 ± 0.02	---
B2	1st	Shop East Central Perimeter Brick Wall	5/18/2010	B2-BW-PP-010-20100518		**7.3 mg/kg Aroclor 1260**			110 /	10 / /	920 / /	ND / /	20 mg/kg / 0.069 mg/L / 0.34 mg/L	**1400 mg/kg / 0.41 mg/L / 16 mg/L**	30 / /	98 / /	**7200 mg/kg / 4.3 mg/L / 150 mg/L**	**24 mg/kg / ND / ND**	8.9 / /	10 / /	ND / /	ND / /	ND / /	100 / /	**8300 mg/kg / 35 mg/L / 130 mg/L**	0.7 ± 0.1	0.00 ± 0.1
B2	1st	Shop East Central Perimeter Brick Wall	5/18/2010	B2-BW-CP-010-20100518			**1.2 mg/kg Aroclor 1260**																				
B2	1st	Shop Exterior East Central Perimeter Brick Wall w/No Paints	5/18/2010	B2-BW-CP-010-20100518-EX			ND																			0.00 ± 0.02	---
B2	1st	Shop Perimeter Southeast Glass Window (Clear Glass)	5/18/2010	B2-GW-WP-011-20100518	ND																						
B2	1st	Shop Perimeter Northeast Glass Window (Clear Glass)	5/18/2010	B2-GW-WP-012-20100518	ND																						

SUMMARY OF SAMPLING RESULTS
CONFIDENTIAL LOCATION, OAKLAND, CA
SCA. PROJECT NO. K-9866

Building	Floor	Location & Description	Date	Sample I.D.	Wipe PCB Results	Paint PCB Results	Brick PCB Results	Concrete Floor PCB Results	CAM 17 Metals (TTLC (mg/kg) / STLC (mg/L)++																	Pre-Sampling Lead Concentration (mg/cm²)+	Post-Sampling Lead Concentration (mg/cm²)+
									An	Ar	Ba	Be	Ca	Ch	Co	Cu	Pb	Hg	Mo	Ni	Se	Si	Th	Va	Zn		
Standards					*0.1 µg/cm²*	*50 mg/kg*	*50 mg/kg*	*50 mg/kg*	*500 / 15*	*500 / 5*	*10000/ 100*	*75/ 0.75*	*100/ 1*	*500 / 5*	*8000 / 80*	*2500 / 25*	*1000 / 5*	*20 / 0.2*	*3500 / 350*	*2000 / 20*	*100 / 1*	*500 / 5*	*700 / 7*	*5000 / 24*	*2400 / 250*	*1.0 mg/cm²*	*1.0 mg/cm²*
B2	1st	Central Shop Crane with Yellow Paints	5/18/2010	B2-EQ-WP-013-20100518	ND																						
B2	1st	Central Shop Crane with Yellow Paints	5/18/2010	B2-EQ-PP-013-20100518		**2.4 mg/kg Aroclor 1260**																				2.2 ± 1.0	0.00 ± 0.02
B2	1st	Shop Interior Central East Concrete Floor	5/21/2010	B2-CF-CP-013-20100521				ND																			
B2	1st	Shop Interior Central East Concrete Floor	5/21/2010	B2-CF-CP-014-20100521				ND																			
B2	1st	Shop Interior Central East Concrete Floor	5/21/2010	B2-CF-CP-015-20100521				**3.8 mg/kg Aroclor 1260**																			
B2	1st	Shop Interior Central East Concrete Floor	5/21/2010	B2-CF-CP-016-20100521				ND																			
B2	1st	Shop Interior Central East Concrete Floor	5/21/2010	B2-CF-CP-017-20100521				**3.4 mg/kg Aroclor 1260**																			
B2	1st	Shop Interior Central East Concrete Floor	5/21/2010	B2-CF-CP-018-20100521				**1.3 mg/kg Aroclor 1260**																			
B2	1st	Shop Interior Central East Concrete Floor	5/21/2010	B2-CF-CP-019-20100521				**3.4 mg/kg Aroclor 1260**																			
B2	1st	Shop Interior Central East Concrete Floor	5/21/2010	B2-CF-CP-020-20100521				**1.5 mg/kg Aroclor 1260**																			
B2	1st	Shop Interior Central East Concrete Floor	5/21/2010	B2-CF-CP-021-20100521				ND																			
B2	1st	Shop Interior Central Concrete Floor	5/21/2010	B2-CF-CP-022-20100521				ND																			
B2	1st	Shop Interior Central Concrete Floor	5/21/2010	B2-CF-CP-023-20100521				**23 mg/kg Aroclor 1260**																			
B2	1st	Shop Interior Central East Concrete Floor	5/21/2010	B2-CF-CP-024-20100521				ND																			
B2	1st	Shop Interior Central Concrete Floor	5/21/2010	B2-CF-CP-025-20100521				ND																			
B2	1st	Shop Interior Central Concrete Floor	5/21/2010	B2-CF-CP-026-20100521				ND																			
B2	1st	Shop Interior Central Concrete Floor	5/21/2010	B2-CF-CP-027-20100521				ND																			
B2	1st	Shop Interior Central West Concrete Floor	5/21/2010	B2-CF-CP-028-20100521				ND																			
B2	1st	Shop Interior Central West Concrete Floor	5/21/2010	B2-CF-CP-029-20100521				ND																			
B2	1st	Shop Interior Central West Concrete Floor	`	B2-CF-CP-030-20100521				**1.1 mg/kg Aroclor 1260**																			

SUMMARY OF SAMPLING RESULTS
CONFIDENTIAL LOCATION, OAKLAND, CA
SCA. PROJECT NO. K-9866

Building	Floor	Location & Description	Date	Sample I.D.	Wipe PCB Results	Paint PCB Results	Brick PCB Results	Concrete Floor PCB Results	CAM 17 Metals (TTLC (mg/kg) / STLC (mg/L)++																	Pre-Sampling Lead Concentration (mg/cm²)+	Post-Sampling Lead Concentration (mg/cm²)+
									An	Ar	Ba	Be	Ca	Ch	Co	Cu	Pb	Hg	Mo	Ni	Se	Si	Th	Va	Zn		
Standards					*0.1 µg/cm²*	*50 mg/kg*	*50 mg/kg*	*50 mg/kg*	*500 / 15*	*500 / 5*	*10000/ 100*	*75/ 0.75*	*100/ 1*	*500 / 5*	*8000 / 80*	*2500 / 25*	*1000 / 5*	*20 / 0.2*	*3500 / 350*	*2000 / 20*	*100 / 1*	*500 / 5*	*700 / 7*	*5000 / 24*	*2400 / 250*	*1.0 mg/cm²*	*1.0 mg/cm²*
B2	1st	Shop Interior Central West Concrete Floor	5/21/2010	B2-CF-CP-031-20100521				ND																			
B2	1st	Shop Interior Central West Concrete Floor	5/21/2010	B2-CF-CP-032-20100521				ND																			

Note: Items in shaded cells represent sampling results over the identified hazardous materials standards; item in bold type only are over the recycling standards
+ Paints with a lead content > 1.0 mg/cm2 are classified as HUD-defined LBPs requiring stabilization of loose and peeling paints prior to demolition and some limitations on recycling potential; full abatement is not deemed necessary
++Per Title 22 California Code of Regulations (CCR) 66261.24 whereby TTLC = Total Threshold Limit Concentration, TCLP = Toxicity Characteristic Leaching Procedures and STLC = Soluble Threshold Limit Concentration

SUMMARY OF SAMPLING RESULTS
CONFIDENTIAL LOCATION, OAKLAND, CA
SCA. PROJECT NO. K-9866

Building	Floor	Location & Description	Date	Sample I.D.	CMU PCB Results	Concrete Floor PCBs
B8	1st	Unpainted North CMU Perimeter Wall	5/18/2010	B8-CW-CP-001-20100518	**1.1 mg/kg Aroclor 1260**	
B8	1st	Unpainted West CMU Perimeter Wall w/Efflorescence	5/18/2010	B8-CW-CP-002-20100518	0.96 mg/kg Aroclor 1260	
B8	1st	Shop Interior South Concrete Floor	5/24/2010	B8-CF-CP-003-20100524		ND
B8	1st	Shop Interior North Concrete Floor	5/24/2010	B8-CF-CP-004-20100524		ND

Note: Items in shaded cells represent sampling results over the identified hazardous materials standards; item in bold type only are over the recycling standards

SUMMARY OF SAMPLING RESULTS
CONFIDENTIAL LOCATION, OAKLAND, CA
SCA. PROJECT NO. K-9866

Building	Floor	Location & Description	Date	Sample I.D.	Timber PCB Results	VOCs	SVOCs	Concrete Floor PCBs
B17	1st	Canopy Round Timber Post @ Northeast	5/18/2010	B17-WS-CP-001-20100518	ND	**0.013 mg/kg Naphthalene**	**6300 mg/kg Pentachlorophenol**	
B17	1st	Canopy Round Timber Post @ Southeast	5/18/2010	B17-WS-CP-002-20100518	ND	**0.0024 mg/kg Naphthalene**	**4400 mg/kg Pentachlorophenol**	
B17	1st	Canopy Round Timber Post @ Center	5/18/2010	B17-WS-CP-003-20100518	ND	**0.022 mg/kg Naphthalene, 0.0062 mg/kg 4-Methyl-2-pentanone & 0.00064 mg/kg Xylenes**	**5600 mg/kg Pentachlorophenol**	
B17	1st	Canopy Round Timber Post @ Northwest	5/18/2010	B17-WS-CP-004-20100518	ND	**0.024 mg/kg Naphthalene**	**5900 mg/kg Pentachlorophenol**	
B17	1st	Canopy Round Timber Post @ Southwest	5/18/2010	B17-WS-CP-005-20100518	ND	**0.0048 mg/kg 4-Isopropyl Toluene & 0.0052 mg/kg Toluene**	ND	
B17	1st	Shop Interior East Concrete Floor	5/21/2010	B17-CF-CP-006-20100521				ND
B17	1st	Shop Interior Central Concrete Floor	5/21/2010	B17-CF-CP-007-20100521				ND
B17	1st	Shop Interior West Concrete Floor	5/21/2010	B17-CF-CP-008-20100521				ND

Note: Items in shaded cells represent sampling results over the identified hazardous materials standards; item in bold type only are over the recycling standards

SUMMARY OF SAMPLING RESULTS
CONFIDENTIAL LOCATION, OAKLAND, CA
SCA. PROJECT NO. K-9866

Building	Floor	Location & Description	Date	Sample I.D.	Concrete Floor PCBs
Standards					***50 mg/kg***
B18	1st	Interior Shop South Concrete Floor	5/24/2010	B18-CF-CP-001-20100524	ND
B18	1st	Interior Shop South Concrete Floor	5/24/2010	B18-CF-CP-002-20100524	**12 mg/kg Aroclor 1260**

Note: Items in shaded cells represent sampling results over the identified hazardous materials standards; item in bold type only are over the recycling standards

SUMMARY OF SAMPLING RESULTS
CONFIDENTIAL LOCATION, OAKLAND, CA
SCA. PROJECT NO. K-9866

Building	Floor	Location & Description	Date	Sample I.D.	Paint PCB Results	Concrete Floor PCBs	Pre-Sampling Lead Concentration (mg/cm^2)	Post-Sampling Lead Concentration (mg/cm^2)
B20	1st	Beige Paints on North Slide Door Steel Framing	05/18/10	B20-SS-PP-001-20100518	**5.9 mg/kg Aroclor 1260**		0.06 ± 0.11	0.04 ± 0.12
B20	1st	Shop Interior South Concrete Floor	05/24/10	B20-CF-CP-002-20100524		0.56 mg/kg Aroclor 1260		
B20	1st	Shop Interior North Concrete Floor	05/24/10	B20-CF-CP-003-20100524		**3.6 mg/kg Aroclor 1260**		

Note: Items in shaded cells represent sampling results over the identified hazardous materials standards;
item in bold type only are over the recycling standards

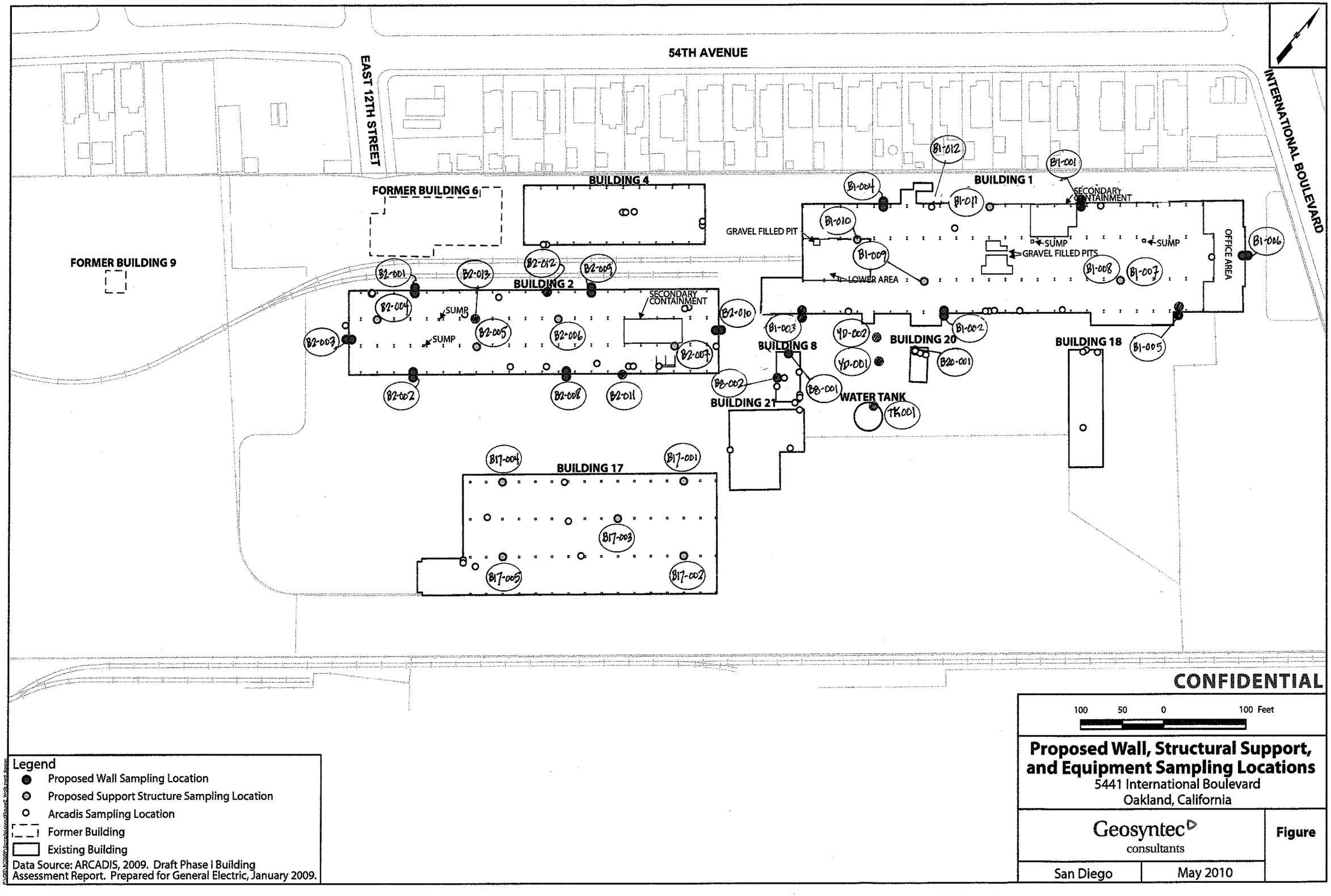
SUMMARY OF SAMPLING RESULTS
CONFIDENTIAL LOCATION, OAKLAND, CA
SCA. PROJECT NO. K-9866

						CAM 17 Metals (TTLC (mg/kg) / STLC (mg/L)$^{++}$																
Building	**Floor**	**Location & Description**	**Date**	**Sample I.D.**	**Paint PCB Results**	**An**	**Ar**	**Ba**	**Be**	**Ca**	**Ch**	**Co**	**Cu**	**Pb**	**Hg**	**Mo**	**Ni**	**Se**	**Si**	**Th**	**Va**	**Zn**	**Pre-Sampling Lead Concentration (mg/cm^2)**	**Post-Sampling Lead Concentration (mg/cm^2)**
Standards					***50 mg/kg***	***500 / 15***	***500 / 5***	***10000 /100***	***75/ 0.75***	***100/ 1***	***500 / 5***	***8000 / 80***	***2500 / 25***	***1000 / 5***	***20 / 0.2***	***3500 / 350***	***2000 / 20***	***100 / 1***	***500 / 5***	***700 / 7***	***5000 / 24***	***2400 / 250***	***1 mg/cm^2***	***1 mg/cm^2***
Tank	1st	Tank with Silver and Orange Paints	05/18/10	TK-MW-PP-001-20100518	**3.3 mg/kg Aroclor 1260**	ND / /	11 / /	3900 mg/kg / ND / 1.5 mg/L	ND / /	ND / /	**2800 mg/kg / 0.67 mg/L / 64 mg/L**	160 / /	55 / /	**46000 mg/kg / 63 mg/L / 2700 mg/L**	ND / /	ND / /	25 / /	ND / /	ND / /	ND / /	10 / /	1100 / /	0.9 ± 0.1	0.04 ± 0.05
Yard	1st	Yard bolster with Faded Red Paints	05/18/10	YD-EQ-PP-001-20100518	ND																		0.03 ± 0.06	0.00 ± 0.02
Yard	1st	Yard Safety Rails with Yellow Paints	05/18/10	YD-EQ-PP-002-20100518	0.99 mg/kg Aroclor 1260																		2.0 ± 0.7	0.00 ± 0.02

Note: Items in shaded cells represent sampling results over the identified hazardous materials standards;
item in bold type only are over the recycling standards

Appendix D

Core and Wipe Sampling Locations



CONFIDENTIAL

Legend
- Proposed Wall Sampling Location
- Proposed Support Structure Sampling Location
- Arcadis Sampling Location
- Former Building
- Existing Building

Data Source: ARCADIS, 2009. Draft Phase I Building Assessment Report. Prepared for General Electric, January 2009.

100 50 0 100 Feet

Proposed Wall, Structural Support, and Equipment Sampling Locations

5441 International Boulevard
Oakland, California

Geosyntec consultants

San Diego | May 2010

Figure

54TH AVENUE

EAST 12TH STREET

INTERNATIONAL BOULEVARD

FORMER BUILDING 9

FORMER BUILDING 6

BUILDING 4

BUILDING 2

BUILDING 1

SECONDARY CONTAINMENT

SUMP

GRAVEL FILLED PIT

LOWER AREA

OFFICE AREA

BUILDING 8

BUILDING 20

BUILDING 18

BUILDING 21

WATER TANK

BUILDING 17

CONFIDENTIAL

100 50 0 100 Feet

Proposed Concrete Core Sampling Locations

5441 International Boulevard
Oakland, California

Legend
- Proposed Sampling Location
- Arcadis Sampling Location
- Former Building
- Existing Building

Data Source: ARCADIS, 2009. Draft Phase I Building Assessment Report. Prepared for General Electric, January 2009.

Geosyntec consultants

San Diego | May 2010

Figure

APPENDIX H

TRANSPORTATION PLAN ADDENDUM

5441 International Boulevard
Oakland, California

Draft Final - August 2019

(EKI B70123.01)

APPENDIX H
TRANSPORTATION PLAN ADDENDUM

5441 International Boulevard
Oakland, California

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Figure H-1 Map of Route to Davis Street Transfer Station
Figure H-2 Map of Route to Forward Landfill
Figure H-3 Map of Route to Beatty Landfill

ATTACHMENT

Transportation Plan from Geosyntec, 2012

1. INTRODUCTION

EKI Environment & Water, Inc. ("EKI") has prepared this Transportation Plan Addendum on behalf of Bridge Acquisition, LLC ("Bridge" or "Developer") for the property located at 5441 International Boulevard, Oakland, California ("site"). This Transportation Plan Addendum supplements the Transportation Plan of the DTSC-approved Remedial Design Implementation Plan ("RDIP") (Geosyntec, 2012; attached) to include additional disposal facilities and proposed truck routes for those facilities to be used during demolition, remediation, and soil handling activities conducted during the planned site redevelopment, which are described in the main text of the RDIP Addendum, to which this plan is an Appendix.

The redevelopment project is being permitted through the City of Oakland and will include the development of a new Environmental Impact Report ("EIR") to meet California Environmental Quality Act ("CEQA") requirements. The Transportation Plan and Addendum will be modified based on the findings in the EIR and the City's requirements for the redevelopment project, which will likely impact the approach to site access and controls, traffic control, and waste transporter truck schedules and frequencies. As appropriate, these modifications will be documented in the Completion Report.

This Transportation Plan Addendum includes the following additional disposal facilities: (1) Waste Management's Davis Street Transfer Station, (2) Republic Services' Forward Landfill, and (3) US Ecology's Beatty Landfill. Proposed truck routes for these facilities are included on Figures H-1, H-2, and H-3, respectively. Information for these disposal facilities are provided below.

1.1 Davis Street Transfer Station

Waste Management, Inc. – Davis Street Transfer Station
2615 Davis St, San Leandro, California 94577
(510) 638-2303

The Davis Street Transfer Station accepts non-hazardous building materials waste and demolition debris.

1.2 Forward Landfill

Republic Services – Forward Inc. & Austin Road Landfills
9999 S Austin Rd, Manteca, California 95336
(209) 982-4298

Forward Landfill accepts non-hazardous soil, demolition debris, and building materials (including concrete). Forward Landfill also accepts asbestos-containing demolition debris.

1.3 Beatty Landfill

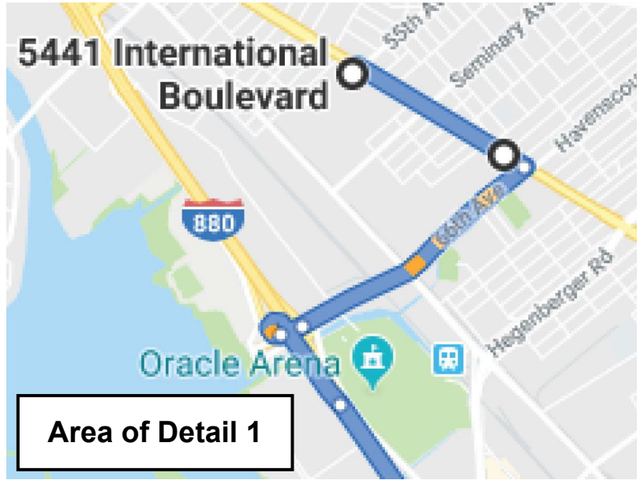
U.S. Ecology – Beatty Landfill
Highway 95, 12 miles south of Beatty, Nevada 89003
(800) 293-3943

Beatty Landfill accepts California hazardous materials and hazardous materials under both the Resource Conservation and Recovery Act ("RCRA hazardous") and the Toxic Substances Control Act ("TSCA").

2. REFERENCES

Geosyntec, 2012. Final Remedial Design and Implementation Plan, General Electric Site, 5441 International Boulevard, Oakland, California, Geosyntec Consultants, Inc., 26 April 2012.

Directions to Davis Street Transfer Station from the Site



1. Head southeast on E 14th St/International Blvd toward 55th Ave

2 min (0.7 mi)

Get on I-880 S

5 min (1.5 mi)

2. Turn right onto 66th Ave

1.0 mi

3. 66th Ave turns slightly right and becomes Zhone Way

427 ft

4. Slight right onto the Interstate 880 S ramp to San Jose

0.5 mi

Continue on I-880 S to San Leandro

5 min (3.1 mi)

5. Merge onto I-880 S

2.5 mi

6. Take exit 34 for Davis St

0.1 mi

7. Use the right 2 lanes to turn right onto Davis St

0.5 mi

Continue on Davis St to your destination

2 min (0.4 mi)

8. Continue straight to stay on Davis St

0.3 mi

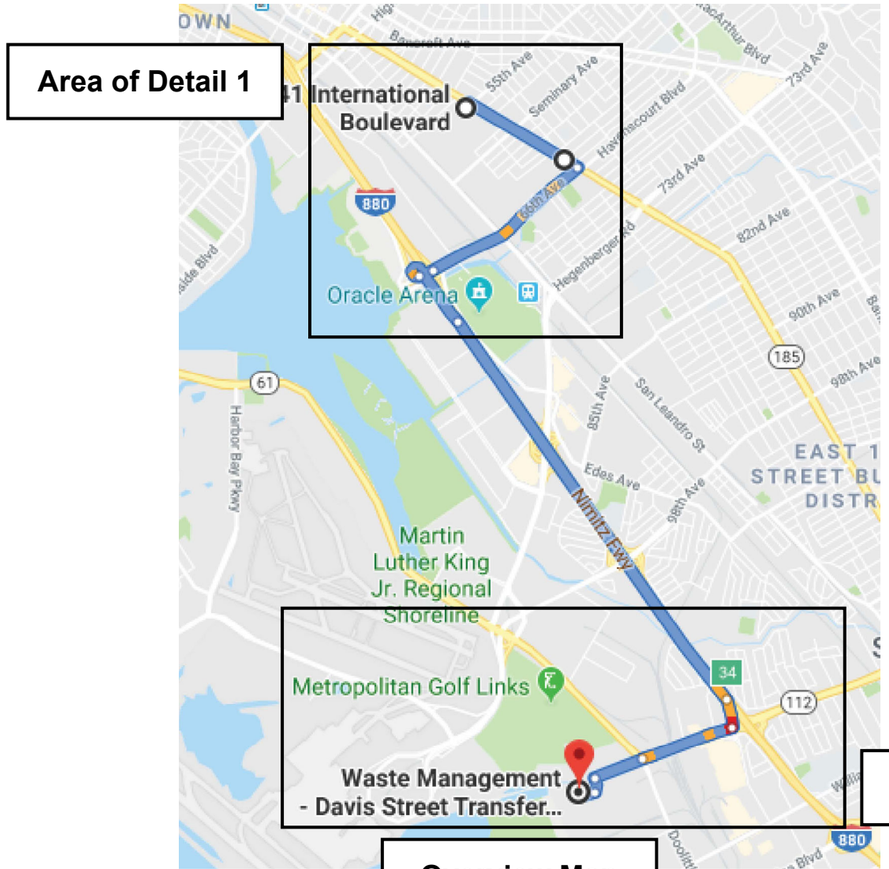
9. Turn left onto Business Center Dr

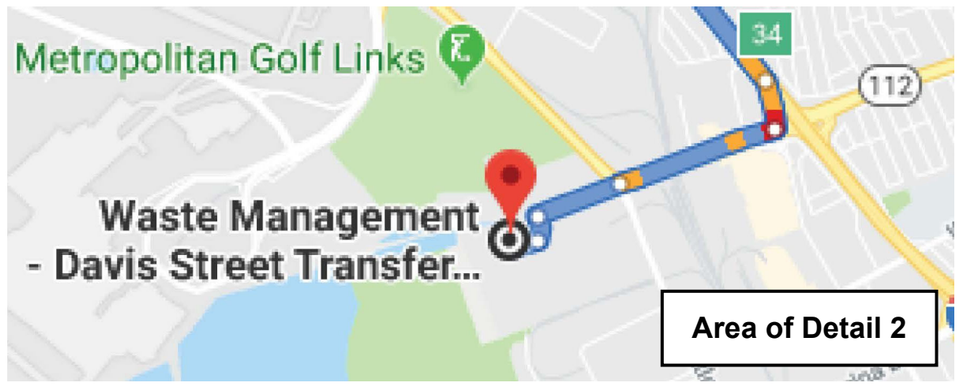
423 ft

10. Turn right
    Destination will be on the right

472 ft

Waste Management - Davis Street Transfer Station
2615 Davis St, San Leandro, CA 94577





Abbreviations

Ave	= avenue
Dr	= drive
ft	= feet
I	= interstate
mi	= mile
min	= minute
St	= street

Source

1. Imagery and directions provided by Google Maps, obtained on 16 April 2019.

Map of Route to Davis Street Transfer Station

DRAFT FINAL

5441 International Blvd.
Oakland, California
August 2019
EKI B70123.01

eki environment & water

Figure H-1

Directions to Forward Landfill from the Site

1. Head southeast on E 14th St/International Blvd toward 55th Ave

0.7 mi

2. Turn right onto 66th Ave

1.0 mi

3. 66th Ave turns slightly right and becomes Zhone Way

427 ft

4. Slight right onto the Interstate 880 S ramp to San Jose

0.5 mi

Take I-580 E, I-205 E and CA-120 E to Lathrop Rd in Manteca. Take the Golden State Highway exit from CA-99 N

1 h (63.8 mi)

5. Merge onto I-880 S

5.1 mi

6. Take exit 31 for I-238 toward Stockton/Fresno/I-580

0.4 mi

7. Keep left at the fork, follow signs for I-238/I-880/Castro Valley/Stockton Fresno

0.4 mi

8. Continue onto I-238 S

2.2 mi

9. Merge onto I-580 E

29.4 mi

10. Keep left to continue on I-205 E, follow signs for Interstate 205/Tracy/Stockton

14.5 mi

11. Merge onto I-5 N

1.0 mi

12. Use the right 2 lanes to take exit 461 for CA-120 toward Manteca/Sonora

0.3 mi

13. Continue onto CA-120 E

5.9 mi

14. Use the left lane to merge onto CA-120 E/CA-99 N toward Sacramento/Sonora N

Continue to follow CA-99 N

4.2 mi

15. Take the Golden State Highway exit

0.3 mi

Take Austin Rd to your destination

9 min (5.2 mi)

16. Turn right onto Lathrop Rd

1.6 mi

17. Turn left onto Austin Rd

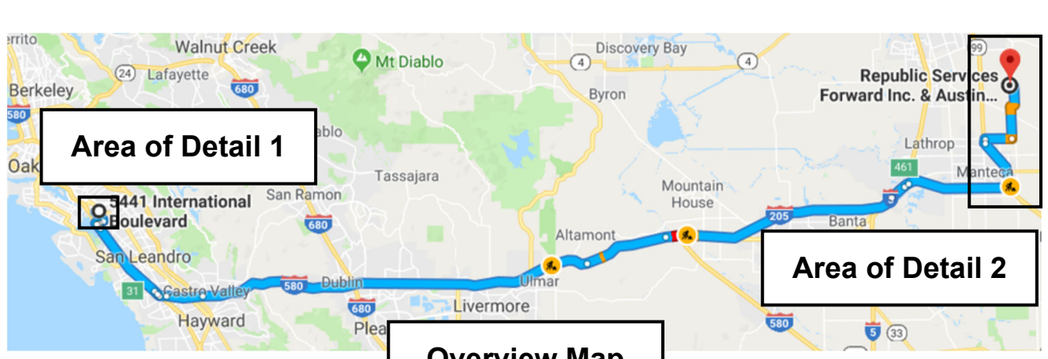
3.4 mi

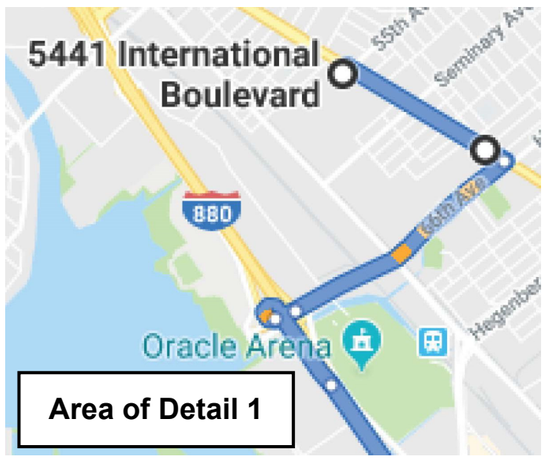
18. Turn left

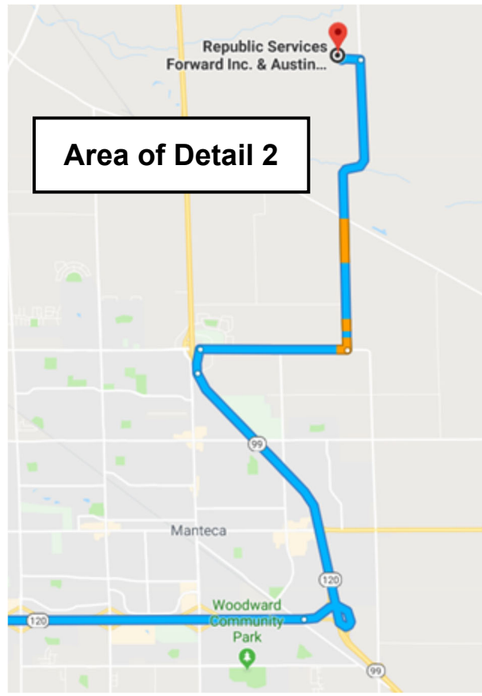
0.2 mi

Republic Services Forward Inc. & Austin Rd. Landfills

9999 S Austin Rd, Manteca, CA 95336







Abbreviations

Ave	= avenue
ft	= feet
I	= interstate
mi	= mile
min	= minute
St	= street

Source

1. Imagery and directions provided by Google Maps, obtained on 16 April 2019.

Map of Route to Forward Landfill

DRAFT FINAL

5441 International Blvd.
Oakland, California
August 2019
EKI B70123.01

eki environment & water

Figure H-2

Directions to Beatty Landfill from the Site

1. Head southeast on E 14th St/International Blvd toward 55th Ave — 0.7 mi
2. Turn right onto 66th Ave — 1.0 mi
3. 66th Ave turns slightly right and becomes Zhone Way — 427 ft
4. Slight right onto the Interstate 880 S ramp to San Jose — 0.5 mi

Take I-580 E, I-5 S and CA-58 E to CA-14 N/Midland Trail in Kern County. Take exit 167 from CA-58 E — 4 h 56 min (325 mi)

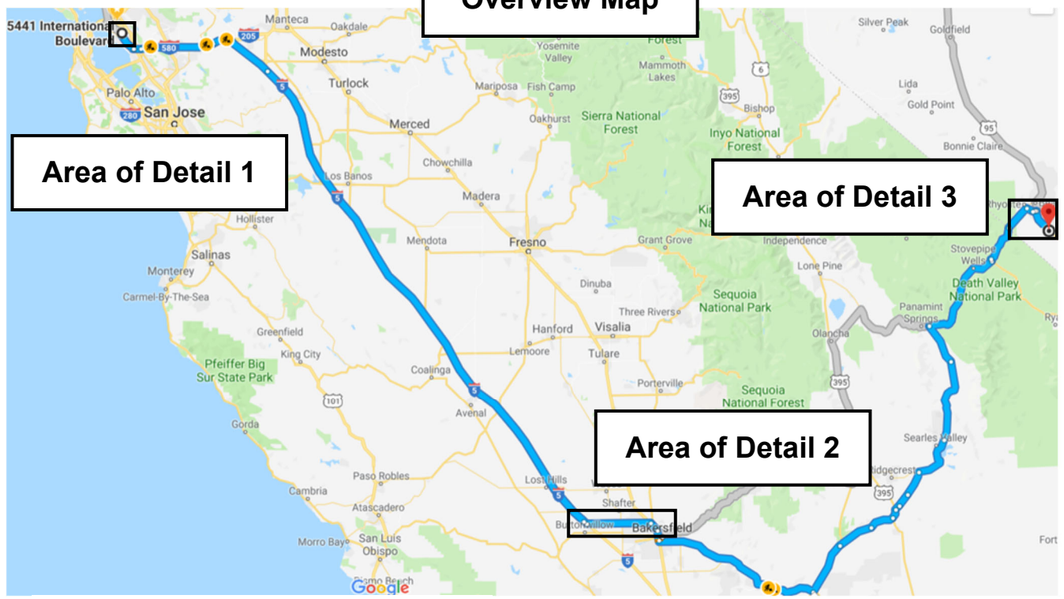
5. Merge onto I-880 S — 5.1 mi
6. Take exit 31 for I-238 toward Stockton/Fresno/I-580 — 0.4 mi
7. Keep left at the fork, follow signs for I-238/I-880/Castro Valley/Stockton Fresno — 0.4 mi
8. Continue onto I-238 S — 2.2 mi
9. Merge onto I-580 E — 29.4 mi
10. Use the right 2 lanes to take the Interstate 580 exit toward Interstate 5 S/Fresno/Los Angeles — 1.0 mi
11. Continue onto I-580 E — 16.0 mi
12. Continue onto I-5 S — 182 mi
13. Take exit 263 toward Buttonwillow/McKittrick — 0.3 mi
14. Turn left onto Rudnick Rd/Wasco Way — 1.3 mi
15. Turn left onto 7th Standard Rd — 21.0 mi
16. Use the right lane to take the ramp onto CA-99 S — 6.7 mi
17. Keep right at the fork to continue on CA-58 E, follow signs for Mojave/Tehachapi — 58.1 mi
18. Take exit 167 for CA-14 toward Bishop/Mojave — 0.4 mi

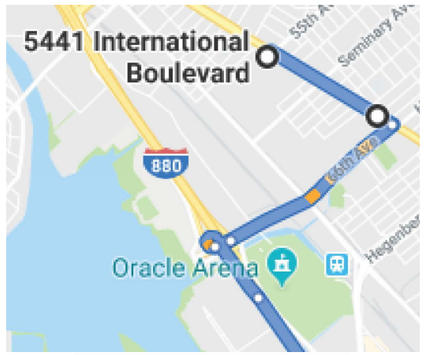
Continue on CA-14 N/Midland Trail. Take Redrock Randsburg Rd, Trona Rd, Trona Wildrose Rd, Panamint Valley Rd, ... and Daylight Pass Rd to U S Ecology Rd in Nye County — 3 h 19 min (186 mi)

19. Turn left onto CA-14 N/Midland Trail — 17.5 mi
20. Turn right onto Redrock Randsburg Rd — 12.1 mi
21. Continue onto Garlock Rd — 8.3 mi
22. Turn left onto US-395 N — 3.1 mi
23. Turn right onto Searles Station Rd/Searles Station Ctf — 1.9 mi
24. Continue onto Searles Station Cutoff — 4.5 mi
25. Turn left onto Trona Rd — 8.5 mi
26. Turn right onto CA-178 E/Trona Rd
    Continue to follow Trona Rd — 16.9 mi
27. Continue onto Trona Wildrose Rd — 28.6 mi
28. Turn left onto Panamint Valley Rd — 13.9 mi
29. Turn right onto CA-190 E (signs for Furnaace Creek 53) — 35.2 mi
30. Turn left onto Scotty's Castle Rd — 0.6 mi
31. Turn right onto Daylight Pass Rd
    Entering Nevada — 13.2 mi
32. Continue onto NV-374 N — 9.0 mi
33. Turn right onto Airport Rd — 2.5 mi
34. Continue straight — 0.6 mi
35. Continue onto Airport Rd — 0.6 mi
36. Turn right onto US-95 S — 8.2 mi
37. Turn right onto U S Ecology Rd — 0.6 mi

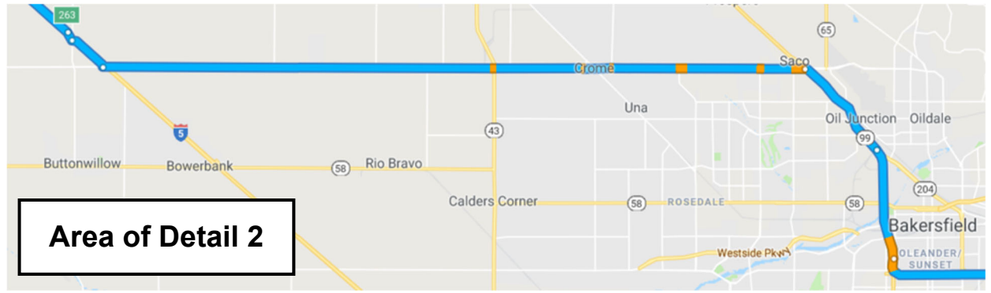
U S Ecology Rd
Nevada

Overview Map





Area of Detail 1



Area of Detail 3



Abbreviations

Ave	= avenue
CTF	= cutoff
Dr	= drive
ft	= feet
I	= interstate
mi	= mile
min	= minute
Rd	= road
St	= street

Source

1. Imagery and directions provided by Google Maps, obtained on 16 April 2019.

Map of Route to Beatty Landfill

DRAFT FINAL

5441 International Blvd.
Oakland, California
August 2019
EKI B70123.01

eki environment & water

Figure H-3

TRANSPORTATION PLAN
FROM GEOSYNTEC, 2012

5441 International Boulevard
Oakland, California

26 April 2012

Prepared for

General Electric Company
King of Prussia, Pennsylvania

TRANSPORTATION PLAN

General Electric Site
5441 International Boulevard
Oakland, California

Prepared by

Geosyntec consultants

engineers | scientists | innovators

1111 Broadway, 6th Floor
Oakland, California 94607

Project Number: WR1507

31 October 2011

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1. INTRODUCTION

This Transportation Plan (Plan) has been prepared by Geosyntec Consultants (Geosyntec) on behalf of General Electric Company (GE) to describe the proposed truck route(s) and transportation procedures for removing materials from the GE property located at 5441 International Boulevard, Oakland, California (the site; Figure 1) during remedial implementation activities as described in the Remedial Design and Implementation Plan (Geosyntec, 2011). This Plan is designed to provide hauling information for materials leaving the site, to be disposed of at facilities approved by GE, documentation protocol, and emergency response procedures.

Transportation contractors and onsite Contractors, who are responsible for completing remedial implementation construction activities, will be provided a copy of this Plan and are responsible for reviewing and complying with this document.

1.1 Report Organization

The remainder of this RDIP is organized the following way:

- Section 2, "*Disposal Facilities,*" summarizes the approved disposal facilities for the project.
- Section 3, "*Loading and Transportation Procedures,*" presents the requirements and routes for waste transportation.
- Section 4, "*Shipping Documentation and Record Keeping,*" summarizes procedures and requirements documenting waste transportation.
- Section 5, "*References,*" presents the documents referenced in this Plan.

2. DISPOSAL FACILITIES

Waste materials will fall into one of four classifications, based on waste characterization sampling results as required by the accepting facility: non-hazardous, California-hazardous (Cal-Haz), hazardous under the Resource Conservation and Recovery Act (RCRA hazardous), and hazardous under the Toxic Substances Control Act (TSCA hazardous). Three facilities operated by Waste Management have been identified as options for disposal of waste materials depending on the waste classification. The following table summarizes the facility names, addresses, and types of materials accepted.

Facility Name	**Address**	**Material Classification**
Altamont Landfill	10840 Altamont Pass Road Livermore, CA 94551	Non-Hazardous/California-Hazardous
Kettleman Hills Facility	35251 Old Skyline Road Kettleman City, CA 93239	RCRA/TSCA Hazardous
Chemical Waste Management of the Northwest (Arlington Facility)	18177 Cedar Springs Lane Arlington, OR 97812	RCRA/TSCA Hazardous

RCRA/TSCA hazardous waste can be taken to either the Kettleman Hills Facility or the Chemical Waste Management of the Northwest (Arlington Facility) depending on facility acceptance at the time of disposal.

3. LOADING AND TRANSPORTATION PROCEDURES

The waste materials will be loaded into trucks in designated loading areas in preparation for transport to the designated disposal facility. The general site layout is shown on Figure 2; loading areas will vary based on construction activities being performed at the time.

The trucking company will be a certified hazardous waste transportation contractor, as needed, and the drivers will be properly licensed in the states of California and Oregon (if applicable). Trucks loaded with excavation materials or debris will be appropriately covered and secured during transport. Semi-tractor trailer trucks with roll-off bins, semi-tractor trailer end dump trucks, or equivalent, each with an effective capacity of approximately 15 cubic yards (CY), or approximately 24 tons, of material are planned for transport and disposal of solid materials during the project. Water that may be collected for offsite disposal will be transported in drums or a vacuum truck. Prior to leaving the site, each truck will be inspected and cleaned as necessary to remove loose debris in the tire wells and on the outside of the truck.

3.1 Transportation Routes

The anticipated transportation routes for waste transport vehicles from the site to the disposal facilities are depicted on Figures 3 through 5. The anticipated route from the site to each disposal facility was selected to minimize potential impacts to the community. The main truck entrance and exit from the site will be through the gate located on International Boulevard. Selected truck routes are described further below.

3.1.1 Altamont Landfill

The anticipated transportation route for transport vehicles from the site to the Altamont Landfill is shown on Figure 3. The part of the route from the site to I-880 requires the most planning in order to minimize potential impacts to the community. From the site, trucks will turn right onto International Boulevard and continue east to Hegenberger Road where they will take another right. Hegenberger Road will take the trucks to I-880 South, the point where they will travel on freeways until they exit at North Flynn Road on route to the Altamont Landfill.

3.1.2 Kettleman Hills Facility

The anticipated transportation route for transport vehicles from the site to the Kettleman Hills Facility is shown on Figure 4. This route follows the same roads from the site to I-880 South as the Altamont Landfill route described above in Section 3.1.1. I-880 will take the trucks to I-580 East, and eventually to I-5 South. The trucks will exit I-5 to take Highway 41 South where they will turn right onto Old Skyline Road to reach the Kettleman Hills Facility.

3.1.3 Arlington Facility

The anticipated transportation route for transport vehicles from the site to the Chemical Waste Management of the Northwest facility in Arlington, Oregon is depicted on Figure 5. From the site, trucks will turn left on International Boulevard and continue west until they turn left on 42nd

Street. 42nd Street will take the trucks to I-880 North, the point where the trucks will travel on interstate freeways until merging onto U.S. Highway 97 in Weed, California. From that point trucks will travel on U.S. and Oregon Highways until turning left onto Cedar Springs Lane to reach Waste Management's facility in Arlington, Oregon.

3.2 Site Access and Controls

Transport vehicles will enter and exit the site through the gate on International Boulevard at the northeast side of the site (Figure 2). Trucks entering the site will be directed to the designated staging area and inspected to ensure compliance with site rules and regulations and suitability for waste transport. If the waste to be transported requires the truck to be lined, liners will be placed in the trucks at this location, if not pre-lined. Trucks that are not suitable for transport will be rejected and will leave the site through the International Boulevard gate. From the staging area, trucks will be directed to the designated loading area as directed by onsite personnel, where they will proceed through loading and tarping/covering. Front end loaders and/or excavators will be used to transfer stockpiled materials into the beds of the transport vehicles. Manifest/documentation will be completed as needed, per Section 4 below, prior to releasing the vehicle to exit.

3.3 Traffic Control

A flag person will be present at the International Boulevard gate as needed to control traffic flow intermittently during heavy equipment arrivals and departures. All traffic control activities will be conducted in accordance with City of Oakland and California Department of Transportation (Caltrans) Work Area Traffic Control Handbook (WATCH Manual) requirements, as appropriate.

3.4 Waste Transporter Truck Schedules and Frequencies

The project is anticipated to result in a maximum of 5 waste transport vehicles leaving the site per workday. The total number of truck trips is estimated to be approximately 55 based upon an estimated quantity of up to 800 CY of waste material.

Waste hauling from the site will be limited to between the hours of 8:00 AM and 4:00 PM, Monday through Friday.

3.5 Waste Transporters – Usage

The transportation contractor selected for the project will ensure compliance with all Department of Transportation, local, and other applicable rules and regulations governing transportation of waste materials. Drivers of waste transport vehicles will be provided with this Plan and shall review the acceptable haul routes.

The transportation contractor will provide end dump trailers and/or semi-tractor trailer trucks with roll-off bins, both with capacities of approximately 24 tons, and/or vacuum trucks to transport the material to the disposal and recycling facilities. The end dumps and trucks with bins will be equipped with cover tarps and plastic sheeting liners, or equivalent, and sealed tailgates. The vacuum trucks are completely enclosed vehicles once loaded.

3.6 Spill/Emergency Response Vendors

Standby services of a street sweeping company may be setup during the project to provide prompt response to accumulation of debris in the locality of the site, as needed.

In the event of a spill from a waste transport vehicle in route to a disposal facility, the driver of the vehicle involved in the spill will contact the waste hauler's dispatcher, who will send their own spill response equipment as well as notify local police and fire departments. It is expected that local police highway patrol/fire departments will be the first to respond to an incident and isolate the area of the spill. The fire/police departments may opt to call their own contractor to clean up the spill in the event that the waste hauler cannot provide a timely response. Each waste hauler will be required to provide a contingency plan and be prepared for emergency situations (e.g., vehicle breakdown, accident, waste spill, waste leak, fire, explosions) during transportation of waste from the site to the designated disposal facilities.

Prior to transportation activities, a kick-off meeting will be held with the appropriate parties to discuss this Plan.

4. SHIPPING DOCUMENTAION AND RECORD KEEPING

Waste will be profiled prior to transporting offsite in coordination with the selected disposal facility. Manifests will be provided by the disposal facility, signed by a GE representative, and finally signed by the truck driver prior to leaving the site with a load of waste. A copy of the appropriate shipping/manifest documentation for each truckload will be maintained onsite until completion of waste transportation operations. The disposal facility will mail a completed, signed copy of the manifest back to the generator (GE). Manifests for disposal of non-RCRA hazardous waste will, at a minimum, include the following information:

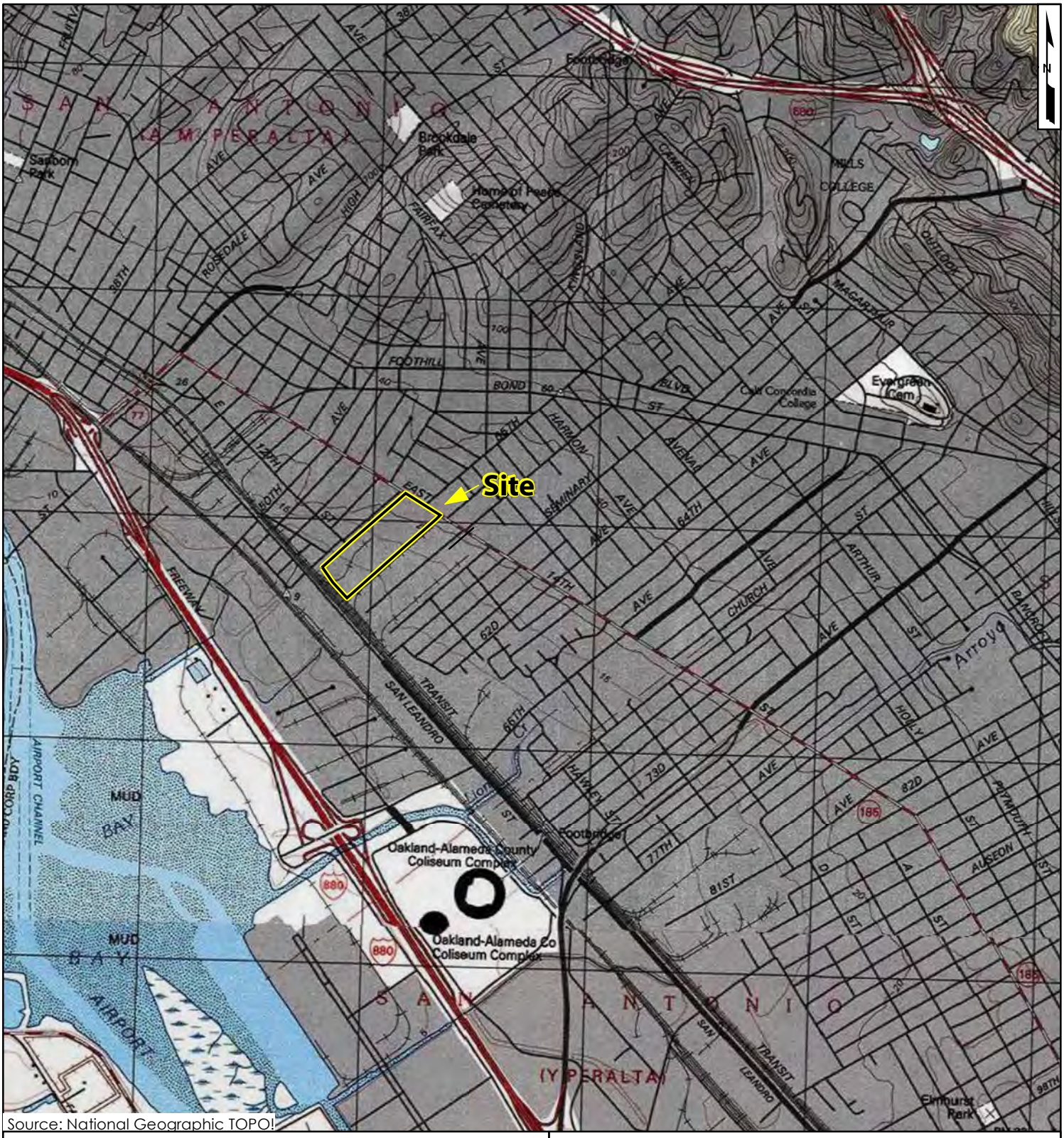
- Name and address of Waste Generator;
- Generator ID number;
- Name and ID number of Waste Transporter;
- Name, address, and ID number of Disposal/Recycling Facility;
- Description of the waste; and
- Quantity of waste shipped.

Manifests for disposal of RCRA/TSCA hazardous waste will include all information required by the United States Environmental Protection Agency (EPA) and the Department of Toxic Substances Control (DTSC). The driver will be responsible for handing the appropriate documentation to the disposal facility for signature and processing by the disposal facility.

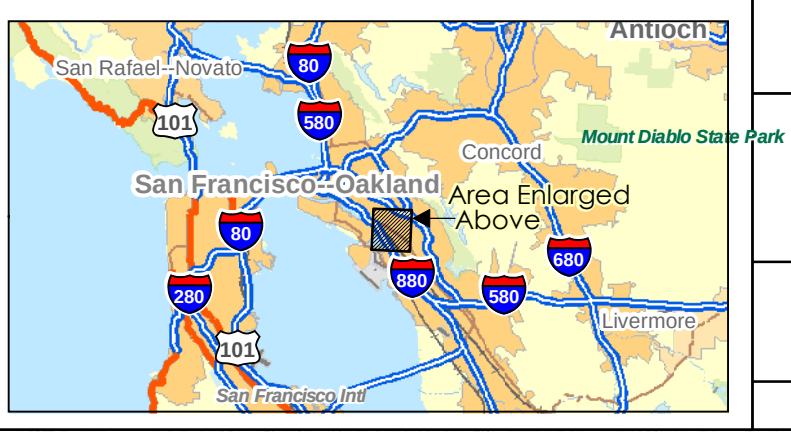
5. REFERENCES

Geosyntec, 2011. *Remedial Design and Implementation Plan*. Prepared for General Electric Company, October.

FIGURES



Source: National Geographic TOPO!



2,000 1,000 0 2,000 Feet

Site Location

5441 International Boulevard
Oakland, California

Geosyntec consultants

San Diego | Marm`cp 2011

Figure 1

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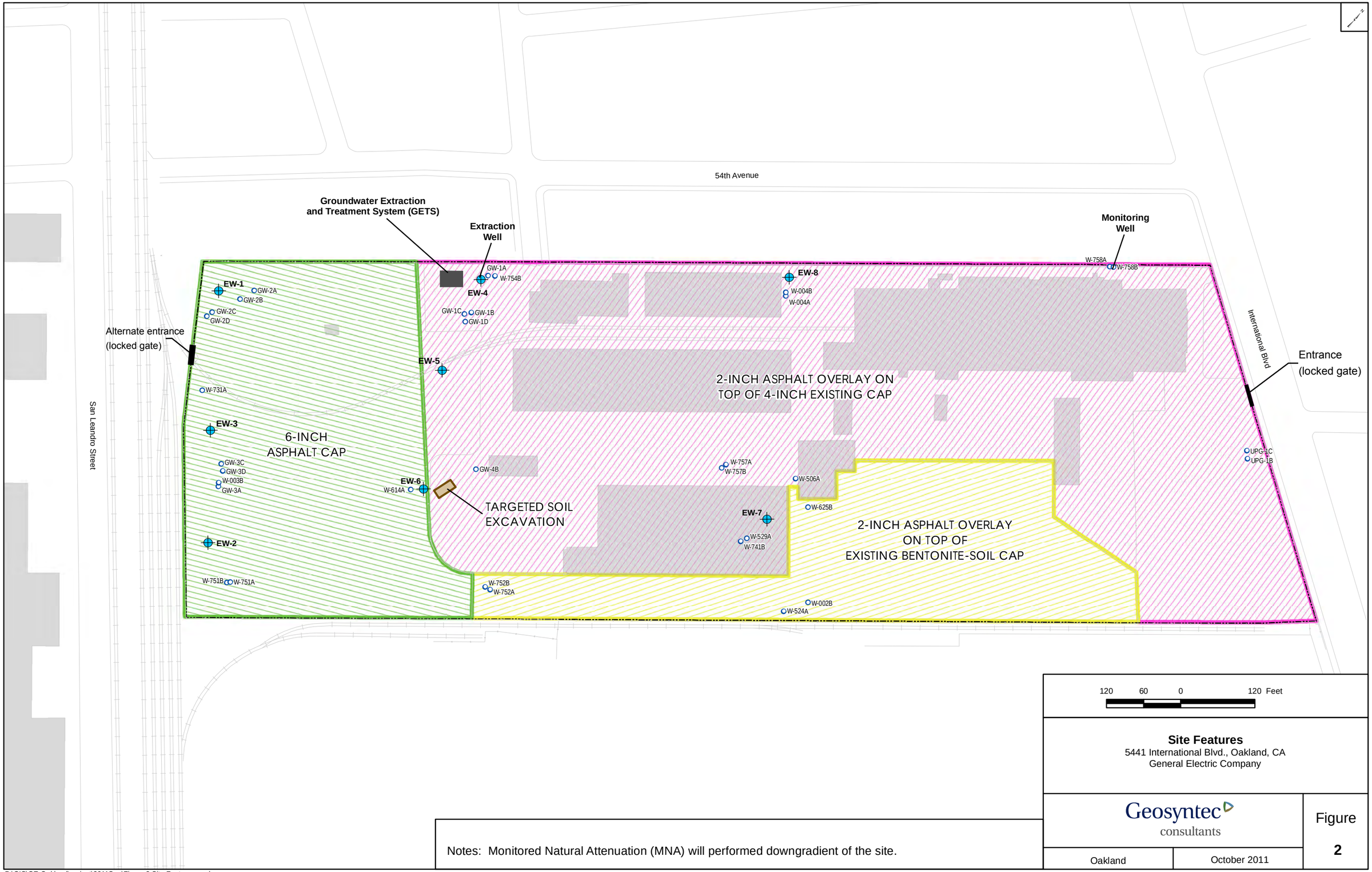


Notes: Monitored Natural Attenuation (MNA) will performed downgradient of the site.

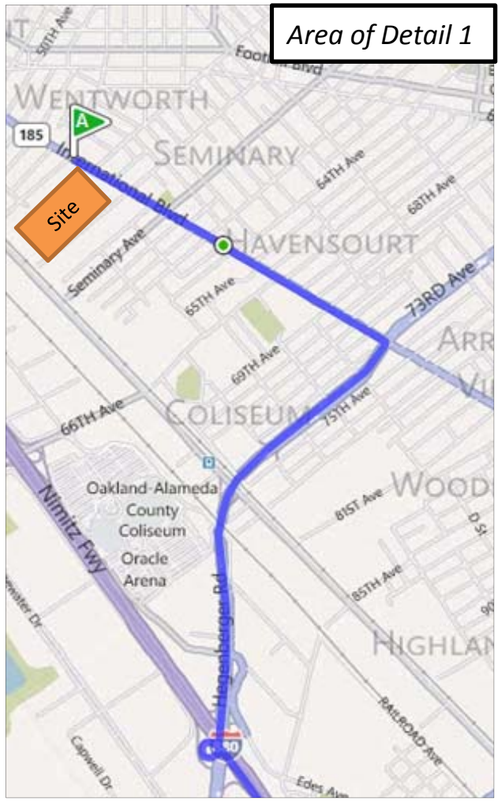
Site Features
5441 International Blvd., Oakland, CA
General Electric Company

Geosyntec consultants

Oakland | October 2011

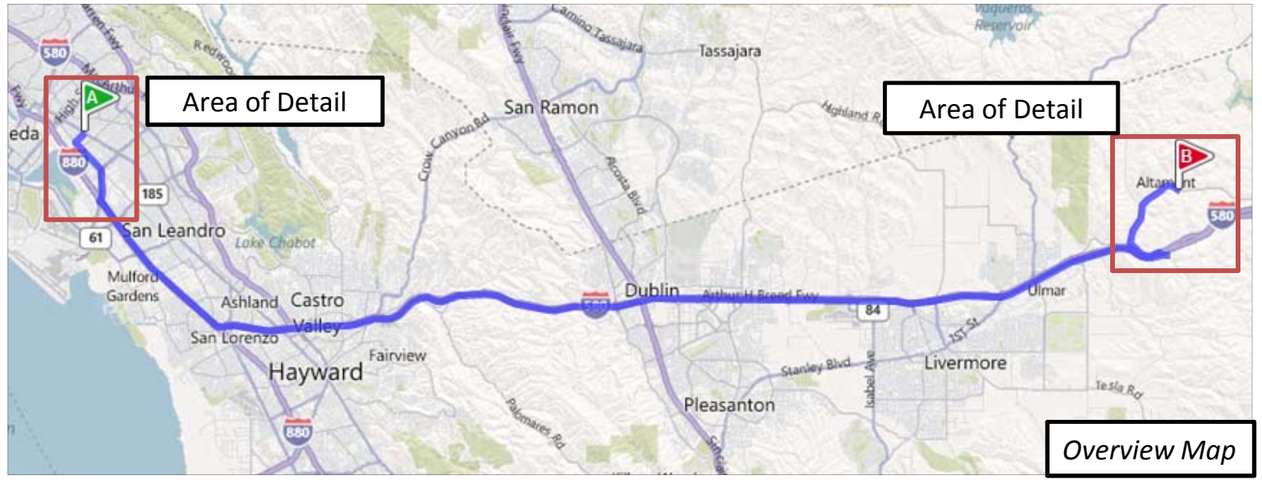
Figure **2**

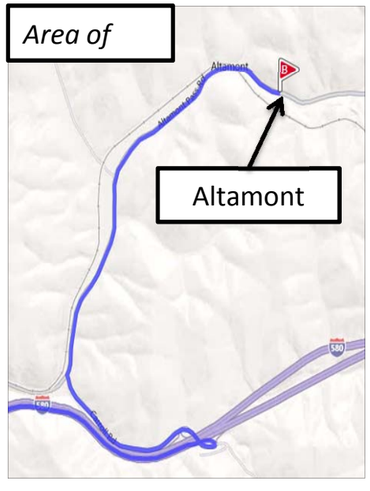
P:\GIS\GE-Oakland\project\2011Sep\Figure 2 Site Features.mxd



Directions to Altamont Landfill from the Site

1. Turn right onto CA-185 / International Blvd from International Blvd Gate
2. Turn right onto Hegenberger Rd
3. Take ramp right for I-880 South toward San Jose
4. At exit 31, take ramp right for I-238 toward Fresno / Stockton / Castro Valley
5. Keep straight onto I-580 East / Arthur H Breed Fwy
6. At exit 59, take ramp right and follow signs for North Flynn Road
7. Turn right onto N Flynn Rd
8. Road name changes to Carroll Rd
9. Turn right onto Altamont Pass Rd
10. Arrive at **Altamont Landfill (**10840 Altamont Pass Rd, Livermore, CA)





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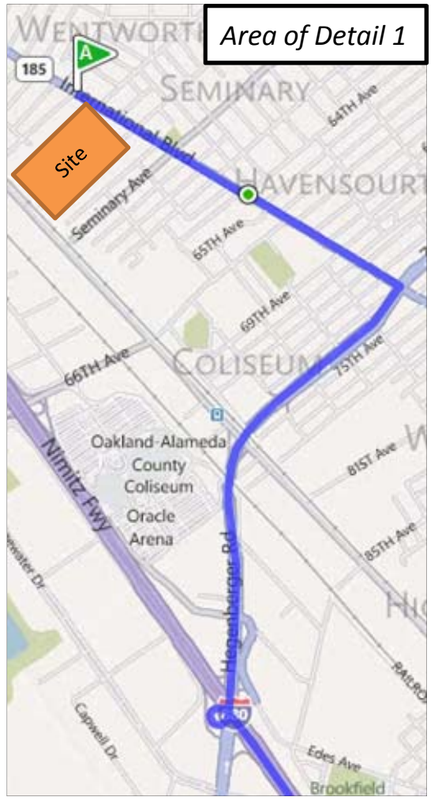
Soure: Microsoft Bing Maps, www.bing.com/maps (2011)

Haul Routes to Altamont Landfill
General Electric Company
5441 International Blvd., Oakland, CA

Geosyntec consultants

Oakland | October 2011

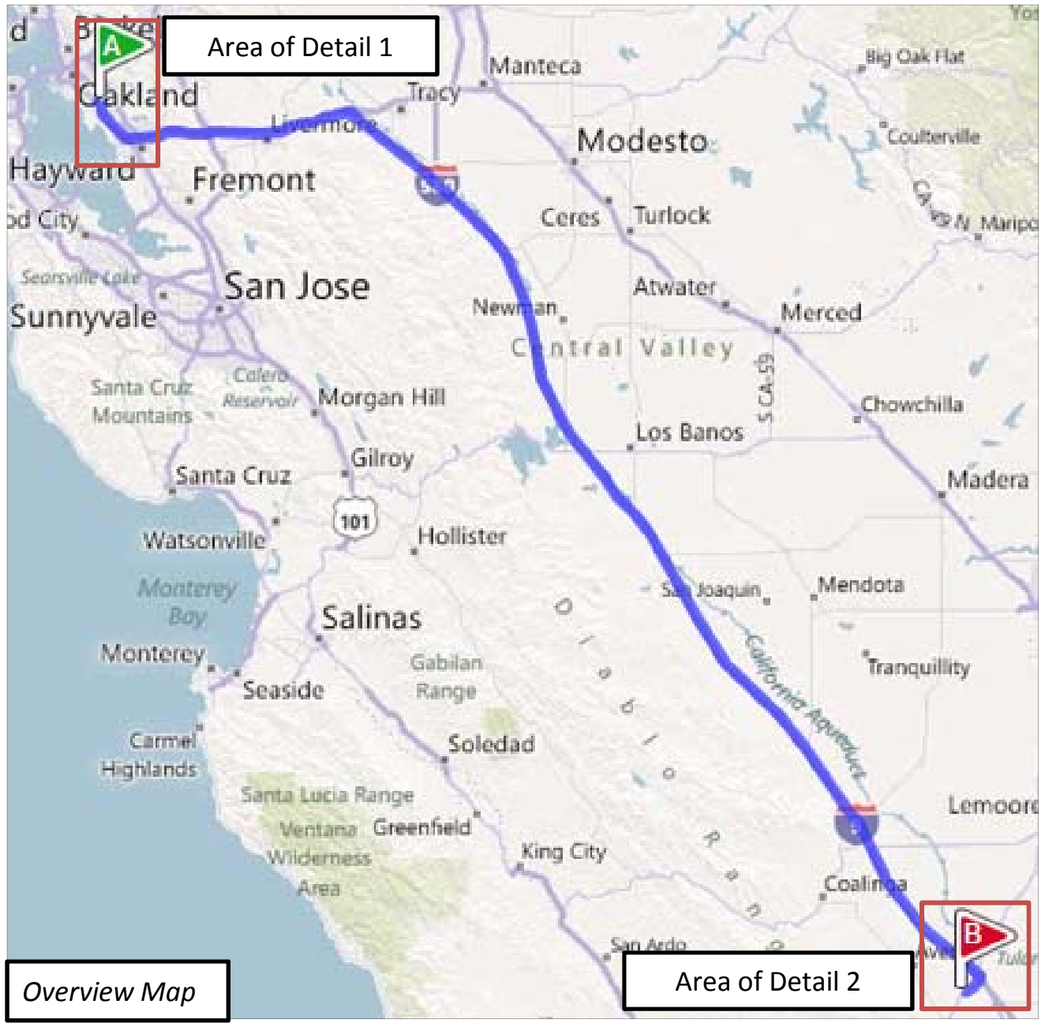
Figure **3**

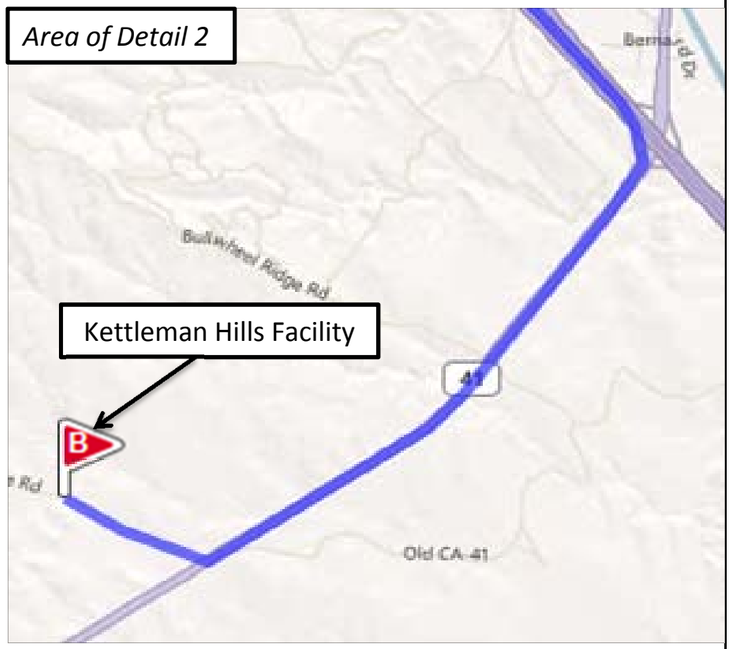


Directions to the Kettleman Hills Facility from the Site

1. Turn right onto CA-185 / International Blvd from International Blvd Gate
2. Turn right onto Hegenberger Rd.
3. Take ramp right for I-880 South toward San Jose
4. At exit 31, take ramp right for I-238 toward Fresno / Stockton / Castro Valley
5. Keep straight onto I-580 East / Arthur H Breed Fwy
6. Keep straight onto I-5 South
7. At exit 309, take ramp right for CA-41 toward Paso Robles / Kettleman City
8. Turn right onto CA-41 South
9. Bear right onto Old Skyline Rd
10. Arrive at **Kettleman Hills Facility** (35251 Old Skyline Rd, Avenal, CA 93204)

N





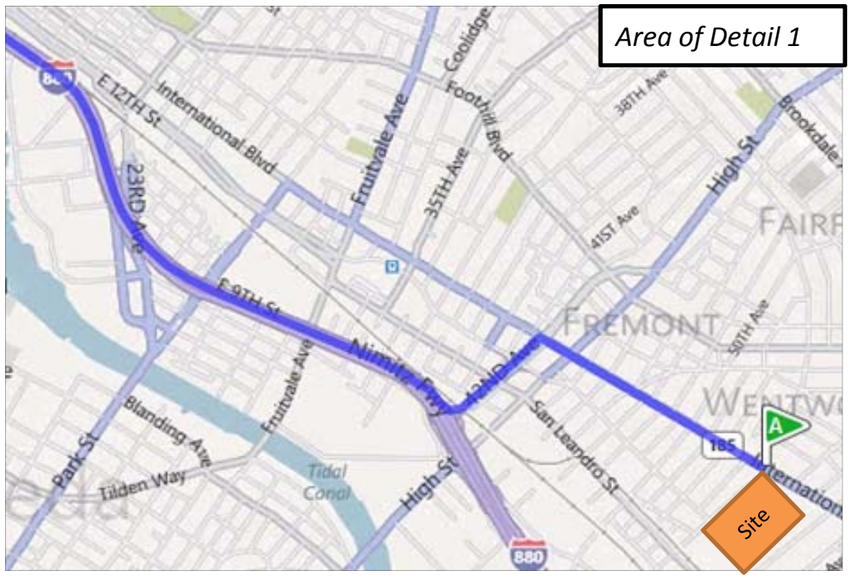
Soure: Microsoft Bing Maps, www.bing.com/maps (2011)

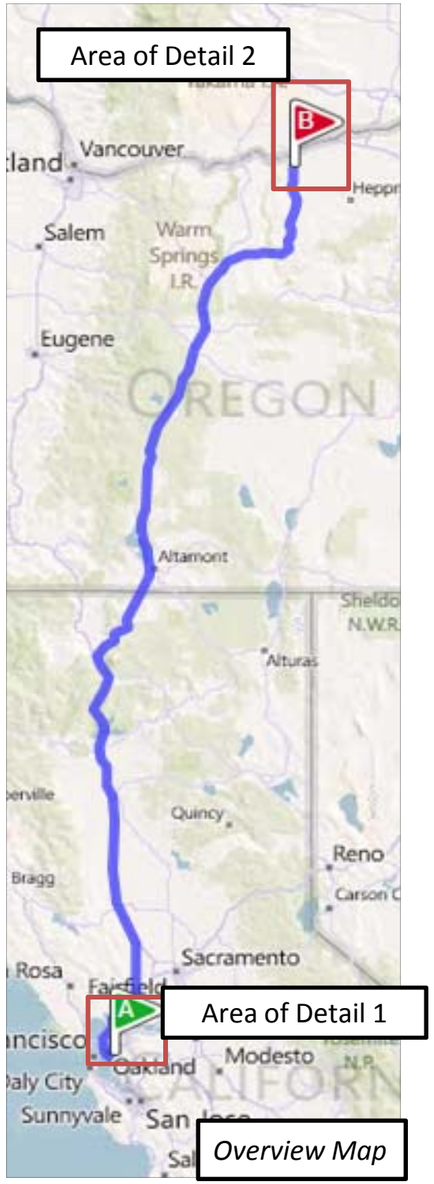
Haul Routes to Kettleman Hills Facility
General Electric Company
5441 International Blvd., Oakland, CA

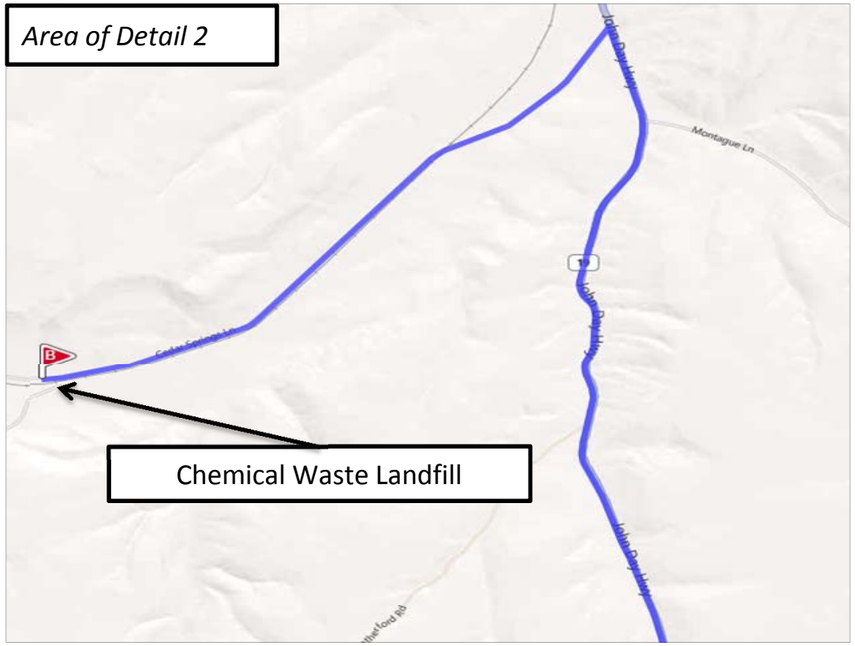
Geosyntec consultants

Oakland | October 2011

Figure **4**







Directions to the Chemical Waste Landfill from the Site

1. Turn left onto CA-185 / International Blvd from International Blvd Gate
2. Turn left onto CA-77 South / 42ND Ave
3. Take ramp for I-880 North / Nimitz Fwy toward Downtown
4. Keep right onto I-980 East
5. Take ramp right for I-580 West toward San Francisco
6. Keep straight onto I-80 East / I-580 West
7. Keep left onto I-80 East / Eastshore Fwy
8. At exit 56, take ramp right for I-505 North toward Redding / Winters
9. Keep straight onto I-5 North
10. At exit 747, take ramp right toward Klamath Falls / Central Weed
11. Turn right onto I-5 / S Weed Blvd
12. Bear right onto US-97 / Volcanic Legacy Scenic Byway
13. Keep straight onto US-26 / US-97 / The Dalles-California Hwy
14. Turn right onto US-97 / NE 5TH St
15. Bear right onto Or-293 / Antelope Hwy
16. Bear right onto Or-218 / Shaniko-Fossil Hwy
17. Turn left onto Or-19 / John Day Hwy
18. Bear left onto Or-19 / Or-206 / John Day Hwy / S Main St
19. Turn right onto Or-19 / John Day Hwy / E Walnut St
20. Turn left onto Cedar Springs Ln
21. Arrive at **Chemical Waste Management of the Northwest** (18177 Cedar Springs Ln, Arlington, OR)

N

Soure: Microsoft Bing Maps, www.bing.com/maps (2011)

Haul Routes to Arlington Facility
General Electric Company
5441 International Blvd., Oakland, CA

Geosyntec consultants

Oakland | October 2011

Figure **5**

APPENDIX I

DECONTAMINATION PLAN

5441 International Boulevard
Oakland, California

Draft Final - October 2019

(EKI B70123.01)

APPENDIX I
DECONTAMINATION PLAN

5441 International Boulevard
Oakland, California

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1. INTRODUCTION

EKI Environment & Water, Inc. ("EKI") has prepared this Decontamination Plan on behalf of Bridge Acquisition, LLC ("Bridge" or "Developer") for the property located at 5441 International Boulevard, Oakland, California ("site"). This Decontamination Plan describes the general decontamination procedures that will be employed by Bridge's contractor ("Contractor") during demolition, remediation, and soil handling activities conducted during the planned site redevelopment, which are described in the main text of the Remedial Design Implementation Plan ("RDIP") Addendum, to which this plan is an Appendix. This Decontamination Plan will also apply to redevelopment construction activities in uncapped areas of the property which involve contact with the soil using non-disposable equipment. Contractor can reduce or eliminate decontamination procedures during redevelopment construction if contact to native site soil is prevented via placement of a temporary cap in work areas before the permanent cap is constructed, subject to approval by EKI on a case-by-case basis.

The Contractor will be required to prepare an addendum to this Decontamination Plan if the Contractor proposes deviations from procedures specified in this Plan. The Contractor will implement the procedures documented in this Decontamination Plan as well as the Contractor's addendum to this Plan. EKI and Bridge will oversee Contractor implementation of this plan and the Contractor's addendum to this Plan.

1.1 Purpose and Objectives

The Decontamination Plan describes the general decontamination procedures and protocols to minimize potential health, safety, and environmental risks from equipment or demolition debris that has been in contact with contaminated soil or groundwater as it leaves the active work area and before it is removed from the site. The procedures contained in this Decontamination Plan apply to equipment used on-site during excavation and grading activities, including the exterior of trucks prior to hauling waste off-site.

The Contractor will prepare a site-specific health and safety plan ("HASP"), which will address personnel decontamination procedures.

2. DECONTAMINATION PROCEDURES

2.1 General

Decontamination work will be conducted, at a minimum, in accordance with the methodologies provided in this Decontamination Plan. Decontamination personnel will be equipped with personnel protective equipment ("PPE") in accordance with the Contractor's HASP. PPE will minimally consist of safety footwear, eye protection, and a hard hat. The need to upgrade PPE will be in accordance with the Contractor's HASP.

All field equipment used on-site will be decontaminated by the Contractor prior to transporting the equipment off-site. Trucks and equipment leaving the site will be inspected for signs of visible contamination. Tracking of sediment by wheels and tires will be minimized to the extent possible. Truck and equipment decontamination will occur within an area designated by the Contractor and a decontamination pad will be installed at the site. Decontamination will include removal of soil or mud (anything larger than approximately ½-inch in diameter).

Compressed air will not be used for decontamination or cleaning of any equipment.

Decontamination of sampling equipment will occur prior to and after each use of a piece of equipment to reduce the potential for cross-contamination of samples. Cleaned small equipment will be stored in plastic bags. Decontamination will initially be accomplished by brushing sampling equipment, as needed, and wiping sample-contact surfaces using disposable paper towels if significant amounts of soil are attached to the sampling equipment. Equipment decontamination will be then accomplished by either (1) a Liquinox (or equivalent non-phosphate containing detergent) solution in water or (2) a steam cleaner. After washing, the equipment shall be rinsed first with clean water, then with distilled water, prior to initial use and between each subsequent use.

2.2 Dry Decontamination

Decontamination will occur within an area designated by the Contractor. Trucks and equipment leaving the site will be decontaminated using brooms, brushes, shovels, plastic scrapers, or PM10-filter bag-equipped industrial vacuum cleaners. Loose dirt will be scraped, swept, or vacuumed off truck tires, mud flaps, fenders, and other accessible exterior areas. Dry decontamination methods may be appropriate during excavation above the water table and during non-rainy periods.

2.3 Wet Decontamination

Wet decontamination methods may be used if an inspector or decontamination technician determines that dry methods result in incomplete removal of dirt. Wet decontamination methods may be required for equipment that traverses an excavation area before the excavation is completed and backfilled or is going to start handling clean soil or import fill after handling potentially impacted soil.

Mops or brushes and soapy water will be the preferred wet decontamination tools. If a mop is not practicable because of the time required for cleaning, pressure washers or spray hoses with high pressure nozzles will be used to remove surface material from trucks during wet decontamination. Pressure washers will be limited to 3,200 pounds per square inch maximum pressure. If needed, any detergent additives will consist of non-phosphate detergents. Pressure washer operators will be instructed not to spray their wands into the truck beds where the spray might impact bed liners. If pressure

washers are used, screens will be set up within the decontamination pad to capture overspray and backsplash from the pressure washing.

3. DECONTAMINATION PAD AND ACCESS ROAD

3.1 Access Road

If needed based on site surface conditions during excavation activities, the Contractor will construct a temporary access road of gravel or crushed rock between the main excavation areas where trucks will be loaded, the decontamination pad, and the site exit for the trucks to provide access for the trucks in all weather conditions while keeping the trucks as clean as practicable. If the access road is constructed with clean import fill and is at least four inches thick, it can be considered a temporary cap.

3.2 Decontamination Pad

The Contractor will construct an in-place decontamination pad or install a mobile decontamination pad where trucks, equipment, and demolition debris can be decontaminated prior to exiting the site. If multiple exits for the site are created, an in-place decontamination pad will be constructed for each exit. The decontamination pad will be lined to contain liquids and used to remove potentially contaminated soil and debris from vehicles and equipment. The decontamination pad will collect soil and rinse or wash water, which will be stored in containers with proper secondary containment. The decontamination pad will be constructed large enough to accommodate the largest piece of equipment used on-site. If needed, sump pumps or an equivalent liquid transfer system will be utilized to transfer wash water from the pad into 55-gallon drums or other appropriate containers. The decontamination pad will be inspected and maintained on a daily basis or more frequently as determined necessary during the work.

3.3 Decontamination Pad and Access Road Decommissioning

At the conclusion of soil handling activities and after the site is capped, the decontamination area and access road (if installed) will be decommissioned by removing all of their components. Potentially contaminated decontamination pad materials and debris will be collected and placed in transport vehicles and sent to an appropriate off-site disposal facility as part of the final off-site load. Access road materials, soil, and sediment can be reused and placed below the permanent cap.

4. WASTE CHARACTERIZATION AND DISPOSAL

Soil collected as part of decontamination during remediation excavation activities will be containerized in 55-gallon drums or returned to stockpiles for characterization and disposal. The remediation decontamination waste will be transported with other excavated soil to an appropriate off-site disposal facility as discussed in the

Transportation Plan Addendum (Appendix H of the RDIP Addendum). Soil and sediment decontamination waste generated during other phases of redevelopment can be reused on-site and placed beneath the permanent cap.

If generated, wash and rinse water collected from the decontamination pad will be periodically removed and stored in a 55-gallon drum or storage tank, pending waste characterization and appropriate off-site disposal in accordance with the Transportation Plan Addendum (Appendix H of the RDIP Addendum). If feasible based on water quality and other considerations, waste water may be treated onsite and discharged under the appropriate permit to either the East Bay Municipal District ("EBMUD") sanitary sewer or the City of Oakland's storm drain system.

APPENDIX J

DUST CONTROL PLAN

5441 International Boulevard
Oakland, California

Draft Final - August 2019

(EKI B70123.01)

APPENDIX J
DUST CONTROL PLAN

5441 International Boulevard
Oakland, California

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1. INTRODUCTION

EKI Environment & Water, Inc. ("EKI") has prepared this Dust Control Plan on behalf of Bridge Acquisition, LLC ("Bridge" or "Developer") for the property located at 5441 International Boulevard, Oakland, California ("site"). This plan describes the general dust control procedures and contingency measures for dust, odors, and vapors that will be employed by Bridge's contractor ("Contractor") during demolition, remediation, and soil handling activities conducted during the planned site redevelopment, which are described in the main text of the Remedial Design Implementation Plan ("RDIP") Addendum, to which this plan is an Appendix. Prior to the start of construction activities, nearby residents will be notified of the remediation work to be conducted and its purpose; see Section 3.1.5 of the RDIP Addendum for additional details.

This Dust Control Plan will also apply to redevelopment construction activities conducted when the site is uncapped. Contractor can reduce or eliminate dust control activities during redevelopment construction if contact with site soil is prevented via placement of a temporary cap in work areas before the permanent cap is constructed, subject to approval by EKI on a case-by-case basis.

The Contractor will be required to prepare an addendum to this Dust Control Plan if the Contractor proposes deviations from procedures specified in this Plan. The Contractor will implement the procedures documented in this Dust Control Plan as well as the Contractor's addendum to this Plan. EKI and Bridge will verify that the Contractor implements this Dust Control Plan and the Contractor's addendum to this Plan.

1.1 Regulatory Status

Remedial and redevelopment activities at the site are being conducted by Bridge with oversight from the California Environmental Protection Agency Department of Toxic Substances Control ("DTSC") and United States Environmental Protection Agency ("EPA"). In compliance with the Bay Area Air Quality Management District ("BAAQMD") regulations and the California Code of Regulations ("CCR"), work activities will be completed in accordance with the airborne Action Levels presented in the Perimeter Air Monitoring Plan ("AMP") (Appendix K of the RDIP Addendum).

1.2 Air Monitoring

Field staff will implement the AMP for Bridge during demolition and soil handling and redevelopment activities while the site's ground surface is not capped conducted by the Contractor. These activities will be completed in accordance with the airborne Action Levels presented in the AMP (Appendix K of the RDIP Addendum). In accordance with the AMP, real-time data will be collected at perimeter air monitoring stations to assess if airborne Action Levels are being met during the work.

The Contractor will prepare and implement a site-specific health and safety plan ("HASP") to address health and safety and personal air monitoring for on-site personnel.

2. DUST CONTROL PROCEDURES

Construction activities such as demolition, excavation, backfilling, grading operations, concrete crushing, stockpiling soil, and construction vehicle traffic and wind flowing over disturbed soil may generate dust when the exposed soil surfaces are dry.

Potential dust mitigation measures presented in Tables 8-2 and 8-3 of the Bay Area Air Quality Management District's ("BAAQMD's") CEQA Guidelines (May 2017) and the South Coast Air Quality Management District's ("SCAQMD") Rule 1466 ("Control of Particulate Emissions from Soils with Toxic Air Contaminants")[1] were reviewed to identify and develop dust control measures that will be implemented during demolition, soil handling, and redevelopment activities at the site while the ground surface is not capped. Potable water may be used as dust control water. If feasible based on water quality and other considerations, extracted treated groundwater or treated storm water may also be used as dust control water.

The Contractor will employ the following dust control measures throughout the project:

- Dust-generating activities (e.g., demolition of existing structures and soil excavation) in areas where polychlorinated biphenyls ("PCBs") are known to be present at concentrations greater than 1,000 milligrams per kilograms ("mg/kg") will be performed within an enclosure that is (a) vented to air pollution control equipment (i.e., particulate air filters) and (b) the excavated/demolished materials will be directly loaded into bins that can be sealed. Consistent with Section (k)(2) of SCAQMD Rule 1466, when enclosures vented to air pollution control equipment are used to mitigate the release of PM10 dust, real-time PM10 monitoring is not required.
- Fencing that is a minimum of 6 feet tall and equipped with a windscreen (with a porosity of 50 ± 5%) will be installed around the site. If feasible based on wind conditions, strategically placed vertical dust screens/fences made of geotextile fabric may also be used to control dust, particularly when intensive soil handling will be occurring and/or when work near the property boundary is conducted.
- An approximately 16-foot tall privacy fence will be installed as a noise/dust barrier along the northern boundary of the site with adjoining residences.

[1] The BAAQMD does not have a Regulation or Rule that addresses particulate emissions from soil with toxic air contaminants.

- If appropriate, and subject to approval by EKI, Contractor may construct a temporary cap (see below) or access road(s) in problem areas to reduce other dust control measures.
- A stabilized construction entrance/exit will be constructed, or steel plates will be installed and used for any unpaved access way to the site.
- Water will be misted or lightly sprayed, as needed, using a watering truck and/or hoses and misting towers to prevent formation of dust while demolishing buildings, concrete floors and foundations, excavating soil, transferring or reworking soil on-site, crushing concrete, and loading or decontaminating transportation vehicles.
- If needed, exposed soil outside of work areas can be temporarily capped by spraying with a non-toxic chemical dust suppressant (e.g., Gorilla-Snot® or equivalent), stabilizer (e.g., Soiltac® or equivalent), or soil binder (e.g. HydroSeal). Exposed non-stabilized soil surfaces will be wetted a minimum of two times per day during working hours using a watering truck and/or hoses and misting towers.
- Exposed soil in work areas that is not being actively excavated will be covered with weighted plastic sheeting or tarps, and/or sprayed with a non-toxic chemical soil binder such as HydroSeal or equivalent or dust suppressant (e.g., Gorilla-Snot® or equivalent).
- Excavation activities will be controlled to minimize generation of dust.
- Drop heights will be kept to a minimum while loading transport vehicles.
- All stockpiles will be inspected daily.
- All stockpiles that are not being actively handled will be covered with weighted plastic sheeting or tarps, and/or sprayed with a non-toxic chemical soil binder such as HydroSeal or equivalent or dust suppressant (e.g., Gorilla-Snot® or equivalent).
- Soil on the exterior of trucks, trailers, and tires will be removed from the vehicle using dry decontamination methods before the vehicle leaves the site.
- Vehicle speeds will be limited to 15 miles per hour at the site.
- During on-site transport, a minimum distance of 6-inches will be maintained between the soil and top of the truck bed.
- Trucks and transport vehicles will be covered when hauling soil or other loose material off-site, or, if clean import fill is being transported, at least 2 feet of freeboard will be maintained at all times.

- Daily sweeping with brooms or a street sweeper will be conducted if visible soil is observed on paved on-site access routes or parking areas.

- Daily, or more frequently if necessary, sweeping with a wet power vacuum street sweeper will be conducted if visible soil material is carried onto public streets.

- Soil collected from sweeping will be containerized, characterized, and disposed of off-site if collected during remediation activities, or reused on-site if generated during other phases of redevelopment.

- In the event that (1) wind speeds[2] exceed 15 miles per hour (averaged over a 15-minute period), (2) instantaneous wind speeds exceed 25 miles per hour, or (3) dust control measures are not able to prevent visible dust emissions or exceedances of dust action levels, soil-moving activities will be halted until wind speeds decrease and no visible emissions are observed.

Publicly visible signs will be posted along International Boulevard informing people how to contact a site representative, DTSC, or the BAAQMD about potential issues related to dust emissions from the site. The name and telephone number for the appropriate contact persons with these organizations will be included on the sign.

3. CONTINGENCY MEASURES FOR DUST CONTROL

The Action Levels at the site perimeter for implementation of contingency dust control measures are developed in the AMP (Appendix K of the RDIP Addendum) and are presented along with the associated rationale and basis therein. The Action Levels are summarized below for quick reference. Field staff implementing the AMP will notify the Contractor if these dust Action Levels are exceeded at the site perimeter.

Dust Action Levels and Contractor Response

Fugitive Dust

- If visible fugitive dust is observed at or beyond the site perimeter during activities that generate dust, the Contractor will increase its dust suppression efforts by implementing the additional dust control measures described herein to reduce dust levels.

PM10 (600 mg/kg < PCBs ≤ 1,000 mg/kg)

- If the 5-minute TWA PM10 Trigger Level of 0.030 mg/m^3 is exceeded at any of

[2] Meteorological monitoring is described in the Perimeter Air Monitoring Plan (see Appendix K of the RDIP Addendum).

the PAM stations,[3] the Contractor will increase dust suppression efforts by implementing additional dust control measures to reduce dust levels.

- If the 30-minute TWA PM10 Suspend Work Level (i.e., 0.030 mg/m^3) is exceeded at any of the PAM stations (see footnote 3), the Contractor will temporarily suspend dust-generation activities to re-assess site activities and implement additional dust control measures.

PM10 (50 mg/kg ≤ PCBs ≤ 600 mg/kg)

- If the 5-minute TWA PM10 Trigger Level of 0.050 mg/m^3 is exceeded at any of the PAM stations (see footnote 3), the Contractor will increase dust suppression efforts by implementing additional dust control measures to reduce dust levels.

- If the 30-minute TWA PM10 Suspend Work Level (i.e., 0.050 mg/m^3) is exceeded at any of the PAM stations (see footnote 3), the Contractor will temporarily suspend dust-generation activities to re-assess site activities and implement additional dust control measures.

PM10 (PCBs < 50 mg/kg)

- If a 5-minute TWA PM10 concentration of 0.11 mg/m^3 or greater is observed at any of the PAM stations,[4] the Contractor will increase dust suppression efforts by implementing additional dust control measures to reduce dust levels.

- If the 30-minute TWA PM10 Suspend Work Level (i.e., 0.11 mg/m^3) is exceeded at any of the PAM stations (see footnote 4), the Contractor will temporarily suspend dust-generation activities to re-assess site activities and implement additional dust control measures.

Contractor will be responsible for implementing contingency measures and field staff will be responsible for overseeing that the specified contingency measures are implemented by the Contractor and are adequate to meet airborne Action Levels. Contingency measures will consist of increasing the magnitude and frequency of dust control measures, constructing a temporary cap in problem areas, and/or addition of dust palliative or surfactant to dust control water.

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[3] Background air samples will be collected to evaluate site-specific upwind concentrations of Aroclor 1260 to determine if subtraction of PM10 concentrations (difference between PM10 concentrations measured upwind and the downwind monitoring station(s)) is appropriate.

[4] Subtraction of PM10 concentrations (i.e., the difference between PM10 concentrations measured at upwind and the downwind monitoring station(s)) will be performed if PCB concentrations are below 50 mg/kg.

4. VAPOR AND ODOR CONTROL PROCEDURES

Vapor and odor control techniques that will be implemented by the Contractor to prevent the formation and migration of vapors and odors during remediation excavation at the site will include:

- Potable water, odor suppressant, and vapor suppressant will be misted or sprayed at a frequency that is sufficient to suppress vapors and odors during the work. Odor and vapor suppressant will be Odex and HydroSeal (Kuma Corporation of Grass Valley, CA), RusFoam® (Rusmar, Inc. of West Chester, PA), or other favorably reviewed odor control agent and vapor suppressant foam, subject to approval by EKI.
- HydroSeal, RusFoam, or other favorably reviewed vapor suppressant foam, will be applied to the top surface of odorous soil in truck loads prior to covering and to odorous and vapor emitting excavation surfaces at the end of each work day.
- Contractor will control excavation activities to minimize generation of vapor and odor.
- Drop heights will be kept to a minimum while loading transport vehicles.
- Trucks and transport vehicles leaving the site will be covered when hauling soil, sand, and other loose or odorous material.
- Areas to be excavated will be thoroughly wetted before starting soil excavation and loading activities.
- A sprinkler or misting system will be operated adjacent to active excavation areas and soil loading areas and adjacent to each active piece of soil excavating and soil loading equipment.
- Personnel will be designated to supplement the sprinkler misting vapor and odor control measures with hoses or other watering equipment.
- All stockpiles that are not being actively handled will be covered with weighted plastic sheeting or tarps, and/or sprayed with a non-toxic chemical soil binder such as HydroSeal or equivalent or dust suppressant (e.g., Gorilla-Snot® or equivalent).

5. CONTINGENCY MEASURES FOR ODOR AND VAPOR CONTROL

The Action Levels for potential airborne chemicals of concern ("PCOCs") are developed in the AMP (Appendix K of the RDIP Addendum) and are presented along with the associated rationale and basis therein. The Action Levels for implementation of contingency vapor and odor control measures during hotspot excavation and the required contingency measures for vapor and odor control are summarized below, for quick reference. As discussed above, field staff implementing the AMP will notify the

Contractor if the Action Levels for volatile organic compounds ("VOC") PCOCs from the AMP are exceeded. Contractor will be responsible for implementing the specified contingency measures and field staff will be responsible for overseeing that the specified contingency measures are implemented by the Contractor and are adequate to meet Action Levels.

VOC PCOCs Action Levels and Contractor Response

The main features of the contingency measures while excavating VOC-impacted areas at the site are summarized below.

- If air sampling indicates that Action Levels for VOC PCOCs (see Appendix K of the RDIP Addendum) at the perimeter air monitoring stations during remediation activities are exceeded, the Contractor will temporarily stop work and re-assess activities and dust and vapor control measures until it is demonstrated that airborne Action Levels are achieved by Contractor's upgraded control measures.

Total VOCs Action Levels and Contractor Response:

- If 1 part per million by volume ("ppmv") above background photoionization detector ("PID") measurements are sustained for more than 2 minutes at the perimeter air monitoring stations during excavation at the site, Contractor will increase the magnitude and frequency of vapor control measures until it is demonstrated that PID readings are consistently below 1 ppmv. If PID readings at the perimeter air monitoring stations are still above 1 ppmv after vapor control measures have been increased, Contractor will temporarily halt soil excavation and loading activities and the Contractor's vapor control practices will be reviewed and modified, as appropriate.

Odor Action Levels and Contractor Response:

- If significant odors are observed at the property perimeter by EKI, Contractor will increase the magnitude and frequency of odor control measures (i.e., covering stockpiles, use of odor suppressants (such as Odex, or equivalent) on exposed working areas, or other techniques). If odors are still noted at the property boundary after odor control measures have been increased, Contractor will temporarily halt soil excavation and loading activities and the Contractor's odor control practices will be reviewed and modified, as appropriate.

APPENDIX K

PERIMETER AIR MONITORING PLAN

5441 International Boulevard
Oakland, California

Draft Final - October 2019

(EKI B70123.01)

APPENDIX K
PERIMETER AIR MONITORING PLAN
5441 International Boulevard
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1. INTRODUCTION

This Perimeter Air Monitoring Plan ("AMP") has been prepared by EKI Environment & Water, Inc. ("EKI") on behalf of Bridge Acquisition, LLC ("Bridge" or "Developer") for the property located at 5441 International Boulevard, Oakland, California ("site," see Figure K-1). The site is surrounded by residences and businesses to the north, International Blvd. to the east with residential and commercial properties on the east side of International Blvd., commercial/industrial properties to the south, and San Leandro Street to the west.

This AMP will be implemented during demolition and soil handling activities[1] until the temporary cap is installed at the site,[2] which are described in the main text of the Remedial Design Implementation Plan ("RDIP") Addendum, to which this plan is an Appendix. Demolition and soil handling activities (including excavation of hotspots) will be performed at the site by the contractor ("Contractor") retained by Bridge. Prior to the start of construction activities, residents will be notified of the remediation work to be conducted and its purpose; see Section 3.1.5 of the RDIP Addendum for additional details.

The perimeter air monitoring activities discussed herein, along with other emission control measures described in the Dust Control Plan (Appendix J of the RDIP Addendum), have been developed to limit the potential for exposure of the surrounding community to potential airborne chemicals of concern ("PCOCs") and dust, to evaluate the adequacy of dust control measures, and to determine if contingency measures for dust or vapor and odor need to be implemented by the Contractor during excavation and demolition activities. Personal air monitoring for construction workers is not included in this AMP but will be included in the Contractor's site-specific health and safety plan ("HASP").

PCOCs for the site are identified in Section 2 and airborne Action Levels for PCOCs and dust are developed in Section 3. These Action Levels developed in Section 3 are airborne concentrations that will be used to assess whether additional actions (i.e., control or mitigation measures) are needed during demolition and/or soil handling activities until the temporary cap is installed at the site. The Action Levels developed in Section 3 are based on regulatory ambient air quality standards and regulatory guidance, if available; otherwise, Action Levels are risk-based values. The development of Action Levels is followed by a discussion of the perimeter air monitoring methods

[1] Implementation of the AMP is not required for the destruction/installation of monitoring or extraction wells or for the relocation/reconstruction of the groundwater extraction and treatment system ("GETS") components that do not require soil disturbance, even if the ground surface is not capped.

[2] No cap means (1) that a temporary or the permanent cap at the site has not been installed or (2) that exposed soil has not been sprayed with a non-toxic chemical dust suppressant (e.g., Gorilla-Snot® or equivalent) or with a stabilizer (e.g., Soiltac® or equivalent).

that will be used to monitor airborne concentrations of PCOCs and dust (Section 4) and protocols that will be implemented during excavation activities (Section 5).

2. IDENTIFICATION OF POTENTIAL AIRBORNE CHEMICALS OF CONCERN

PCOCs include chemicals in shallow soil and other materials that may volatilize and migrate into air or become airborne particles during demolition and earthwork activities at the site. This section identifies the PCOCs that will be monitored at the site perimeter during demolition, remediation, soil handling, and redevelopment activities until the temporary cap is installed.

2.1 PCOCs in Soil and Concrete

A brief description of the methodology used to identify PCOCs for the site, which includes compiling available data for solid media (i.e., soil and concrete) at the site and comparing it to published soil screening levels, is provided below.

Available soil data for the site were compiled from the following documents:

(1) Remedial Investigation Report, General Electric Company, 5441 International Boulevard, Oakland, California, prepared by Geomatrix Consultants, and dated April 2002;

(2) 2006 – 2008 Field Investigation Report, General Electric Site, 5441 International Boulevard, Oakland, California, prepared by Geosyntec Consultants, and dated 13 March 2009;

(3) Remedial Action Completion Report – Phase I, General Electric Site, 5441 International Boulevard, Oakland, California, prepared by Geosyntec Consultants, and dated 24 November 2015 ("RACR");

(4) Underground Storage Tank Closure Report, GE Facility at 5441 International Boulevard, Oakland, California, prepared by Geosyntec Consultants, Inc., and dated 2 February 2010;

(5) Five Year Status Report for the Period August 2013 through December 2017, prepared by Wood Environment & Infrastructure, Inc., and dated June 2018; and

(6) Screening level soil sampling conducted by EKI in September 2018 (Appendix C of the RDIP Addendum).

Soil samples removed during targeted excavation activities conducted in September 2013 to remediate soil with concentrations of chlorinated volatile organic compounds ("cVOCs") above 10 mg/kg, which are described in the RACR, were deleted from the soil dataset because they are no longer present at the site. Soil samples include samples

collected up to 15 feet below ground surface ("bgs"), the maximum expected depth of redevelopment soil handling activities in native soil.[3]

Available concrete data for the site were compiled from the following documents:

(1) Draft Phase I Building Assessment Report, prepared by Arcadis, and dated January 2009 (included in Appendix G of the RDIP Addendum); and

(2) Summary Report: Phase 2 Hazardous Materials Survey, prepared by SCA Environmental, Inc., and dated June 2010 (included in Appendix G of the RDIP Addendum).

The concrete data for the site are compiled from GE's Phase II Building Materials Characterization Report, GE Facility, Oakland, California, Geosyntec Consultants, Inc., July 2010 (Geosyntec, 2010b; included as Appendix G of the RDIP Addendum).

The maximum concentrations in the site soil and concrete datasets were compared to Department of Toxic Substances Control ("DTSC") Modified Screening Levels ("DTSC-SLs;" DTSC, 2019b) for residential soil or, consistent with DTSC Note 3 (DTSC, 2019b), to United States Environmental Protection Agency ("EPA") residential Regional Screening Levels ("RSLs;" U.S. EPA, 2019b) when DTSC-SLs were not available.

The following chemicals were detected in soil and/or concrete at concentrations above the applicable screening levels for residential soil and are, therefore, identified as PCOCs (see Table K-1).

- Metals: Arsenic, cobalt, copper, and lead were identified as PCOCs for the site. Air monitoring of these metals is described in Section 4.4.1.

- Volatile Organic Compounds ("VOCs"): 1,2,3-Trichlorobenzene, 1,2,4-trichlorobenzene, naphthalene, trichloroethene ("TCE"), and vinyl chloride were identified as PCOCs for the site. Air monitoring of individual VOCs is described in Section 4.4.2 and of total VOCs is described in Section 4.4.4.2.

- Polychlorinated Biphenyls ("PCBs"): Aroclor 1260 was identified as a PCOC for the site. Air monitoring for PCBs is described in Section 4.4.3.

- Polycyclic Aromatic Hydrocarbons ("PAHs"): Benzo(a)pyrene was identified as a PCOC for the site. However, monitoring is not proposed for this PCOC because it would be difficult to interpret the air data due to confounding factors (the proximity of the site to I-880, San Leandro St., and International Blvd., and the fact that PAHs are byproducts of construction equipment combustion).

[3] Soil import backfill placed in the area of the Phase I targeted cVOC removal will need to be re-worked for geotechnical purposes at depths greater than 15 bgs.

3. ACTION LEVELS AT THE SITE PERIMETER

Action Levels are the airborne dust or PCOC concentrations at which the Contractor is required to implement contingency measures, as described in Section 5.

3.1 Development of Action Levels for PCOCs

The following resources were used to develop Action Levels for PCOCs for this AMP:

1. Bay Area Air Quality Management District ("BAAQMD") and other regulatory limits, if available for a PCOC.

2. Applicable Agency for Toxic Substances and Disease Registry ("ATSDR") Minimal Risk Levels ("MRLs").

3. EPA Region 9 Accelerated Response Action Level for TCE (U.S. EPA, 2014b).

4. Estimated reference concentration ("RfC") for Aroclor 1260, provided by EPA's Toxic Substances Control Act ("TSCA") PCB group (EPA, 2019c).

5. Calculated site-specific non-carcinogenic and carcinogenic risk-based Action Levels for those PCOCs not addressed by Item 1.

These resources listed in Items 1 through 4 are described in more detail in Sections 3.2 through 3.5 below. The methodology for calculating chemical-specific risk-based Action Levels for PCOCs (i.e., Item 5) is presented in Section 3.6. The hierarchy used to select an Action Level for each PCOC is described in Section 3.7. The Action Levels for PM10 are presented in Section 3.8.

3.2 BAAQMD and Other Regulatory Limits

The only PCOC for which there is a Regulatory Limit is lead. The BAAQMD Regulatory Limit for lead is 0.001 milligrams per cubic meter ("mg/m^3"), measured as a 24-hour time weighted average ("TWA") (BAAQMD, 1982).

3.3 Minimal Risk Levels

MRLs for airborne toxicants are guidance values developed by the ATSDR, as mandated by the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"). ATSDR states the following: "An MRL is an estimate of the daily human exposure to a hazardous substance that is likely to be without appreciable risk of adverse non-cancer health effects over a specified duration of exposure." MRLs are set below levels that, based on current information, might cause adverse health effects in

the people most sensitive to such substance-induced effects.[4] MRLs have generally been derived for the following exposure durations:

- Acute (1 to 14 days);
- Intermediate (>14 to 364 days); and
- Chronic (365 days or longer).

The expected duration of demolition, soil handling, and redevelopment activities at the site (i.e., "duration of exposure") until the temporary cap is installed, is approximately 45 weeks[5] (see Table K-2). Considering the project duration, intermediate MRLs are the most appropriate MRLs to assess potential exposure to airborne PCOCs during the project. Available inhalation MRLs for PCOCs are shown in Table K-3.

3.4 Estimated RfC for Aroclor 1260

EPA's TSCA PCB group recommended that a modified RfC for childhood receptors of 0.03 ug/m^3 be used as the daily maximum concentration for Aroclor 1260 at the site during dust generating activities (EPA, 2019c). A RfC value for Aroclor 1260 is not available from EPA or Office of Environmental Health Hazard Assessment ("OEHHA"), but an oral reference dose ("RfDo") is available from the Integrated Risk Information System ("IRIS") for Aroclor 1254 (2E-5 mg/kg-day). EPA used route-to-route extrapolation to estimate the RfC using a generic composite child receptor (i.e., 15 kg body weight and inhalation rate of 10 m^3/day) (see Section 2, Comment 19 in Appendix P of the RDIP Addendum).

3.5 EPA Region 9 Accelerated Response Action Level for TCE

In a 9 July 2014 memorandum, EPA Region 9 recommended that the Superfund program establish interim action levels and response actions to address inhalation exposures to TCE in indoor air that are protective of sensitive and vulnerable populations (U.S. EPA, 2014b). For a residential scenario, EPA recommended an accelerated response Action Level of 0.002 mg/m^3 (see Table K-3).

3.6 Development of Chemical-Specific Risk-Based Action Levels

For PCOCs that do not have BAAQMD-regulatory levels, EPA risk assessment guidance (U.S. EPA, 2019b) and available toxicity data were used to develop chemical-specific risk-based Action Levels for potentially exposed populations, as described below.

[4] https://www.atsdr.cdc.gov/mrls/index.asp

[5] This estimated duration is conservative and will likely be reduced to 36 weeks or less by earlier placement of a temporary cap.

3.6.1 Potentially Exposed Populations

In terms of assessing risk, EPA defines "exposure" as the contact of a human with a chemical (U.S. EPA, 1989). To assess exposure, each group of people that could potentially be exposed to chemicals (the "potentially exposed populations") must be defined.

For the purposes of this AMP, only off-site populations will be considered.[6] Because access to on-site work zones will only be allowed in accordance with project-specific HASPs, the only potentially complete exposure pathway for the off-site populations is inhalation of airborne PCOCs. The two hypothetical receptor populations that exist near the site and that will be evaluated are the following:

- Off-Site Commercial/Industrial Workers: includes hypothetical office and warehouse/industrial workers on the properties in the vicinity of the site. For the purposes of this AMP, Off-Site Commercial/Industrial Workers are assumed to work primarily outdoors. It is expected that off-site exposure levels to airborne contaminants from site would be lower for indoor workers.

- Off-Site Child Resident: includes a hypothetical child who lives in the residential area adjacent to the northern property boundary. EKI conservatively assumed that children would be at their nearby residence each day for the entire work shift. Children are assumed to be the most sensitive off-site, non-worker receptor.

Chemical-specific risk-based Action Levels will not be developed for intermittent visitors because risks to these potential receptors are likely to be less significant than the risk levels for the hypothetical populations listed above.

3.6.2 Exposure Parameters

The assumed exposure parameters for the hypothetical potentially exposed populations is provided in Table K-2. As indicated in Table K-2, these exposure parameters are typically based on available guidance documents by DTSC (2019) and EPA (2019b) or, for project specific parameters such as exposure frequency, based on professional judgment.

[6] It is assumed that the on-site worker population will be adequately protected against potential exposure to PCOCs in air using engineering controls and personal protective equipment ("PPE") in accordance with project-specific HASPs. Based on discussions with the Contractor, no exterior non-excavation/non-demolition activities will be performed while construction activities involving demolition or potentially contaminated soil are being performed or until the temporary cap is installed at the site.

3.6.3 Potential Airborne Action Levels Based on Non-Cancer Health Effects to Potential Off-Site Receptors

Non-carcinogenic health effects encompass potential adverse, chronic human health effects that do not result in the production of tumors, but which include adverse developmental, reproductive, metabolic, and other systemic effects such as organ damage. When chemical doses exceed threshold dose levels for non-carcinogens, the potentially exposed populations may develop symptoms of toxic exposure. Dose levels less than the threshold level are assumed unlikely to produce adverse health effects in exposed individuals, typically over some defined exposure period, i.e., acute, intermediate, or long-term (chronic).

The non-carcinogenic hazard of an individual PCOC through a particular exposure pathway is called the Hazard Quotient ("HQ"). The Hazard Index ("HI") is the sum of all HQs. A total HI less than or equal to one (1) represents an exposure that is unlikely to cause adverse non-cancer health effects, even for sensitive populations (U.S. EPA, 1989).

For the non-carcinogenic PCOCs that do not have BAAQMD-regulatory levels, reference exposure levels ("RELs") and RfCs can be used to calculate potential site-specific risk-based Action Levels for non-carcinogenic health effects.

RELs for airborne toxicants can be used as indicators of concentrations at which potential chronic and acute adverse health effects may occur (OEHHA, 1999; 2000). Acute and chronic RELs are concentration levels at which no adverse health effects are anticipated for given short-term (i.e., 1 to 7 hours) and long-term (i.e., greater than 8 years) exposure periods, respectively. RELs are based on the most sensitive adverse health effect reported in the medical and toxicological literature (OEHHA, 1999; 2000). The OEHHA REL documents include summaries of the supporting human and laboratory animal studies and other background information used to derive the RELs.

The total period of active remedial activities for the site until the temporary cap is installed is anticipated to be 45 weeks[7] (i.e., the exposure period). Even though sub-chronic RELs would be more appropriate for the site, the more conservative chronic RELs were used, where available.

Similar to RELs are RfCs, which are developed by EPA and presented in IRIS. The assumptions used in developing the RfCs are similar to those discussed above for the RELs. Where RELs were not available for PCOCs that do not have BAAQMD-regulatory levels, RfCs were used to calculate potential site-specific risk-based Action Levels (Table K-3).

[7] This estimated duration is conservative and will likely be reduced to 36 weeks or less by earlier placement of a temporary cap.

Consistent with DTSC guidance (2019d), if chronic RELs or RfCs were not available, the RfDo was used by performing a route-to-route extrapolation (Table K-3).

As no single source incorporates all toxicity data for PCOCs, published REL, RfC, and RfDo values for chemicals are typically obtained from several sources. Consistent with DTSC's Final Toxicity Criteria Rule[8] dated 4 September 2018 and DTSC Note 10 (DTSC, 2019a), the following hierarchy was used in this AMP for selecting REL, RfC, and RfDo values:

1. OEHHA's peer-reviewed toxicity data in Table A of DTSC's Final Toxicity Criteria Rule;[6]

2. EPA's on-line IRIS database (U.S. EPA, 2019a); and

3. EPA's Regional Screening Levels Table ("RSLs") (U.S. EPA, 2019b) or OEHHA's All OEHHA Acute, 8-hour and Chronic Reference Exposure Levels (OEHHA, 2016).

For non-carcinogenic compounds, the exposure assumptions described above (Table K-2), a target HQ of 1, and the RELs, RfCs, and RfDo values (Table K-3) were used to calculate the chemical-specific, non-cancer risk-based Action Levels for inhalation of each identified PCOC for the site using Equation 1 below (U.S. EPA, 2019b). For non-volatile PCOCs, the Action Level is the amount of non-volatile chemical associated with PM10.

Equation 1: Action Level for Non-Carcinogenic PCOCs (U.S. EPA, 2019b)

$$AL = \frac{HQ \times AT_{nc} \times REL \times \frac{mg}{1{,}000\ ug}}{EF \times ED \times \frac{ET}{24\ hour}}$$

where:

AL	=	Action Level – chemical concentration in ambient air or PM10 that is unlikely to cause adverse non-cancer health effects [mg/m^3]
HQ	=	Hazard Quotient – target risk for non-carcinogens [dimensionless] (i.e., 1; see Table K-2)
AT_{nc}	=	Averaging time non-carcinogens [days] (ED * 365 days/year) (Table K-2)
REL	=	Reference exposure level [ug/m^3] (Table K-3)
EF	=	Assumed exposure frequency [days/year] (Table K-2)
ED	=	Assumed exposure duration [year] (Table K-2)
ET	=	Exposure time [hours/day] (Table K-2)

[8] https://dtsc.ca.gov/regs/toxicity-criteria-for-human-health-risk-assessment/

The chemical-specific risk-based Action Levels (see Table K-3) for inhalation of the site-specific non-carcinogenic PCOCs were calculated using Equation 1 and the exposure parameters listed in Table K-2. These airborne chemical concentrations (i.e., Action Levels for non-carcinogenic effects) are conservative because these concentrations would have to be sustained at the location of the exposed receptors for the entire duration of interest to yield a HQ of 1, which is highly unlikely. Risk-based Action Levels were not calculated for Aroclor 1260 because, as discussed in Section 3.4, EPA recommended that the estimated child-adjusted RfC for Aroclor 1260 be used as the daily maximum concentration for Aroclor 1260 at the site during dust generating activities.

3.6.4 Potential Airborne Action Levels Corresponding to a 10^{-6} Incremental Lifetime Cancer Risk to Potential Off-Site Receptors

EPA defines incremental cancer risks ranging from one in one million (10^{-6}) to one in ten thousand (10^{-4}) as "safe and protective" of human health (U.S. EPA, 1991b). Chemical-specific Action Levels for potentially carcinogenic PCOCs were calculated using EPA risk assessment guidance and the lower bound, more conservative risk level of 10^{-6}. This risk level is the acceptable level of incremental cancer risk (i.e., Target Risk for carcinogens in Table K-2), used for the off-site potentially exposed populations defined above.

For the inhalation pathway, the carcinogenicity of a chemical is expressed as an inhalation unit risk ("IUR"), which represents the estimated incremental lifetime risk of developing cancer per unit of chemical exposure, and an oral slope factor ("SF_o") for the ingestion pathway, which represents the incremental lifetime risk of developing cancer per unit of chemical intake (expressed as the incremental risk of developing cancer per milligram of chemical intake, per kilogram of body weight, per day ($[mg/kg\text{-}day]^{-1}$). The units of an IUR are based on incremental risk of developing cancer per microgram per cubic meter of chemical in air ($[ug/m^3]^{-1}$). EPA defines an IUR as the "upper-bound excess lifetime cancer risk estimated to result from continuous exposure to an agent at a concentration of 1 ug/m^3 in air" (U.S. EPA, 2014a) and a SF_o as the "plausible upper-bound estimate of the probability of a carcinogenic response per unit of chemical intake over a lifetime" (U.S. EPA, 1989). Chemicals having a higher IUR or SF_o values are believed to have inherently more carcinogenic potency than those with a lower IUR or SF_o values.

Consistent with DTSC guidance (2019d), if IURs were not available, the SF_o was used by performing a route-to-route extrapolation (Table K-4).

Similar to non-carcinogenic PCOCs, the preferred source for IUR and SF_o values is as follows:

1. OEHHA's peer-reviewed toxicity data in Table A of DTSC's Final Toxicity Criteria Rule;

2. EPA's on-line IRIS database, (U.S. EPA, 2019a); and

3. EPA's RSLs (U.S. EPA, 2019b) or OEHHA's on-line Toxicity Criteria Database (OEHHA, 2019).

The International Agency for Research on Cancer ("IARC") and EPA have also developed systems to categorize chemicals that are potentially carcinogenic according to the strength of the existing experimental evidence (e.g., human and animal studies). The EPA Human Health Assessment Group ranks chemicals from Group A (known human carcinogen) to Group E (evidence of non-carcinogenicity for humans). These categories are referred to as "weight-of-evidence" classifications. Group A designation is assigned to those chemicals known to be carcinogenic to humans as substantiated by positive epidemiological evidence. Chemicals not known to be human carcinogens are classified into other categories based on the strength of the available human and animal toxicological data. The EPA carcinogen ranking classification is presented in Table K-4 for each site-specific PCOC for which a ranking has been assigned.

The incremental lifetime cancer risk due to inhalation of a chemical can be estimated using Equation 2 (U.S. EPA, 2019b).

Equation 2: Action Level for Carcinogenic PCOCs (U.S. EPA, 2019b)

$$AL = \frac{CR \times AT_c \times \frac{mg}{1{,}000\ ug}}{EF \times ED \times \frac{ET}{24\ hr} \times IUR}$$

where:

AL	=	Action Level – chemical concentration in ambient air or PM10 that corresponds to incremental cancer risk of 10^{-6} [mg/m^3]
CR	=	Target lifetime incremental cancer risk of 10^{-6} [dimensionless] (Table K-2)
AT_c	=	Averaging time carcinogens (70 years * 365 days/year) (Table K-2)
EF	=	Assumed exposure frequency [days/year] (Table K-2)
ED	=	Assumed exposure duration [year] (Table K-2)
ET	=	Exposure time [hours/day] (Table K-2)
IUR	=	Inhalation unit risk $[ug/m^3]^{-1}$ (Table K-4)

The chemical-specific risk-based Action Levels for inhalation of site-specific carcinogenic PCOCs (see Table K-4) were calculated using Equation 2 and the exposure parameters listed in Tables K-2. As mentioned above, these airborne chemical concentrations (i.e., Action Levels for carcinogenic effects) are conservative because the exposed receptors would have to be exposed at the calculated concentrations for the entire duration of the

remedial excavation period to yield an incremental cancer risk of 10^{-6}, which is highly unlikely.

3.7 Selected Action Levels for PCOCs

The following hierarchy was used to select the Action Levels for PCOCs for this AMP:

1. BAAQMD and other regulatory limits, if available for a PCOC.
2. Most conservative value from the following:
    - Chronic or Intermediate ATSDR inhalation MRL;
    - EPA Accelerated Response Action Level for TCE;
    - Estimated RfC for Aroclor 1260 by EPA's TSCA PCB group;
    - Calculated site-specific non-carcinogenic risk-based Action Level; and
    - Calculated site-specific carcinogenic risk-based Action Level.

The selected chemical-specific Action Levels are shown in Table K-5.

3.8 Action Levels for PM10

The Action Levels presented in this section for suspended particulate matter with effective particle diameters less than or equal to 10 microns ("PM10") were developed for this AMP using whichever is the lowest of the following:

1. The California Ambient Air Quality Standard ("CAAQS") for PM10; and
2. The Action Level for each non-volatile PCOC, calculated as PM10. For PCBs, this calculation follows the approach described by EPA's TSCA PCB group and is considered a Trigger Level for increasing dust suppression efforts, with the Action Level as described above in Section 3.4.

In addition, as the BAAQMD does not have any regulations for particulate matter with toxic air contaminants, EPA and DTSC recommended that the South Coast Air Quality Management District's ("SCAQMD") Rule 1466 be reviewed to identify potentially appropriate requirements. Therefore, the best management practices ("BMPs") outlined in Rule 1466 with respect to air monitoring methodology and equipment were

reviewed to identify and develop the PM10 Action Levels in this AMP.[9] Also, the following concepts from Rule 1466 were considered in development of the AMP:

- In Rule 1466, the Action Level for PM10 is defined as representative of the difference between the PM10 concentrations measured at upwind and the downwind monitoring station(s) over the averaging time for the Action Level, which is a 2-hour TWA in Rule 1466.

- In Section (k)(2) of Rule 1466, when enclosures vented to air pollution control equipment are used to mitigate the release of PM10 dust, real-time PM10 monitoring is not required.

In addition, as recommended by EPA (EPA, 2019c), if visible fugitive dust is observed at or beyond the site perimeter during activities that generate dust, the Contractor will increase its dust suppression efforts by implementing additional dust control measures to reduce dust levels.

3.8.1 CAAQS for PM10

The CAAQS for PM10 is 0.05 milligrams per cubic meter ("mg/m^3"), measured as a 24-hour TWA (California Code of Regulations, Title 17, Section 70200). At the nearest BAAQMD monitoring station (San Pablo, CA) to the site, the annual average PM10 concentration was 0.0214 mg/m^3 in 2018.[10] Using this value, a TWA Action Level for PM10 during an 8-hour workday can be calculated from the following equation, which assumes that the average annual concentration is present at site while active work is not occurring.

$$PM10_{8-hour-TWA} = \frac{24 \times PM10_{24-hour-TWA} - 16 \times PM10_{background}}{8}$$

where:

$PM10_{8\text{-hour-TWA}}$	=	8-hour TWA PM10 for an 8-hour shift (mg/m^3)
$PM10_{24\text{-hour-TWA}}$	=	24-hour TWA PM10 Action Level (0.050 mg/m^3)
$PM10_{background}$	=	Background PM10 (0.0214 mg/m^3)

The resulting Action Level for PM10 based on an 8-hour workday and the CAAQS is 0.11 mg/m^3.[11]

[9] The action level set forth in Rule 1466 was not used in this AMP, as the site in not in the South Coast jurisdiction.

[10] http://www.baaqmd.gov/~/media/files/communications-and-outreach/annual-bay-area-air-quality-summaries/pollsum2018-pdf.pdf?la=en. Based on these data, the background PM10 concentration in the East Bay is anticipated to be approximately 20 ug/m^3.

[11] If a 10-hour workday is used, the resulting Action Level would be 0.092 mg/m^3.

In addition, to account for short-term variations in dust emissions, a Suspend Work Level for PM10 of 0.11 mg/m^3 was selected, measured as a 30-minute TWA concentration at the site perimeter. If the Suspend Work Level for PM10 is exceeded, the Contractor will temporarily suspend work and reassessment of site activities and dust control measures will be required as described in Section 5.

As an additional conservative measure, a Trigger Level for PM10 is established at 0.11 mg/m^3 measured as a 5-minute TWA concentration at the site perimeter. As described below in Section 5, exceedance of the Trigger Level will require the Contractor to increase dust suppression efforts until the PM10 5-minute TWA concentration at the site perimeter is below 0.11 mg/m^3.

3.8.2 Action Levels for non-PCB PCOCs Calculated as PM10

Based on the selected Action Levels for non-volatile PCOCs (i.e., metals), corresponding PM10 Action Levels were calculated for each PCOC except PCBs using Equation 3 to evaluate whether the 8-hour TW PM10 Action Level of 0.11 mg/m^3 throughout construction activities, would be protective of off-site populations from exposure to PCOCs in dust; the results of these calculations are shown in Table K-6. For lead, consistent with DTSC guidance (2019d), the 95% upper confidence limit ("UCL") of the mean of the available lead in soil data (Geomatrix, 2002 and Geosyntec, 2010) was used as the representative concentration, which was calculated with the latest version of EPA's ProUCL software.[12]

Equation 3: PM10 Dust Concentration that Meets Action Level for Identified PCOCs (U.S. EPA, 1991a)

$$D = \frac{AL}{PCOC_{max} \times 10^{-6} \frac{kg}{mg}}$$

where:

D	=	conservative estimate of PM10 concentration that meets the Action Level [mg/m^3];
AL	=	selected Action Level [mg/m^3] (see Table K-5); and
$PCOC_{max}$	=	maximum PCOC concentration in soil [mg/kg].

As shown in Table K-6, the calculated PM10 concentrations for metals, which range from 0.25 mg/m^3 to 39 mg/m^3, exceed the PM10 Action Level of 0.11 mg/m^3. This means that if the measured PM10 concentration is less than 0. 11 mg/m^3, metal concentrations in air will be below their respective Action Levels (Table K-5).

[12] https://www.epa.gov/land-research/proucl-software

3.8.3 Trigger Levels for PCBs Calculated as PM10

Potential real-time Trigger Levels for PCBs in PM10 were calculated using (1) the maximum known PCB concentration in soil or building materials that will be handled and generate dust during a given construction activity (e.g., soil remediation excavation, building demolition, PCB building materials abatement, concrete crushing, grading); (2) the PCB Action Level, defined as the calculated toxicity value as a RfC provided by EPA's TSCA PCB group as shown in Table K-3; and (3) Equation 4 below. These calculated Trigger Levels, grouped by activity and/or area are shown in Table K-7.

Equation 4: Real-Time PM10 Trigger Level for PCBs

$$AL_{PM10} = \frac{RfC}{PCB_{max} \times 10^{-6} \frac{kg}{mg}}$$

where:

AL_{PM10}	=	conservative estimate of PM10 Action Level [mg/m^3];
RfC	=	calculated toxicity value for PCBs as a RfC [mg/m^3] (see Table K-3); and
PCB_{max}	=	maximum PCB concentration in soil [mg/kg].

As shown in Table K-7, calculated potential 5-minute TWA PM10 trigger levels based on PCB concentrations are as low as 0.0023 mg/m^3. However, available SCAQMD-approved real-time dust monitoring instruments are not capable of accurately measuring a PM10 concentration difference of less than approximately 0.01 mg/m^3 and background PM10 concentrations are anticipated to be approximately 0.020 mg/m^3 (see discussion in Section 3.8.1 above). Therefore, dust-generating activities (e.g., demolition of existing structures and soil remediation excavation) in areas where PCBs are known to be present at concentrations greater than 1,000 mg/kg and would generate dust if disturbed will be performed within an enclosure that is (a) vented air pollution control equipment (i.e., particulate air filters) and (b) the excavated/demolished/removed materials will be directly loaded into bins that can be sealed. Consistent with Section (k)(2) of SCAQMD Rule 1466, when enclosures vented to air pollution control equipment are used to mitigate the release of PM10 dust, real-time PM10 monitoring is not required and will not be performed.

For demolition and soil remediation excavation activities in areas where disturbance of PCBs known to be present at concentrations between 600 mg/kg and 1,000 mg/kg will generate dust,[13] a 5-minute TWA PM10 Trigger Level of 0.030 mg/m^3 (Table K-7) is proposed for increasing dust suppression efforts; potential additional dust control measures are summarized in the Dust Control Plan (Appendix J of the RDIP Addendum). In the event that the 30-minute TWA PM10 Suspend Work Level of 0.030 mg/m^3 is

[13] Based on currently available building materials data (see Appendix G of the RDIP Addendum), no building materials fall within this range at the site.

exceeded, dust-generating activities will be temporarily suspended to re-assess site activities and implement additional dust control measures (see Table K-8).

For demolition and soil remediation excavation activities in areas where disturbance of PCBs known to be present at concentrations between 50 mg/kg and 600 mg/kg will generate dust, a 5-minute TWA PM10 Trigger Level of 0.050 mg/m^3 (Table K-7) is proposed for increasing dust suppression efforts. In the event that the 30-minute TWA PM10 Suspend Work Level of 0.050 mg/m^3 is exceeded, dust-generating activities will be temporarily suspended to re-assess site activities and implement additional dust control measures (see Table K-8).

For other construction activities in areas where PCBs are known to be present below 50 mg/kg (e.g., concrete crushing and mass grading), the Trigger Level for PCBs calculated as PM10 is 0.6 mg/m^3 (Table K-7), which is higher and less conservative than the Trigger Level for PM10 selected based on the CAAQS described above in Section 3.2.1. Therefore, for construction activities with known PCBs <50 mg/kg, the 5-minute and 30-minute TWA PM10 Trigger and Suspend Work Levels will be 0.11 mg/m^3.

The proposed PM10 Trigger Levels (Table K-8) will be used to trigger increased dust suppression efforts (based on a 5-minute TWA) or the temporary suspension of dust-generating activities at the site (when the level is exceeded on a 30-minute TWA). These PM10 Trigger Levels are very conservative because they assume that the most sensitive potential receptor (i.e., an off-site child) would be exposed to PM10 at a concentration equivalent to the Trigger Level concentration for a 24-hour period (but dust generating activities would only be conducted during the work day) and that all of the dust causing the exposure contains PCBs at the assumed PCB concentration, which is highly unlikely.

As ambient background PM10 concentrations are anticipated to be approximately 0.020 mg/m^3, it is likely that the real-time 5-minute TWA PM10 Action Levels may be exceeded due to conditions unrelated to site activities. As a result, background air data[14] or upwind data from the PCBs sampling (see Section 4.4.3) will be evaluated to determine whether PCBs are present in upwind ambient air. In the event that PCBs are not present in the upwind ambient air samples, consistent with SCAQMD Rule 1466, the difference in PM10 concentrations between the upwind and downwind PM10 monitor(s) will be compared to the 5-minute TWA PM10 Action Levels. For additional details regarding implementation of the 5-minute TWA PM10 Action Levels, see Section 4.3.

In the event that PCBs are detected in the upwind ambient air samples at levels below the airborne Action Level for PCBs, Bridge may elect to use a lines of evidence

[14] If background ambient air monitoring is conducted, it will be conducted during mobilization and site setup activities before the existing ground surface is disturbed and before any above ground abatement outside of enclosures and/or demolition activities are conducted. These data will be collected between two weeks and one month prior to the start of abatement/demolition/excavation activities.

methodology to evaluate whether the approach described above is feasible given site conditions and anticipated activities and/or if a 5-minute PM10 Trigger Level that is equal to the difference in PM10 concentrations between the upwind and downwind PM10 monitor(s) is protective of potential off-site receptors. The results of the evaluation will be provided to EPA, and EPA will be consulted on appropriate modifications to the AMP based on this information.

Some abatement of PCB-containing building materials (i.e., with PCBs ≥50 mg/kg) may be performed indoors or is not expected to generate dust (e.g., tile adhesive), and therefore, the Action Levels and mitigation approaches discussed in this section do not apply and are not required in the performance of such non-dust generating or indoor demolition activities.

3.9 Action Level for Total VOCs

To screen for total VOCs at the site perimeter and determine if contingency measures for vapor may need to be implemented, an Action Level of 1 part per million by volume ("ppmv") above background is proposed.

Total VOCs will be monitored at the perimeter air monitoring ("PAM") stations and by air monitoring field staff using data-logging real-time organic vapor meters ("OVMs"). If total VOC measurements of 1 ppmv or greater above background are sustained for more than 2 minutes or is significant odors are observed at the site perimeter by air monitoring field staff, the Contractor will implement the contingency odor and vapor control measures outlined in the Dust Control Plan (Appendix J of the RDIP Addendum). If sustained OVM measurements over 1 ppmv above background or odors persist, the Contractor will temporarily halt soil handling activities, and the Contractor's odor and vapor control practices will be reviewed and modified, as appropriate.

4. IMPLEMENTING THE PERIMETER AIR MONITORING PLAN

This section outlines protocols for air sampling for PCOCs, PM10, and total VOCs at the perimeter of the site. This section also describes the collection of companion meteorological measurements.

4.1 Meteorological Measurements

During dust generating activities (e.g., demolition and soil handling until the temporary cap is installed), a data logging meteorological station (e.g., Kestrel Meter 5500 or equivalent) will be used to monitor wind direction and speeds at the site. At a minimum, wind speed and wind direction data will be collected every 5 minutes during dust generating activities.

Based on a review of BAAQMD's Meteorological Monitoring Guidance[15] and a review of wind data from the Oakland International Airport, the meteorological monitoring station will be located at the construction trailer (see Figure K-1) and the wind anemometer and wind vane will be positioned a minimum of 20 feet away from nearby structures of greater height and a minimum of four feet above the top of the construction trailer. During construction activities, wind socks and/or wind vanes, positioned at several locations around the site, will be used to monitor for localized wind direction variations.

The meteorological station will be set up one week prior to the initiation of dust generating activities to assess whether wind data from the Oakland International Airport are representative of site winds and whether the proposed PAM stations (see Section 4.2, below) are appropriately located. If necessary, the locations of the PAM stations may be modified.

4.2 Air Monitoring Station Locations

The purpose of the air monitoring during dust generating activities that disturb PCB-containing materials (e.g., demolition) and construction activities at the site until the temporary cap is installed is to: (1) collect ambient air data at the site perimeter to evaluate the effectiveness of the Contractor's dust control and vapor mitigation efforts and (2) collect data to assess potential PCOC migration off-site to locations where exposures to human receptors could occur.

To identify locations for the perimeter air monitoring, BAAQMD instrument siting guidance was reviewed. Based on 2018 wind data collected between 07:00 and 19:00 at the Oakland Airport (see Figure K-2), located approximately 3 miles southwest of the site, a total of 8 potential PAM stations were identified for monitoring (see Figure K-1). The actual locations and placement of the PAM stations will depend on the observed wind directions during air monitoring.

Of the four PAM stations located along the southwestern and northwestern boundaries of the site (i.e., the upwind locations), a minimum of three will be monitored when air monitoring is required;[16] all four of the PAM stations located along the southeastern and northeastern boundaries of the site (i.e., the downwind locations) will be monitored throughout construction activities while air monitoring is required.

[15] Appendix A of the BAAQMD's Manual of Procedures, Volume VI.

[16] The upwind station along San Leandro Street will be used during activity on the southwestern portion (i.e., the San Leandro side) of the site.

4.3 Air Monitoring Parameters, Duration, and Frequency

Each of the PAM stations will include a data-logging direct-read OVM and/or a data-logging direct-read PM10 monitor, as described below; each of the PAM stations will also be equipped with telemetry so that the results from the real-time monitoring equipment can be monitored from a single location.

During periods of specific activities, air samples will also be collected for laboratory analysis to demonstrate that the real-time monitoring data and the Contractor's dust and vapor suppression measures are sufficient to maintain PCOC concentrations at the site perimeter below their respective airborne Action Levels.

The air monitoring parameters, duration, and frequency during different phases of the project are discussed below. Dust generating activities at the site will involve the following:

- Abatement of existing building materials whose disturbance will generate dust and that contain PCBs at concentrations greater than 1,000 mg/kg;
- Excavation of soil containing PCBs at concentrations greater than 1,000 mg/kg;
- Excavation of the VOC hotspot near the northern property boundary;
- Aboveground demolition of existing buildings and excavation of soil containing PCBs between 50 and 1,000 mg/kg;
- Construction activities (e.g., concrete crushing, rough and fine grading, excavation of clean corridors, foundation construction, backfilling, paving) involving materials that contain less than 50 mg/kg PCBs; and
- Construction activities (e.g., installation of underground utilities, backfilling of clean corridors, site paving) following installation of a temporary cap at the site.

Prior to the performance of these activities, an approximately 16-foot tall privacy fence will be installed as a noise/dust barrier along the northern boundary of the site with adjoining residences and the remaining fencing around the perimeter of the site will be retrofitted with a SCAQMD compliant windscreen.

Additional details about the perimeter air monitoring that will be conducted during each of these phases (if any) is provided below.

4.3.1 Abatement of Existing Building Materials with PCBs >1,000 mg/kg

During the abatement and/or removal of existing building materials that contain PCBs at concentrations greater than 1,000 mg/kg and would generate dust if disturbed, the existing cap at the site will not be disturbed and abatement and/or removal activities

will be performed within enclosures. Work inside enclosures will be performed by personnel under their organization's HASP and the personal air monitoring required therein.

Consistent with SCAQMD Rule 1466, real-time PM10 monitoring is not proposed[17] for activities within enclosures because the potential release of PM10 will be mitigated.

4.3.2 Excavation of Soil Containing PCBs >1,000 mg/kg

During the excavation of soil containing PCBs at concentrations greater than 1,000 mg/kg, the existing cap at the site will not be disturbed except where required for excavation activities. In addition, the excavations will be performed within enclosures equipped with air pollution control equipment (i.e., particulate air filters) and excavated materials will be directly loaded into bins that can be sealed.

Consistent with SCAQMD Rule 1466, real-time PM10 monitoring is not proposed for activities within enclosures because the potential release of PM10 will be mitigated.

4.3.3 Excavation of VOC Hotspot near Northern Property Boundary

During excavation of the VOC hotspot near the northern property boundary, excavated materials will be directly loaded into bins that can be sealed. During excavation activities in this area, real-time PM10 monitoring, real-time total VOC monitoring, and air sampling for VOC PCOCs will be conducted to demonstrate that the Contractor's vapor control measures are adequate to meet VOC PCOC Action Levels. The air monitoring and sampling will be conducted at the two PAM stations along the northwest property boundary located closest to the VOC excavation and the most northerly of the PAM stations located along the southeastern property boundary (Figure K-1). Additional details regarding the planned monitoring and sampling are provided below.

- Real-time PM10 and total VOC monitoring will be conducted at the indicated PAM stations throughout excavation activities in this area.
- During the first 5 days of excavation activities in this area, air samples will be collected on a daily basis from each of the indicated PAM stations. The samples will be submitted to a State of California certified analytical laboratory for the analysis of 1,2,3-trichlorobenzene, 1,2,4-trichlorobenzene, naphthalene, TCE, and vinyl chloride.
    - If the Action Levels for the VOC PCOCs are not exceeded during the first five days of excavation activities in this area, the collection of air samples will be discontinued. If VOC PCOC Action Levels are exceeded during the

[17] However, in the event that other dust generating activities that require air monitoring are being conducted simultaneously at the site outside of enclosures, real-time PM10 monitoring will be conducted in accordance with the procedures listed below for those activities.

initial sampling, the collection of samples for laboratory analysis will continue until the VOC PCOC Action Levels are not exceeded for 3 consecutive work days.

4.3.4 Aboveground Demolition of Existing Buildings and Soil Remediation Excavation with PCBs between 50 and 1,000 mg/kg

During the vertical demolition of existing buildings and soil remediation excavations with PCBs between 50 and 1,000 mg/kg, the existing cap at the site will not be disturbed except as needed. After work is complete, areas where the cap was removed will be covered or a temporary cap will be placed, as described in the Dust Control Plan (Appendix J of the RDIP Addendum). Real-time PM10 monitoring will be conducted during these activities and air sampling for PCBs will be conducted to demonstrate that the Contractor's dust control measures are adequate to meet the Action Level for PCBs. Additional details regarding the planned air monitoring and/or sampling are provided below.

- Real-time PM10 monitoring will be conducted at up to 7 of the proposed PAM stations.[18]
- During the first 5 days of new dust generating activities (see below for list of activities), air samples will be collected on a daily basis from each of the PAM stations where real-time PM10 monitoring is being conducted. The air samples will be submitted to a State of California certified analytical.
- Samples will be analyzed by laboratory for PCBs.
- If the Action Level for Aroclor 1260 (i.e. the estimated child-adjusted RfC of 0.03 ug/m^3) is not exceeded at any of the PAM stations during the first five days of new dust generating activities, the collection of air samples for PCBs analysis will be discontinued. If the Action Level for Aroclor 1260 is exceeded during the initial sampling, sampling will continue until the Action Level is not exceeded at any PAM station for 3 consecutive work days.
- A list of dust-generating activities that will require PCB air sampling for laboratory analysis during at least the first five days is provided below:
    - Mass vertical demolition of existing buildings outside of enclosures;
    - Soil remediation excavation outside of enclosures; and
    - Concrete removal activities for off-site disposal, performed outside.

Prior to this phase of work, background air samples to evaluate the site-specific upwind concentration of PCBs in PM10 will be collected for 5 consecutive days during

[18] The upwind station along San Leandro Street will be used during activity on the southwestern portion (i.e., the San Leandro side) of the site.

mobilization and/or work in enclosures. The samples will be collected from the upwind air monitoring station shown on Figure K-1 along San Leandro Street. The air samples will be submitted to a State of California certified analytical laboratory for the analysis of PCBs. If results show that PCBs are not present in PM10 dust from upwind of the site (i.e., non-detect above the laboratory reporting limit), the real-time PM10 concentration for comparison to the Trigger Level for the rest of the project will be measured by the difference between the 5-minute TWA in the upwind and downwind PM10 monitoring stations, in accordance with SCAQMD Rule 1466. Otherwise during this phase of work, the Trigger Levels will be compared to the
5-minute TWA PM10 concentration at the PAM stations and further evaluation of this approach will be conducted as described above.

The Trigger Level will depend on the dust generating activity and the PCB concentration that will be disturbed, as described in Section 3.8.3 and Table K-8. If multiple dust generating activities are being conducted at the site simultaneously that will disturb PCB-containing materials, the maximum PCB concentration being disturbed will drive the selection of the Trigger Level, until that activity is completed.

4.3.5 Construction Activities Involving Material where PCBs are less than 50 mg/kg

This phase of work will include concrete crushing, cap removal, rough and fine grading, ground improvement activities for geotechnical purposes, the construction of new building foundation(s), and excavation for clean corridors. Upon completion of these activities, a temporary cap will be installed at the site.

During this work, real-time PM10 monitoring will be conducted and air sampling for PCBs and other non-volatile PCOCs will be conducted to demonstrate that the Contractor's dust control measures are adequate to meet the Action Levels for the site. Additional details regarding the planned air monitoring and/or sampling are provided below.

- Real-time PM10 monitoring will be conducted throughout these activities, until the temporary cap is installed, at up to 7 of the proposed PAM stations.[19]

- During the first 5 days of each representative dust generating activity (i.e., cap removal, concrete crushing, grading, ground improvement activities for geotechnical purposes, and excavation for clean corridors), air samples will be collected on a daily basis from each of the PAM stations where real-time PM10 monitoring is being conducted. The air samples will be submitted to a State of California certified analytical laboratory for the analysis of arsenic, cobalt, copper, lead, and PCBs.

[19] The upwind station along San Leandro Street will only be used during activity on the southwestern portion (i.e., the San Leandro side) of the site.

- If the Action Levels are not exceeded at any of the PAM stations during the first five days of each representative activity, the collection of air samples for laboratory analysis will be discontinued. If the Action Level for one or more non-volatile PCOC is exceeded during the initial sampling, sampling for those non-volatile PCOCs will continue until their Action Levels are not exceeded at any PAM station for 3 consecutive work days.

During this phase of work, additional dust suppression activities will be performed when the difference between the 5-minute TWA PM10 concentrations measured at the upwind and downwind PAM stations are greater than the PM10 Action Level (i.e., 0.11 mg/m^3, see Table K-8).

4.3.6 Construction Activities following Installation of a Temporary Cap

Work during this phase includes inspections and maintenance of the temporary cap, the installation of below grade utilities within previously excavated clean corridors, the backfilling of the utilities corridors with clean import fill, and construction of a permanent site cap. This phase of work does not involve handling of native soils or existing building materials at that site that may contain PCOCs, therefore air monitoring is not proposed for this phase of work.

4.4 Air Monitoring Collection Methods and Equipment

Air sample collection and analytical methods are presented in Table K-9 and discussed further below. The information in Table K-9 includes sampling equipment, filter media, anticipated sampler flow-rate, duration of the planned sampling event, analytical methods, anticipated turn-around times ("TATs") after the lab receives the samples, and typical analytical reporting limits for each PCOC. As shown in Table K-9, the typical analytical laboratory reporting limits are below the chemical-specific Action Levels.

To be representative of air entering and/or leaving the site, the inlets to the monitoring and/or sampling equipment will be positioned at the top of the privacy fence located near the residences and the fencing surrounding the rest of the site. Additional details about the real-time monitoring equipment, air sampling equipment, and laboratory analytical methods are presented below.

4.4.1 Metal PCOCs

Battery-powered air sampling pumps (Gilian Model GilAir5 or equivalent) will be used to collect dust samples for analysis of the PCOCs arsenic, cobalt, copper, and lead. The pumps will be operated at approximately 10 liters per minute and the units will be fitted with a PM10 Personal Environmental Monitor (SKC 761-200B or equivalent) coupled to 37 millimeter ("mm") mixed cellulose ester ("MCE") filter cassettes. Laboratory analysis of the MCE filter cassettes can detect PCOCs at or below the selected Action Levels (Table K-9).

Following sample collection, the filter cassettes will be placed in individual receptacles for shipment to a State of California certified analytical laboratory under chain-of-custody procedures. The metal PCOC samples will be analyzed using inductively coupled plasma/mass spectrometry ("ICP/MS") (EPA Method 6020) and the results will be reported on a 24-hour rush TAT to verify that chemical-specific Action Levels are not exceeded.

The battery-powered air sampling pumps will be calibrated in general accordance with the manufacturer's instructions. Flow rates and start/stop times will be recorded on the air monitoring field logs. If chemical-specific air monitoring Action Levels are exceeded, site activities will be modified to reduce dust. Additional details about potential dust control measures are presented in the Dust Control Plan (Appendix J of the RDIP Addendum).

4.4.2 VOC PCOCs

Six-liter Summa™ canisters, provided by a State of California certified analytical laboratory, will be used to collect air samples for chemical-specific analysis of VOCs that are identified PCOCs for the site (i.e., 1,2,3-trichlorobenzene, 1,2,4-trichlorobenzene, naphthalene, TCE, and vinyl chloride). The analytical laboratory will provide individually certified clean six-liter Summa™ canisters and flow controllers. Flow controllers will be vacuum-driven by the Summa™ canister and will be calibrated by the analytical laboratory for collection of a TWA sample for an 8-hour period (approximately 3.8 milliliters per minute ("mL/min")).

Start/stop sampling times and vacuum readings on Summa™ canisters will be recorded by air monitoring field staff on the field logs. Collected Summa™ samples will be shipped to the analytical laboratory under chain-of-custody procedures. Air samples collected in Summa™ canisters will be analyzed for VOC PCOCs using EPA Method TO-15 SIM with expected detection limits shown in Table K-9. The air samples will be analyzed and the results reported on a 24-hour rush TAT to verify that chemical-specific Action Levels are not exceeded.

If the chemical-specific air monitoring Action Levels are exceeded, site activities will be modified to reduce potential vapor emissions. Additional details about potential vapor control measures are presented in the Dust Control Plan (Appendix J of the RDIP Addendum).

4.4.3 PCBs

Battery-powered air sampling pumps (Gilian Model GilAir5 or equivalent) will be used to collect dust samples for analysis of PCBs. The pumps will be running at approximately 4 liters per minute for an 8-hour period. The units will be fitted with a PM10 Personal Environmental Monitor (SKC 761-200A or equivalent) coupled to a polyurethane foam ("PUF") cartridge, which consists of a glass sampling cartridge in which the PUF plug is retained. The PUF cartridges will be prepared and provided by the analytical laboratory. Certified clean cartridges are considered clean up to 30 days when stored in sealed containers.

The PUF cartridges will be attached to the pumps with flexible tubing. The sampling assemblies will be positioned with the intake downward or in a horizontal position. Samplers will be located in an unobstructed area at least 100 feet from any obstacle to air flow.

The battery-powered air sampling pumps will be calibrated in general accordance with the manufacturer's instructions. During the 8-hour sample collection period, field staff will periodically check the pumps and record any abnormal conditions on the air monitoring field logs. Ambient air temperatures and barometric pressures will be measured and recorded periodically. Flow rates and start/stop times will be recorded on the air monitoring field logs.

Following sample collection, the PUF cartridge will be rewrapped with its original aluminum foil and placed in a cooler in individual labeled receptacles for shipment to the analytical laboratory under chain-of-custody procedures. Samples will be stored at <4˚ C or below until analyzed in the laboratory. The air samples will be analyzed using EPA Method TO-10A and the results reported on a 24-hour rush TAT.

Laboratory analysis of the cartridge can detect PCBs at or below the Action Level (i.e., the estimated child-adjusted RfC of 0.03 ug/m^3) (Table K-9). If the Action Level for Aroclor 1260 is exceeded, site activities will be modified to reduce dust. Additional details about potential additional dust control measures are presented in the Dust Control Plan (Appendix J of the RDIP Addendum).

4.4.4 Real-Time Air Monitoring

During dust generating activities where real-time air monitoring is required, data logging real-time PM10 monitors and OVMs will be used to provide immediate information about particulate matter and organic vapor concentrations at the PAM station locations. The monitors will be factory calibrated and operated in accordance with the manufacturer's instructions.

The data collected will provide real-time information that will be used to evaluate the effectiveness of dust and vapor control procedures being implemented by the Contractor and to demonstrate that perimeter Action Levels are being met. Each PAM

station will be set up with telemetry so that the data collected at each station can be reviewed from a single on-site location.

4.4.4.1 PM10

During dust generating activities where real-time PM10 monitoring is required, a TSI Dusttrak II equipped with a PM10 impactor inlet (or equivalent) particulate aerosol monitor will be used to monitor PM10 concentrations at the site perimeter. The PM10 monitors will have a heated inlet sample conditioner to reduce the effect of humidity on photometric mass measurements. The monitors will be factory calibrated and operated in accordance with the manufacturer's instructions. The instruments will be setup to record 1-minute TWA PM10 measurements and 5-minute TWA PM10 readings will be calculated by the web-based telemetry monitoring interface. Real-time PM10 data will be provided to EPA and DTSC without correction based on upwind or downwind conditions.

4.4.4.2 Total VOCs

During site remediation activities within the VOC hotspot area, air at the PAM stations will be monitored using a calibrated, data-logging direct-read OVM with a 10.6 eV lamp. In addition to the OVM at the PAM stations, an OVM will be used by air monitoring field staff to monitor total VOC concentrations along the northwestern perimeter of the site.

The OVM, which will be a model MiniRAE 2000 (or equivalent), analyzes VOCs by photoionization.[20] The OVM has a detection limit of approximately 0.1 ppmv and does not provide airborne concentrations for individual VOCs.

The OVM will be calibrated using isobutylene daily before the start of work by the field staff in accordance with the manufacturer's specifications. At a relative humidity of greater than 95-percent, the OVM may tend to record false-positives due to relative humidity interferences (RAE, 2004). Therefore, if relative humidity is greater than 95-percent, as reported by the meteorological station, the OVM will be checked periodically by field staff using the calibration gas and re-calibrated, if needed. OVM calibrations and field checks for functionality will be recorded in the field logs by field staff.

4.5 Quality Assurance and Quality Control Procedures

Field quality assurance/quality control ("QA/QC") procedures, such as calibration and sample collection procedures, are described in Section 4.4.

[20] A photoionization detector ("PID") will be used instead of flame ionization detector ("FID") due to the ease of use and because FIDs tend to give false-positives for VOCs due to the potential interference of methane (RAE, 2004).

All laboratory data packages will be reviewed for completeness and for compliance with QA/QC parameters, including laboratory hold times. Specifically, quality control samples for air sampling will consist of field blanks, laboratory blanks, laboratory spikes, and laboratory spike duplicates. Field quality control ("QC") checks of air samples will be performed by the collection and submission of one field blank (an unused filter cassette in the case of metals and one PUF cartridge in the case of PCBs) per batch of filter media. Field blanks consist of air sample matrices that have been briefly opened to field conditions and then sealed.

Laboratory quality control checks (i.e., laboratory blanks, spikes, and spike duplicates) will be performed by adherence to laboratory QC procedures and the analysis of laboratory QC samples. A minimum of one laboratory blank, one laboratory spike, and one laboratory spike duplicate will be analyzed for each of the five days of air samples analyzed by the laboratory. Accuracy and precision will be assessed using matrix spike/matrix spike duplicates.

5. APPLICATION OF ACTION LEVELS AND AIR MONITORING RESULTS

Below is a summary of the measures to be taken if PCOC Action Levels (Table K-5) or PM10 Action and Trigger Levels (Table K-8) are exceeded until the temporary cap is installed. The Dust Control Plan (Appendix J of the RDIP Addendum) provides additional details about the potential contingency measures that could be implemented to protect off-site receptors until the temporary cap is installed at the site.

Fugitive Dust

- If visible fugitive dust is observed at or beyond the site perimeter during activities that generate dust, the Contractor will increase its dust suppression efforts by implementing additional dust control measures (see the Dust Control Plan) to reduce dust levels.

PM10 (600 mg/kg < PCBs ≤ 1,000 mg/kg)

- If the 5-minute TWA PM10 Trigger Level of 0.030 mg/m^3 is exceeded at any of the PAM stations,[21] the Contractor will increase dust suppression efforts by implementing additional dust control measures to reduce dust levels.

- If the 30-minute TWA PM10 Suspend Work Level (i.e., 0.030 mg/m^3) is exceeded at any of the PAM stations (see footnote 21), the Contractor will temporarily

[21] As discussed in Section 4.3.4, background air samples will be collected to evaluate site-specific upwind concentrations of PCBs to determine if subtraction of PM10 concentrations (difference between PM10 concentrations measured at the upwind and the downwind monitoring station(s)) is appropriate.

suspend dust-generation activities to re-assess site activities and implement additional dust control measures.

PM10 (50 mg/kg ≤ PCBs ≤ 600 mg/kg)

- If the 5-minute TWA PM10 Trigger Level of 0.050 mg/m^3 is exceeded at any of the PAM stations (see footnote 21), the Contractor will increase dust suppression efforts by implementing additional dust control measures to reduce dust levels.

- If the 30-minute TWA PM10 Suspend Work Level (i.e., 0.050 mg/m^3) is exceeded at any of the PAM stations (see footnote 21), the Contractor will temporarily suspend dust-generation activities to re-assess site activities and implement additional dust control measures.

PM10 (PCBs < 50 mg/kg)

- If a 5-minute TWA PM10 concentration of 0.11 mg/m^3 or greater is observed at any of the PAM stations,[22] the Contractor will increase dust suppression efforts by implementing additional dust control measures to reduce dust levels.

- If the 30-minute TWA PM10 Suspend Work Level (i.e., 0.11 mg/m^3) is exceeded at any of the PAM stations (see footnote 22), the Contractor will temporarily suspend dust-generation activities to re-assess site activities and implement additional dust control measures.

PCOCs

- If air sampling indicates that Action Levels for Aroclor 1260, 1,2,3-trichlorobenzene, 1,2,4-trichlorobenzene, naphthalene, TCE, vinyl chloride, arsenic, cobalt, copper, and lead (Table K-5) are exceeded at the site perimeter, as indicated by laboratory chemical specific analyses of air samples, the Contractor will temporarily stop work and re-assess activities and dust control measures until it is demonstrated that Action Levels are achieved by Contractor's upgraded control measures.

Total VOCs

- If OVM measurements greater than 1 ppmv persist for more than 2 minutes above background at any perimeter air monitoring station, Contractor will implement contingency vapor mitigation measures. If vapors persist, Contractor

[22] Subtraction of PM10 concentrations (i.e., the difference between PM10 concentrations measured at the upwind and the downwind monitoring station(s)) will be performed if known PCB concentrations are below 50 mg/kg.

will temporarily stop work, re-assess activities and vapor control contingency measures, and/or develop additional vapor control measures as needed (see Appendix J of the RDIP Addendum).

Odor

- If odors are observed during work, Contractor will implement contingency measures for odor. If odors persist, Contractor will temporarily stop work, re-assess site activities and odor control contingency measures, and/or develop additional odor control measures as needed (see Appendix J of the RDIP Addendum).

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Table K-1
Selection of PCOCs
5441 International Boulevard
Oakland, California

Detected Chemical in Soil or Concrete Samples (a)	Maximum Concentration (mg/kg)	Maximum Concentration Source (a)	Screening Level for Residential Soil (mg/kg)	Screening Level Source	PCOC?
Metals					
Antimony	23	Geomatrix, 2002	31	U.S. EPA, 2019	No
Arsenic	**100**	Geomatrix, 2002	0.11	DTSC, 2019	**Yes**
Barium	1,100	Geomatrix, 2002	15,000	U.S. EPA, 2019	No
Cadmium	14	Geomatrix, 2002	--	--	No
Chromium	790	Geomatrix, 2002	120,000 (b)	U.S. EPA, 2019	No
Cobalt	**53**	Geomatrix, 2002	23	U.S. EPA, 2019	**Yes**
Copper	**20,000**	Geomatrix, 2002	3,100	U.S. EPA, 2019	**Yes**
Lead	**13,000**	Geomatrix, 2002	80	DTSC, 2019	**Yes**
Mercury	0.069	EKI, 2019	1	DTSC, 2019	No
Molybdenum	2	EKI, 2019	390	U.S. EPA, 2019	No
Nickel	170	Geomatrix, 2002	820	DTSC, 2019	No
Selenium	7	Geomatrix, 2002	390	U.S. EPA, 2019	No
Silver	63	Geomatrix, 2002	390	U.S. EPA, 2019	No
Vanadium	55	EKI, 2019	390	U.S. EPA, 2019	No
Zinc	1,500	Geomatrix, 2002	23,000	U.S. EPA, 2019	No
VOCs					
1,1,1-Trichloroethane	40	EKI, 2019	1,700	DTSC, 2019	No
1,1,2-Trichloroethane	0.0036	Geosyntec, 2009	1.1	U.S. EPA, 2019	No
1,1-Dichloroethene	2	EKI, 2019	83	DTSC, 2019	No
1,2,3-Trichlorobenzene	**320**	Geomatrix, 2002	40	DTSC, 2019	**Yes**
1,2,4-Trichlorobenzene	**1,000**	Geomatrix, 2002	7.8	DTSC, 2019	**Yes**
1,2,4-Trimethylbenzene	9.2	Geosyntec, 2009	300	U.S. EPA, 2019	No
1,2-Dichlorobenzene	0.0032	Geosyntec, 2009	1,800	U.S. EPA, 2019	No
1,2-Dichloroethane	0.0061	Geosyntec, 2009	0.46	U.S. EPA, 2019	No
1,3,5-Trimethylbenzene	2.6	Geosyntec, 2009	270	U.S. EPA, 2019	No
1,3-Dichlorobenzene	0.018	Geosyntec, 2009	--	--	--
1,4-Dichlorobenzene	0.077	Geosyntec, 2009	2.6	U.S. EPA, 2019	No
2,2-Dichloropropane	0.46	Geosyntec, 2009	--	--	--
2-Butanone (MEK)	0.0093	Geosyntec, 2009	27,000	U.S. EPA, 2019	No
4-Isopropyltoluene	0.13	Geosyntec, 2009	--	--	--
Acetone	0.25	Geosyntec, 2009	61,000	U.S. EPA, 2019	No
Benzene	0.18	Geosyntec, 2010	0.33	DTSC, 2019	No
Chlorobenzene	0.00099	Geosyntec, 2009	280	U.S. EPA, 2019	No
cis-1,2-Dichloroethene	1.5	Geosyntec, 2009	18	DTSC, 2019	No
Ethylbenzene	1	EKI, 2019	5.8	U.S. EPA, 2019	No
Isopropylbenzene (Cumene)	1.5	Geosyntec, 2009	1,900	U.S. EPA, 2019	No
Naphthalene	**4.2**	Geosyntec, 2009	2.0	DTSC, 2019	**Yes**
n-Butylbenzene	4.6	Geosyntec, 2009	2,400	DTSC, 2019	No
n-Propylbenzene	3.5	Geosyntec, 2009	3,800	U.S. EPA, 2019	No
sec-Butylbenzene	0.86	(e)	2,200	DTSC, 2019	No
Styrene	0.0013	EKI, 2019	6,000	U.S. EPA, 2019	No
tert-Butylbenzene	0.031	Geosyntec, 2009	2,200	DTSC, 2019	No
Tetrachloroethene	0.34	Geosyntec, 2009	0.59	DTSC, 2019	No
Toluene	3.3	Geosyntec, 2010	1,100	DTSC, 2019	No

Table K-1
Selection of PCOCs
5441 International Boulevard
Oakland, California

Detected Chemical in Soil (a)	Maximum Concentration in Soil (mg/kg)	Maximum Concentration Source (a)	Screening Level for Residential Soil (mg/kg)	Screening Level Source	PCOC?
VOCs *(continued)*					
trans-1,2-Dichloroethene	0.15	Geosyntec, 2009	130	DTSC, 2019	No
Trichloroethene (TCE)	**63**	EKI, 2019	0.94	U.S. EPA, 2019	**Yes**
Vinyl chloride	**0.019**	Geosyntec, 2009	0.0082	DTSC, 2019	**Yes**
Xylenes-m&p	4	EKI, 2019	550	U.S. EPA, 2019	No
Xylene-o	11	EKI, 2019	650	U.S. EPA, 2019	No
Xylenes	12	Geosyntec, 2010	580	U.S. EPA, 2019	No
PCBs					
Total PCBs	2,500	URS, 2003	0.24	U.S. EPA, 2019	No (c)
Aroclor 1260	**13,000**	Wood, 2018	0.24	U.S. EPA, 2019	**Yes**
SVOCs					
Benzo(a)anthracene	0.12	Geomatrix, 2002	1.1	DTSC, 2019	No
Benzo(a)pyrene	**0.49**	Geomatrix, 2002	0.11	DTSC, 2019	**Yes (d)**
Benzo(b)fluoranthene	0.7	Geomatrix, 2002	1.1	DTSC, 2019	No
Benzo(k)fluoranthene	0.12	Geomatrix, 2002	11	DTSC, 2019	No
Benzyl alcohol	54	EKI, 2019	6,300	U.S. EPA, 2019	No
Bis(2-Ethylhexyl)-phthalate	0.69	Geomatrix, 2002	39	DTSC, 2019	No
Chrysene	0.48	Geomatrix, 2002	110	DTSC, 2019	No
Fluoranthene	0.58	Geomatrix, 2002	2,400	DTSC, 2019	No
Isophorone	18	EKI, 2019	570	U.S. EPA, 2019	No
Phenanthrene	0.37	Geomatrix, 2002	--	U.S. EPA, 2019	No
Phenol	3.3	EKI, 2019	19,000	U.S. EPA, 2019	No
Pyrene	0.68	Geomatrix, 2002	1,800	DTSC, 2019	No
TPH					
Gasoline range	670	(e)	--	--	No
Diesel range	930	Geosyntec, 2010	--	--	No

Abbreviations:
BTEX = benzene, toluene, ethylbenzene, and xylenes
ft bgs = feet below ground surface
mg/kg = milligrams per kilogram
PAH = polycyclic aromatic hydrocarbons
PCOCs = potential chemical of concern
PCBs = polychlorinated biphenyls
SVOC = semi-volatile organic compounds
TPH = total petroleum hydrocarbons
U.S. EPA = United States Environmental Protection Agency
A double hyphen (--) indicates that no screening level is available for the indicated chemical from the listed sources.

Table K-1
Selection of PCOCs
5441 International Boulevard
Oakland, California

Notes:

(a) Detected chemicals and maximum concentration in soil obtained from Table 1 (URS, 2003), Tables 2, 5, and 6 (Geomatrix, 2002), Table 3 (Geosyntec, 2009), or Table 2 (Wood, 2018). TPH (diesel range) and BTEX data obtained from Geosyntec, 2010. Data to 15 ft bgs were considered, when available. Metals and SVOC data only available to 5 ft bgs in Geosyntec, 2002. Detected chemicals and maximum concentration in concrete obtained from Table 1 (EKI, 2019).

(b) Value shown is for insoluble salts.

(c) Total PCBs are not retained as PCOCs because only Aroclor 1260 was detected above laboratory reporting limits in soil samples collected by EKI in 2018 (2018). Historically, other Aroclors were rarely detected.

(d) Even though benzo(a)pyrene is identified as a PCOC, monitoring is not proposed for it due to the proximity of the site to I-880 and International Boulevard, and the fact that PAHs are byproducts of construction equipment combustion; it would be difficult to interpret the air data for this PCOC.

(e) See Appendix C of this report.

References:

DTSC, 2019. Human Health Risk Assessment (HHRA) Note Number 3, Department of Toxic Substances Control, April 2019.

EKI, 2019. Building Materials Sampling, EKI Environment & Water, Inc., 11 July 2019.

Geomatrix, 2002. Remedial Investigation Report, Geomatrix Consultants, Inc., 29 April 2002.

Geosyntec, 2009. 2006-2008 Field Investigations Report, Geosyntec Consultants, Inc., 13 March 2009.

Geosyntec, 2010. Underground Storage Tank Closure Report, Geosyntec Consultants, Inc., 2 February 2010.

URS, 2003. Baseline Human Health and Tier 1 Ecological Risk Assessment, URS Corporation, 8 August 2003.

U.S. EPA, 2019. Regional Screening Levels - Generic Tables, U.S. Environmental Protection Agency, May 2019.

Wood, 2018. Five Year Status Report for the Period August 2013 through December 2017, Wood Environment & Infrastructure, Inc., June 2018.

Table K-2
Human Health Exposure Assumptions
5441 International Boulevard
Oakland, California

Parameter	Variable	Value	Units	Reference/Comment
Exposure Duration	**ED**			
Off-Site Child Receptor		1	year	Professional Judgment
Off-Site Commercial/Industrial Worker		1	year	Professional Judgment
Exposure Frequency	**EF**			
Off-Site Child Receptor		225	days/year	Professional Judgment (= 5 days per week for 45 weeks, based on conservative estimate of construction activities)
Off-Site Commercial/Industrial Worker		225	days/year	Professional Judgment (= 5 days per week for 45 weeks, based on conservative estimate of construction activities)
Exposure Time	**ET**			
Off-Site Child Receptor		8	hr/day	Based on an 8 hour work day
Off-Site Commercial/Industrial Worker		8	hr/day	Based on an 8 hour work day
Averaging Time	**AT**			
Non-Carcinogens				
Off-Site Child Receptor		365	days	= Exposure Duration (DTSC, 2019; U.S. EPA 2019)
Off-Site Commercial/Industrial Worker		365	days	= Exposure Duration (DTSC, 2019; U.S. EPA 2019)
Carcinogens				
All Populations (70 years)		25,550	days	DTSC, 2019; U.S. EPA 2019
Target Risk	**TR**			
Carcinogens		1E-06	unitless	U.S. EPA, 2019
Non-Carcinogens		1 (a)	unitless	U.S. EPA, 2019

Abbreviations:
Cal-EPA = California Environmental Protection Agency
cm = centimeters
DTSC = Department of Toxic Substances Control
hr/day = hours per day
kg = kilograms
m^3/day = cubic meters per day
U.S. EPA = United States Environmental Protection Agency

Notes
(a) Also known as the Hazard Quotient.

References:
DTSC, 2019. Human Health Risk Assessment (HHRA) Note Number 1, California Department of Toxic Substances Control, 9 April 2019.
U.S. EPA, 2019. Regional Screening Levels - Generic Tables, U.S. Environmental Protection Agency, May 2019.

Table K-3
Risk-Based Action Levels for Non-Carcinogenic PCOCs
5441 International Boulevard
Oakland, California

Chemical Class	PCOCs	ATSDR Minimal Risk Levels (2019) (a)			U.S. EPA Response Action Level (2014)	Toxicity Value in Reference (b)						Toxicity Value as a REL/RfC (c)	Risk-Based Action Level (d)	
		Acute Inhalation (mg/m^3)	Intermediate Inhalation (mg/m^3)	Chronic Inhalation (mg/m^3)	(mg/m^3)	Acute REL or RfC (ug/m^3)	Acute REL or RfC Source	Chronic REL or RfC (ug/m^3)	Chronic REL or RfC Source	RfDo (mg/kg-day)	RfDo Source	(ug/m^3)	Child Off-Site Resident (mg/m^3)	Adult Off-Site Worker (mg/m^3)
Metals	Arsenic	--	--	--	--	2.0E-01	OEHHA	1.5E-02	OEHHA-PR	3.5E-06	OEHHA-PR	1.5E-02	7.3E-05	7.3E-05
	Cobalt	--	--	1.0E-04	--	--	--	6.0E-03	RSL	3.0E-04	RSL	6.0E-03	2.9E-05	2.9E-05
	Copper	--	--	--	--	1.0E+02	OEHHA	--	--	4.0E-02	RSL	1.6E+02	7.8E-01	7.8E-01
VOCs	1,2,3-Trichlorobenzene	--	--	--	--	--	--	--	--	8.0E-04	RSL	3.2E+00	1.6E-02	1.6E-02
	1,2,4-Trichlorobenzene	--	--	--	--	--	--	2.0E+00	RSL	1.0E-02	IRIS	2.0E+00	9.7E-03	9.7E-03
	Naphthalene	--	--	3.7E-03	--	--	--	3.0E+00	IRIS	2.0E-02	IRIS	3.0E+00	1.5E-02	1.5E-02
	Trichloroethene	--	2.2E-03	2.2E-03	2.0E-03	--	--	2.0E+00	IRIS	5.0E-04	IRIS	2.0E+00	9.7E-03	9.7E-03
	Vinyl Chloride	1.3E+00	7.7E-02	--	--	1.8E+05	OEHHA	1.0E+02	IRIS	3.0E-03	IRIS	1.0E+02	4.9E-01	4.9E-01
PCBs	Aroclor 1260	--	--	--	--	--	--	--	--	2.0E-05 (e)	IRIS	3.0E-02 (f) 8.0E-02	3.0E-05 (g) --	-- 8.0E-05 (g)

Abbreviations:
ATSDR = Agency for Toxic Substances and Disease Registry
BAAQMD = Bay Area Air Quality Management District
mg/kg-day = milligrams per kilogram per day
mg/m^3 = milligrams per cubic meter
OEHHA = Office of Environmental Health Hazard Assessment
PCOCs = potential chemical of concern
A double hyphen (--) indicates that no data for the indicated parameter are available from the listed sources.
PCBs = polychlorinated biphenyls
ppm = parts per million
REL = reference exposure level
RfC = reference concentration
RfDo = oral reference dose
U.S. EPA = United States Environmental Protection Agency

Notes:
(a) Inhalation Minimal Risk Levels in ppm were converted to mg/m^3 using EPA's online Indoor Air Unit Conversion tool (https://www3.epa.gov/ceampubl/learn2model/part-two/onsite/ia_unit_conversion.html).
(b) This table summarizes calculation of risk-based Action Levels for those PCOCs for which BAAQMD regulatory limits were not available. Toxicity values for the PCOCs for which risk-based action levels are being calculated were obtained from the following sources, in order of preference:
1. Peer-reviewed toxicity data from California Environmental Protection Agency, Office of Environmental Health Hazard Assessment ("OEHHA-PR"), *(https://www.dtsc.ca.gov/LawsRegsPolicies/Regs/upload/Final-Toxicity-Criteria-Rule-Rule-Text-Appdx-2018-09-04-clean.pdf).*
2. U.S. Environmental Protection Agency Integrated Risk Information System ("IRIS") *(https://www.epa.gov/iris),*
3. U.S. EPA Regional Screening Table (May 2019) ("RSL") or OEHHA Acute, 8-hour and Chronic Reference Exposure Levels ("OEHHA") *(https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables or https://oehha.ca.gov/air/general-info/oehha-acute-8-hour-and-chronic-reference-exposure-level-rel-summary).*

(c) Consistent with DTSC Note 3 (2019), when chronic RELs or RfCs were not available, RfDos were converted to RELs by multiplying them by the body weight (i.e., 80 kilograms ("kg")) and then by dividing them by the daily inhalation rate (i.e., 20 cubic meters per day ("m^3/day")). Also consistent with DTSC Note 3, this conversion factor (i.e., 80 kg/(20 m^3/day)) was used for off-site child and adult receptors.
(d) Risk-based Action Levels for non-carcinogenic PCOCs were calculated using Equation [1] (see text for details).
(e) The presented value is for Aroclor 1254.
(f) Value for an off-site child receptor. Based on discussions with the U.S. EPA's Toxic Substances Control Act PCB group, for PCBs, the REL for an off-site child receptor was calculated using a body weight of 15 kg and an inhalation rate of 10 m^3/day.
(g) The U.S. EPA's Toxic Substances Control Act PCB group recommended that the Toxicity Value as an RfC be used as the Action Level for PCBs.

References:

ATSDR, 2019. Minimal Risk Levels (MRLs), Agency for Toxic Substances & Disease Registry, June 2019. (https://www.atsdr.cdc.gov/mrls/mrllist.asp)
DTSC, 2019. Human Health Risk Assessment (HHRA) Note Number 3, California Department of Toxic Substances Control, April 2019.
OEHHA, 2016. All OEHHA Acute, 8-hour and Chronic Reference Exposure Levels (chRELs) as of June 2016, California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, (https://oehha.ca.gov/air/general-info/oehha-acute-8-hour-and-chronic-reference-exposure-level-rel-summary), 28 June 2016.
U.S. EPA, 2014. Memorandum to Region 9 Superfund Division Staff and Management Regarding EPA Region 9 Response Action Levels and Recommendations to Address Near-Term Inhalation Exposures to TCE in Air from Subsurface Vapor Intrusion, U.S. Environmental Protection Agency, 9 July 2014.
U.S. EPA, 2019a. Integrated Risk Information System database, U.S. Environmental Protection Agency.
U.S. EPA, 2019b. Regional Screening Levels - Generic Tables, U.S. Environmental Protection Agency, May 2019.

Table K-4
Risk-Based Action Levels for Carcinogenic PCOCs
5441 International Boulevard
Oakland, California

Chemical Class	PCOCs	Toxicity Value in References (a)				Weight of Evidence Classification (c)	Toxicity Value as IUR (b) (ug/m^3)$^{-1}$	Risk-Based Action Level (d)	
		IUR (ug/m^3)$^{-1}$	IUR Source	SFo ($mg/kg\text{-}day$)$^{-1}$	SFo Source			Child Off-Site Resident (mg/m^3)	Adult Off-Site Worker (mg/m^3)
Metals	Arsenic	4.3E-03	IRIS	9.5E+00	OEHHA-PR	A	4.3E-03	7.9E-05	7.9E-05
	Cobalt	9.0E-03	RSL	--	--	--	9.0E-03	3.8E-05	3.8E-05
	Copper	--	--	--	--	D	--	--	--
VOCs	1,2,3-Trichlorobenzene	--	--	--	--	D	--	--	--
	1,2,4-Trichlorobenzene	--	--	2.9E-02	RSL	D	7.3E-06	4.7E-02	4.7E-02
	Naphthalene	3.4E-05	OEHHA	1.2E-01	OEHHA	C	3.4E-05	1.0E-02	1.0E-02
	Trichloroethene	4.1E-06	IRIS	4.6E-02	IRIS	A	4.1E-06	8.3E-02	8.3E-02
	Vinyl Chloride	7.8E-05	OEHHA	7.2E-01	IRIS	A	7.8E-05	4.4E-03	4.4E-03
PCBs	Aroclor 1260	5.7E-04	OEHHA	2.0E+00	OEHHA	B2	5.7E-04	6.0E-04	6.0E-04

Abbreviations:
BAAQMD = Bay Area Air Quality Management District
SFo = oral slope factor
IUR = inhalation unit risk
mg/kg-day = milligrams per kilogram per day
A double hyphen (--) indicates that no data for the indicated parameter are available from the listed sources.
PCOCs = potential chemical of concern
PCBs = polychlorinated biphenyls
mg/m^3 = milligrams per cubic meter
ug/m^3 = microgram per cubic meter
VOCs = volatile organic compounds

Notes:
(a) This table summarizes calculation of risk-based Action Levels for those PCOCs for which BAAQMD regulatory limits were not available. Carcinogenic slope factors or inhalation unit risk factors were obtained from the following sources, in order of preference:
1. Peer-reviewed toxicity data from California Environmental Protection Agency, Office of Environmental Health Hazard Assessment ("OEHHA-PR"), *(https://www.dtsc.ca.gov/LawsRegsPolicies/Regs/upload/Final-Toxicity-Criteria-Rule-Rule-Text-Appdx-2018-09-04-clean.pdf).*
2. U.S. Environmental Protection Agency Integrated Risk Information System ("IRIS") *(https://www.epa.gov/iris),*
3. U.S. EPA Regional Screening Table (May 2019) ("RSL") or OEHHA Toxicity Criteria Database ("OEHHA") *(https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables or http://www.oehha.ca.gov/risk/ChemicalDB/index.asp).*

(b) Consistent with DTSC Note 3 (2019), when IURs were not available, CSFos were converted to IURs by multiplying them by the daily inhalation rate and then dividing them by the body weight (i.e., ($20m^3$/day)/80kg). The CSFo can be used for the IUR by performing this route-to-route extrapolation.
(c) U.S. EPA weight-of-evidence classification is as follows:
A = Human Carcinogen
B1 or B2 = Probable Human Carcinogen; B1 indicates that limited human data are available; B2 indicates that there is sufficient evidence in animals and inadequate or no evidence in humans.
C = Possible Human Carcinogen
D = Not Classifiable as to Human Carcinogenicity
E = Evidence of Non-Carcinogenicity for Humans
Weight-of-evidence information was obtained from IRIS.
(d) Risk-based Action levels for carcinogenic PCOCs were calculated using Equation [2] (see text for details).

References:
DTSC, 2019. Human Health Risk Assessment (HHRA) Note Number 3, California Department of Toxic Substances Control, April 2019.
OEHHA, 2019. Toxicity Criteria Database, California Environmental Protection Agency, Office of Environmental Health Hazard Assessment (http://www.oehha.ca.gov/risk/ChemicalDB/index.asp).
U.S. EPA, 2019a. Integrated Risk Information System database, U.S. Environmental Protection Agency.
U.S. EPA, 2019b. Regional Screening Levels - Generic Tables, U.S. Environmental Protection Agency, May 2019.

Table K-5
Summary of Action Levels for PCOCs, PM10, and Total VOCs
5441 International Boulevard
Oakland, California

Chemical Class	PCOCs and PM10	Regulatory Limit (mg/m^3)	ATSDR MRL (a) (Table K-3) (mg/m^3)	U.S. EPA Accelerated Response Action Level (Table K-3) (mg/m^3)	Non-Carcinogenic Risk-Based Action Level (Table K-3)		Carcinogenic Risk-Based Action Level (Table K-4)		Selected Action Level (b) (mg/m^3)
					Child (mg/m^3)	Adult (mg/m^3)	Child (mg/m^3)	Adult (mg/m^3)	
Metals	Arsenic	--	--	--	7.3E-05	7.3E-05	7.9E-05	7.9E-05	7.3E-05
	Cobalt	--	1.0E-04	--	2.9E-05	2.9E-05	3.8E-05	3.8E-05	2.9E-05
	Copper	--	--	--	7.8E-01	7.8E-01	--	--	7.8E-01
	Lead	1.0E-03	--	--	na	na	na	na	1.0E-03
VOCs	1,2,3-Trichlorobenzene	--	--	--	1.6E-02	1.6E-02	--	--	1.6E-02
	1,2,4-Trichlorobenzene	--	--	--	9.7E-03	9.7E-03	4.7E-02	4.7E-02	9.7E-03
	Naphthalene	--	3.7E-03	--	1.5E-02	1.5E-02	1.0E-02	1.0E-02	3.7E-03
	Trichloroethene	--	2.2E-03	2.0E-03	9.7E-03	9.7E-03	8.3E-02	8.3E-02	2.0E-03
	Vinyl Chloride	--	7.7E-02	--	4.9E-01	4.9E-01	4.4E-03	4.4E-03	4.4E-03
PCBs	Aroclor 1260	--	--	--	3.0E-05	8.0E-05	6.0E-04	6.0E-04	3.0E-05 / 8.0E-05
PM10	PM10	5.0E-02 (24-hour avg) (c)	--	--	--	--	--	--	1.1E-01 (8-hour avg) (d)
Total VOCs	Total VOCs	--	--	--	--	--	--	--	1 ppmv

Abbreviations

ATSDR = Agency for Toxic Substances and Disease Registry
avg = average
BAAQMD = Bay Area Air Quality Management District
mg/kg = milligrams per kilogram
mg/m^3 = milligrams per cubic meter
na = not applicable because BAAQMD regulatory limit available for this chemical
PCOCs = potential chemical of concern
PCBs = polychlorinated biphenyls
PM10 = particulate matter 10 micrometers in diameter or less
ppmv = parts per million by volume
TWA = time weighted average
VOCs = volatile organic compounds
A double hyphen (--) indicates that no data for the indicated parameter are available from the listed sources.

Notes:

(a) The most conservative of the available chronic and intermediate inhalation MRLs is shown.
(b) The selected Action Level for each PCOC is based on the following hierarchy: (1) BAAQMD value and (2) most conservative value from the following: chronic ATSDR inhalation Minimal Risk Level; U.S. EPA Accelerated Response Action Level for Trichloroethene; calculated site-specific non-carcinogenic risk-based Action Level, and calculated site-specific non-carcinogenic risk-based Action Level. These Action Levels are based on an 8-hour averaging time unless otherwise noted.
(c) California Ambient Air Quality Standard for PM10, which is a 24-hour time-weighted average (California Code of Regulations, Title 17, Section 70200).
(d) The PM10 8-hour TWA Action Level of 0.110 mg/m^3 is based on the California Ambient Air Quality Standard for PM10 and a background PM10 concentration of 0.0214 mg/m^3; see text for derivation.

Table K-5
Summary of Action Levels for PCOCs, PM10, and Total VOCs
5441 International Boulevard
Oakland, California

References:

BAAQMD, 1982. Bay Area Air Quality Management District Rules and Regulations, Regulation 11-Rule 1, Lead, Bay Area Air Quality Management District Rules and Regulations.

DTSC, 2019. Human Health Risk Assessment (HHRA) Note Number 1, California Department of Toxic Substances Control, 9 April 2019.

Table K-6
Comparison of PCOC Action Levels as PM10 to the PM10 Action Level
5441 International Boulevard
Oakland, California

Chemical Class	PCOCs	Selected Action Level (Table K-5) (mg/m^3)	Maximum Concentration Detected in Soil (Table K-1) (mg/kg)	Calculated PM10 Concentration that Meets Action Level (a) (mg/m^3)
Metals	Arsenic	7.3E-05	100	7.3E-01
	Cobalt	2.9E-05	53	5.5E-01
	Copper	7.8E-01	20,000	3.9E+01
	Lead	1.0E-03	4,062 (b)	2.5E-01
PM10 Action Level (Table K-5)				1.1E-01 (8-hour avg)

Abbreviations:

avg = average
mg/kg = milligrams per kilogram
mg/m^3 = milligrams per cubic meter
PCOCs = potential chemical of concern
PM10 = particulate matter 10 micrometers in diameter or less
UCL = upper confidence level
U.S. EPA = United States Environmental Protection Agency
VOCs = volatile organic compounds

Notes:

(a) Conservative estimate of the PM10 dust concentration that meets the Action Level (i.e., that should not result in adverse health effects) was calculated using Equation [3] of the Perimeter Air Monitoring Plan.
(b) Value shown is the 95% UCL of the mean concentration of available lead in soil data (Geomatrix, 2002 and Geosyntec, 2010), which was calculated with the latest version of U.S. EPA's ProUCL software (version 5.1).

References:

Geomatrix, 2002. Remedial Investigation Report, Geomatrix Consultants, Inc., 29 April 2002.
Geosyntec, 2010. Underground Storage Tank Closure Report, Geosyntec Consultants, Inc., 2 February 2010.

Table K-7
Potential 5-Minute TWA PM10 Trigger Levels for PCBs
5441 International Boulevard
Oakland, California

Chemical Class	PCOCs	Action Level (Table K-5) (mg/m^3)	Maximum PCB Concentration in Excavation (mg/kg)	Excavation Area(s)/ PCB Abatement Area/ Construction Activity (b)	Potential 5-Minute TWA PM10 Trigger Levels (a)	
					Off-Site Child (mg/m^3) (c)	Off-Site Adult (mg/m^3)
PCBs	Aroclor 1260	3.0E-05 / 8.0E-05	13,000	Trench 1	0.0023	0.0062
			11,000	S-626, W-613, W-792	0.0027	0.007
			3,400	S-604	0.0088	0.024
			2,500	S-602 and S-702	0.012	0.032
			1,900	S-704 and Trench 2	0.016	0.042
			1,600	B1-034/B1-044/1BH-19 (concrete)	0.019	0.050
			1,500	S-015	0.020	0.053
			1,400	S-012 and S-014	0.021	0.057
			1,000	S-703, G-002 (d)	**0.030**	0.080
			900		0.033	0.089
			800		0.038	0.100
			700		0.043	0.11
			600		**0.050**	0.13
			50	Mass grading and post-remediation/abatement soil handling activities	0.600	1.60

Abbreviations:
mg/kg = milligrams per kilogram
mg/m^3 = milligrams per cubic meter
PCBs = polychlorinated biphenyls
PCOCs = potential chemical of concern
PM10 = particulate matter 10 micrometers in diameter or less
SCAQMD = South Coast Air Quality Management District
TWA = time-weighted average
U.S. EPA = United States Environmental Protection Agency

Notes:
(a) Potential 5-minute PM10 Trigger Levels for an off-site child and adult receptors calculated in accordance with sample calculations provided by the U.S. EPA's Toxic Substances Control Act PCB group (U.S. EPA, 2019).
(b) Prior to the performance of these activities, an approximately 16-foot tall privacy fence will be installed as a noise/dust barrier along the northern boundary of the site with adjoining residences and the remaining fencing around the perimeter of the site will be retrofitted with a SCAQMD compliant windscreen.
(c) Bolded values represent Trigger Levels for the site.
(d) The maximum PCBs concentration for these excavation areas is 840 mg/kg.

References:
U.S. EPA, 2019. EPA Comments on TSCA Approval Application. Memorandum from Steven Armann of EPA to Brendan Kotler of Bridge and Lance Hauer of GE, 12 July 2019.

Table K-8
Summary of PM10 Trigger Levels
5441 International Boulevard
Oakland, California

PCBs Concentration (mg/kg)	**PM10 Trigger Level** (mg/m^3)	**Rationale/Contractor Response (a)**
PCBs > 1,000	Not Applicable (b)	Dust-generating activities will be performed within an enclosure that is vented to air pollution control equipment and the demolished materials will be directly loaded into bins that can be sealed.
600 < PCBs ≤ 1,000	3.0E-02 (5-min avg) (c)(d)	If the 5-minute TWA PM10 Trigger Level is exceeded at any of the PAM stations, the Contractor will increase dust suppression efforts.
	3.0E-02 (30-min avg) (c)(d)	If the 30-minute TWA PM10 Suspend Work Level (i.e., 0.030 mg/m^3) is exceeded at any of the PAM stations, the Contractor will temporarily stop work and reassess site activities and dust control measures.
50 ≤ PCBs ≤ 600	5.0E-02 (5-min avg) (c)(d)	If the 5-minute TWA PM10 Trigger Level is exceeded at any of the PAM stations, the Contractor will increase dust suppression efforts.
	5.0E-02 (30-min avg) (c)(d)	If the 30-minute TWA PM10 Suspend Work Level (i.e., 0.050 mg/m^3) is exceeded at any of the PAM stations, the Contractor will temporarily stop work and reassess site activities and dust control measures.
PCBs < 50	1.1E-01 (5-min avg) (e)	If the 5-minute TWA PM10 Trigger Level is exceeded at any of the PAM stations, the Contractor will increase dust suppression efforts.
	1.1E-01 (30-min avg) (e)	If the 30-minute TWA PM10 Suspend Work Level (i.e., 0.110 mg/m^3) is exceeded at any of the PAM stations, the Contractor will temporarily stop work and reassess site activities and dust control measures.
Visible Fugitive Dust		If visible fugitive dust is observed at or beyond the site perimeter during activities that generate dust, the Contractor will increase its dust suppression efforts by implementing additional dust control measures to reduce dust levels.

Abbreviations:
avg = average
BAAQMD = Bay Area Air Quality Management District
mg/kg = milligrams per kilogram
mg/m^3 = milligrams per cubic meter
PAM = perimeter air monitoring
PCBs = polychlorinated biphenyls
PM10 = particulate matter 10 micrometers in diameter or less
SCAQMD = South Coast Air Quality Management District
TWA = time-weighted average
U.S. EPA = United States Environmental Protection Agency

Notes:
(a) Prior to the performance of dust generating activities, an approximately 16-foot tall privacy fence will be installed as a noise/dust barrier along the northern boundary of the site with adjoining residences and the remaining fencing around the perimeter of the site will be retrofitted with a SCAQMD compliant windscreen.
(b) Consistent with SCAQMD Rule 1466, real-time PM10 monitoring is not proposed during excavation and/or demolition activities within enclosures because the release of PM10 will be mitigated.
(c) This PM10 Action Level is from Table K-7.
(d) Background air samples will be collected to evaluate site-specific upwind concentrations of PCBs to determine if subtraction of PM10 concentrations (difference between PM10 concentrations measured at upwind and the downwind monitoring station(s)) is appropriate.
(e) Subtraction of PM10 concentrations will be performed if PCB concentrations are below 50 mg/kg.

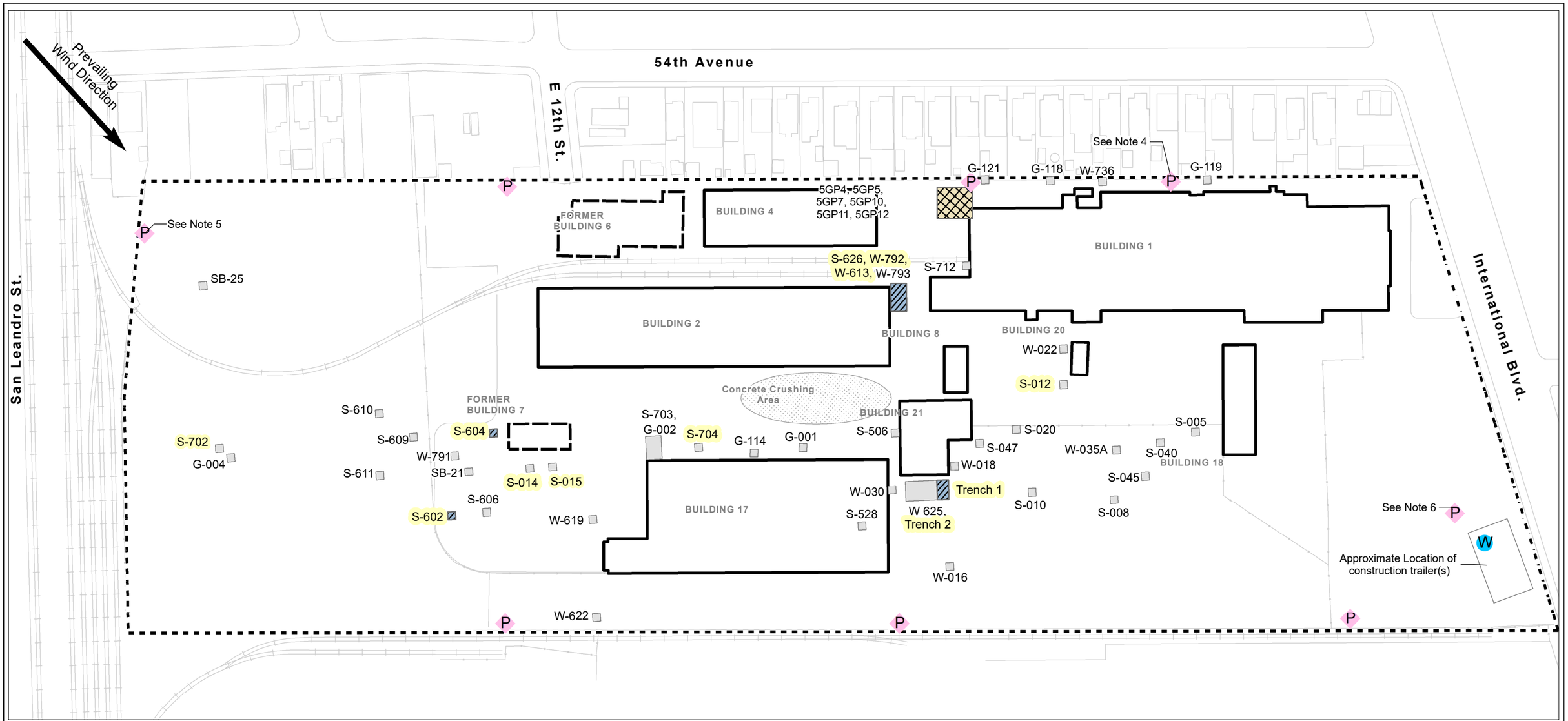
Table K-9
Perimeter Air Sampling Equipment and Analytical Methods
5441 International Boulevard
Oakland, California

Chemical Class	PCOCs and Dust	Sampling Equipment	Filter Media	Anticipated Sampler Flow Rate	Duration of Sampling Event	Analytical Method	Anticipated Turn Around Time After Lab Receives Samples	Typical Analytical Reporting Limit (mg/m^3)	Selected Action Level (Table K-5) (mg/m^3)
Metals	Arsenic	Battery Powered Air Sampling Pump (a) coupled to a PM10 PEM (b)	Two 37 mm MCE cassettes	10 liters per minute	8 hours	U.S. EPA Method 6020	24 hours	1.25E-05	7.3E-05
	Cobalt							1.25E-05	2.9E-05
	Copper							1.25E-05	7.8E-01
	Lead							1.25E-05	1.0E-03
VOCs	1,2,3-Trichlorobenzene	6-Liter Summa Vacuum Canister and flow controller	None	3.8 ml/min	8 hours	EPA Method TO-15 SIM	24 hours	1.48E-04	1.6E-02
	1,2,4-Trichlorobenzene							1.48E-04	9.7E-03
	Naphthalene							5.24E-04	3.7E-03
	Trichloroethene							5.37E-05	2.0E-03
	Vinyl Chloride							2.56E-05	4.4E-03
	Total VOCs	OVM	None	na	Instantaneous	Photoionization Field Meter	na	0.1 ppmv	1 ppmv
PCBs	Aroclor 1260	Battery Powered Air Sampling Pump (c) coupled to a PM10 PEM (d)	PUF cartridge	4 liters per minute	8 hours	U.S. EPA TO-10A	24 hours	1.00E-05	3.0E-05 / 8.0E-05
PM10	PM10	TSI Dusttrak II equipped with a PM10 impactor inlet (or equivalent) with telemetry	None	na	8 hours	na (Real-Time Method) (c)	na	na	1.1E-01 (8-hour avg)

Table K-9
Perimeter Air Sampling Equipment and Analytical Methods
5441 International Boulevard
Oakland, California

Abbreviations:
avg = average
MCE = mixed cellulose ester
mg/m^3 = milligrams per cubic meter
na = not applicable
OVM = organic vapor meter
PCOCs = potential chemical of concern
PCBs = polychlorinated biphenyls
PEM = personal environmental monitor
PUF = polyurethane foam
ppmv = parts per million by volume
U.S. EPA = United States Environmental Protection Agency
VOCs = volatile organic compounds
PM10 = particulate matter 10 micrometers in diameter or less

Notes:
(a) Personal air sampling pump - Leland Legacy Pump or equivalent.
(b) 10 liters per minute PM10 PEM (SKC 761-200B or equivalent)
(c) Personal air sampling pump - Gilian Model GilAir 5 or equivalent.
(d) 4 liters per minute PM10 PEM (SKC 761-200A or equivalent)



Legend

- Hotspot PCB Excavation
- PCB Excavation
- VOC Excavation
- Former Building
- Existing Building
- Site Property Boundary
- S-602 Tented Excavation Location
- Concrete Crushing Area
- P Proposed Location of Perimeter Air Monitoring Station
- W Proposed Location of Weather Station

Abbreviations

PCB = Polychlorinated biphenyl
VOC = Volatile organic compound

Notes

1. EKI proposed excavation limits shown in blue, grey, and tan.
2. Excavation labels represent sampling locations shown on Table 2 and Figures 4 and 5 of the RDIP Addendum main text.
3. Actual locations of the air monitoring stations will depend on where demolition and active soil handling is occuring and the actual observed wind direction.
4. During construction activities in the southeastern portion of the site, the perimeter air monitoring equipment at this location will be relocated to the perimeter air monitoring location along the southwestern boundary of the site (see Note 5).
5. Potential perimeter air monitoring location that will only be used while construction activities are being conducted in the southeastern portion of the site.
6. Approximate location. Perimeter air monitoring station will be installed on the fencing surrounding the construction support zone.

0 125 250
Feet

DRAFT FINAL

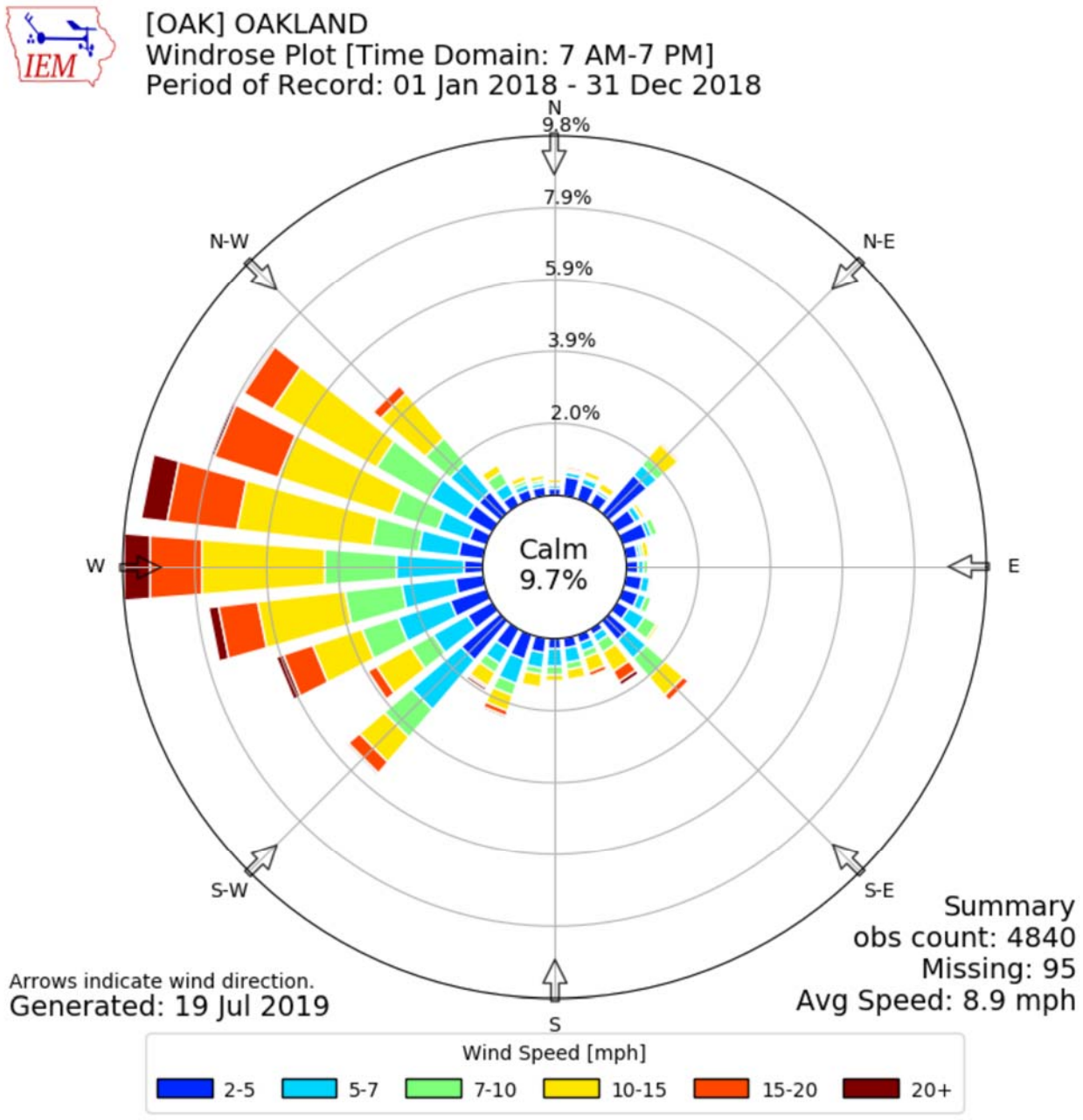
Proposed Perimeter Air Monitoring and Weather Station Locations

5441 International Blvd.
Oakland, CA
August 2019
B70123.01
Figure K-1

eki environment & water

Path: X:\B70123\Maps_01\2019\08\FigK1_PAM.mxd

Wind Speed Direction (Blowing From)



Notes

1. This figure represents a graphic summary of the direction of prevailing wind at the Oakland Airport, which is located approximately 3 miles southwest of the site, based on wind data collected between January and December 2018 between the hours of 0700 and 1900.
   Data obtained from: https://tinyurl.com/y2myylax
2. The percentage values indicate the fraction of the time that wind was blowing from the indicated direction.

2018 Wind Rose for Oakland Airport

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5441 Industrial Blvd.
Oakland, CA
August 2019
EKI B70123.01

Figure K-2

APPENDIX L

HEALTH AND SAFETY PLAN

5441 International Boulevard
Oakland, California

Draft Final - August 2019

(EKI B70123.01)

Not included in this version.
To be submitted under separate cover for DTSC review and approval prior to the start of work.

APPENDIX M

CONSTRUCTION STORM WATER POLLUTION PREVENTION PLAN

5441 International Boulevard
Oakland, California

Draft Final - October 2019

(EKI B70123.01)

APPENDIX M
CONSTRUCTION STORM WATER POLLUTION PREVENTION PLAN

5441 International Boulevard
Oakland, California

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CONSTRUCTION STORM WATER POLLUTION PREVENTION PLAN

5441 International Boulevard
Oakland, California

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1. INTRODUCTION

EKI Environment & Water, Inc. ("EKI") has prepared this Construction Storm Water Pollution Prevention Plan ("SWPPP") on behalf of Bridge Acquisition, LLC ("Bridge" or "Developer") for the property located at 5441 International Boulevard, Oakland, California ("site"). This SWPPP describes the minimum storm water pollution prevention procedures that will be employed by Bridge's contractor ("Contractor") during demolition, remediation, and soil handling activities conducted during the planned site redevelopment, which are described in the main text of the Remedial Design Implementation Plan ("RDIP") Addendum, to which this plan is an Appendix.

This SWPPP is prepared pursuant to the requirements of the National Pollution Discharge Elimination System ("NPDES") *General Permit for Storm Water Discharges Associated with Construction Activity,* Water Quality Order 2009-0009-DWQ amended by 2010-0014-DWQ and 2012-0006-DWQ ("General Permit") issued by the State of California Water Resources Control Board ("SWRCB").

The Contractor or other Bridge representative will be required to comply with the General Permit and submit the following permit registration documents ("PRDs") prior to the start of field activities: (1) Notice of Intent ("NOI"), (2) risk assessment, (3) site map, (4) SWPPP (either this SWPPP with Addendum or a new SWPPP for the site incorporating General Permit-required information made available during the construction design phase of the redevelopment work, including relevant forms examples [see Attachment M-1]), (5) annual fee, and (6) certification. The PRDs shall be prepared and certified by a Qualified SWPPP Developer, in accordance with the General Permit requirements for the project Risk Level determined for the site. Bridge or its representative will be responsible for observing Contractor implementation of the SWPPP by conducting periodic reviews of Contractor efforts.

Construction at the site is regulated by the General Permit based on the size of the site and the nature of the activities, which will include excavation, stockpiling, and removal and replacement of soil. The NOI and all Permit Registration documents will be submitted to the SWRCB by the Contractor or Bridge representative to obtain coverage under the General Permit.

1.1 Purpose and Objectives

The SWPPP has been prepared to help identify pollutants and their sources, including sources of sediment associated with construction, construction site erosion, and other construction related activities that may affect the quality of storm water discharges. The SWPPP is also designed to help identify and address non-storm water discharges at the site. In addition, the SWPPP has been prepared to propose site-specific best

management practices ("BMPs") to reduce or prevent discharges of pollutants associated with storm water discharges and authorized non-storm water discharges and to identify a maintenance schedule for BMPs.

1.2 SWPPP Amendments

The General Permit now requires that SWPPPs be written, amended, and certified by a Qualified SWPPP Developer. The Contractor or other Bridge representative will be required to prepare an addendum to this SWPPP (or a new SWPPP for the site), which shall be prepared and certified by a Qualified SWPPP Developer, in accordance with the General Permit requirements.

Changes to the SWPPP will also be included in the addendum if more economical or effective means are identified to reduce pollutant loading to storm water than the ones currently proposed.

2. SITE DESCRIPTION

2.1 Chemicals of Concern

Aroclor 1260, metals, chlorinated volatile organic compounds ("cVOCs"), and semi-volatile organic compounds ("SVOCs") have been detected in soil, soil gas, groundwater, and storm drain sediments at the site. During soil excavation, workers may encounter these chemicals in soil, soil gas, and/or groundwater.

2.2 Risk Level Determination

The General Permit categorizes construction projects according to Risk Levels, which are determined based on the sediment and receiving water risks at the site. The sediment risk is determined based on the rate of soil loss for the site, which is calculated from the RUSLE equation shown below:

Equation 1 Soil Loss (RUSLE) Equation

$$A = R \times K \times LS \times C \times P$$

where:

A	soil erosion rate (tons/acre)
R	rainfall-runoff erosivity factor
K	soil erodibility factor
LS	length-slope factor
C	cover factor (erosion controls)
P	management operations and support practices (sediment controls)

Maps showing R, K, and LS factors are available on the SWRCB website.[1] Based on these maps, the site has an R of 40, most of the site has a K of 0.37 (the northeastern portion of the site has a K of 0.24), and a LS of 0.32. Assuming C and P are equal to 1 (to simulate bare ground conditions), the calculated rate of soil loss is 4.7 tons per acre,[2] which classifies as low sediment risk.

A map[3] showing the areas determined to have low and high receiving water risk is also available from the SWRCB. Based on the site location, the site has low receiving water risk. The receiving water for the site is the San Leandro Bay.

Sites with low sediment risk and low receiving water risk are classified as Risk Level 1 for purposes of storm water monitoring and reporting, as described in the General Permit. A Risk Level 1 is, therefore, assumed for the site. Risk Level 1 projects are subject to minimum BMP and visual monitoring requirements.

2.3 Identification of Potential Pollutant Sources

Potential pollutant sources during implementation of remedial activities and construction include disturbed soil, which can generate dust and sediment, contaminated soil exposed to wind and rain, removed and crushed concrete, and spills from construction vehicles and construction-related facilities. Extracted groundwater and decontamination wash water may be treated on-site if needed based on comparison of analytical results to discharge or re-use requirements. This water would be used for dust control, discharged to the East Bay Municipal District ("EBMUD") sanitary sewer system, or discharged to the storm drain system under a NPDES permit (e.g., Order No. R2-2017-0048 NPDES Permit No. CAG912002 (VOC and Fuel General

[1] http://www.swrcb.ca.gov/water_issues/programs/stormwater/constpermits.shtml

[2] Soil loss of less than 15 tons/acre is considered low sediment risk.

[3] https://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/constpermits/guidance/receivingwaterrisk.pdf

Permit)). Construction activities, potential pollutant sources, and potential pollutants are summarized in Table M-1.

2.4 Drainage Patterns

Twenty-two catch basins are present at the site (see Figure M-1). Based on topography, on-site water generally drains to these catch basins. As part of remediation and redevelopment activities, on-site catch basins and storm drain lines will be abandoned in place or removed. MH-24, the final discharge location before storm water leaves the site, will be replaced in the same location with a replacement manhole. During construction and until the new storm drain system is installed and operational, the storm drain leaving the site will be plugged to prevent off-site discharge. Prior to the start of construction activities, the existing storm drain will be operational. Site activities that may occur during this time include site demolition and soil excavation.

During construction, the existing perimeter curb will be retained on-site, and together with driveway berms, will be used to restrict off-site storm water run-on and keep runoff on-site.[4] Runoff collected on-site will be allowed to infiltrate or, if needed because of conflict with redevelopment construction, will be stored, sampled, treated (if needed based on discharge or re-use requirements), and used for dust control or discharged under the appropriate permit to either the EBMUD sanitary sewer or the City of Oakland's ("the City's") storm drain system.

During the wet season, existing groundwater extraction wells EW-1, EW-2, and EW-3, located on the western (downgradient) property boundary will be operated and monitored to the extent practicable to demonstrate that storm water infiltration while the site is not capped does not result in changes in the trends for chemicals of concern ("COCs") in extracted groundwater. Groundwater from extraction wells EW-1, EW-2, and EW-3 will be sampled quarterly when the wells are operating during the wet season until the new cap is in place. Extraction well groundwater samples will be collected as described in the Field Sampling and Laboratory Analysis Plan Addendum ("SAP"; Appendix N of the RDIP Addendum). Consistent with the existing sampling protocols for the groundwater extraction and treatment system ("GETS")[5], samples collected from EW-1, EW-2 and EW-3 will be analyzed for:

- VOCs by U.S. Environmental Protection Agency ("EPA") Method 8260B; and
- Polychlorinated biphenyls ("PCBs") by U.S. EPA Method 8082, Ultra Low Level ("ULL").

[4] The curb was designed for the 100-year storm event.

[5] GETS sampling protocols are described in the *Operation, Maintenance and Monitoring Plan, General Electric Site, 5441 International Boulevard, Oakland, California,* prepared by Geosyntec, dated 24 November 2015.

Redevelopment work is expected to commence during the dry season. Work will be staged such that extraction wells EW-1, EW-2, and EW-3 and the treatment system is operational throughout the wet season, i.e. October 15th through April 15th.[6]

After redevelopment activities have been completed, storm and surface water runoff on-site will be collected using a new system consisting of a new retaining wall/curb around the perimeter of the site and drainage and/or catch basins for the entire site (hardscape, parking lot, driveways, building, truck aprons, truck court, and aboveground landscaped areas) that is conveyed to a new storm drain system beneath the site (see Preliminary Grading and Drainage Plan included in Appendix D of the RDIP Addendum. This Preliminary Grading and Drainage Plan may be modified as the project progresses). The final discharge location before storm water leaves the site will be MH-24R, the replacement manhole to be installed in the same location as existing MH-24. The new storm water collection system and site grades will be designed to keep runoff on-site, restrict run-on from off-site, provide uniform drainage of the site, and prevent ponding except in the designated on-site, aboveground detention area during high flow storm events, as required to meet the City's Storm Drainage Design Standards (City, 2014).

3. BEST MANAGEMENT PRACTICES

Proposed BMPs that may be used at the site are outlined in Table M-2 and detailed guidelines for implementation of the BMPs are included in Attachment M-2. The guidelines provided in Attachment M-2 are excerpted from the California Stormwater Quality Association ("CASQA") *Stormwater Best Management Practice Handbook* (CASQA, 2015). In the SWPPP Addendum or new SWPPP for the site, the Contractor or Bridge representative will identify activity-specific BMPs based on the expected construction phases, schedule, and sequence. The Contractor or Bridge representative will use experience and professional judgment in the implementation of these guidelines.

3.1 Protection of Storm Water Inlets

Proposed BMPs for protection of off-site storm water inlets (SE-10, Storm Drain Inlet Protection) include the use of gravel bag berms or wattles filled with granular activated carbon around the inlet and filter fabric covering the grating (Table M-2 and Attachment M-2). Proposed BMPs to address sediment leaving the site include inspection and decontamination of vehicle tires as outlined in the Decontamination Plan (Appendix I of the RDIP Addendum), dust control measures during demolition, remediation, and redevelopment construction to prevent visible dust, including conducting street sweeping as outlined in the Dust Control Plan (Appendix J of the RDIP Addendum).

[6] As defined by the City of Oakland, the wet season begins on October 15 and ends on April 15 (City, 2019).

Proposed BMPs to address wind erosion include dust control measures as outlined in the Dust Control Plan (Appendix J of the RDIP Addendum). Protective devices at storm water inlets will be inspected before, during, and after storm events. In the event a major storm is predicted, the Contractor or Bridge representative will evaluate the need for removal of filter fabric from grating or replace it with a filter BMP designed to handle higher flows (e.g., REM TRITON™ Crescent filter or similar) in order to reduce the potential for localized flooding.

3.2 Protection of Soil from Storm Water

In general, the majority of the excavated soil is planned to be stockpiled on-site. When feasible, loading operations will be timed to occur during dry weather. Soil will be stockpiled on plastic sheeting or on a concrete or asphalt surface that will be subsequently removed as part of demolition activities. Non-active soil stockpiles will be covered with weighted plastic sheeting or tarps, and/or sprayed with a non-toxic chemical soil binder such as Hydroseal or equivalent to reduce contact between storm water and the soil stockpile. The stockpile will be managed in accordance with the BMPs outlined in Table M-2 and Attachment M-2. Additional controls including silt fences, straw bales, and sandbag or gravel bag dikes will be implemented if necessary, based on inspection and evaluation of implemented BMPs.

After the site cap is partially or completely removed, the existing perimeter curb will be retained on-site and, together with driveway berms, will be used to restrict run-on from off-site and keep runoff on-site during storm events. If the cap is partially or completely removed, exposed soil will be covered (e.g., with plastic sheeting) to prevent contact with storm water or the off-site storm drain line (if present) will be plugged and storm water will be allowed to infiltrate.

If during an inspection it is observed that runoff contains significant amounts of soil, a temporary cap will be placed on exposed soil in problem areas outside of work areas. In accordance with the Dust Control Plan (Appendix J of the RDIP Addendum), exposed soil could be sprayed with a non-toxic chemical dust suppressant (e.g., Gorilla-Snot® or equivalent) or stabilizer (e.g., Soiltac® or equivalent).

3.3 Chemical Storage

Any chemicals used on-site shall be stored in watertight containers with secondary containment or in a storage shed. An inventory of the products used or expected to be used, and the products produced or expected to be produced shall be maintained during the project.

3.4 Waste Handling

Waste handling BMPs will include spill prevention and control and management of solid wastes, hazardous wastes, and sanitary and septic wastes. Proposed BMPs for waste handling are detailed in Table M-2 and Attachment M-2. Liquid construction wastes, such as equipment decontamination wash water collected from the decontamination pad sump, will be periodically removed from the sump and transferred into 55-gallon drums or other appropriate containers. As outlined in the Decontamination Plan (Appendix I of the RDIP Addendum), if feasible based on water quality and other considerations, waste water may be treated on-site and used for dust control or discharged under the appropriate permit to either the EBMUD sanitary sewer or the City's storm drain system. Sanitation facilities located on-site will have proper containment to prevent discharges of pollutants to the storm water drainage system or receiving water and will be regularly inspected for leaks and spills. Waste disposal containers will be covered at the end of each work day and during rain events.

3.5 Control of Non-Storm Water Discharges

BMPs will also be implemented for the control of non-storm water discharges. The most likely potential sources of non-storm water discharges are from equipment and vehicle cleaning, fueling, maintenance activities, and the dewatering and water treatment system, if needed. BMPs will be used to prevent storm water pollution from leaks from dewatering and water treatment operations. Proposed BMPs to control non-storm water discharges are included in Table M-2 and Attachment M-2.

Groundwater will likely be encountered during remedial work at deep excavations. In addition to groundwater, water to be used or handled on-site includes decontamination water and water used for dust suppression purposes. The quantities of water to be handled may be high (variability is a function of precipitation, dust suppression, etc.), but nearly all groundwater will be treated and discharged via EBMUD lines or trucked off-site.

Groundwater contaminated with COCs may be accumulated for on-site treatment and discharge via EBMUD or trucked off-site. Groundwater accumulated for on-site treatment would be stored with secondary containment structures to contain spills. If a spill were to occur, the water would be contained with absorbent materials. After containment, the fluids and absorbent materials would be recovered and put in 55-gallon drums for appropriate disposal.

3.6 Schedule of Construction Activities

Construction will occur over approximately one year. The construction schedule will be developed as detailed design of the redevelopment project progresses and project

implementation nears. Modifications to the schedule will be managed by Bridge in accordance with Contract requirements.

4. EROSION AND SEDIMENT CONTROL

Erosion and sediment control BMPs will be implemented to retain soil and sediment on the construction site. These controls are grouped into two main phases: 1. Demolition and Remedial Excavation Phase, for the period when the site is capped and the existing storm drain system is operational, and 2. Construction Phase, for activities when the site is not capped and the off-site storm drain is plugged. Both phases of work will be covered under the General Permit stormwater requirements.

4.1 Demolition and Remedial Excavation Phase

Storm water from the site currently runs off as overland sheet flow to on-site catch basins. It then flows inside the on-site storm drain system to manhole MH-23, where it is pumped out to the surface, treated by bag filters, and runs off overland to the catch basin adjacent to manhole MH-24, which is the last on-site manhole and is connected to the City's storm drain system (see Figure M-1).

Site demolition and remediation excavation activities shall be considered regulated activities under the General Permit as they are part of a larger common plan of development that exceeds 1 acre. During this phase of work, existing sediment control measures will remain in place (fiber rolls and filter fabric for upstream catch basin inlet protection, storm water treatment via bag filters at MH-23, and FloGard® filtration material for inlet protection of catch basin CB-24, prior to discharge to MH-24 and flow off-site).

Other sediment control measures will include the BMPs as described in Section 3.1. Proposed sediment control BMPs include protecting storm drain inlets with gravel bags and filter fabric or other sediment removal means. Additional controls including silt fences, straw bales, sandbag dikes, granular activated carbon filled wattles, and sediment traps will be used, if necessary, based on inspection and evaluation of the site's BMPs and storm water monitoring.

BMPs including MH-24 will be inspected as described in Section 8.2 during site demolition and remediation excavation, when the site is still capped, the existing storm drain system is in place, and the off-site storm drain is not plugged. If this work occurs during the wet season,[7] sampling for PCBs will be performed to meet EPA requirements using the methods described in the SAP. PCB sampling will be included as part of the

[7] The City of Oakland requires storm water BMPs be in place and maintained from October 15th through April 15th, i.e. during the wet season (City, 2019).

non-visible pollutant monitoring program and will be conducted at MH-24 for each qualifying storm event per General Permit requirements. pH monitoring may also be conducted if it is determined that there are local sources of pH-altering material present (i.e., crushed concrete). Additionally, sediment samples will be collected and analyzed for PCBs if sediment is present in the MH-24 outfall. Non-visible pollutant monitoring in storm water will continue until the storm drain line is plugged and there is no off-site discharge.

EPA will be notified in writing of PCB detections in storm water and/or sediment within 3 days of receiving results from the laboratory. The written notification will include the medium sampled, the date of sampling, the PCB concentrations detected, response actions taken, and mitigation measures taken to prevent future detections of PCBs in storm water.

4.2 Construction Phase

After the cap is removed, erosion control for storm water runoff will meet the requirements of the General Permit and include appropriate grading of the site and installation and maintenance of fiber rolls (wattles) or other barrier BMPs (see Table M-2 and Attachment M-2) at the perimeter of the active construction areas or subareas to reduce storm water run-on to the site. The concrete curb that exists around the perimeter of the site (see Figure M-1) will prevent storm water runoff from leaving the site. BMPs currently in place in on-site drain inlets (e.g., fiber rolls and filter fabric) will be maintained and protected until the storm drain inlets are abandoned in-place or removed. Low points at the site within the perimeter concrete curbs will serve as erosion control for the site by allowing on-site storm water to infiltrate into the ground; however, storm water may be removed if needed.

Wind erosion will be controlled during construction using dust control measures as outlined in the Dust Control Plan (Appendix J of the RDIP Addendum).

In the case that pooled storm water needs to be removed, it will be stored in above-ground tanks, tested, and treated if needed prior to on-site use for dust control or permitted discharge to the sanitary sewer system or storm drain system. If needed, and based on the test results, water may be treated on-site using mobile treatment equipment consisting of the following potential treatment steps, to be refined through on-site testing (i.e., some unit process may be removed, reconfigured, or adjusted as needed based on field conditions):

(1) Influent storage tanks to allow for either batch or continuous operation of the system;
(2) Equalization tank (if needed);
(3) Electrocoagulation (“EC”) treatment unit for removal of dissolved solids (if needed);

(4) De-foaming & aeration/flocculation/clarifier tanks (if needed), chemical additives may be used at this step to enhance flocculation or adjust pH, if needed;
(5) Sludge thickener (if needed);
(6) Sand media filtration system (if needed);
(7) Bag filter vessels;
(8) Granular activated carbon vessels; and,
(9) Effluent storage tanks.

The "if needed" processes may not be included in the final system or may be phased out based on the results of on-site testing.

Erosion due to storm water runoff from stockpiles will be controlled by covering the stockpiles with weighted plastic.

5. STABILIZATION

The General Permit requires that all disturbed areas of a construction site be stabilized. A Notice of Termination must be filed when construction is complete and final stabilization has been reached or ownership has been transferred. Final stabilization at the site can be achieved by grading and/or compaction or when equivalent stabilization methods have been implemented (e.g., use of such BMPs as blankets, reinforced channel liners, soil cement, fiber matrices, geotextiles, or other erosion resistant soil coverings or treatments [e.g. temporary cap], see Dust Control Plan, Appendix J of the RDIP Addendum).

6. RUN-ON AND RUNOFF CONTROLS

Run-on from off-site will be limited during construction by the perimeter curb. However, if run-on from off-site sources is identified, it will be diverted from disturbed areas on the site. If run-on from off-site sources enters disturbed areas on the site, the run-on will be managed in the same way as site storm water or authorized non-storm water discharges. Runoff will be managed according to site storm water and non-storm water BMP procedures (see Sections 3 through 5).

7. SPILL RESPONSE

To address storm water or non-storm water contamination that may result from spills of material at the site, spill response measures will include spill kits located near waste and material storage areas on-site. Spill kits may include absorbent booms, cat litter, rags, or other materials that can be used to contain and clean up minor to semi-significant

spills as a first response. For significant spills that cannot be controlled by on-site personnel, the Contractor shall notify the emergency contacts listed on Table M-3.

Gasoline or diesel generators may be used to power perimeter air sampling equipment if electrical power is not available. The quantities of gasoline/diesel to be handled would be moderate (approximately 40 gallons per day), but handling will be limited to refueling of generators from gas cans designed for the purpose. If a gasoline or diesel spill were to occur, the spill would be contained with absorbent materials (e.g., absorbent pads). After containment, the fluids and absorbent materials would be recovered and put in 55-gallon drums for appropriate disposal.

8. INSPECTIONS AND RECORD KEEPING

Records and plans (including the SWPPP and all documents incorporated by reference) will be maintained on-site. Other records maintained by the Contractor and/or Bridge representative include:

- Material Safety Data Sheets ("MSDSs"),
- Sampling records, if any,
- Inspection records, and
- Records of emergency reports.

8.1 Material Safety Data Sheets for Chemicals Used or Stored on the Site during Construction

The only chemicals expected to be used on-site during remediation are odor and vapor suppressants, diesel fuel for vehicles, petroleum-based greases and oils for machine lubrication, and possibly gasoline for pumps or generators, if required. During redevelopment activities, building construction materials (e.g., paint, solvents, thinners, acids, cement, concrete, form release oils, joint and curing compounds, etc.) will be present at the site. Chemicals brought on-site will be stored in accordance with procedures outlined in Section 3.3 and the respective material safety data sheets stored with the Contractor.

8.2 Inspections and SWPPP Personnel

Inspections of BMPs will occur after BMP installation at the start of the project, weekly afterwards, quarterly, and at least once each 24-hour during extended storm events. Findings from BMP inspections and any modifications or repairs to BMPs will be logged on the inspection form (see example included in Attachment M-1). The Contractor or

Bridge representative will modify locations and design of individual BMPs based on site conditions, field experience, and performance of the individual BMPs.

During extended storm events, Contractor or Bridge representative will endeavor to conduct inspections during each 24-hour period. The purposes of the inspections are: (1) to identify areas contributing to a storm water discharge, (2) to evaluate whether BMPs identified in the SWPPP are adequate, are properly installed, and function in accordance with the terms of the General Permit, and (3) to evaluate whether additional control practices or corrective maintenance activities are needed.

Visual inspections of rain events will be conducted within two business days after a qualifying rain event (a qualifying rain event is one producing precipitation of ½ inch or more with greater than 48 hours between events). The following information will be recorded in the visual inspection field log sheet (see example in Attachment M-1):

- Date, time, and rain gauge reading.
- Observations of all storm water drainage areas to identify spills, leaks, or uncontrolled pollutant sources, and subsequent corrective actions if needed.
- Observations of all BMPs to identify if they were properly implemented in accordance with the SWPPP, and subsequent corrective actions if needed.
- Observations of any storm water and containment areas to detect leaks and ensure maintenance of adequate freeboard.
- The presence or absence of floating or suspended materials, sheen, discolorations, turbidity, odors, and sources of any observed pollutants.

Visual inspections are not required during dangerous weather conditions or outside scheduled site business hours. The Contractor or Bridge representative will also conduct quarterly inspections to visually observe the drainage area(s) for authorized and unauthorized non-storm water discharges during daylight hours. If any non-storm water discharges are observed during inspections, the pollutant characteristics and source will be recorded and appropriate BMPs will be implemented to eliminate unauthorized non-storm water discharges or to reduce or prevent pollutants from contacting non-storm water discharges.

If any changes to the BMPs are needed following inspections, the Contractor or Bridge representative will implement new or modified BMPs within 72 hours of identification. Inspections will use the inspection form included in Attachment M-1 (based on CASQA's template) or similar. The inspector shall be a Qualified SWPPP Practitioner ("QSP") or trained by a QSP.

Lastly, prior to the start of construction and immediately following completion of the permanent cap installation, the condition of the 24-inch diameter storm drain located downstream of manhole MH-24 will be video logged. The video logging will be used to

determine the pre-existing and post-redevelopment condition of the 24-inch storm drain line with respect to sediment accumulation and pre-cap construction activities.

8.3 Sampling

Per the General Permit, sampling of regular storm water discharges is not required for Risk Level 1 projects. However, sampling of storm water discharges is required by EPA as described in Section 4.

If any breach, malfunction, leakage, or spill is observed during an inspection which could result in the discharge of pollutants to surface waters that would not be visually detectable in storm water, the QSP will collect one or more water samples at all discharge locations that can be safely accessed during the first two hours of discharge from a qualifying storm event. The samples will be analyzed for the appropriate pollutant parameters to be determined by the QSP in accordance with the test procedures in Title 40 of the Code of Federal Regulations Part 136, as specified in the General Permit.

8.4 Record Keeping

The results of the inspections will be documented and kept on file by the Contractor or Bridge representative as required by the General Permit. At the end of the project, the Contractor or Bridge representative shall submit a copy of all records to Bridge in electronic format, such as a pdf.

9. EMERGENCY CONTACT INFORMATION

The General Permit requires that the SWPPP list the name and telephone number of the qualified person(s) who have been assigned responsibility for pre-storm, post-storm, and storm event BMP inspections; and the qualified person(s) assigned responsibility to ensure full compliance with the permit and implementation of all elements of the SWPPP, including the preparation of the annual compliance evaluation and the elimination of all unauthorized discharges. Qualified persons and emergency contact information associated with storm water pollution prevention is included in Table M-3.

10. REFERENCES

CASQA, 2015. Stormwater Best Management Practice Handbook Portal: Construction, January 2015.

City, 2014. Storm Drainage Design Standards, Bureau of Engineering & Construction, October 2014.

City, 2019. Amendment to Part 2 - California Building Code, City of Oakland, June 2019.

Geosyntec, 2015. Operation, Maintenance and Monitoring Plan, General Electric Site, 5441 International Boulevard, Oakland, California, November 2015.

Table M-1
Summary of Potential Pollutant Sources
5441 International Boulevard
Oakland, California

Construction Activities	Pollutant Source	Potential Storm Water Pollutants
Demolition	Dust and concrete from demolition activities transported off-site by runoff and wind.	Dust, lead, cVOCs, pH, and Aroclor 1260.
Soil Excavation	Soil from excavation activities transported off-site by runoff and wind.	Sediment, dust, arsenic, cobalt, copper, lead, cVOCs, benzo(a)pyrene, and Aroclor 1260.
Stockpiling of Soil	Wind erosion, dust, and runoff from soil stockpiles.	Sediment, dust, arsenic, cobalt, copper, lead, cVOCs, benzo(a)pyrene, and Aroclor 1260.
Off-haul of Soil	Tracking of dirt from site to streets. Runoff from transportation route (e.g. roads) to storm drains or streams.	Sediment, dust, arsenic, cobalt, copper, lead, cVOCs, benzo(a)pyrene, and Aroclor 1260.
Removal of Cap	Outdoor construction activities may cause soil disturbance, with soil transported off-site by runoff, wind, and tracking. Crushed concrete.	Sediment, dust, arsenic, cobalt, copper, lead, cVOCs, benzo(a)pyrene, pH and Aroclor 1260.
Groundwater Dewatering and Water Treatment System	Leaking from dewatering operations and water treatment system.	Aroclor 1260 and cVOCs.
Backfilling and General Grading	Water from runoff. Wind erosion from site.	Sediment, dust, arsenic, cobalt, copper, lead, cVOCs, benzo(a)pyrene, and Aroclor 1260.
Building Construction Materials	Use of adhesives, paints, solvents, thinners, cleaners, curing compounds, etc.	Oil and grease, synthetic organics, and metals
Construction Equipment Fueling and Maintenance	Spills from fueling and maintenance operations.	Diesel fuel, motor oil, hydraulic oil, antifreeze/coolant.
Construction Equipment Leaks	Leaking construction equipment.	Diesel fuel, motor oil, hydraulic oil, antifreeze/coolant.
Construction Concrete Pouring	Concrete mix wash-out.	Concrete.
Construction Equipment Cleaning	Cleaning of trucks in equipment decontamination area.	Sediment, dust, arsenic, cobalt, copper, lead, cVOCs, benzo(a)pyrene, Aroclor 1260, diesel fuel, motor oil, hydraulic oil, antifreeze/coolant.

Abbreviations:
cVOC = chlorinated volatile organic compound

Table M-2
Summary of Best Management Practices
5441 International Boulevard
Oakland, California

ID (a)	Minimum BMPs (b)
Erosion and Sediment Control	
SE-1	Silt Fence
SE-3	Sediment Trap
SE-5	Fiber Rolls
SE-6	Gravel Bag Berm
SE-7	Street Sweeping and Vacuuming
SE-8	Sandbag Barrier
SE-9	Straw Bale Barrier
SE-10	Storm Drain Inlet Protection
--	Temporary cap if needed
--	Final grading design to assist in erosion control.
Wind Erosion Control	
WE-1	Wind Erosion Control
Temporary Tracking Control	
TC-1	Stabilized Construction Entrance/Exit
TC-2	Stabilized Construction Roadway
Non-Stormwater Management	
NS-3	Paving and Grinding Operations
NS-6	Illicit Connection/Discharge
NS-8	Vehicle and Equipment Cleaning
NS-9	Vehicle and Equipment Fueling
NS-10	Vehicle and Equipment Maintenance
Waste Management and Materials Pollution Control	
WM-1	Material Delivery and Storage
WM-2	Material Use
WM-3	Stockpile Management
WM-4	Spill Prevention and Control
WM-5	Solid Waste Management
WM-6	Hazardous Waste Management
WM-7	Contaminated Soil Management
WM-8	Concrete Waste Management
WM-9	Sanitary/Septic Waste Management
WM-10	Liquid Waste Management

Table M-2
Summary of Best Management Practices
5441 International Boulevard
Oakland, California

ID (a)	Minimum BMPs (b)
Other	
--	Decontamination Plan (Appendix I of the RDIP Addendum)
--	Dust Control Plan (Appendix J of the RDIP Addendum)

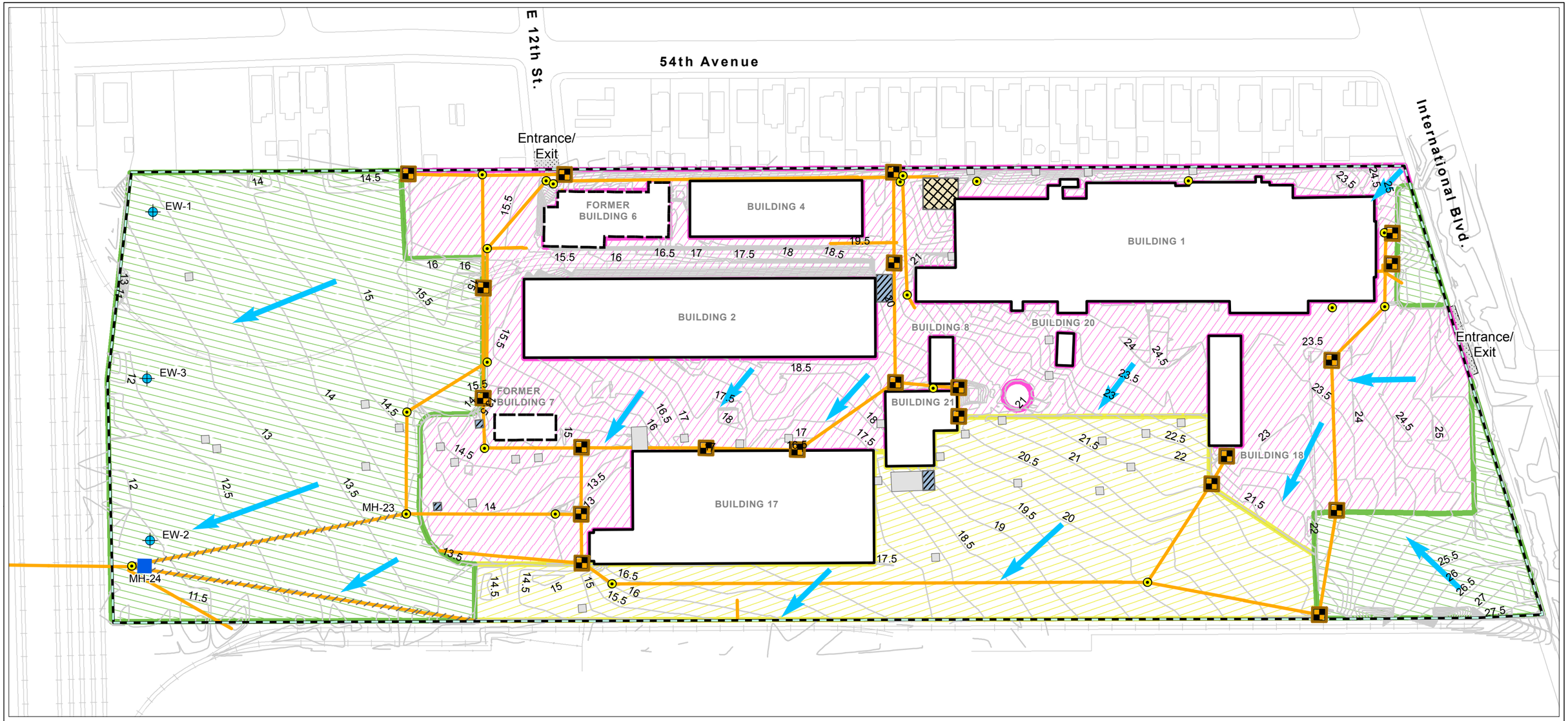
Abbreviations:
BMP = Best Management Practice
RDIP Addendum = Remedial Design Implementation Plan Addendum (EKI, 2019)

Notes:
(a) BMP IDs from CASQA, 2015.
(b) Additional BMPs to be implemented if determined to be necessary based on inspection and evaluation of implemented BMPs.

References:
California Stormwater Quality Association ("CASQA"), 2015. *Stormwater Best Management Practice Handbook Portal: Construction*, January 2015.
EKI, 2019. *Remedial Design Implementation Plan Addendum, Oakland, California*, March 2019.

Table M-3
Emergency Contacts
5441 International Boulevard
Oakland, California

Qualified SWPPP Developer To be determined	**Qualified SWPPP Practitioner** To be determined
Contractor To be determined	**Subcontractor** To be determined
Oakland Fire Department 911	**California Office of Emergency Services** (800) 852-7550
National Response Center (800) 424-9300	**Alameda County Office of Emergency Services** (925) 803-7800
California State Water Resources Control Board (800) 952-5400	**San Francisco Bay Regional Water Quality Control Board** (510) 622-2369



Legend

- Site Property Boundary
- Former Building
- Existing Building
- 4-Inch Existing Cap
- 6-Inch Asphalt Cap
- Existing Bentonite-Soil Cap
- Hotspot PCB Excavation
- PCB Excavation
- Site Entrance/ Exit
- VOC Excavation
- Concrete Curb
- Storm Drain Lines (Removed)
- Storm Drain Lines
- Surface Water Flow Direction
- Existing Manhole
- Existing Catch Basin
- Existing Catch Basin BMP
- Catch Basin with Inlet Protection
- Extraction Well

Abbreviations

BMP = Best Management Practice
PCB = Polychlorinated biphenyl
VOC = Volatile organic compound

Note

1. EKI proposed excavation limits shown in blue, grey, and tan.
2. Stockpile locations will depend on where demolition and active soil handling is occuring.
3. Equipment and material storage will be shown once field work begins.

0 125 250
Feet

DRAFT FINAL

Site Map

5441 International Blvd.
Oakland, CA
August 2019
B70123.01

Figure M-1

eki environment & water

Path: X:\B70123\Maps\...01\2019\08\FigM1_SWPPP.mxd

ATTACHMENT M-1

Relevant Forms Examples

BMP INSPECTION REPORT

Date and Time of Inspection:	Date Report Written:

Inspection Type: (Circle one)	Weekly *Complete Parts I,II,III and VII*	Pre-Storm *Complete Parts I,II,III,IV and VII*	During Rain Event *Complete Parts I, II, III, V, and VII*	Post-Storm *Complete Parts I,II,III,VI and VII*

Part I. General Information

Site Information

Construction Site Name:	
Construction stage and completed activities:	Approximate area of site that is exposed:

Photos Taken: (Circle one)	Yes	No	Photo Reference IDs:

Weather

Estimate storm beginning: (date and time)	Estimate storm duration: (hours)
Estimate time since last storm: (days or hours)	Rain gauge reading and location: (in)

Is a "Qualifying Event" predicted or did one occur (i.e., 0.5" rain with 48-hrs or greater between events)? (Y/N)
If yes, summarize forecast:

Exemption Documentation (explanation required if inspection could not be conducted). Visual inspections are not required outside of business hours or during dangerous weather conditions such as flooding or electrical storms.

Inspector Information

Inspector Name:	Inspector Title:
Signature:	Date:

Part II. BMP Observations. Describe deficiencies in Part III.			
Minimum BMPs for Risk Level _____ Sites	Failures or other short comings (yes, no, N/A)	Action Required (yes/no)	Action Implemented (Date)
Good Housekeeping for Construction Materials			
Inventory of products (excluding materials designed to be outdoors)			
Stockpiled construction materials not actively in use are covered and bermed			
All chemicals are stored in watertight containers with appropriate secondary containment, or in a completely enclosed storage shed			
Construction materials are minimally exposed to precipitation			
BMPs preventing the off-site tracking of materials are implemented and properly effective			
Good Housekeeping for Waste Management			
Wash/rinse water and materials are prevented from being disposed into the storm drain system			
Portable toilets are contained to prevent discharges of waste			
Sanitation facilities are clean and with no apparent for leaks and spills			
Equipment is in place to cover waste disposal containers at the end of business day and during rain events			
Discharges from waste disposal containers are prevented from discharging to the storm drain system / receiving water			
Stockpiled waste material is securely protected from wind and rain if not actively in use			
Procedures are in place for addressing hazardous and non-hazardous spills			
Appropriate spill response personnel are assigned and trained			
Equipment and materials for cleanup of spills is available onsite			
Washout areas (e.g., concrete) are contained appropriately to prevent discharge or infiltration into the underlying soil			
Good Housekeeping for Vehicle Storage and Maintenance			
Measures are in place to prevent oil, grease, or fuel from leaking into the ground, storm drains, or surface waters			
All equipment or vehicles are fueled, maintained, and stored in a designated area with appropriate BMPs			
Vehicle and equipment leaks are cleaned immediately and disposed of properly			

Part II. BMP Observations Continued. Describe deficiencies in Part III.			
Minimum BMPs for Risk Level _____ Sites	Adequately designed, implemented and effective (yes, no, N/A)	Action Required (yes/no)	Action Implemented (Date)
Good Housekeeping for Landscape Materials			
Stockpiled landscape materials such as mulches and topsoil are contained and covered when not actively in use			
Erodible landscape material has not been applied 2 days before a forecasted rain event or during an event			
Erodible landscape materials are applied at quantities and rates in accordance with manufacturer recommendations			
Bagged erodible landscape materials are stored on pallets and covered			
Good Housekeeping for Air Deposition of Site Materials			
Good housekeeping measures are implemented onsite to control the air deposition of site materials and from site operations			
Non-Stormwater Management			
Non-Stormwater discharges are properly controlled			
Vehicles are washed in a manner to prevent non-stormwater discharges to surface waters or drainage systems			
Streets are cleaned in a manner to prevent unauthorized non-stormwater discharges to surface waters or drainage systems.			
Erosion Controls			
Wind erosion controls are effectively implemented			
Effective soil cover is provided for disturbed areas inactive (i.e., not scheduled to be disturbed for 14 days) as well as finished slopes, open space, utility backfill, and completed lots			
The use of plastic materials is limited in cases when a more sustainable, environmentally friendly alternative exists.			
Sediment Controls			
Perimeter controls are established and effective at controlling erosion and sediment discharges from the site			
Entrances and exits are stabilized to control erosion and sediment discharges from the site			
Sediment basins are properly maintained			
Run-On and Run-Off Controls			
Run-on to the site is effectively managed and directed away from all disturbed areas.			

Other			
Are the project SWPPP and BMP plan up to date, available on-site and being properly implemented?			

Part III. Descriptions of BMP Deficiencies

Deficiency	Repairs Implemented: Note - Repairs must begin within 72 hours of identification and, complete repairs as soon as possible.	
	Start Date	Action
1.		
2.		
3.		
4.		

Part IV. Additional Pre-Storm Observations. Note the presence or absence of floating and suspended materials, sheen, discoloration, turbidity, odors, and source(s) of pollutants(s).

	Yes, No, N/A
Do stormwater storage and containment areas have adequate freeboard? If no, complete Part III.	
Are drainage areas free of spills, leaks, or uncontrolled pollutant sources? If no, complete Part VII and describe below.	
Notes:	
Are stormwater storage and containment areas free of leaks? If no, complete Parts III and/or VII and describe below.	
Notes:	

Part V. Additional During Storm Observations. **If BMPs cannot be inspected during inclement weather, list the results of visual inspections at all relevant outfalls, discharge points, and downstream locations. Note odors or visible sheen on the surface of discharges. Complete Part VII (Corrective Actions) as needed.**	
Outfall, Discharge Point, or Other Downstream Location	
Location	Description
Location	Description
Location	Description
Location	Description
Location	Description
Location	Description
Location	Description
Location	Description

Part VI. Additional Post-Storm Observations. **Visually observe (inspect) stormwater discharges at all discharge locations within two business days (48 hours) after each qualifying rain event, and observe (inspect) the discharge of stored or contained stormwater that is derived from and discharged subsequent to a qualifying rain event producing precipitation of ½ inch or more at the time of discharge. Complete Part VII (Corrective Actions) as needed.**	
Discharge Location, Storage or Containment Area	**Visual Observation**

Part VII. Additional Corrective Actions Required. **Identify additional corrective actions not included with BMP Deficiencies (Part III) above. Note if SWPPP change is required.**	
Required Actions	**Implementation Date**

Qualified SWPPP Developer

Approval and Certification of the Stormwater Pollution Prevention Plan

Project Name: _____

Project Number/ID [if applicable] _____

"This Stormwater Pollution Prevention Plan and Attachments were prepared under my direction to meet the requirements of the California Construction General Permit (SWRCB Orders No. 2009-009-DWQ as amended by Order 2010-0014-DWQ and Order 2012-0006-DWQ). I certify that I am a Qualified SWPPP Developer in good standing as of the date signed below."

_____	_____
QSD Signature	*Date*
_____	_____
QSD Name	*QSD Certificate Number*
_____	_____
Title and Affiliation	*Telephone Number*
_____	
Email	

Legally Responsible Person

Approval and Certification of the Stormwater Pollution Prevention Plan

Project Name: _____

Project Number/ID [if applicable] _____

"I certify under penalty of law that this document and all Attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

_____

Legally Responsible Person [if organization]

_____ _____

Signature of [Authorized Representative of] Legally Responsible Person or Approved Signatory

Date

_____ _____

Name of [Authorized Representative of] Legally Responsible Person or Approved Signatory

Telephone Number

Amendment Log

Project Name: _____

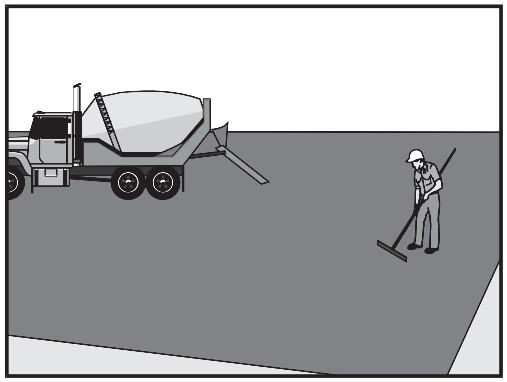
Project Number/ID [if applicable] _____

Amendment No.	Date	Brief Description of Amendment, include section and page number	Prepared and Approved By
			Name: QSD#
			Name: QSD#
			Name: QSD#
			Name: QSD#
			Name: QSD#
			Name: QSD#
			Name: QSD#
			Name: QSD#
			Name: QSD#

Risk Level 1, 2, 3 ***Visual Inspection Field Log Sheet***						
Date and Time of Inspection:				Report Date:		
Inspection Type:	☐ Weekly	☐ Before predicted rain	☐ During rain event	☐ Following qualifying rain event	☐ Contained stormwater release	☐ Quarterly non-stormwater
Site Information						
Construction Site Name:						
Construction stage and completed activities:				Approximate area of exposed site:		
Weather and Observations						
Date Rain Predicted to Occur:				Predicted % chance of rain:		
Estimate storm beginning: _____ (date and time)		Estimate storm duration:_____ (hours)		Estimate time since last storm: _____ (days or hours)		Rain gauge reading: _____ (inches)
Observations: If yes identify location						
Odors	Yes ☐	No ☐				
Floating material	Yes ☐	No ☐				
Suspended Material	Yes ☐	No ☐				
Sheen	Yes ☐	No ☐				
Discolorations	Yes ☐	No ☐				
Turbidity	Yes ☐	No ☐				
Site Inspections						
Outfalls or BMPs Evaluated			**Deficiencies Noted**			
(add additional sheets or attached detailed BMP Inspection Checklists)						
Photos Taken:	Yes ☐	No ☐	Photo Reference IDs:			
Corrective Actions Identified (note if SWPPP/REAP change is needed)						
Inspector Information						
Inspector Name:				Inspector Title:		
Signature:					Date:	

ATTACHMENT M-2
BMP Details

Paving and Grinding Operations NS-3



Categories		
EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	☒

Legend:
☑ **Primary Category**
☒ **Secondary Category**

Targeted Constituents	
Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

If User/Subscriber modifies this fact sheet in any way, the CASQA name/logo and footer below must be removed from each page and not appear on the modified version.

Description and Purpose

Prevent or reduce the discharge of pollutants from paving operations, using measures to prevent runon and runoff pollution, properly disposing of wastes, and training employees and subcontractors.

The General Permit incorporates Numeric Action Levels (NAL) for pH and turbidity (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Many types of construction materials associated with paving and grinding operations, including mortar, concrete, and cement and their associated wastes have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows, which could lead to exceedances of the General Permit requirements.

Suitable Applications

These procedures are implemented where paving, surfacing, resurfacing, or sawcutting, may pollute stormwater runoff or discharge to the storm drain system or watercourses.

Limitations

- Paving opportunities may be limited during wet weather.

  Discharges of freshly paved surfaces may raise pH to environmentally harmful levels and trigger permit violations.

Paving and Grinding Operations NS-3

Implementation

General

- Avoid paving during the wet season when feasible.
- Reschedule paving and grinding activities if rain is forecasted.
- Train employees and sub-contractors in pollution prevention and reduction.
- Store materials away from drainage courses to prevent stormwater runon (see WM-1, Material Delivery and Storage).
- Protect drainage courses, particularly in areas with a grade, by employing BMPs to divert runoff or to trap and filter sediment.
- Stockpile material removed from roadways away from drain inlets, drainage ditches, and watercourses. These materials should be stored consistent with WM-3, Stockpile Management.
- Disposal of PCC (Portland cement concrete) and AC (asphalt concrete) waste should be in conformance with WM-8, Concrete Waste Management.

Saw Cutting, Grinding, and Pavement Removal

- Shovel or vacuum saw-cut slurry and remove from site. Cover or barricade storm drains during saw cutting to contain slurry.
- When paving involves AC, the following steps should be implemented to prevent the discharge of grinding residue, uncompacted or loose AC, tack coats, equipment cleaners, or unrelated paving materials:
  - AC grindings, pieces, or chunks used in embankments or shoulder backing should not be allowed to enter any storm drains or watercourses. Install inlet protection and perimeter controls until area is stabilized (i.e. cutting, grinding or other removal activities are complete and loose material has been properly removed and disposed of)or permanent controls are in place. Examples of temporary perimeter controls can be found in EC-9, Earth Dikes and Drainage Swales; SE-1, Silt Fence; SE-5, Fiber Rolls, or SE-13 Compost Socks and Berms
  - Collect and remove all broken asphalt and recycle when practical. Old or spilled asphalt should be recycled or disposed of properly.
- Do not allow saw-cut slurry to enter storm drains or watercourses. Residue from grinding operations should be picked up by a vacuum attachment to the grinding machine, or by sweeping, should not be allowed to flow across the pavement, and should not be left on the surface of the pavement. See also WM-8, Concrete Waste Management, and WM-10, Liquid Waste Management.
- Pavement removal activities should not be conducted in the rain.
- Collect removed pavement material by mechanical or manual methods. This material may be recycled for use as shoulder backing or base material.

- If removed pavement material cannot be recycled, transport the material back to an approved storage site.

Asphaltic Concrete Paving

- If paving involves asphaltic cement concrete, follow these steps:
  - Do not allow sand or gravel placed over new asphalt to wash into storm drains, streets, or creeks. Vacuum or sweep loose sand and gravel and properly dispose of this waste by referring to WM-5, Solid Waste Management.
  - Old asphalt should be disposed of properly. Collect and remove all broken asphalt from the site and recycle whenever possible.

Portland Cement Concrete Paving

- Do not wash sweepings from exposed aggregate concrete into a storm drain system. Collect waste materials by dry methods, such as sweeping or shoveling, and return to aggregate base stockpile or dispose of properly. Allow aggregate rinse to settle. Then, either allow rinse water to dry in a temporary pit as described in WM-8, Concrete Waste Management, or pump the water to the sanitary sewer if authorized by the local wastewater authority.

Sealing Operations

- During chip seal application and sweeping operations, petroleum or petroleum covered aggregate should not be allowed to enter any storm drain or water courses. Apply temporary perimeter controls until structure is stabilized (i.e. all sealing operations are complete and cured and loose materials have been properly removed and disposed).
- Inlet protection (SE-10, Storm Drain Inlet Protection) should be used during application of seal coat, tack coat, slurry seal, and fog seal.
- Seal coat, tack coat, slurry seal, or fog seal should not be applied if rainfall is predicted to occur during the application or curing period.

Paving Equipment

- Leaks and spills from paving equipment can contain toxic levels of heavy metals and oil and grease. Place drip pans or absorbent materials under paving equipment when not in use. Clean up spills with absorbent materials and dispose of in accordance with the applicable regulations. See NS-10, Vehicle and Equipment Maintenance, WM-4, Spill Prevention and Control, and WM-10, Liquid Waste Management.
- Substances used to coat asphalt transport trucks and asphalt spreading equipment should not contain soap and should be non-foaming and non-toxic.
- Paving equipment parked onsite should be parked over plastic to prevent soil contamination.
- Clean asphalt coated equipment offsite whenever possible. When cleaning dry, hardened asphalt from equipment, manage hardened asphalt debris as described in WM-5, Solid Waste Management. Any cleaning onsite should follow NS-8, Vehicle and Equipment Cleaning.

Thermoplastic Striping

- Thermoplastic striper and pre-heater equipment shutoff valves should be inspected to ensure that they are working properly to prevent leaking thermoplastic from entering drain inlets, the stormwater drainage system, or watercourses.
- Pre-heaters should be filled carefully to prevent splashing or spilling of hot thermoplastic. Leave six inches of space at the top of the pre-heater container when filling thermoplastic to allow room for material to move.
- Do not pre-heat, transfer, or load thermoplastic near drain inlets or watercourses.
- Clean truck beds daily of loose debris and melted thermoplastic. When possible, recycle thermoplastic material.

Raised/Recessed Pavement Marker Application and Removal

- Do not transfer or load bituminous material near drain inlets, the stormwater drainage system, or watercourses.
- Melting tanks should be loaded with care and not filled to beyond six inches from the top to leave room for splashing.
- When servicing or filling melting tanks, ensure all pressure is released before removing lids to avoid spills.
- On large-scale projects, use mechanical or manual methods to collect excess bituminous material from the roadway after removal of markers.

Costs

- All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of paving and grinding operations.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Sample stormwater runoff required by the General Permit.
- Keep ample supplies of drip pans or absorbent materials onsite.
- Inspect and maintain machinery regularly to minimize leaks and drips.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

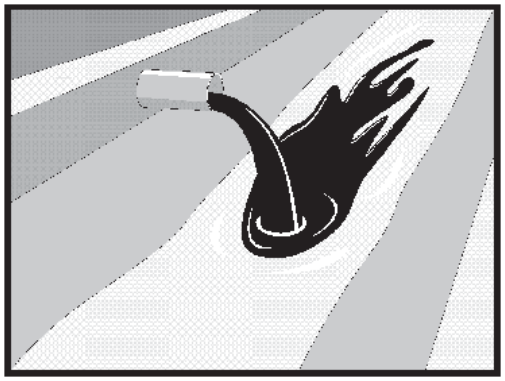
Paving and Grinding Operations NS-3

Hot Mix Asphalt-Paving Handbook AC 150/5370-14, Appendix I, U.S. Army Corps of Engineers, July 1991.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Illicit Connection / Discharge NS-6



Categories		
EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:
☑ **Primary Objective**
☒ **Secondary Objective**

Targeted Constituents	
Sediment	
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

If User/Subscriber modifies this fact sheet in any way, the CASQA name/logo and footer below must be removed from each page and not appear on the modified version.

Description and Purpose

Procedures and practices designed for construction contractors to recognize illicit connections or illegally dumped or discharged materials on a construction site and report incidents.

Suitable Applications

This best management practice (BMP) applies to all construction projects. Illicit connection/discharge and reporting is applicable anytime an illicit connection or discharge is discovered or illegally dumped material is found on the construction site.

Limitations

Illicit connections and illegal discharges or dumping, for the purposes of this BMP, refer to discharges and dumping caused by parties other than the contractor. If pre-existing hazardous materials or wastes are known to exist onsite, they should be identified in the SWPPP and handled as set forth in the SWPPP.

Implementation

Planning

- Review the SWPPP. Pre-existing areas of contamination should be identified and documented in the SWPPP.
- Inspect site before beginning the job for evidence of illicit connections, illegal dumping or discharges. Document any pre-existing conditions and notify the owner.

Illicit Connection / Discharge NS-6

- Inspect site regularly during project execution for evidence of illicit connections, illegal dumping or discharges.
- Observe site perimeter for evidence for potential of illicitly discharged or illegally dumped material, which may enter the job site.

Identification of Illicit Connections and Illegal Dumping or Discharges

- **General –** unlabeled and unidentifiable material should be treated as hazardous.
- **Solids** - Look for debris, or rubbish piles. Solid waste dumping often occurs on roadways with light traffic loads or in areas not easily visible from the traveled way.
- **Liquids** - signs of illegal liquid dumping or discharge can include:
  - Visible signs of staining or unusual colors to the pavement or surrounding adjacent soils
  - Pungent odors coming from the drainage systems
  - Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes
  - Abnormal water flow during the dry weather season
- **Urban Areas** - Evidence of illicit connections or illegal discharges is typically detected at storm drain outfall locations or at manholes. Signs of an illicit connection or illegal discharge can include:
  - Abnormal water flow during the dry weather season
  - Unusual flows in sub drain systems used for dewatering
  - Pungent odors coming from the drainage systems
  - Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes
  - Excessive sediment deposits, particularly adjacent to or near active offsite construction projects
- **Rural Areas** - Illicit connections or illegal discharges involving irrigation drainage ditches are detected by visual inspections. Signs of an illicit discharge can include:
  - Abnormal water flow during the non-irrigation season
  - Non-standard junction structures
  - Broken concrete or other disturbances at or near junction structures

Reporting

Notify the owner of any illicit connections and illegal dumping or discharge incidents at the time of discovery. For illicit connections or discharges to the storm drain system, notify the local stormwater management agency. For illegal dumping, notify the local law enforcement agency.

Cleanup and Removal

The responsibility for cleanup and removal of illicit or illegal dumping or discharges will vary by location. Contact the local stormwater management agency for further information.

Costs

Costs to look for and report illicit connections and illegal discharges and dumping are low. The best way to avoid costs associated with illicit connections and illegal discharges and dumping is to keep the project perimeters secure to prevent access to the site, to observe the site for vehicles that should not be there, and to document any waste or hazardous materials that exist onsite before taking possession of the site.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect the site regularly to check for any illegal dumping or discharge.
- Prohibit employees and subcontractors from disposing of non-job related debris or materials at the construction site.
- Notify the owner of any illicit connections and illegal dumping or discharge incidents at the time of discovery.

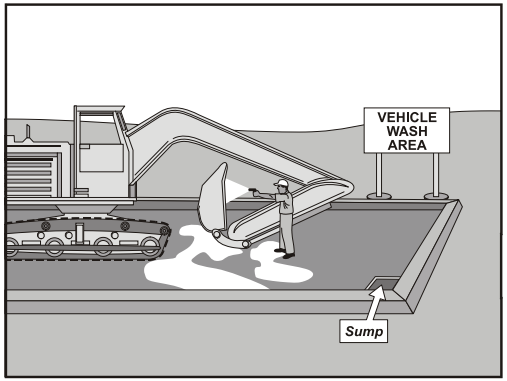
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Vehicle and Equipment Cleaning NS-8



Categories		
EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:
☑ **Primary Objective**
☒ **Secondary Objective**

Targeted Constituents	
Sediment	☑
Nutrients	☑
Trash	
Metals	
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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Description and Purpose

Vehicle and equipment cleaning procedures and practices eliminate or reduce the discharge of pollutants to stormwater from vehicle and equipment cleaning operations. Procedures and practices include but are not limited to: using offsite facilities; washing in designated, contained areas only; eliminating discharges to the storm drain by infiltrating the wash water; and training employees and subcontractors in proper cleaning procedures.

Suitable Applications

These procedures are suitable on all construction sites where vehicle and equipment cleaning is performed.

Limitations

Even phosphate-free, biodegradable soaps have been shown to be toxic to fish before the soap degrades. Sending vehicles/equipment offsite should be done in conjunction with TC-1, Stabilized Construction Entrance/Exit.

Implementation

Other options to washing equipment onsite include contracting with either an offsite or mobile commercial washing business. These businesses may be better equipped to handle and dispose of the wash waters properly. Performing this work offsite can also be economical by eliminating the need for a separate washing operation onsite.

If washing operations are to take place onsite, then:

Vehicle and Equipment Cleaning NS-8

- Use phosphate-free, biodegradable soaps.
- Educate employees and subcontractors on pollution prevention measures.
- Do not permit steam cleaning onsite. Steam cleaning can generate significant pollutant concentrates.
- Cleaning of vehicles and equipment with soap, solvents or steam should not occur on the project site unless resulting wastes are fully contained and disposed of. Resulting wastes should not be discharged or buried, and must be captured and recycled or disposed according to the requirements of WM-10, Liquid Waste Management or WM-6, Hazardous Waste Management, depending on the waste characteristics. Minimize use of solvents. Use of diesel for vehicle and equipment cleaning is prohibited.
- All vehicles and equipment that regularly enter and leave the construction site must be cleaned offsite.
- When vehicle and equipment washing and cleaning must occur onsite, and the operation cannot be located within a structure or building equipped with appropriate disposal facilities, the outside cleaning area should have the following characteristics:
  - Located away from storm drain inlets, drainage facilities, or watercourses
  - Paved with concrete or asphalt and bermed to contain wash waters and to prevent runon and runoff
  - Configured with a sump to allow collection and disposal of wash water
  - No discharge of wash waters to storm drains or watercourses
  - Used only when necessary
- When cleaning vehicles and equipment with water:
  - Use as little water as possible. High-pressure sprayers may use less water than a hose and should be considered
  - Use positive shutoff valve to minimize water usage
  - Facility wash racks should discharge to a sanitary sewer, recycle system or other approved discharge system and must not discharge to the storm drainage system, watercourses, or to groundwater

Costs

Cleaning vehicles and equipment at an offsite facility may reduce overall costs for vehicle and equipment cleaning by eliminating the need to provide similar services onsite. When onsite cleaning is needed, the cost to establish appropriate facilities is relatively low on larger, long-duration projects, and moderate to high on small, short-duration projects.

Vehicle and Equipment Cleaning NS-8

Inspection and Maintenance

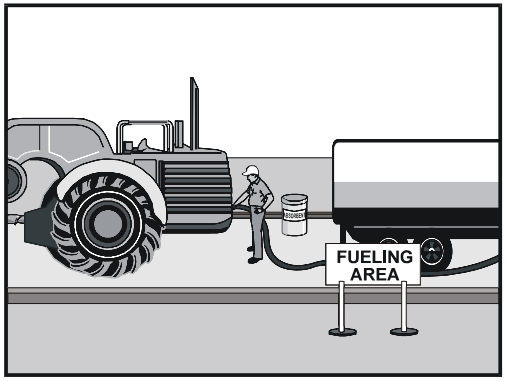
- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Inspection and maintenance is minimal, although some berm repair may be necessary.
- Monitor employees and subcontractors throughout the duration of the construction project to ensure appropriate practices are being implemented.
- Inspect sump regularly and remove liquids and sediment as needed.
- Prohibit employees and subcontractors from washing personal vehicles and equipment on the construction site.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Swisher, R.D. Surfactant Biodegradation, Marcel Decker Corporation, 1987.

Vehicle and Equipment Fueling NS-9



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:
☑ **Primary Objective**
☒ **Secondary Objective**

Targeted Constituents

Sediment	
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

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Description and Purpose

Vehicle equipment fueling procedures and practices are designed to prevent fuel spills and leaks, and reduce or eliminate contamination of stormwater. This can be accomplished by using offsite facilities, fueling in designated areas only, enclosing or covering stored fuel, implementing spill controls, and training employees and subcontractors in proper fueling procedures.

Suitable Applications

These procedures are suitable on all construction sites where vehicle and equipment fueling takes place.

Limitations

Onsite vehicle and equipment fueling should only be used where it is impractical to send vehicles and equipment offsite for fueling. Sending vehicles and equipment offsite should be done in conjunction with TC-1, Stabilized Construction Entrance/ Exit.

Implementation

- Use offsite fueling stations as much as possible. These businesses are better equipped to handle fuel and spills properly. Performing this work offsite can also be economical by eliminating the need for a separate fueling area at a site.
- Discourage "topping-off" of fuel tanks.

- Absorbent spill cleanup materials and spill kits should be available in fueling areas and on fueling trucks, and should be disposed of properly after use.
- Drip pans or absorbent pads should be used during vehicle and equipment fueling, unless the fueling is performed over an impermeable surface in a dedicated fueling area.
- Use absorbent materials on small spills. Do not hose down or bury the spill. Remove the adsorbent materials promptly and dispose of properly.
- Avoid mobile fueling of mobile construction equipment around the site; rather, transport the equipment to designated fueling areas. With the exception of tracked equipment such as bulldozers and large excavators, most vehicles should be able to travel to a designated area with little lost time.
- Train employees and subcontractors in proper fueling and cleanup procedures.
- When fueling must take place onsite, designate an area away from drainage courses to be used. Fueling areas should be identified in the SWPPP.
- Dedicated fueling areas should be protected from stormwater runon and runoff, and should be located at least 50 ft away from downstream drainage facilities and watercourses. Fueling must be performed on level-grade areas.
- Protect fueling areas with berms and dikes to prevent runon, runoff, and to contain spills.
- Nozzles used in vehicle and equipment fueling should be equipped with an automatic shutoff to control drips. Fueling operations should not be left unattended.
- Use vapor recovery nozzles to help control drips as well as air pollution where required by Air Quality Management Districts (AQMD).
- Federal, state, and local requirements should be observed for any stationary above ground storage tanks.

Costs

- All of the above measures are low cost except for the capital costs of above ground tanks that meet all local environmental, zoning, and fire codes.

Inspection and Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Vehicles and equipment should be inspected each day of use for leaks. Leaks should be repaired immediately or problem vehicles or equipment should be removed from the project site.
- Keep ample supplies of spill cleanup materials onsite.

- Immediately clean up spills and properly dispose of contaminated soil and cleanup materials.

References

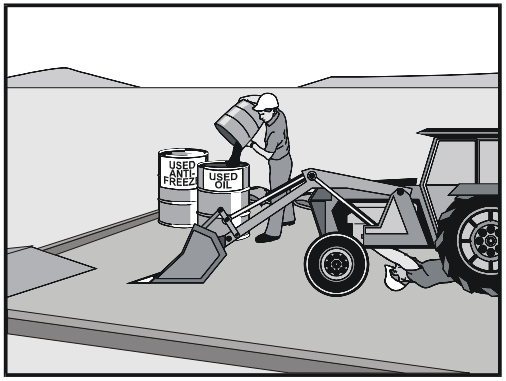
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Vehicle & Equipment Maintenance NS-10



Categories		
EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:
☑ **Primary Objective**
☒ **Secondary Objective**

Targeted Constituents	
Sediment	
Nutrients	☑
Trash	☑
Metals	
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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Description and Purpose

Prevent or reduce the contamination of stormwater resulting from vehicle and equipment maintenance by running a "dry and clean site". The best option would be to perform maintenance activities at an offsite facility. If this option is not available then work should be performed in designated areas only, while providing cover for materials stored outside, checking for leaks and spills, and containing and cleaning up spills immediately. Employees and subcontractors must be trained in proper procedures.

Suitable Applications

These procedures are suitable on all construction projects where an onsite yard area is necessary for storage and maintenance of heavy equipment and vehicles.

Limitations

Onsite vehicle and equipment maintenance should only be used where it is impractical to send vehicles and equipment offsite for maintenance and repair. Sending vehicles/equipment offsite should be done in conjunction with TC-1, Stabilized Construction Entrance/Exit.

Outdoor vehicle or equipment maintenance is a potentially significant source of stormwater pollution. Activities that can contaminate stormwater include engine repair and service, changing or replacement of fluids, and outdoor equipment storage and parking (engine fluid leaks). For further information on vehicle or equipment servicing, see NS-8,

Vehicle & Equipment Maintenance NS-10

Vehicle and Equipment Cleaning, and NS-9, Vehicle and Equipment Fueling.

Implementation

- Use offsite repair shops as much as possible. These businesses are better equipped to handle vehicle fluids and spills properly. Performing this work offsite can also be economical by eliminating the need for a separate maintenance area.
- If maintenance must occur onsite, use designated areas, located away from drainage courses. Dedicated maintenance areas should be protected from stormwater runon and runoff, and should be located at least 50 ft from downstream drainage facilities and watercourses.
- Drip pans or absorbent pads should be used during vehicle and equipment maintenance work that involves fluids, unless the maintenance work is performed over an impermeable surface in a dedicated maintenance area.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- All fueling trucks and fueling areas are required to have spill kits and/or use other spill protection devices.
- Use adsorbent materials on small spills. Remove the absorbent materials promptly and dispose of properly.
- Inspect onsite vehicles and equipment daily at startup for leaks, and repair immediately.
- Keep vehicles and equipment clean; do not allow excessive build-up of oil and grease.
- Segregate and recycle wastes, such as greases, used oil or oil filters, antifreeze, cleaning solutions, automotive batteries, hydraulic and transmission fluids. Provide secondary containment and covers for these materials if stored onsite.
- Train employees and subcontractors in proper maintenance and spill cleanup procedures.
- Drip pans or plastic sheeting should be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than 1 hour.
- For long-term projects, consider using portable tents or covers over maintenance areas if maintenance cannot be performed offsite.
- Consider use of new, alternative greases and lubricants, such as adhesive greases, for chassis lubrication and fifth-wheel lubrication.
- Properly dispose of used oils, fluids, lubricants, and spill cleanup materials.
- Do not place used oil in a dumpster or pour into a storm drain or watercourse.
- Properly dispose of or recycle used batteries.
- Do not bury used tires.

- Repair leaks of fluids and oil immediately.

Listed below is further information if you must perform vehicle or equipment maintenance onsite.

Safer Alternative Products

- Consider products that are less toxic or hazardous than regular products. These products are often sold under an "environmentally friendly" label.
- Consider use of grease substitutes for lubrication of truck fifth-wheels. Follow manufacturers label for details on specific uses.
- Consider use of plastic friction plates on truck fifth-wheels in lieu of grease. Follow manufacturers label for details on specific uses.

Waste Reduction

Parts are often cleaned using solvents such as trichloroethylene, trichloroethane, or methylene chloride. Many of these cleaners are listed in California Toxic Rule as priority pollutants. These materials are harmful and must not contaminate stormwater. They must be disposed of as a hazardous waste. Reducing the number of solvents makes recycling easier and reduces hazardous waste management costs. Often, one solvent can perform a job as well as two different solvents. Also, if possible, eliminate or reduce the amount of hazardous materials and waste by substituting non-hazardous or less hazardous materials. For example, replace chlorinated organic solvents with non-chlorinated solvents. Non-chlorinated solvents like kerosene or mineral spirits are less toxic and less expensive to dispose of properly. Check the list of active ingredients to see whether it contains chlorinated solvents. The "chlor" term indicates that the solvent is chlorinated. Also, try substituting a wire brush for solvents to clean parts.

Recycling and Disposal

Separating wastes allows for easier recycling and may reduce disposal costs. Keep hazardous wastes separate, do not mix used oil solvents, and keep chlorinated solvents (like,-trichloroethane) separate from non-chlorinated solvents (like kerosene and mineral spirits). Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around. Provide cover and secondary containment until these materials can be removed from the site.

Oil filters can be recycled. Ask your oil supplier or recycler about recycling oil filters.

Do not dispose of extra paints and coatings by dumping liquid onto the ground or throwing it into dumpsters. Allow coatings to dry or harden before disposal into covered dumpsters.

Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries, even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Costs

All of the above are low cost measures. Higher costs are incurred to setup and maintain onsite maintenance areas.

Vehicle & Equipment Maintenance NS-10

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Keep ample supplies of spill cleanup materials onsite.
- Maintain waste fluid containers in leak proof condition.
- Vehicles and equipment should be inspected on each day of use. Leaks should be repaired immediately or the problem vehicle(s) or equipment should be removed from the project site.
- Inspect equipment for damaged hoses and leaky gaskets routinely. Repair or replace as needed.

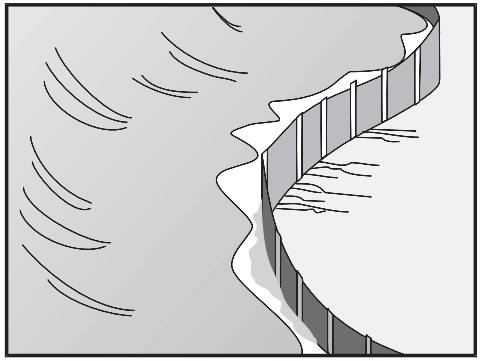
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program; Program Development and Approval Guidance, Working Group, Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Silt Fence SE-1



Categories		
EC	Erosion Control	
SE	Sediment Control	☑
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:
☑ **Primary Category**
☒ **Secondary Category**

Description and Purpose

A silt fence is made of a woven geotextile that has been entrenched, attached to supporting poles, and sometimes backed by a plastic or wire mesh for support. The silt fence detains water, promoting sedimentation of coarse sediment behind the fence. Silt fence does not retain soil fine particles like clays or silts.

Suitable Applications

Silt fences are suitable for perimeter control, placed below areas where sheet flows discharge from the site. They could also be used as interior controls below disturbed areas where runoff may occur in the form of sheet and rill erosion and around inlets within disturbed areas (SE-10). Silt fences should not be used in locations where the flow is concentrated. Silt fences should always be used in combination with erosion controls. Suitable applications include:

- At perimeter of a project.
- Below the toe or down slope of exposed and erodible slopes.
- Along streams and channels.
- Around temporary spoil areas and stockpiles.
- Around inlets.
- Below other small cleared areas.

Targeted Constituents	
Sediment (coarse sediment)	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-5 Fiber Rolls

SE-6 Gravel Bag Berm SE-12 Manufactured Linear Sediment Controls

SE-13 Compost Socks and Berms

SE-14 Biofilter Bags

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Silt Fence SE-1

Limitations

- Do not use in streams, channels, drain inlets, or anywhere flow is concentrated.
- Do not use in locations where ponded water may cause a flooding hazard.
- Do not use silt fence to divert water flows or place across any contour line.
- Improperly installed fences are subject to failure from undercutting, overtopping, or collapsing.
- Must be trenched and keyed in.
- Not intended for use as a substitute for Fiber Rolls (SE-5), when fiber rolls are being used as a slope interruption device.
- Do not use on slopes subject to creeping, slumping, or landslides.

Implementation

General

A silt fence is a temporary sediment barrier consisting of woven geotextile stretched across and attached to supporting posts, trenched-in, and, depending upon the strength of fabric used, supported with plastic or wire mesh fence. Silt fences trap coarse sediment by intercepting and detaining sediment-laden runoff from disturbed areas in order to promote sedimentation behind the fence.

The following layout and installation guidance can improve performance and should be followed:

- Silt fence should be used in combination with erosion controls up-slope in order to provide the most effective sediment control.
- Silt fence alone is not effective at reducing turbidity. (Barrett and Malina, 2004)
- Designers should consider diverting sediment laden water to a temporary sediment basin or trap. (EPA, 2012)
- Use principally in areas where sheet flow occurs.
- Install along a level contour, so water does not pond more than 1.5 ft at any point along the silt fence.
- Provide sufficient room for runoff to pond behind the fence and to allow sediment removal equipment to pass between the silt fence and toes of slopes or other obstructions. About 1200 ft^2 of ponding area should be provided for every acre draining to the fence.
- Efficiency of silt fences is primarily dependent on the detention time of the runoff behind the control. (Barrett and Malina, 2004)
- The drainage area above any fence should not exceed a quarter of an acre. (Rule of Thumb-100-feet of silt fence per 10,000 square feet of disturbed area.) (EPA 2012)

- The maximum length of slope draining to any point along the silt fence should be 100 ft per foot of silt fence.
- Turn the ends of the filter fence uphill to prevent stormwater from flowing around the fence.
- Leave an undisturbed or stabilized area immediately down slope from the fence where feasible.
- Silt fences should remain in place until the disturbed area draining to the silt fence is permanently stabilized, after which, the silt fence fabric and posts should be removed and properly disposed.
- J-Hooks, which have ends turning up the slope to break up long runs of fence and provide multiple storage areas that work like mini-retention areas, may be used to increase the effectiveness of silt fence.
- Be aware of local regulations regarding the type and installation requirements of silt fence, which may differ from those presented in this fact sheet.

Design and Layout

In areas where high winds are anticipated the fence should be supported by a plastic or wire mesh. The geotextile fabric of the silt fence should contain ultraviolet inhibitors and stabilizers to provide longevity equivalent to the project life or replacement schedule.

- Layout in accordance with the attached figures.
- For slopes that contain a high number of rocks or large dirt clods that tend to dislodge, it may be necessary to protect silt fence from rocks (e.g., rockfall netting) ensure the integrity of the silt fence installation.

Standard vs. Heavy Duty Silt Fence

Standard Silt Fence

- Generally applicable in cases where the area draining to fence produces moderate sediment loads.

Heavy Duty Silt Fence

- Heavy duty silt fence usually has 1 or more of the following characteristics, not possessed by standard silt fence.
  - Fabric is reinforced with wire backing or additional support.
  - Posts are spaced closer than pre-manufactured, standard silt fence products.
- Use is generally limited to areas affected by high winds.
- Area draining to fence produces moderate sediment loads.

Materials

Standard Silt Fence

- Silt fence material should be woven geotextile with a minimum width of 36 in. The fabric should conform to the requirements in ASTM designation D6461.
- Wooden stakes should be commercial quality lumber of the size and shape shown on the plans. Each stake should be free from decay, splits or cracks longer than the

thickness of the stake or other defects that would weaken the stakes and cause the stakes to be structurally unsuitable.

- Staples used to fasten the fence fabric to the stakes should be not less than 1.75 in. long and should be fabricated from 15 gauge or heavier wire. The wire used to fasten the tops of the stakes together when joining two sections of fence should be 9 gauge or heavier wire. Galvanizing of the fastening wire will not be required.

Heavy-Duty Silt Fence

- Some silt fence has a wire backing to provide additional support, and there are products that may use prefabricated plastic holders for the silt fence and use metal posts instead of wood stakes.

Installation Guidelines – Traditional Method

Silt fences are to be constructed on a level contour. Sufficient area should exist behind the fence for ponding to occur without flooding or overtopping the fence.

- A trench should be excavated approximately 6 in. wide and 6 in. deep along the line of the proposed silt fence (trenches should not be excavated wider or deeper than necessary for proper silt fence installation).
- Bottom of the silt fence should be keyed-in a minimum of 12 in.
- Posts should be spaced a maximum of 6 ft apart and driven securely into the ground a minimum of 18 in. or 12 in. below the bottom of the trench.
- When standard strength geotextile is used, a plastic or wire mesh support fence should be fastened securely to the upslope side of posts using heavy–duty wire staples at least 1 in. long. The mesh should extend into the trench.
- When extra-strength geotextile and closer post spacing are used, the mesh support fence may be eliminated.
- Woven geotextile should be purchased in a long roll, then cut to the length of the barrier. When joints are necessary, geotextile should be spliced together only at a support post, with a minimum 6 in. overlap and both ends securely fastened to the post.
- The trench should be backfilled with native material and compacted.
- Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/3 the height of the barrier; in no case should the reach exceed 500 ft.
- Cross barriers should be a minimum of 1/3 and a maximum of ½ the height of the linear barrier.
- See typical installation details at the end of this fact sheet.

Installation Guidelines - Static Slicing Method

- Static Slicing is defined as insertion of a narrow blade pulled behind a tractor, similar to a plow blade, at least 10 inches into the soil while at the same time pulling silt geotextile fabric into the ground through the opening created by the blade to the depth of the blade. Once the geotextile is installed, the soil is compacted using tractor tires.
- This method will not work with pre-fabricated, wire backed silt fence.
- Benefits:
    - Ease of installation (most often done with a 2 person crew).
    - Minimal soil disturbance.
    - Better level of compaction along fence, less susceptible to undercutting
    - Uniform installation.
- Limitations:
    - Does not work in shallow or rocky soils.
    - Complete removal of geotextile material after use is difficult.
    - Be cautious when digging near potential underground utilities.

Costs

- It should be noted that costs vary greatly across regions due to available supplies and labor costs.
- Average annual cost for installation using the traditional silt fence installation method (assumes 6 month useful life) is $7 per linear foot based on vendor research. Range of cost is $3.50 - $9.10 per linear foot.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Repair undercut silt fences.
- Repair or replace split, torn, slumping, or weathered fabric. The lifespan of silt fence fabric is generally 5 to 8 months.
- Silt fences that are damaged and become unsuitable for the intended purpose should be removed from the site of work, disposed, and replaced with new silt fence barriers.
- Sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches 1/3 of the barrier height.
- Silt fences should be left in place until the upgradient area is permanently stabilized. Until then, the silt fence should be inspected and maintained regularly.

- Remove silt fence when upgradient areas are stabilized. Fill and compact post holes and anchor trench, remove sediment accumulation, grade fence alignment to blend with adjacent ground, and stabilize disturbed area.

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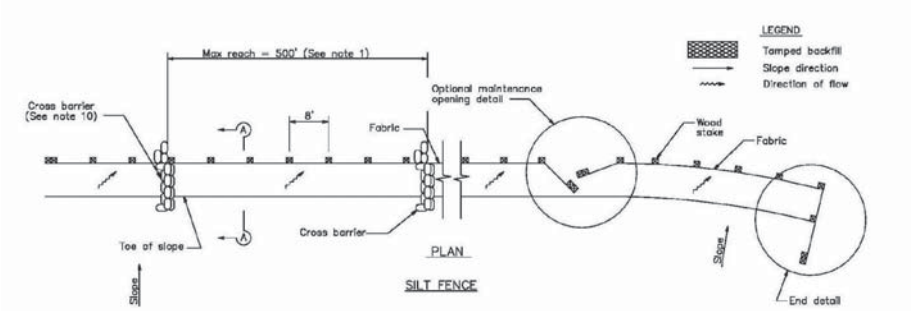
Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

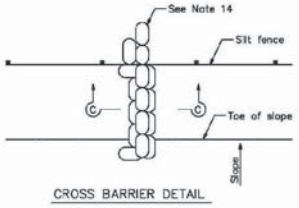
Silt Fence

SE-1

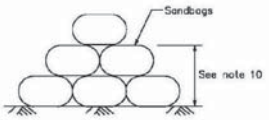


NOTES

1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/3 the height of the linear barrier, in no case shall the reach length exceed 500'.
2. The last 8'–0" of fence shall be turned up slope.
3. Stake dimensions are nominal.
4. Dimension may vary to fit field condition.
5. Stakes shall be spaced at 8'–0" maximum and shall be positioned on downstream side of fence.
6. Stakes to overlap and fence fabric to fold around each stake one full turn. Secure fabric to stake with 4 staples.
7. Stakes shall be driven tightly together to prevent potential flow–through of sediment at joint. The tops of the stakes shall be secured with wire.
8. For end stake, fence fabric shall be folded around two stakes one full turn and secured with 4 staples.
9. Minimum 4 staples per stake. Dimensions shown are typical.
10. Cross barriers shall be a minimum of 1/3 and a maximum of 1/2 the height of the linear barrier.
11. Maintenance openings shall be constructed in a manner to ensure sediment remains behind silt fence.
12. Joining sections shall not be placed at sump locations.
13. Sandbag rows and layers shall be offset to eliminate gaps.
14. Add 3–4 bags to cross barrier on downgrodient side of silt fence as needed to prevent bypass or undermining and as allowable based on site limits of disturbance.



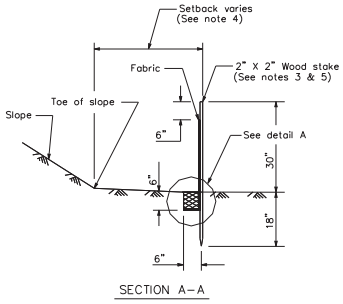
CROSS BARRIER DETAIL



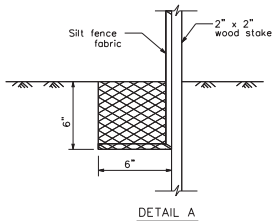
SECTION C–C

Silt Fence

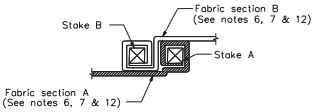
SE-1



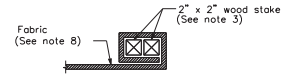
SECTION A–A



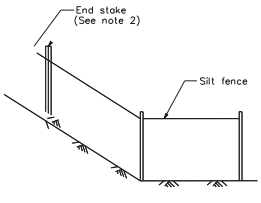
DETAIL A



JOINING SECTION DETAIL (TOP VIEW)



END STAKE DETAIL (TOP VIEW)



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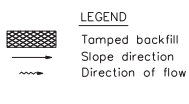
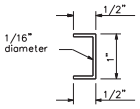
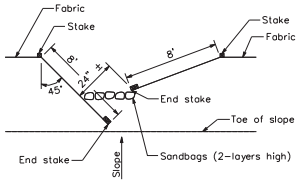


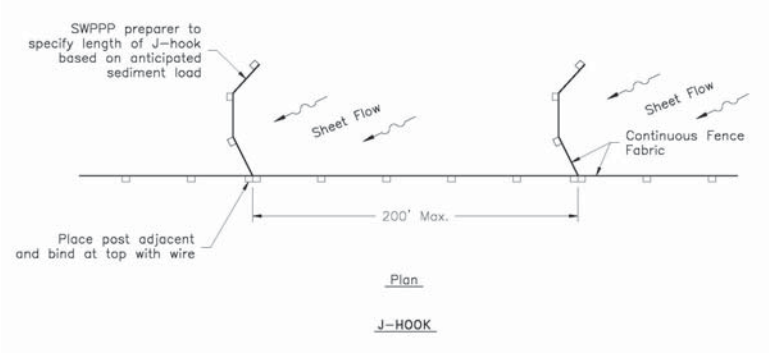


STAPLE DETAIL
(SEE NOTE 9)

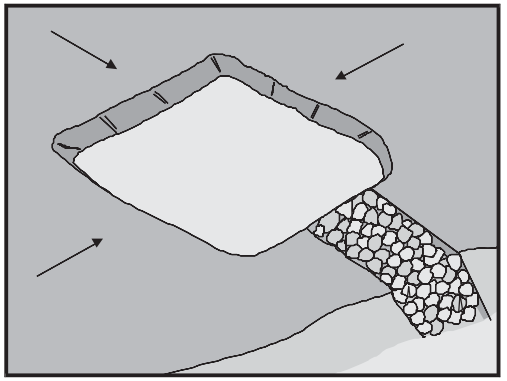


OPTIONAL MAINTENANCE OPENING DETAIL
(SEE NOTE 11)

Silt Fence SE-1



Sediment Trap SE-3



Categories

EC	Erosion Control	
SE	Sediment Control	☑
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:
☑ **Primary Objective**
☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	☑
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-2 Sediment Basin (for larger areas)

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Description and Purpose

A sediment trap is a containment area where sediment-laden runoff is temporarily detained under quiescent conditions, allowing sediment to settle out or before the runoff is discharged by gravity flow. Sediment traps are formed by excavating or constructing an earthen embankment across a waterway or low drainage area.

Trap design guidance provided in this fact sheet is not intended to guarantee compliance with numeric discharge limits (numeric action levels or numeric effluent limits for turbidity). Compliance with discharge limits requires a thoughtful approach to comprehensive BMP planning, implementation, and maintenance. Therefore, optimally designed and maintained sediment traps should be used in conjunction with a comprehensive system of BMPs.

Suitable Applications

Sediment traps should be considered for use:

- At the perimeter of the site at locations where sediment-laden runoff is discharged offsite.
- At multiple locations within the project site where sediment control is needed.
- Around or upslope from storm drain inlet protection measures.
- Sediment traps may be used on construction projects where the drainage area is less than 5 acres. Traps would be

placed where sediment-laden stormwater may enter a storm drain or watercourse. SE-2, Sediment Basins, must be used for drainage areas greater than 5 acres.

- As a supplemental control, sediment traps provide additional protection for a water body or for reducing sediment before it enters a drainage system.

Limitations

- Requires large surface areas to permit infiltration and settling of sediment.
- Not appropriate for drainage areas greater than 5 acres.
- Only removes large and medium sized particles and requires upstream erosion control.
- Attractive and dangerous to children, requiring protective fencing.
- Conducive to vector production.
- Should not be located in live streams.

Implementation

Design

A sediment trap is a small temporary ponding area, usually with a gravel outlet, formed by excavation or by construction of an earthen embankment. Its purpose is to collect and store sediment from sites cleared or graded during construction. It is intended for use on small drainage areas with no unusual drainage features and projected for a quick build-out time. It should help in removing coarse sediment from runoff. The trap is a temporary measure with a design life of approximately six months to one year and is to be maintained until the site area is permanently protected against erosion by vegetation and/or structures.

Sediment traps should be used only for small drainage areas. If the contributing drainage area is greater than 5 acres, refer to SE-2, Sediment Basins, or subdivide the catchment area into smaller drainage basins.

Sediment usually must be removed from the trap after each rainfall event. The SWPPP should detail how this sediment is to be disposed, such as in fill areas onsite, or removal to an approved offsite dump. Sediment traps used as perimeter controls should be installed before any land disturbance takes place in the drainage area.

Sediment traps are usually small enough that a failure of the structure would not result in a loss of life, damage to home or buildings, or interruption in the use of public roads or utilities. However, sediment traps are attractive to children and can be dangerous. The following recommendations should be implemented to reduce risks:

- Install continuous fencing around the sediment trap or pond. Consult local ordinances regarding requirements for maintaining health and safety.
- Restrict basin side slopes to 3:1 or flatter.

Sediment trap size depends on the type of soil, size of the drainage area, and desired sediment removal efficiency (see SE-2, Sediment Basin). As a rule of thumb, the larger the basin volume

the greater the sediment removal efficiency. Sizing criteria are typically established under the local grading ordinance or equivalent. The runoff volume from a 2-year storm is a common design criteria for a sediment trap. The sizing criteria below assume that this runoff volume is 0.042 acre-ft/acre (0.5 in. of runoff). While the climatic, topographic, and soil type extremes make it difficult to establish a statewide standard, the following criteria should trap moderate to high amounts of sediment in most areas of California:

- Locate sediment traps as near as practical to areas producing the sediment.
- Trap should be situated according to the following criteria: (1) by excavating a suitable area or where a low embankment can be constructed across a swale, (2) where failure would not cause loss of life or property damage, and (3) to provide access for maintenance, including sediment removal and sediment stockpiling in a protected area.
- Trap should be sized to accommodate a settling zone and sediment storage zone with recommended minimum volumes of 67 yd^3/acre and 33 yd^3/acre of contributing drainage area, respectively, based on 0.5 in. of runoff volume over a 24-hour period. In many cases, the size of an individual trap is limited by available space. Multiple traps or additional volume may be required to accommodate specific rainfall, soil, and site conditions.
- Traps with an impounding levee greater than 4.5 ft tall, measured from the lowest point to the impounding area to the highest point of the levee, and traps capable of impounding more than 35,000 ft^3, should be designed by a Registered Civil Engineer. The design should include maintenance requirements, including sediment and vegetation removal, to ensure continuous function of the trap outlet and bypass structures.
- The outlet pipe or open spillway must be designed to convey anticipated peak flows.
- Use rock or vegetation to protect the trap outlets against erosion.
- Fencing should be provided to prevent unauthorized entry.

Installation

Sediment traps can be constructed by excavating a depression in the ground or creating an impoundment with a small embankment. Sediment traps should be installed outside the area being graded and should be built prior to the start of the grading activities or removal of vegetation. To minimize the area disturbed by them, sediment traps should be installed in natural depressions or in small swales or drainage ways. The following steps must be followed during installation:

- The area under the embankment must be cleared, grubbed, and stripped of any vegetation and root mat. The pool area should be cleared.
- The fill material for the embankment must be free of roots or other woody vegetation as well as oversized stones, rocks, organic material, or other objectionable material. The embankment may be compacted by traversing with equipment while it is being constructed.
- All cut-and-fill slopes should be 3:1 or flatter.
- When a riser is used, all pipe joints must be watertight.

- When a riser is used, at least the top two-thirds of the riser should be perforated with 0.5 in. diameter holes spaced 8 in. vertically and 10 to 12 in. horizontally. See SE-2, Sediment Basin.
- When an earth or stone outlet is used, the outlet crest elevation should be at least 1 ft below the top of the embankment.
- When crushed stone outlet is used, the crushed stone used in the outlet should meet AASHTO M43, size No. 2 or 24, or its equivalent such as MSHA No. 2. Gravel meeting the above gradation may be used if crushed stone is not available.

Costs

Average annual cost per installation and maintenance (18 month useful life) is $0.73 per ft^3 ($1,300 per drainage acre). Maintenance costs are approximately 20% of installation costs.

Inspection and Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect outlet area for erosion and stabilize if required.
- Inspect trap banks for seepage and structural soundness, repair as needed.
- Inspect outlet structure and spillway for any damage or obstructions. Repair damage and remove obstructions as needed.
- Inspect fencing for damage and repair as needed.
- Inspect the sediment trap for area of standing water during every visit. Corrective measures should be taken if the BMP does not dewater completely in 96 hours or less to prevent vector production.
- Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the trap capacity. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed of at an appropriate location.
- Remove vegetation from the sediment trap when first detected to prevent pools of standing water and subsequent vector production.
- BMPs that require dewatering shall be continuously attended while dewatering takes place. Dewatering BMPs per NS-2 shall be implemented at all times during dewatering activities.

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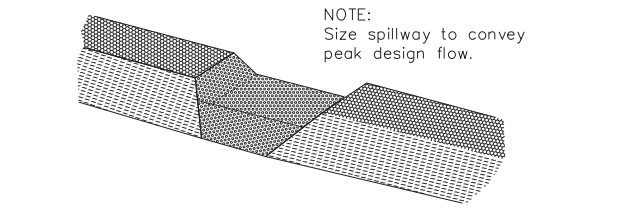
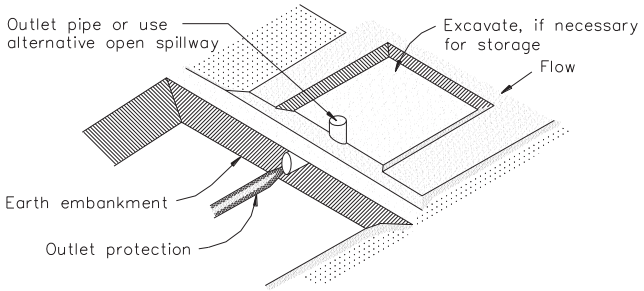
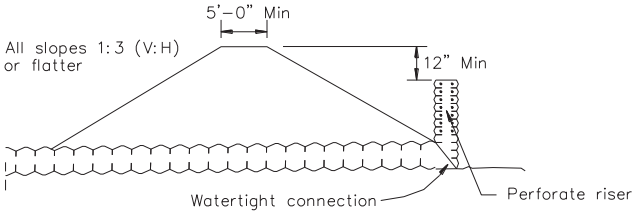
Sediment Trap SE-3



TYPICAL OPEN SPILLWAY

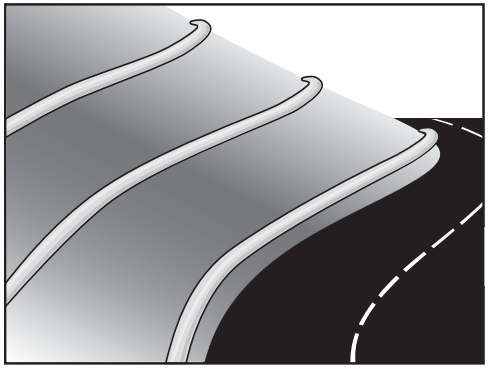




EMBANKMENT SECTION THRU RISER

TYPICAL SEDIMENT TRAP
NOT TO SCALE

Fiber Rolls SE-5



Categories

EC	Erosion Control	☒
SE	Sediment Control	☑
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:
☑ **Primary Category**
☒ **Secondary Category**

Description and Purpose

A fiber roll consists of straw, coir, or other biodegradable materials bound into a tight tubular roll wrapped by netting, which can be photodegradable or natural. Additionally, gravel core fiber rolls are available, which contain an imbedded ballast material such as gravel or sand for additional weight when staking the rolls are not feasible (such as use as inlet protection). When fiber rolls are placed at the toe and on the face of slopes along the contours, they intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide removal of sediment from the runoff (through sedimentation). By interrupting the length of a slope, fiber rolls can also reduce sheet and rill erosion until vegetation is established.

Suitable Applications

Fiber rolls may be suitable:

- Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.
- At the end of a downward slope where it transitions to a steeper slope.
- Along the perimeter of a project.
- As check dams in unlined ditches with minimal grade.
- Down-slope of exposed soil areas.
- At operational storm drains as a form of inlet protection.

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- SE-1 Silt Fence
- SE-6 Gravel Bag Berm
- SE-8 Sandbag Barrier
- SE-12 Manufactured Linear Sediment Controls
- SE-14 Biofilter Bags

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- Around temporary stockpiles.

Limitations

- Fiber rolls are not effective unless trenched in and staked.
- Not intended for use in high flow situations.
- Difficult to move once saturated.
- If not properly staked and trenched in, fiber rolls could be transported by high flows.
- Fiber rolls have a very limited sediment capture zone.
- Fiber rolls should not be used on slopes subject to creep, slumping, or landslide.
- Rolls typically function for 12-24 months depending upon local conditions.

Implementation

Fiber Roll Materials

- Fiber rolls should be prefabricated.
- Fiber rolls may come manufactured containing polyacrylamide (PAM), a flocculating agent within the roll. Fiber rolls impregnated with PAM provide additional sediment removal capabilities and should be used in areas with fine, clayey or silty soils to provide additional sediment removal capabilities. Monitoring may be required for these installations.
- Fiber rolls are made from weed free rice straw, flax, or a similar agricultural material bound into a tight tubular roll by netting.
- Typical fiber rolls vary in diameter from 9 in. to 20 in. Larger diameter rolls are available as well.

Installation

- Locate fiber rolls on level contours spaced as follows:
  - Slope inclination of 4:1 (H:V) or flatter: Fiber rolls should be placed at a maximum interval of 20 ft.
  - Slope inclination between 4:1 and 2:1 (H:V): Fiber Rolls should be placed at a maximum interval of 15 ft. (a closer spacing is more effective).
  - Slope inclination 2:1 (H:V) or greater: Fiber Rolls should be placed at a maximum interval of 10 ft. (a closer spacing is more effective).
- Prepare the slope before beginning installation.
- Dig small trenches across the slope on the contour. The trench depth should be ¼ to 1/3 of the thickness of the roll, and the width should equal the roll diameter, in order to provide area to backfill the trench.

- It is critical that rolls are installed perpendicular to water movement, and parallel to the slope contour.
- Start building trenches and installing rolls from the bottom of the slope and work up.
- It is recommended that pilot holes be driven through the fiber roll. Use a straight bar to drive holes through the roll and into the soil for the wooden stakes.
- Turn the ends of the fiber roll up slope to prevent runoff from going around the roll.
- Stake fiber rolls into the trench.
  - Drive stakes at the end of each fiber roll and spaced 4 ft maximum on center.
  - Use wood stakes with a nominal classification of 0.75 by 0.75 in. and minimum length of 24 in.
- If more than one fiber roll is placed in a row, the rolls should be overlapped, not abutted.
- See typical fiber roll installation details at the end of this fact sheet.

Removal

- Fiber rolls can be left in place or removed depending on the type of fiber roll and application (temporary vs. permanent installation). Typically, fiber rolls encased with plastic netting are used for a temporary application because the netting does not biodegrade. Fiber rolls used in a permanent application are typically encased with a biodegradeable material and are left in place. Removal of a fiber roll used in a permanent application can result in greater disturbance.
- Temporary installations should only be removed when up gradient areas are stabilized per General Permit requirements, and/or pollutant sources no longer present a hazard. But, they should also be removed before vegetation becomes too mature so that the removal process does not disturb more soil and vegetation than is necessary.

Costs

Material costs for regular fiber rolls range from $20 - $30 per 25 ft roll.

Material costs for PAM impregnated fiber rolls range between 7.00-$9.00 per linear foot, based upon vendor research.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Repair or replace split, torn, unraveling, or slumping fiber rolls.
- If the fiber roll is used as a sediment capture device, or as an erosion control device to maintain sheet flows, sediment that accumulates in the BMP should be periodically removed

in order to maintain BMP effectiveness. Sediment should be removed when sediment accumulation reaches one-third the designated sediment storage depth.

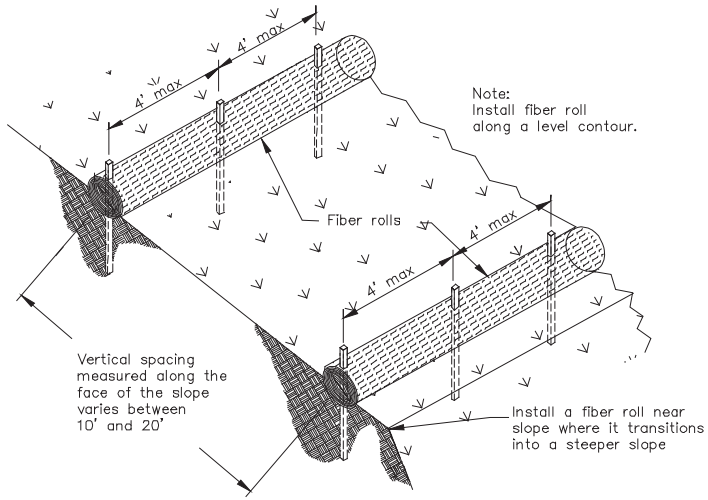
- If fiber rolls are used for erosion control, such as in a check dam, sediment removal should not be required as long as the system continues to control the grade. Sediment control BMPs will likely be required in conjunction with this type of application.
- Repair any rills or gullies promptly.

References

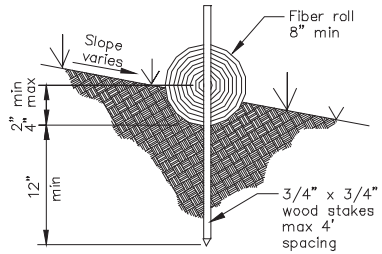
Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Fiber Rolls SE-5

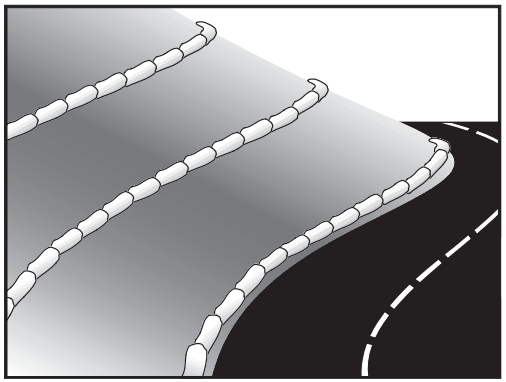


TYPICAL FIBER ROLL INSTALLATION
N.T.S.



ENTRENCHMENT DETAIL
N.T.S.

Gravel Bag Berm SE-6



Description and Purpose

A gravel bag berm is a series of gravel-filled bags placed on a level contour to intercept sheet flows. Gravel bags pond sheet flow runoff, allowing sediment to settle out, and release runoff slowly as sheet flow, preventing erosion.

Suitable Applications

Gravel bag berms may be suitable:

- As a linear sediment control measure:
  - Below the toe of slopes and erodible slopes
  - As sediment traps at culvert/pipe outlets
  - Below other small cleared areas
  - Along the perimeter of a site
  - Down slope of exposed soil areas
  - Around temporary stockpiles and spoil areas
  - Parallel to a roadway to keep sediment off paved areas
  - Along streams and channels
- As a linear erosion control measure:
  - Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.

Categories

EC	Erosion Control	☒
SE	Sediment Control	☑
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:
☑ **Primary Category**
☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence
SE-5 Fiber Roll
SE-8 Sandbag Barrier
SE-12 Temporary Silt Dike
SE-14 Biofilter Bags

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- At the top of slopes to divert runoff away from disturbed slopes.
- As chevrons (small check dams) across mildly sloped construction roads. For use check dam use in channels, see SE-4, Check Dams.

Limitations

- Gravel berms may be difficult to remove.
- Removal problems limit their usefulness in landscaped areas.
- Gravel bag berm may not be appropriate for drainage areas greater than 5 acres.
- Runoff will pond upstream of the berm, possibly causing flooding if sufficient space does not exist.
- Degraded gravel bags may rupture when removed, spilling contents.
- Installation can be labor intensive.
- Durability of gravel bags is somewhat limited and bags may need to be replaced when installation is required for longer than 6 months.
- Easily damaged by construction equipment.
- When used to detain concentrated flows, maintenance requirements increase.

Implementation

General

A gravel bag berm consists of a row of open graded gravel-filled bags placed on a level contour. When appropriately placed, a gravel bag berm intercepts and slows sheet flow runoff, causing temporary ponding. The temporary ponding allows sediment to settle. The open graded gravel in the bags is porous, which allows the ponded runoff to flow slowly through the bags, releasing the runoff as sheet flows. Gravel bag berms also interrupt the slope length and thereby reduce erosion by reducing the tendency of sheet flows to concentrate into rivulets, which erode rills, and ultimately gullies, into disturbed, sloped soils. Gravel bag berms are similar to sand bag barriers, but are more porous. Generally, gravel bag berms should be used in conjunction with temporary soil stabilization controls up slope to provide effective erosion and sediment control.

Design and Layout

- Locate gravel bag berms on level contours.
- When used for slope interruption, the following slope/sheet flow length combinations apply:
  - Slope inclination of 4:1 (H:V) or flatter: Gravel bags should be placed at a maximum interval of 20 ft, with the first row near the slope toe.
  - Slope inclination between 4:1 and 2:1 (H:V): Gravel bags should be placed at a maximum interval of 15 ft. (a closer spacing is more effective), with the first row near the slope toe.

Slope inclination 2:1 (H:V) or greater: Gravel bags should be placed at a maximum interval of 10 ft. (a closer spacing is more effective), with the first row near the slope toe.

- Turn the ends of the gravel bag barriers up slope to prevent runoff from going around the berm.
- Allow sufficient space up slope from the gravel bag berm to allow ponding, and to provide room for sediment storage.
- For installation near the toe of the slope, gravel bag barriers should be set back from the slope toe to facilitate cleaning. Where specific site conditions do not allow for a set-back, the gravel bag barrier may be constructed on the toe of the slope. To prevent flows behind the barrier, bags can be placed perpendicular to a berm to serve as cross barriers.
- Drainage area should not exceed 5 acres.
- In Non-Traffic Areas:
  - Height = 18 in. maximum
  - Top width = 24 in. minimum for three or more layer construction
  - Top width = 12 in. minimum for one or two layer construction
  - Side slopes = 2:1 (H:V) or flatter
- In Construction Traffic Areas:
  - Height = 12 in. maximum
  - Top width = 24 in. minimum for three or more layer construction.
  - Top width = 12 in. minimum for one or two layer construction.
  - Side slopes = 2:1 (H:V) or flatter.
- Butt ends of bags tightly.
- On multiple row, or multiple layer construction, overlap butt joints of adjacent row and row beneath.
- Use a pyramid approach when stacking bags.

Materials

- ***Bag Material:*** Bags should be woven polypropylene, polyethylene or polyamide fabric or burlap, minimum unit weight of 4 ounces/yd^2, Mullen burst strength exceeding 300 lb/in^2 in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355.

Gravel Bag Berm SE-6

- ***Bag Size:*** Each gravel-filled bag should have a length of 18 in., width of 12 in., thickness of 3 in., and mass of approximately 33 lbs. Bag dimensions are nominal, and may vary based on locally available materials.
- ***Fill Material:*** Fill material should be 0.5 to 1 in. crushed rock, clean and free from clay, organic matter, and other deleterious material, or other suitable open graded, non-cohesive, porous gravel.

Costs

Material costs for gravel bags are average and are dependent upon material availability. $2.50-3.00 per filled gravel bag is standard based upon vendor research.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Gravel bags exposed to sunlight will need to be replaced every two to three months due to degrading of the bags.
- Reshape or replace gravel bags as needed.
- Repair washouts or other damage as needed.
- Sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Remove gravel bag berms when no longer needed and recycle gravel fill whenever possible and properly dispose of bag material. Remove sediment accumulation and clean, re-grade, and stabilize the area.

References

Handbook of Steel Drainage and Highway Construction, American Iron and Steel Institute, 1983.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Pollution Plan Handbook, First Edition, State of California, Department of Transportation Division of New Technology, Materials and Research, October 1992.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Street Sweeping and Vacuuming SE-7



Categories		
EC	Erosion Control	
SE	Sediment Control	☒
TC	Tracking Control	☑
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:
☑ **Primary Objective**
☒ **Secondary Objective**

Targeted Constituents	
Sediment	☑
Nutrients	
Trash	☑
Metals	
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

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Description and Purpose

Street sweeping and vacuuming includes use of self-propelled and walk-behind equipment to remove sediment from streets and roadways, and to clean paved surfaces in preparation for final paving. Sweeping and vacuuming prevents sediment from the project site from entering storm drains or receiving waters.

Suitable Applications

Sweeping and vacuuming are suitable anywhere sediment is tracked from the project site onto public or private paved streets and roads, typically at points of egress. Sweeping and vacuuming are also applicable during preparation of paved surfaces for final paving.

Limitations

Sweeping and vacuuming may not be effective when sediment is wet or when tracked soil is caked (caked soil may need to be scraped loose).

Implementation

- Controlling the number of points where vehicles can leave the site will allow sweeping and vacuuming efforts to be focused, and perhaps save money.
- Inspect potential sediment tracking locations daily.
- Visible sediment tracking should be swept or vacuumed on a daily basis.

Street Sweeping and Vacuuming SE-7

- Do not use kick brooms or sweeper attachments. These tend to spread the dirt rather than remove it.
- If not mixed with debris or trash, consider incorporating the removed sediment back into the project

Costs

Rental rates for self-propelled sweepers vary depending on hopper size and duration of rental. Expect rental rates from $58/hour (3 yd^3 hopper) to $88/hour (9 yd^3 hopper), plus operator costs. Hourly production rates vary with the amount of area to be swept and amount of sediment. Match the hopper size to the area and expect sediment load to minimize time spent dumping.

Inspection and Maintenance

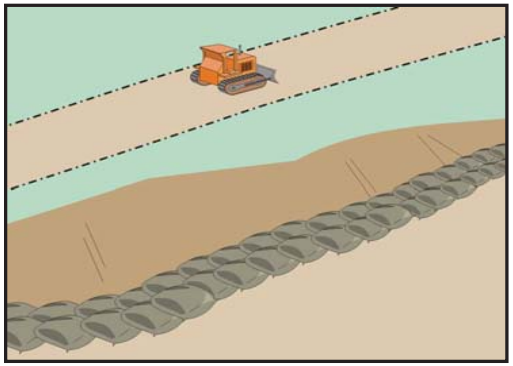
- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- When actively in use, points of ingress and egress must be inspected daily.
- When tracked or spilled sediment is observed outside the construction limits, it must be removed at least daily. More frequent removal, even continuous removal, may be required in some jurisdictions.
- Be careful not to sweep up any unknown substance or any object that may be potentially hazardous.
- Adjust brooms frequently; maximize efficiency of sweeping operations.
- After sweeping is finished, properly dispose of sweeper wastes at an approved dumpsite.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Labor Surcharge and Equipment Rental Rates, State of California Department of Transportation (Caltrans), April 1, 2002 – March 31, 2003.

Sandbag Barrier SE-8



Categories		
EC	Erosion Control	☒
SE	Sediment Control	☑
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:
☑ **Primary Category**
☒ **Secondary Category**

Description and Purpose

A sandbag barrier is a series of sand-filled bags placed on a level contour to intercept or to divert sheet flows. Sandbag barriers placed on a level contour pond sheet flow runoff, allowing sediment to settle out.

Suitable Applications

Sandbag barriers may be a suitable control measure for the applications described below. It is important to consider that sand bags are less porous than gravel bags and ponding or flooding can occur behind the barrier. Also, sand is easily transported by runoff if bags are damaged or ruptured. The SWPPP Preparer should select the location of a sandbag barrier with respect to the potential for flooding, damage, and the ability to maintain the BMP.

- As a linear sediment control measure:
  - Below the toe of slopes and erodible slopes.
  - As sediment traps at culvert/pipe outlets.
  - Below other small cleared areas.
  - Along the perimeter of a site.
  - Down slope of exposed soil areas.
  - Around temporary stockpiles and spoil areas.
  - Parallel to a roadway to keep sediment off paved areas.
  - Along streams and channels.

Targeted Constituents	
Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives
SE-1 Silt Fence
SE-5 Fiber Rolls
SE-6 Gravel Bag Berm
SE-12 Manufactured Linear Sediment Controls
SE-14 Biofilter Bags

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Sandbag Barrier SE-8

- As linear erosion control measure:
  - Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.
  - At the top of slopes to divert runoff away from disturbed slopes.
  - As check dams across mildly sloped construction roads.

Limitations

- It is necessary to limit the drainage area upstream of the barrier to 5 acres.
- Sandbags are not intended to be used as filtration devices.
- Easily damaged by construction equipment.
- Degraded sandbags may rupture when removed, spilling sand.
- Installation can be labor intensive.
- Durability of sandbags is somewhat limited and bags will need to be replaced when there are signs of damage or wear.
- Burlap should not be used for sandbags.

Implementation

General

A sandbag barrier consists of a row of sand-filled bags placed on a level contour. When appropriately placed, a sandbag barrier intercepts and slows sheet flow runoff, causing temporary ponding. The temporary ponding allows sediment to settle. Sand-filled bags have limited porosity, which is further limited as the fine sand tends to quickly plug with sediment, limiting or completely blocking the rate of flow through the barrier. If a porous barrier is desired, consider SE-1, Silt Fence, SE-5, Fiber Rolls, SE-6, Gravel Bag Berms or SE-14, Biofilter Bags. Sandbag barriers also interrupt the slope length and thereby reduce erosion by reducing the tendency of sheet flows to concentrate into rivulets which erode rills, and ultimately gullies, into disturbed, sloped soils. Sandbag barriers are similar to gravel bag berms, but less porous. Generally, sandbag barriers should be used in conjunction with temporary soil stabilization controls up slope to provide effective erosion and sediment control.

Design and Layout

- Locate sandbag barriers on a level contour.
- When used for slope interruption, the following slope/sheet flow length combinations apply:
  - Slope inclination of 4:1 (H:V) or flatter: Sandbags should be placed at a maximum interval of 20 ft, with the first row near the slope toe.
  - Slope inclination between 4:1 and 2:1 (H:V): Sandbags should be placed at a maximum interval of 15 ft. (a closer spacing is more effective), with the first row near the slope toe.

  - Slope inclination 2:1 (H:V) or greater: Sandbags should be placed at a maximum interval of 10 ft. (a closer spacing is more effective), with the first row near the slope toe.

- Turn the ends of the sandbag barrier up slope to prevent runoff from going around the barrier.
- Allow sufficient space up slope from the barrier to allow ponding, and to provide room for sediment storage.
- For installation near the toe of the slope, sand bag barriers should be set back from the slope toe to facilitate cleaning. Where specific site conditions do not allow for a set-back, the sand bag barrier may be constructed on the toe of the slope. To prevent flows behind the barrier, bags can be placed perpendicular to a berm to serve as cross barriers.
- Drainage area should not exceed 5 acres.
- Butt ends of bags tightly.
- Overlap butt joints of row beneath with each successive row.
- Use a pyramid approach when stacking bags.
- In non-traffic areas
  - Height = 18 in. maximum
  - Top width = 24 in. minimum for three or more layer construction
  - Side slope = 2:1 (H:V) or flatter
- In construction traffic areas
  - Height = 12 in. maximum
  - Top width = 24 in. minimum for three or more layer construction.
  - Side slopes = 2:1 (H:V) or flatter.
- See typical sandbag barrier installation details at the end of this fact sheet.

Materials

- ***Sandbag Material:*** Sandbag should be woven polypropylene, polyethylene or polyamide fabric, minimum unit weight of 4 ounces/yd^2, Mullen burst strength exceeding 300 lb/in^2 in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355. Use of burlap is not an acceptable substitute, as sand can more easily mobilize out of burlap.
- ***Sandbag Size:*** Each sand-filled bag should have a length of 18 in., width of 12 in., thickness of 3 in., and mass of approximately 33 lbs. Bag dimensions are nominal, and may vary based on locally available materials.

- ***Fill Material:*** All sandbag fill material should be non-cohesive, Class 3 (Caltrans Standard Specification, Section 25) or similar permeable material free from clay and deleterious material, such as recycled concrete or asphalt.

Costs

Empty sandbags cost $0.25 - $0.75. Average cost of fill material is $8 per yd^3. Additional labor is required to fill the bags. Pre-filled sandbags are more expensive at $1.50 - $2.00 per bag. These costs are based upon vendor research.

Inspection and Maintenance

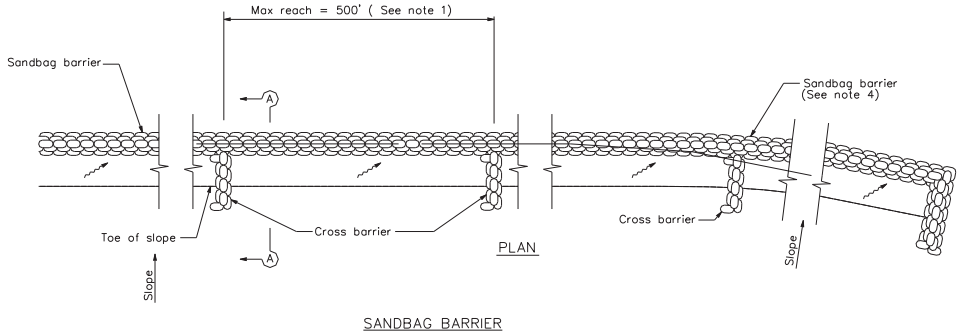
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Sandbags exposed to sunlight will need to be replaced every two to three months due to degradation of the bags.
- Reshape or replace sandbags as needed.
- Repair washouts or other damage as needed.
- Sediment that accumulates behind the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Remove sandbags when no longer needed and recycle sand fill whenever possible and properly dispose of bag material. Remove sediment accumulation, and clean, re-grade, and stabilize the area.

References

Standard Specifications for Construction of Local Streets and Roads, California Department of Transportation (Caltrans), July 2002.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

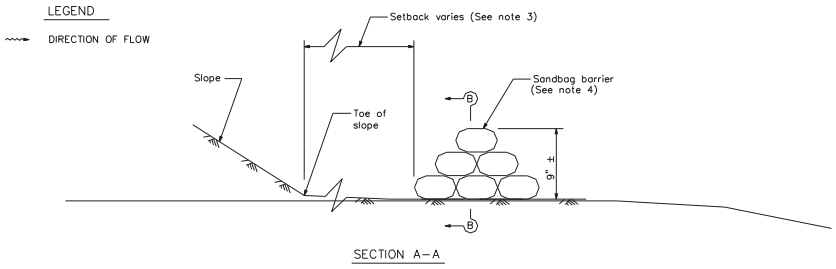
Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.



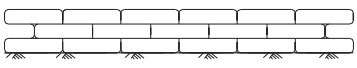
SANDBAG BARRIER

NOTES

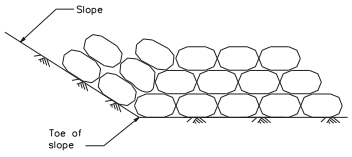
1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/2 the height of the linear barrier. In no case shall the reach length exceed 500'.
2. Place sandbags tightly.
3. Dimension may vary to fit field condition.
4. Sandbag barrier shall be a minimum of 3 bags high.
5. The end of the barrier shall be turned up slope.
6. Cross barriers shall be a min of 1/2 and a max of 2/3 the height of the linear barrier.
7. Sandbag rows and layers shall be staggered to eliminate gaps.



SECTION A–A



SECTION B–B



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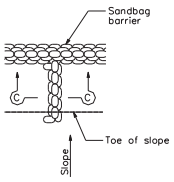
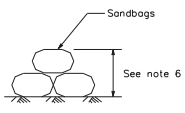
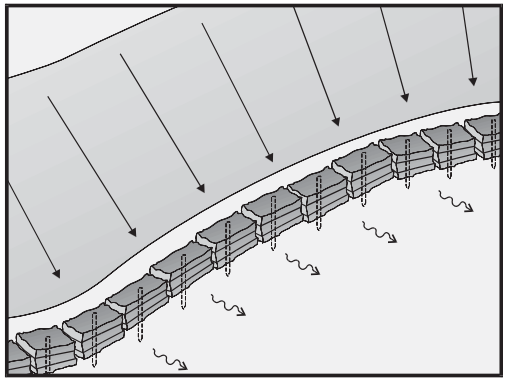


CROSS BARRIER DETAIL



SECTION C–C

Straw Bale Barrier SE-9



Categories		
EC	Erosion Control	☒
SE	Sediment Control	☑
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:
☑ **Primary Objective**
☒ **Secondary Objective**

Targeted Constituents	
Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence
SE-5 Fiber Rolls
SE-6 Gravel Bag Berm
SE-8 Sandbag Barrier
SE-12 Temporary Silt Dike
SE-14 Biofilter Bags

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Description and Purpose

A straw bale barrier is a series of straw bales placed on a level contour to intercept sheet flows. Straw bale barriers pond sheet-flow runoff, allowing sediment to settle out.

Suitable Applications

Straw bale barriers may be suitable:

- As a linear sediment control measure:
  - Below the toe of slopes and erodible slopes
  - As sediment traps at culvert/pipe outlets
  - Below other small cleared areas
  - Along the perimeter of a site
  - Down slope of exposed soil areas
  - Around temporary stockpiles and spoil areas
  - Parallel to a roadway to keep sediment off paved areas
  - Along streams and channels
- As linear erosion control measure:
  - Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow

  - At the top of slopes to divert runoff away from disturbed slopes
  - As check dams across mildly sloped construction roads

Limitations

Straw bale barriers:

- Are not to be used for extended periods of time because they tend to rot and fall apart
- Are suitable only for sheet flow on slopes of 10 % or flatter
- Are not appropriate for large drainage areas, limit to one acre or less
- May require constant maintenance due to rotting
- Are not recommended for concentrated flow, inlet protection, channel flow, and live streams
- Cannot be made of bale bindings of jute or cotton
- Require labor-intensive installation and maintenance
- Cannot be used on paved surfaces
- Should not to be used for drain inlet protection
- Should not be used on lined ditches
- May introduce undesirable non-native plants to the area

Implementation

General

A straw bale barrier consists of a row of straw bales placed on a level contour. When appropriately placed, a straw bale barrier intercepts and slows sheet flow runoff, causing temporary ponding. The temporary ponding provides quiescent conditions allowing sediment to settle. Straw bale barriers also interrupt the slope length and thereby reduce erosion by reducing the tendency of sheet flows to concentrate into rivulets, which erode rills, and ultimately gullies, into disturbed, sloped soils.

Straw bale barriers have not been as effective as expected due to improper use. These barriers have been placed in streams and drainage ways where runoff volumes and velocities have caused the barriers to wash out. In addition, failure to stake and entrench the straw bale has allowed undercutting and end flow. Use of straw bale barriers in accordance with this BMP should produce acceptable results.

Design and Layout

- Locate straw bale barriers on a level contour.
  - Slopes up to 10:1 (H:V): Straw bales should be placed at a maximum interval of 50 ft (a closer spacing is more effective), with the first row near the toe of slope.
  - Slopes greater than 10:1 (H:V): Not recommended.

- Turn the ends of the straw bale barrier up slope to prevent runoff from going around the barrier.
- Allow sufficient space up slope from the barrier to allow ponding, and to provide room for sediment storage.
- For installation near the toe of the slope, consider moving the barrier away from the slope toe to facilitate cleaning. To prevent flow behind the barrier, sand bags can be placed perpendicular to the barrier to serve as cross barriers.
- Drainage area should not exceed 1 acre, or 0.25 acre per 100 ft of barrier.
- Maximum flow path to the barrier should be limited to 100 ft.
- Straw bale barriers should consist of two parallel rows.
  - Butt ends of bales tightly
  - Stagger butt joints between front and back row
  - Each row of bales must be trenched in and firmly staked
- Straw bale barriers are limited in height to one bale laid on its side.
- Anchor bales with either two wood stakes or four bars driven through the bale and into the soil. Drive the first stake towards the butt joint with the adjacent bale to force the bales together.
- See attached figure for installation details.

Materials

- ***Straw Bale Size:*** Each straw bale should be a minimum of 14 in. wide, 18 in. in height, 36 in. in length and should have a minimum mass of 50 lbs. The straw bale should be composed entirely of vegetative matter, except for the binding material.
- ***Bale Bindings:*** Bales should be bound by steel wire, nylon or polypropylene string placed horizontally. Jute and cotton binding should not be used. Baling wire should be a minimum diameter of 14 gauge. Nylon or polypropylene string should be approximately 12 gauge in diameter with a breaking strength of 80 lbs force.
- ***Stakes:*** Wood stakes should be commercial quality lumber of the size and shape shown on the plans. Each stake should be free from decay, splits or cracks longer than the thickness of the stake, or other defects that would weaken the stakes and cause the stakes to be structurally unsuitable. Steel bar reinforcement should be equal to a #4 designation or greater. End protection should be provided for any exposed bar reinforcement.

Costs

Straw bales cost $5 - $7 each. Adequate labor should be budgeted for installation and maintenance.

Straw Bale Barrier SE-9

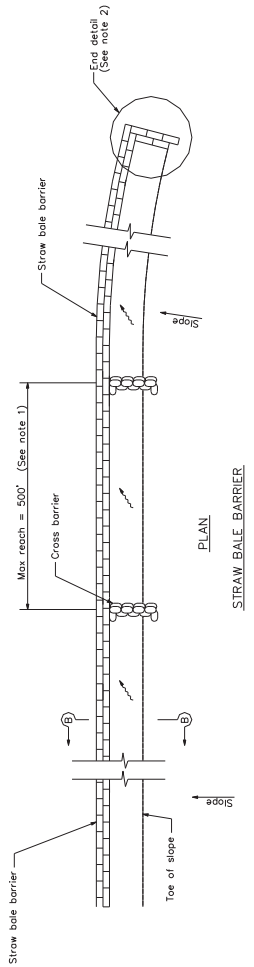
Inspection and Maintenance

Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Straw bales degrade, especially when exposed to moisture. Rotting bales will need to be replaced on a regular basis.
- Replace or repair damaged bales as needed.
- Repair washouts or other damages as needed.
- Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed at an appropriate location.
- Remove straw bales when no longer needed. Remove sediment accumulation, and clean, re-grade, and stabilize the area. Removed sediment should be incorporated in the project or disposed of.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.



PLAN

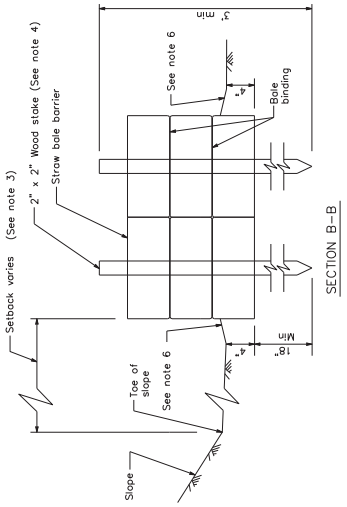
STRAW BALE BARRIER

LEGEND

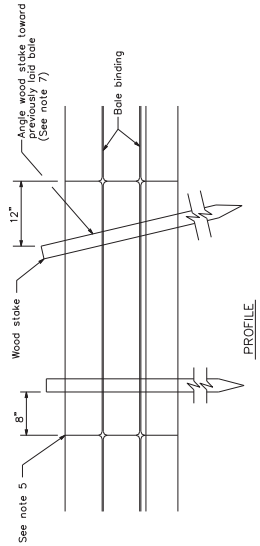
DIRECTION OF FLOW

NOTES

1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/2 the height of the linear barrier. In no case shall the reach length exceed 500'.
2. The end of barrier shall be turned up slope.
3. Dimension may vary to fit field condition.
4. Stake dimensions are nominal.
5. Place straw bales tightly together.
6. Tamp embedment spoils against sides of installed bales.
7. Drive angled wood stake before vertical stake to ensure tight abutment to adjacent bale.
8. Sandbag cross barriers should be a min of 1/2 and a max of 2/3 the height of the linear barrier.
9. Sandbag rows and layers should be offset to eliminate gaps.



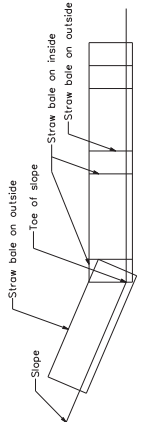
SECTION B-B



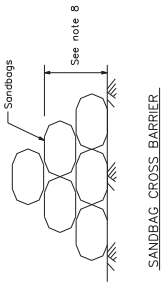
PROFILE

LEGEND

DIRECTION OF FLOW

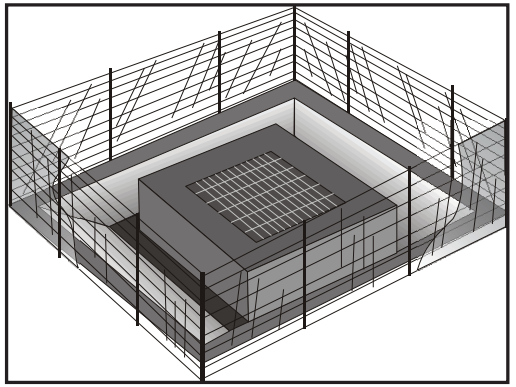


END DETAIL



SANDBAG CROSS BARRIER

Storm Drain Inlet Protection SE-10



Categories		
EC	Erosion Control	
SE	Sediment Control	☑
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:
☑ **Primary Category**
☒ **Secondary Category**

Targeted Constituents	
Sediment	☑
Nutrients	
Trash	☒
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence
SE-5 Fiber Rolls
SE-6 Gravel Bag Berm
SE-8 Sandbag Barrier
SE-14 Biofilter Bags
SE-13 Compost Socks and Berms

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Description and Purpose

Storm drain inlet protection consists of a sediment filter or an impounding area in, around or upstream of a storm drain, drop inlet, or curb inlet. Storm drain inlet protection measures temporarily pond runoff before it enters the storm drain, allowing sediment to settle. Some filter configurations also remove sediment by filtering, but usually the ponding action results in the greatest sediment reduction. Temporary geotextile storm drain inserts attach underneath storm drain grates to capture and filter storm water.

Suitable Applications

- Every storm drain inlet receiving runoff from unstabilized or otherwise active work areas should be protected. Inlet protection should be used in conjunction with other erosion and sediment controls to prevent sediment-laden stormwater and non-stormwater discharges from entering the storm drain system.

Limitations

- Drainage area should not exceed 1 acre.
- In general straw bales should not be used as inlet protection.
- Requires an adequate area for water to pond without encroaching into portions of the roadway subject to traffic.
- Sediment removal may be inadequate to prevent sediment discharges in high flow conditions or if runoff is heavily sediment laden. If high flow conditions are expected, use

other onsite sediment trapping techniques in conjunction with inlet protection.

- Frequent maintenance is required.
- Limit drainage area to 1 acre maximum. For drainage areas larger than 1 acre, runoff should be routed to a sediment-trapping device designed for larger flows. See BMPs SE-2, Sediment Basin, and SE-3, Sediment Traps.
- Excavated drop inlet sediment traps are appropriate where relatively heavy flows are expected, and overflow capability is needed.

Implementation

General

Inlet control measures presented in this handbook should not be used for inlets draining more than one acre. Runoff from larger disturbed areas should be first routed through SE-2, Sediment Basin or SE-3, Sediment Trap and/or used in conjunction with other drainage control, erosion control, and sediment control BMPs to protect the site. Different types of inlet protection are appropriate for different applications depending on site conditions and the type of inlet. Alternative methods are available in addition to the methods described/shown herein such as prefabricated inlet insert devices, or gutter protection devices.

Design and Layout

Identify existing and planned storm drain inlets that have the potential to receive sediment-laden surface runoff. Determine if storm drain inlet protection is needed and which method to use.

- The key to successful and safe use of storm drain inlet protection devices is to know where runoff that is directed toward the inlet to be protected will pond or be diverted as a result of installing the protection device.
  - Determine the acceptable location and extent of ponding in the vicinity of the drain inlet. The acceptable location and extent of ponding will influence the type and design of the storm drain inlet protection device.
  - Determine the extent of potential runoff diversion caused by the storm drain inlet protection device. Runoff ponded by inlet protection devices may flow around the device and towards the next downstream inlet. In some cases, this is acceptable; in other cases, serious erosion or downstream property damage can be caused by these diversions. The possibility of runoff diversions will influence whether or not storm drain inlet protection is suitable; and, if suitable, the type and design of the device.
- The location and extent of ponding, and the extent of diversion, can usually be controlled through appropriate placement of the inlet protection device. In some cases, moving the inlet protection device a short distance upstream of the actual inlet can provide more efficient sediment control, limit ponding to desired areas, and prevent or control diversions.
- Seven types of inlet protection are presented below. However, it is recognized that other effective methods and proprietary devices exist and may be selected.

- Silt Fence: Appropriate for drainage basins with less than a 5% slope, sheet flows, and flows under 0.5 cfs.
- Excavated Drop Inlet Sediment Trap: An excavated area around the inlet to trap sediment (SE-3).
- Gravel bag barrier: Used to create a small sediment trap upstream of inlets on sloped, paved streets. Appropriate for sheet flow or when concentrated flow may exceed 0.5 cfs, and where overtopping is required to prevent flooding.
- Block and Gravel Filter: Appropriate for flows greater than 0.5 cfs.
- Temporary Geotextile Storm drain Inserts: Different products provide different features. Refer to manufacturer details for targeted pollutants and additional features.
- Biofilter Bag Barrier: Used to create a small retention area upstream of inlets and can be located on pavement or soil. Biofilter bags slowly filter runoff allowing sediment to settle out. Appropriate for flows under 0.5 cfs.
- Compost Socks: Allow filtered run-off to pass through the compost while retaining sediment and potentially other pollutants (SE-13). Appropriate for flows under 1.0 cfs.

- Select the appropriate type of inlet protection and design as referred to or as described in this fact sheet.
- Provide area around the inlet for water to pond without flooding structures and property.
- Grates and spaces around all inlets should be sealed to prevent seepage of sediment-laden water.
- Excavate sediment sumps (where needed) 1 to 2 ft with 2:1 side slopes around the inlet.

Installation

- ***DI Protection Type 1 - Silt Fence -*** Similar to constructing a silt fence; see BMP SE-1, Silt Fence. Do not place fabric underneath the inlet grate since the collected sediment may fall into the drain inlet when the fabric is removed or replaced and water flow through the grate will be blocked resulting in flooding. See typical Type 1 installation details at the end of this fact sheet.

  1. Excavate a trench approximately 6 in. wide and 6 in. deep along the line of the silt fence inlet protection device.
  2. Place 2 in. by 2 in. wooden stakes around the perimeter of the inlet a maximum of 3 ft apart and drive them at least 18 in. into the ground or 12 in. below the bottom of the trench. The stakes should be at least 48 in.
  3. Lay fabric along bottom of trench, up side of trench, and then up stakes. See SE-1, Silt Fence, for details. The maximum silt fence height around the inlet is 24 in.
  4. Staple the filter fabric (for materials and specifications, see SE-1, Silt Fence) to wooden stakes. Use heavy-duty wire staples at least 1 in. in length.

  5. Backfill the trench with gravel or compacted earth all the way around.

- ***DI Protection Type 2 - Excavated Drop Inlet Sediment Trap -*** Install filter fabric fence in accordance with DI Protection Type 1. Size excavated trap to provide a minimum storage capacity calculated at the rate 67 yd^3/acre of drainage area. See typical Type 2 installation details at the end of this fact sheet.
- ***DI Protection Type 3 - Gravel bag -*** Flow from a severe storm should not overtop the curb. In areas of high clay and silts, use filter fabric and gravel as additional filter media. Construct gravel bags in accordance with SE-6, Gravel Bag Berm. Gravel bags should be used due to their high permeability. See typical Type 3 installation details at the end of this fact sheet.

  1. Construct on gently sloping street.
  2. Leave room upstream of barrier for water to pond and sediment to settle.
  3. Place several layers of gravel bags – overlapping the bags and packing them tightly together.
  4. Leave gap of one bag on the top row to serve as a spillway. Flow from a severe storm (e.g., 10 year storm) should not overtop the curb.

- ***DI Protection Type 4 – Block and Gravel Filter -*** Block and gravel filters are suitable for curb inlets commonly used in residential, commercial, and industrial construction. See typical Type 4 installation details at the end of this fact sheet.

  1. Place hardware cloth or comparable wire mesh with 0.5 in. openings over the drop inlet so that the wire extends a minimum of 1 ft beyond each side of the inlet structure. If more than one strip is necessary, overlap the strips. Place woven geotextile over the wire mesh.
  2. Place concrete blocks lengthwise on their sides in a single row around the perimeter of the inlet, so that the open ends face outward, not upward. The ends of adjacent blocks should abut. The height of the barrier can be varied, depending on design needs, by stacking combinations of blocks that are 4 in., 8 in., and 12 in. wide. The row of blocks should be at least 12 in. but no greater than 24 in. high.
  3. Place wire mesh over the outside vertical face (open end) of the concrete blocks to prevent stone from being washed through the blocks. Use hardware cloth or comparable wire mesh with 0.5 in. opening.
  4. Pile washed stone against the wire mesh to the top of the blocks. Use 0.75 to 3 in.

- ***DI Protection Type 5 – Temporary Geotextile Insert (proprietary)*** – Many types of temporary inserts are available. Most inserts fit underneath the grate of a drop inlet or inside of a curb inlet and are fastened to the outside of the grate or curb. These inserts are removable and many can be cleaned and reused. Installation of these inserts differs between manufacturers. Please refer to manufacturer instruction for installation of proprietary devices.

- ***DI Protection Type 6 - Biofilter bags*** – Biofilter bags may be used as a substitute for gravel bags in low-flow situations. Biofilter bags should conform to specifications detailed in SE-14, Biofilter bags.

    1. Construct in a gently sloping area.
    2. Biofilter bags should be placed around inlets to intercept runoff flows.
    3. All bag joints should overlap by 6 in.
    4. Leave room upstream for water to pond and for sediment to settle out.
    5. Stake bags to the ground as described in the following detail. Stakes may be omitted if bags are placed on a paved surface.

- ***DI Protection Type 7 – Compost Socks*** – A compost sock can be assembled on site by filling a mesh sock (e.g., with a pneumatic blower). Compost socks do not require special trenching compared to other sediment control methods (e.g., silt fence). Compost socks should conform to specification detailed in SE-13, Compost Socks and Berms.

Costs

- Average annual cost for installation and maintenance of DI Type 1-4 and 6 (one year useful life) is $200 per inlet.
- Temporary geotextile inserts are proprietary and cost varies by region. These inserts can often be reused and may have greater than 1 year of use if maintained and kept undamaged. Average cost per insert ranges from $50-75 plus installation, but costs can exceed $100. This cost does not include maintenance.
- See SE-13 for Compost Sock cost information.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Silt Fences. If the fabric becomes clogged, torn, or degrades, it should be replaced. Make sure the stakes are securely driven in the ground and are in good shape (i.e., not bent, cracked, or splintered, and are reasonably perpendicular to the ground). Replace damaged stakes. At a minimum, remove the sediment behind the fabric fence when accumulation reaches one-third the height of the fence or barrier height.
- Gravel Filters. If the gravel becomes clogged with sediment, it should be carefully removed from the inlet and either cleaned or replaced. Since cleaning gravel at a construction site may be difficult, consider using the sediment-laden stone as fill material and put fresh stone around the inlet. Inspect bags for holes, gashes, and snags, and replace bags as needed. Check gravel bags for proper arrangement and displacement.

Storm Drain Inlet Protection SE-10

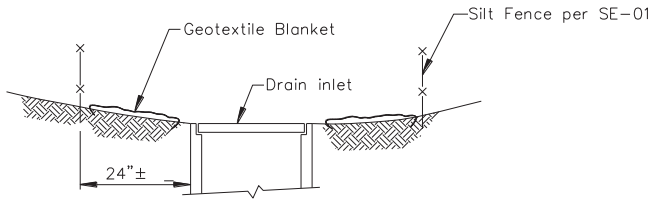
- Sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Inspect and maintain temporary geotextile insert devices according to manufacturer's specifications.
- Remove storm drain inlet protection once the drainage area is stabilized.
    - Clean and regrade area around the inlet and clean the inside of the storm drain inlet, as it should be free of sediment and debris at the time of final inspection.

References

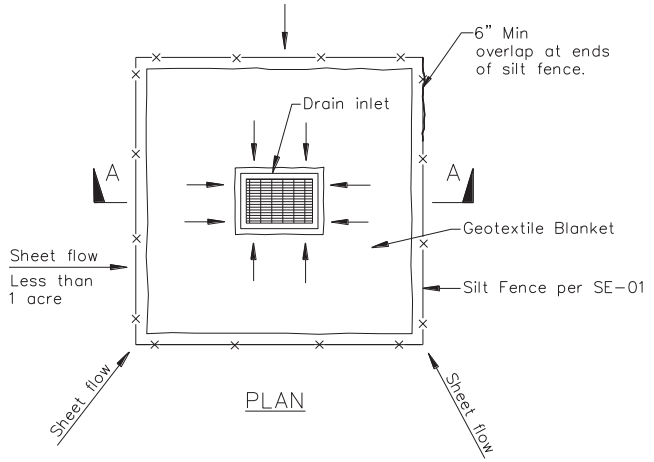
Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management Manual for The Puget Sound Basin, Washington State Department of Ecology, Public Review Draft, 1991.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.



SECTION A–A

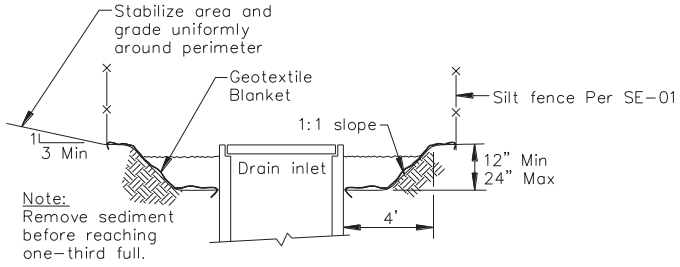


PLAN

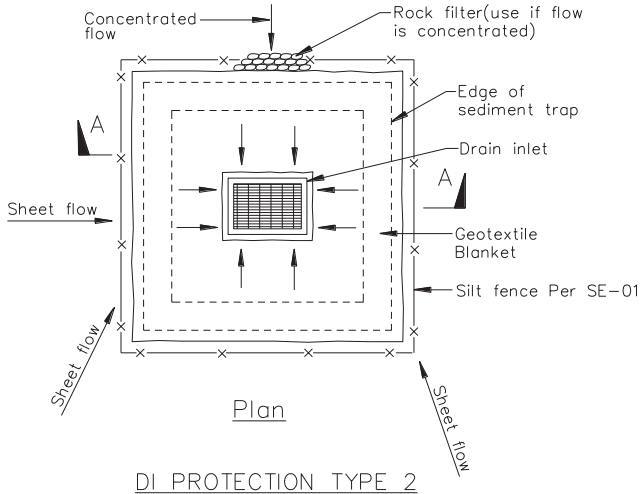
DI PROTECTION TYPE 1
NOT TO SCALE

NOTES:

1. For use in areas where grading has been completed and final soil stabilization and seeding are pending.
2. Not applicable in paved areas.
3. Not applicable with concentrated flows.



Section A–A

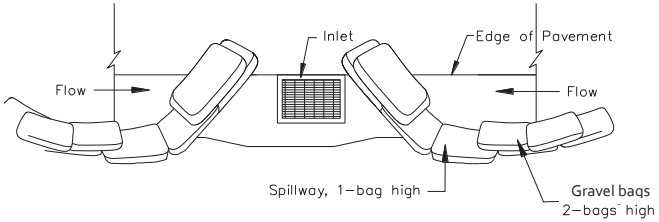


Plan

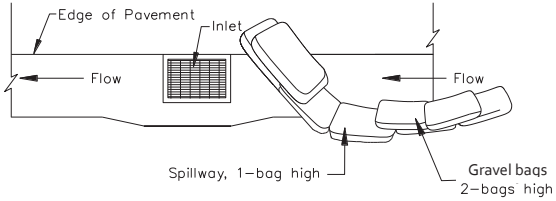
DI PROTECTION TYPE 2
NOT TO SCALE

Notes

1. For use in cleared and grubbed and in graded areas.
2. Shape basin so that longest inflow area faces longest length of trap.
3. For concentrated flows, shape basin in 2:1 ratio with length oriented towards direction of flow.



TYPICAL PROTECTION FOR INLET ON SUMP



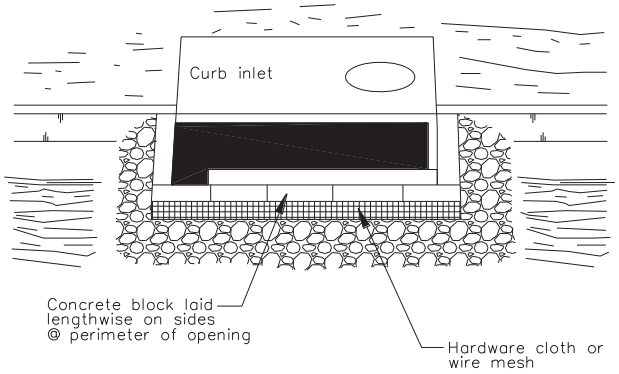
TYPICAL PROTECTION FOR INLET ON GRADE

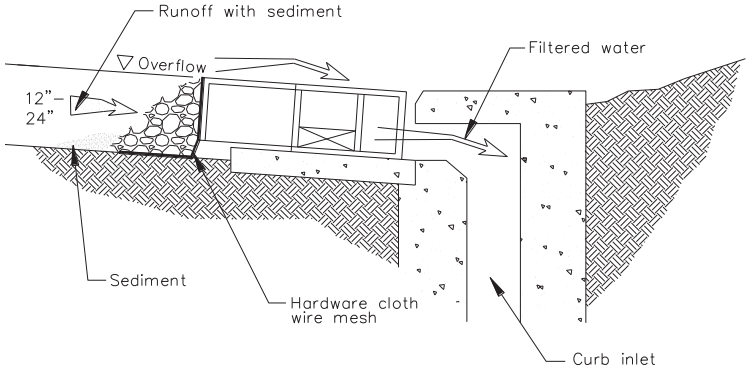
NOTES:

1. Intended for short-term use.
2. Use to inhibit non-storm water flow.
3. Allow for proper maintenance and cleanup.
4. Bags must be removed after adjacent operation is completed
5. Not applicable in areas with high silts and clays without filter fabric.
6. Protection can be effective even if it is not immediately adjacent to the inlet provided that the inlet is protected from potential sources of pollution.

DI PROTECTION TYPE 3
NOT TO SCALE

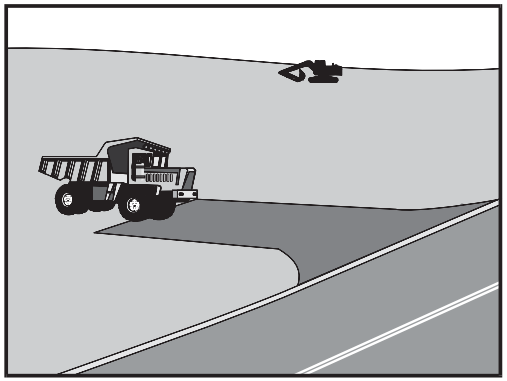
Storm Drain Inlet Protection SE-10





DI PROTECTION – TYPE 4
NOT TO SCALE

Stabilized Construction Entrance / Exit TC-1



Description and Purpose
A stabilized construction access is defined by a point of entrance/exit to a construction site that is stabilized to reduce the tracking of mud and dirt onto public roads by construction vehicles.

Suitable Applications
Use at construction sites:

- Where dirt or mud can be tracked onto public roads.
- Adjacent to water bodies.
- Where poor soils are encountered.
- Where dust is a problem during dry weather conditions.

Limitations
- Entrances and exits require periodic top dressing with additional stones.
- This BMP should be used in conjunction with street sweeping on adjacent public right of way.
- Entrances and exits should be constructed on level ground only.
- Stabilized construction entrances are rather expensive to construct and when a wash rack is included, a sediment trap of some kind must also be provided to collect wash water runoff.

Categories

EC	Erosion Control	☒
SE	Sediment Control	☒
TC	Tracking Control	☑
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:
☑ **Primary Objective**
☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives
None

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Stabilized Construction Entrance / Exit TC-1

Implementation
General
A stabilized construction entrance is a pad of aggregate underlain with filter cloth located at any point where traffic will be entering or leaving a construction site to or from a public right of way, street, alley, sidewalk, or parking area. The purpose of a stabilized construction entrance is to reduce or eliminate the tracking of sediment onto public rights of way or streets. Reducing tracking of sediments and other pollutants onto paved roads helps prevent deposition of sediments into local storm drains and production of airborne dust.

Where traffic will be entering or leaving the construction site, a stabilized construction entrance should be used. NPDES permits require that appropriate measures be implemented to prevent tracking of sediments onto paved roadways, where a significant source of sediments is derived from mud and dirt carried out from unpaved roads and construction sites.

Stabilized construction entrances are moderately effective in removing sediment from equipment leaving a construction site. The entrance should be built on level ground. Advantages of the Stabilized Construction Entrance/Exit is that it does remove some sediment from equipment and serves to channel construction traffic in and out of the site at specified locations. Efficiency is greatly increased when a washing rack is included as part of a stabilized construction entrance/exit.

Design and Layout
- Construct on level ground where possible.
- Select 3 to 6 in. diameter stones.
- Use minimum depth of stones of 12 in. or as recommended by soils engineer.
- Construct length of 50 ft or maximum site will allow, and 10 ft minimum width or to accommodate traffic.
- Rumble racks constructed of steel panels with ridges and installed in the stabilized entrance/exit will help remove additional sediment and to keep adjacent streets clean.
- Provide ample turning radii as part of the entrance.
- Limit the points of entrance/exit to the construction site.
- Limit speed of vehicles to control dust.
- Properly grade each construction entrance/exit to prevent runoff from leaving the construction site.
- Route runoff from stabilized entrances/exits through a sediment trapping device before discharge.
- Design stabilized entrance/exit to support heaviest vehicles and equipment that will use it.

- Select construction access stabilization (aggregate, asphaltic concrete, concrete) based on longevity, required performance, and site conditions. Do not use asphalt concrete (AC) grindings for stabilized construction access/roadway.
- If aggregate is selected, place crushed aggregate over geotextile fabric to at least 12 in. depth, or place aggregate to a depth recommended by a geotechnical engineer. A crushed aggregate greater than 3 in. but smaller than 6 in. should be used.
- Designate combination or single purpose entrances and exits to the construction site.
- Require that all employees, subcontractors, and suppliers utilize the stabilized construction access.
- Implement SE-7, Street Sweeping and Vacuuming, as needed.
- All exit locations intended to be used for more than a two-week period should have stabilized construction entrance/exit BMPs.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMPs are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect local roads adjacent to the site daily. Sweep or vacuum to remove visible accumulated sediment.
- Remove aggregate, separate and dispose of sediment if construction entrance/exit is clogged with sediment.
- Keep all temporary roadway ditches clear.
- Check for damage and repair as needed.
- Replace gravel material when surface voids are visible.
- Remove all sediment deposited on paved roadways within 24 hours.
- Remove gravel and filter fabric at completion of construction

Costs

Average annual cost for installation and maintenance may vary from $1,200 to $4,800 each, averaging $2,400 per entrance. Costs will increase with addition of washing rack, and sediment trap. With wash rack, costs range from $1,200 - $6,000 each, averaging $3,600 per entrance.

References

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Stabilized Construction Entrance / Exit TC-1

National Management Measures to Control Nonpoint Source Pollution from Urban Areas, USEPA Agency, 2002.

Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group Working Paper, USEPA, April 1992.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

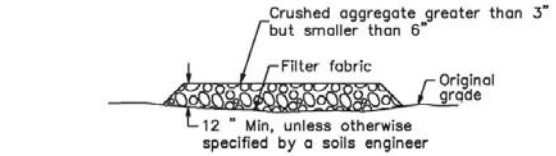
Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Virginia Erosion and Sedimentation Control Handbook, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation, 1991.

Guidance Specifying Management Measures for Nonpoint Pollution in Coastal Waters, EPA 840-B-9-002, USEPA, Office of Water, Washington, DC, 1993.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

Stabilized Construction Entrance / Exit TC-1



SECTION B–B
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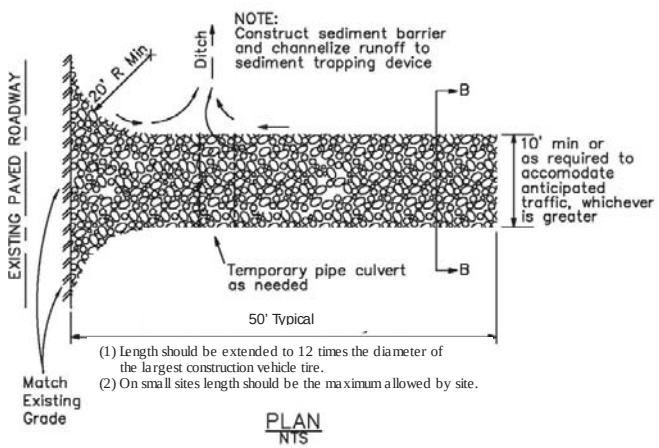
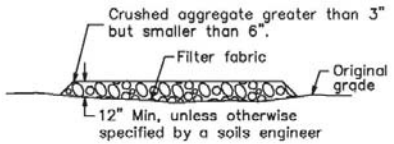


PLAN
NTS

Stabilized Construction Entrance / Exit TC-1



SECTION B–B
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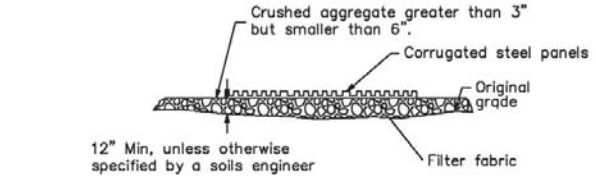
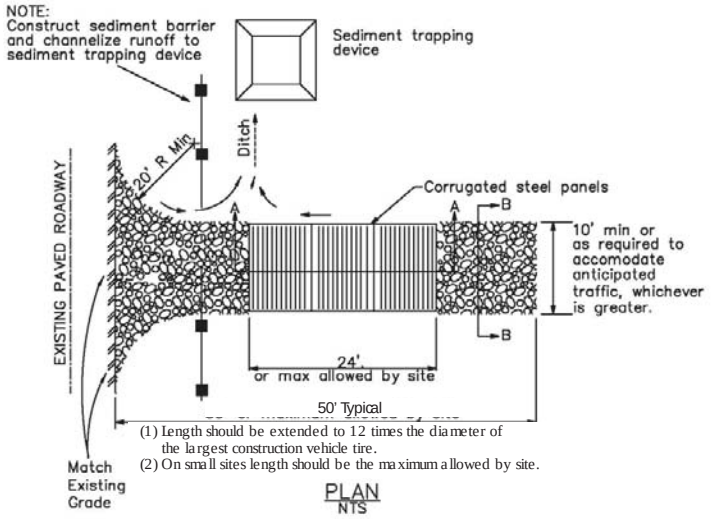


SECTION A–A
NOT TO SCALE



PLAN
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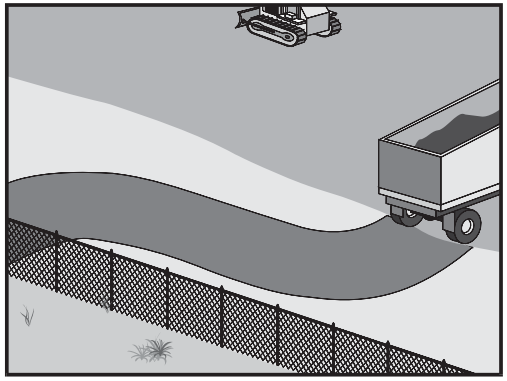
Stabilized Construction Roadway TC-2



Description and Purpose

Access roads, subdivision roads, parking areas, and other onsite vehicle transportation routes should be stabilized immediately after grading, and frequently maintained to prevent erosion and control dust.

Suitable Applications

This BMP should be applied for the following conditions:

- Temporary Construction Traffic:
  - Phased construction projects and offsite road access
  - Construction during wet weather
- Construction roadways and detour roads:
  - Where mud tracking is a problem during wet weather
  - Where dust is a problem during dry weather
  - Adjacent to water bodies
  - Where poor soils are encountered

Limitations

- The roadway must be removed or paved when construction is complete.

Categories

EC	Erosion Control	☒
SE	Sediment Control	☒
TC	Tracking Control	☑
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:
☑ **Primary Objective**
☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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- Certain chemical stabilization methods may cause stormwater or soil pollution and should not be used. See WE-1, Wind Erosion Control.
- Management of construction traffic is subject to air quality control measures. Contact the local air quality management agency.
- Materials will likely need to be removed prior to final project grading and stabilization.
- Use of this BMP may not be applicable to very short duration projects.

Implementation

General

Areas that are graded for construction vehicle transport and parking purposes are especially susceptible to erosion and dust. The exposed soil surface is continually disturbed, leaving no opportunity for vegetative stabilization. Such areas also tend to collect and transport runoff waters along their surfaces. During wet weather, they often become muddy quagmires that generate significant quantities of sediment that may pollute nearby streams or be transported offsite on the wheels of construction vehicles. Dirt roads can become so unstable during wet weather that they are virtually unusable.

Efficient construction road stabilization not only reduces onsite erosion but also can significantly speed onsite work, avoid instances of immobilized machinery and delivery vehicles, and generally improve site efficiency and working conditions during adverse weather

Installation/Application Criteria

Permanent roads and parking areas should be paved as soon as possible after grading. As an alternative where construction will be phased, the early application of gravel or chemical stabilization may solve potential erosion and stability problems. Temporary gravel roadway should be considered during the rainy season and on slopes greater than 5%.

Temporary roads should follow the contour of the natural terrain to the maximum extent possible. Slope should not exceed 15%. Roadways should be carefully graded to drain transversely. Provide drainage swales on each side of the roadway in the case of a crowned section or one side in the case of a super elevated section. Simple gravel berms without a trench can also be used.

Installed inlets should be protected to prevent sediment laden water from entering the storm sewer system (SE-10, Storm Drain Inlet Protection). In addition, the following criteria should be considered.

- Road should follow topographic contours to reduce erosion of the roadway.
- The roadway slope should not exceed 15%.
- Chemical stabilizers or water are usually required on gravel or dirt roads to prevent dust (WE-1, Wind Erosion Control).
- Properly grade roadway to prevent runoff from leaving the construction site.
- Design stabilized access to support heaviest vehicles and equipment that will use it.

- Stabilize roadway using aggregate, asphalt concrete, or concrete based on longevity, required performance, and site conditions. The use of cold mix asphalt or asphalt concrete (AC) grindings for stabilized construction roadway is not allowed.
- Coordinate materials with those used for stabilized construction entrance/exit points.
- If aggregate is selected, place crushed aggregate over geotextile fabric to at least 12 in. depth. A crushed aggregate greater than 3 in. but smaller than 6 in. should be used.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Keep all temporary roadway ditches clear.
- When no longer required, remove stabilized construction roadway and re-grade and repair slopes.
- Periodically apply additional aggregate on gravel roads.
- Active dirt construction roads are commonly watered three or more times per day during the dry season.

Costs

Gravel construction roads are moderately expensive, but cost is often balanced by reductions in construction delay. No additional costs for dust control on construction roads should be required above that needed to meet local air quality requirements.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program; Program Development and Approval Guidance, Working Group, Working Paper; USEPA, April 1992.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

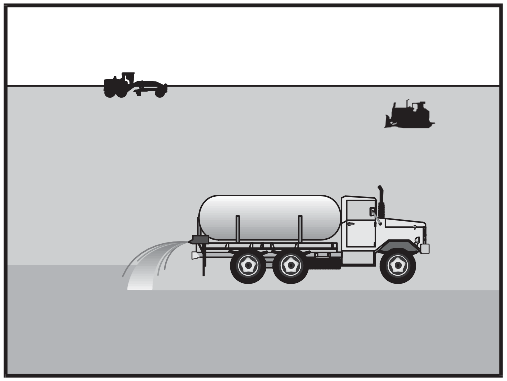
Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Virginia Erosion and Sedimentation Control Handbook, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation, 1991.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

Wind Erosion Control WE-1



Categories		
EC	Erosion Control	
SE	Sediment Control	☒
TC	Tracking Control	
WE	Wind Erosion Control	☑
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:
☑ **Primary Category**
☒ **Secondary Category**

Targeted Constituents	
Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-5 Soil Binders

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Description and Purpose

Wind erosion or dust control consists of applying water or other chemical dust suppressants as necessary to prevent or alleviate dust nuisance generated by construction activities. Covering small stockpiles or areas is an alternative to applying water or other dust palliatives.

California's Mediterranean climate, with a short "wet" season and a typically long, hot "dry" season, allows the soils to thoroughly dry out. During the dry season, construction activities are at their peak, and disturbed and exposed areas are increasingly subject to wind erosion, sediment tracking and dust generated by construction equipment. Site conditions and climate can make dust control more of an erosion problem than water based erosion. Additionally, many local agencies, including Air Quality Management Districts, require dust control and/or dust control permits in order to comply with local nuisance laws, opacity laws (visibility impairment) and the requirements of the Clean Air Act. Wind erosion control is required to be implemented at all construction sites greater than 1 acre by the General Permit.

Suitable Applications

Most BMPs that provide protection against water-based erosion will also protect against wind-based erosion and dust control requirements required by other agencies will generally meet wind erosion control requirements for water quality protection. Wind erosion control BMPs are suitable during the following construction activities:

Wind Erosion Control WE-1

- Construction vehicle traffic on unpaved roads
- Drilling and blasting activities
- Soils and debris storage piles
- Batch drop from front-end loaders
- Areas with unstabilized soil
- Final grading/site stabilization

Limitations

- Watering prevents dust only for a short period (generally less than a few hours) and should be applied daily (or more often) to be effective.
- Over watering may cause erosion and track-out.
- Oil or oil-treated subgrade should not be used for dust control because the oil may migrate into drainageways and/or seep into the soil.
- Chemical dust suppression agents may have potential environmental impacts. Selected chemical dust control agents should be environmentally benign.
- Effectiveness of controls depends on soil, temperature, humidity, wind velocity and traffic.
- Chemical dust suppression agents should not be used within 100 feet of wetlands or water bodies.
- Chemically treated subgrades may make the soil water repellant, interfering with long-term infiltration and the vegetation/re-vegetation of the site. Some chemical dust suppressants may be subject to freezing and may contain solvents and should be handled properly.
- In compacted areas, watering and other liquid dust control measures may wash sediment or other constituents into the drainage system.
- If the soil surface has minimal natural moisture, the affected area may need to be pre-wetted so that chemical dust control agents can uniformly penetrate the soil surface.

Implementation

Dust Control Practices

Dust control BMPs generally stabilize exposed surfaces and minimize activities that suspend or track dust particles. The following table presents dust control practices that can be applied to varying site conditions that could potentially cause dust. For heavily traveled and disturbed areas, wet suppression (watering), chemical dust suppression, gravel asphalt surfacing, temporary gravel construction entrances, equipment wash-out areas, and haul truck covers can be employed as dust control applications. Permanent or temporary vegetation and mulching can be employed for areas of occasional or no construction traffic. Preventive measures include minimizing surface areas to be disturbed, limiting onsite vehicle traffic to 15 mph or less, and controlling the number and activity of vehicles on a site at any given time.

Chemical dust suppressants include: mulch and fiber based dust palliatives (e.g. paper mulch with gypsum binder), salts and brines (e.g. calcium chloride, magnesium chloride), non-petroleum based organics (e.g. vegetable oil, lignosulfonate), petroleum based organics (e.g. asphalt emulsion, dust oils, petroleum resins), synthetic polymers (e.g. polyvinyl acetate, vinyls, acrylic), clay additives (e.g. bentonite, montimorillonite) and electrochemical products (e.g. enzymes, ionic products).

Site Condition	Dust Control Practices							
	Permanent Vegetation	Mulching	Wet Suppression (Watering)	Chemical Dust Suppression	Gravel or Asphalt	Temporary Gravel Construction Entrances/Equipment Wash Down	Synthetic Covers	Minimize Extent of Disturbed Area
Disturbed Areas not Subject to Traffic	x	x	x	x	x			x
Disturbed Areas Subject to Traffic			x	x	x	x		x
Material Stockpiles		x	x	x			x	x
Demolition			x			x	x	
Clearing/ Excavation			x	x				x
Truck Traffic on Unpaved Roads			x	x	x	x	x	
Tracking					x	x		

Additional preventive measures include:

- Schedule construction activities to minimize exposed area (see EC-1, Scheduling).
- Quickly treat exposed soils using water, mulching, chemical dust suppressants, or stone/gravel layering.
- Identify and stabilize key access points prior to commencement of construction.
- Minimize the impact of dust by anticipating the direction of prevailing winds.
- Restrict construction traffic to stabilized roadways within the project site, as practicable.
- Water should be applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses and nozzles that will ensure even distribution.
- All distribution equipment should be equipped with a positive means of shutoff.
- Unless water is applied by means of pipelines, at least one mobile unit should be available at all times to apply water or dust palliative to the project.
- If reclaimed waste water is used, the sources and discharge must meet California Department of Health Services water reclamation criteria and the Regional Water Quality

Control Board (RWQCB) requirements. Non-potable water should not be conveyed in tanks or drain pipes that will be used to convey potable water and there should be no connection between potable and non-potable supplies. Non-potable tanks, pipes, and other conveyances should be marked, "NON-POTABLE WATER - DO NOT DRINK."

- Pave or chemically stabilize access points where unpaved traffic surfaces adjoin paved roads.
- Provide covers for haul trucks transporting materials that contribute to dust.
- Provide for rapid clean up of sediments deposited on paved roads. Furnish stabilized construction road entrances and wheel wash areas.
- Stabilize inactive areas of construction sites using temporary vegetation or chemical stabilization methods.

For chemical stabilization, there are many products available for chemically stabilizing gravel roadways and stockpiles. If chemical stabilization is used, the chemicals should not create any adverse effects on stormwater, plant life, or groundwater and should meet all applicable regulatory requirements.

Costs

Installation costs for water and chemical dust suppression vary based on the method used and the length of effectiveness. Annual costs may be high since some of these measures are effective for only a few hours to a few days.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Check areas protected to ensure coverage.
- Most water-based dust control measures require frequent application, often daily or even multiple times per day. Obtain vendor or independent information on longevity of chemical dust suppressants.

References

Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, Arizona, September 1992.

California Air Pollution Control Laws, California Air Resources Board, updated annually.

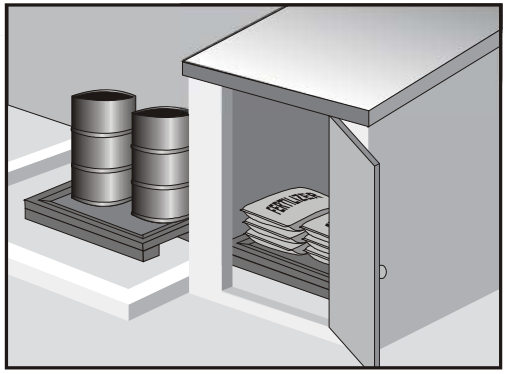
Construction Manual, Chapter 4, Section 10, "Dust Control"; Section 17, "Watering"; and Section 18, "Dust Palliative", California Department of Transportation (Caltrans), July 2001.

Wind Erosion Control WE-1

Prospects for Attaining the State Ambient Air Quality Standards for Suspended Particulate Matter (PM10), Visibility Reducing Particles, Sulfates, Lead, and Hydrogen Sulfide, California Air Resources Board, April 1991.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Material Delivery and Storage WM-1



Categories		
EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:
☑ Primary Category
☒ Secondary Category

Description and Purpose

Prevent, reduce, or eliminate the discharge of pollutants from material delivery and storage to the stormwater system or watercourses by minimizing the storage of hazardous materials onsite, storing materials in watertight containers and/or a completely enclosed designated area, installing secondary containment, conducting regular inspections, and training employees and subcontractors.

This best management practice covers only material delivery and storage. For other information on materials, see WM-2, Material Use, or WM-4, Spill Prevention and Control. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

These procedures are suitable for use at all construction sites with delivery and storage of the following materials:

- Soil stabilizers and binders
- Pesticides and herbicides
- Fertilizers
- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease

Targeted Constituents	
Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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- Asphalt and concrete components
- Hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Concrete compounds
- Other materials that may be detrimental if released to the environment

Limitations

- Space limitation may preclude indoor storage.
- Storage sheds often must meet building and fire code requirements.

Implementation

The following steps should be taken to minimize risk:

- Chemicals must be stored in water tight containers with appropriate secondary containment or in a storage shed.
- When a material storage area is located on bare soil, the area should be lined and bermed.
- Use containment pallets or other practical and available solutions, such as storing materials within newly constructed buildings or garages, to meet material storage requirements.
- Stack erodible landscape material on pallets and cover when not in use.
- Contain all fertilizers and other landscape materials when not in use.
- Temporary storage areas should be located away from vehicular traffic.
- Material Safety Data Sheets (MSDS) should be available on-site for all materials stored that have the potential to effect water quality.
- Construction site areas should be designated for material delivery and storage.
- Material delivery and storage areas should be located away from waterways, if possible.
  - Avoid transport near drainage paths or waterways.
  - Surround with earth berms or other appropriate containment BMP. See EC-9, Earth Dikes and Drainage Swales.
  - Place in an area that will be paved.
- Storage of reactive, ignitable, or flammable liquids must comply with the fire codes of your area. Contact the local Fire Marshal to review site materials, quantities, and proposed storage area to determine specific requirements. See the Flammable and Combustible Liquid Code, NFPA30.
- An up to date inventory of materials delivered and stored onsite should be kept.

- Hazardous materials storage onsite should be minimized.
- Hazardous materials should be handled as infrequently as possible.
- Keep ample spill cleanup supplies appropriate for the materials being stored. Ensure that cleanup supplies are in a conspicuous, labeled area.
- Employees and subcontractors should be trained on the proper material delivery and storage practices.
- Employees trained in emergency spill cleanup procedures must be present when dangerous materials or liquid chemicals are unloaded.
- If significant residual materials remain on the ground after construction is complete, properly remove and dispose of materials and any contaminated soil. See WM-7, Contaminated Soil Management. If the area is to be paved, pave as soon as materials are removed to stabilize the soil.

Material Storage Areas and Practices

- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 should be stored in approved containers and drums and should not be overfilled. Containers and drums should be placed in temporary containment facilities for storage.
- A temporary containment facility should provide for a spill containment volume able to contain precipitation from a 25 year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest container within its boundary, whichever is greater.
- A temporary containment facility should be impervious to the materials stored therein for a minimum contact time of 72 hours.
- A temporary containment facility should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills should be collected and placed into drums. These liquids should be handled as a hazardous waste unless testing determines them to be non-hazardous. All collected liquids or non-hazardous liquids should be sent to an approved disposal site.
- Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.
- Incompatible materials, such as chlorine and ammonia, should not be stored in the same temporary containment facility.
- Materials should be covered prior to, and during rain events.
- Materials should be stored in their original containers and the original product labels should be maintained in place in a legible condition. Damaged or otherwise illegible labels should be replaced immediately.

- Bagged and boxed materials should be stored on pallets and should not be allowed to accumulate on the ground. To provide protection from wind and rain throughout the rainy season, bagged and boxed materials should be covered during non-working days and prior to and during rain events.
- Stockpiles should be protected in accordance with WM-3, Stockpile Management.
- Materials should be stored indoors within existing structures or completely enclosed storage sheds when available.
- Proper storage instructions should be posted at all times in an open and conspicuous location.
- An ample supply of appropriate spill clean up material should be kept near storage areas.
- Also see WM-6, Hazardous Waste Management, for storing of hazardous wastes.

Material Delivery Practices

- Keep an accurate, up-to-date inventory of material delivered and stored onsite.
- Arrange for employees trained in emergency spill cleanup procedures to be present when dangerous materials or liquid chemicals are unloaded.

Spill Cleanup

- Contain and clean up any spill immediately.
- Properly remove and dispose of any hazardous materials or contaminated soil if significant residual materials remain on the ground after construction is complete. See WM-7, Contaminated Soil Management.
- See WM-4, Spill Prevention and Control, for spills of chemicals and/or hazardous materials.
- If spills or leaks of materials occur that are not contained and could discharge to surface waters, non-visible sampling of site discharge may be required. Refer to the General Permit or to your project specific Construction Site Monitoring Plan to determine if and where sampling is required.

Cost

- The largest cost of implementation may be in the construction of a materials storage area that is covered and provides secondary containment.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Keep storage areas clean and well organized, including a current list of all materials onsite.
- Inspect labels on containers for legibility and accuracy.

- Repair or replace perimeter controls, containment structures, covers, and liners as needed to maintain proper function.

References

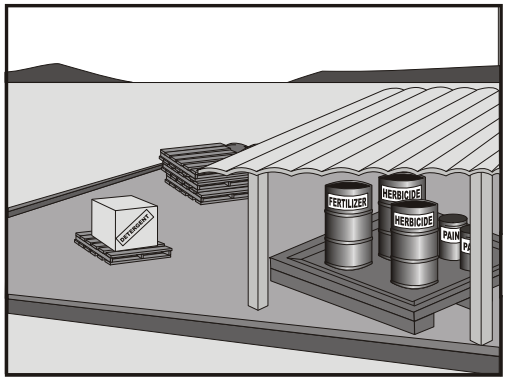
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Material Use WM-2



Categories		
EC	Erosion Control	
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WE	Wind Erosion Control	
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WM	Waste Management and Materials Pollution Control	☑

Legend:
☑ **Primary Category**
☒ **Secondary Category**

Targeted Constituents	
Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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Description and Purpose

Prevent or reduce the discharge of pollutants to the storm drain system or watercourses from material use by using alternative products, minimizing hazardous material use onsite, and training employees and subcontractors.

Suitable Applications

This BMP is suitable for use at all construction projects. These procedures apply when the following materials are used or prepared onsite:

- Pesticides and herbicides
- Fertilizers
- Detergents
- Petroleum products such as fuel, oil, and grease
- Asphalt and other concrete components
- Other hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Other materials that may be detrimental if released to the environment

Material Use WM-2

Limitations

Safer alternative building and construction products may not be available or suitable in every instance.

Implementation

The following steps should be taken to minimize risk:

- Minimize use of hazardous materials onsite.
- Follow manufacturer instructions regarding uses, protective equipment, ventilation, flammability, and mixing of chemicals.
- Train personnel who use pesticides. The California Department of Pesticide Regulation and county agricultural commissioners license pesticide dealers, certify pesticide applicators, and conduct onsite inspections.
- The preferred method of termiticide application is soil injection near the existing or proposed structure foundation/slab; however, if not feasible, soil drench application of termiticides should follow EPA label guidelines and the following recommendations (most of which are applicable to most pesticide applications):
  - Do not treat soil that is water-saturated or frozen.
  - Application shall not commence within 24-hours of a predicted precipitation event with a 40% or greater probability. Weather tracking must be performed on a daily basis prior to termiticide application and during the period of termiticide application.
  - Do not allow treatment chemicals to runoff from the target area. Apply proper quantity to prevent excess runoff. Provide containment for and divert stormwater from application areas using berms or diversion ditches during application.
  - Dry season: Do not apply within 10 feet of storm drains. Do not apply within 25 feet of aquatic habitats (such as, but not limited to, lakes; reservoirs; rivers; permanent streams; marshes or ponds; estuaries; and commercial fish farm ponds).
  - Wet season: Do not apply within 50 feet of storm drains or aquatic habitats (such as, but not limited to, lakes; reservoirs; rivers; permanent streams; marshes or ponds; estuaries; and commercial fish farm ponds) unless a vegetative buffer is present (if so, refer to dry season requirements).
  - Do not make on-grade applications when sustained wind speeds are above 10 mph (at application site) at nozzle end height.
  - Cover treatment site prior to a rain event in order to prevent run-off of the pesticide into non-target areas. The treated area should be limited to a size that can be backfilled and/or covered by the end of the work shift. Backfilling or covering of the treated area shall be done by the end of the same work shift in which the application is made.
  - The applicator must either cover the soil him/herself or provide written notification of the above requirement to the contractor on site and to the person commissioning the

application (if different than the contractor). If notice is provided to the contractor or the person commissioning the application, then they are responsible under the Federal Insecticide Fungicide, and Rodenticide Act (FIFRA) to ensure that: 1) if the concrete slab cannot be poured over the treated soil within 24 hours of application, the treated soil is covered with a waterproof covering (such as polyethylene sheeting), and 2) the treated soil is covered if precipitation is predicted to occur before the concrete slab is scheduled to be poured.

- Do not over-apply fertilizers, herbicides, and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over-application is expensive and environmentally harmful. Unless on steep slopes, till fertilizers into the soil rather than hydraulic application. Apply surface dressings in several smaller applications, as opposed to one large application, to allow time for infiltration and to avoid excess material being carried offsite by runoff. Do not apply these chemicals before predicted rainfall.
- Train employees and subcontractors in proper material use.
- Supply Material Safety Data Sheets (MSDS) for all materials.
- Dispose of latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths, when thoroughly dry and are no longer hazardous, with other construction debris.
- Do not remove the original product label; it contains important safety and disposal information. Use the entire product before disposing of the container.
- Mix paint indoors or in a containment area. Never clean paintbrushes or rinse paint containers into a street, gutter, storm drain, or watercourse. Dispose of any paint thinners, residue, and sludge(s) that cannot be recycled, as hazardous waste.
- For water-based paint, clean brushes to the extent practicable, and rinse to a drain leading to a sanitary sewer where permitted, or contain for proper disposal off site. For oil-based paints, clean brushes to the extent practicable, and filter and reuse thinners and solvents.
- Use recycled and less hazardous products when practical. Recycle residual paints, solvents, non-treated lumber, and other materials.
- Use materials only where and when needed to complete the construction activity. Use safer alternative materials as much as possible. Reduce or eliminate use of hazardous materials onsite when practical.
- Document the location, time, chemicals applied, and applicator's name and qualifications.
- Keep an ample supply of spill clean up material near use areas. Train employees in spill clean up procedures.
- Avoid exposing applied materials to rainfall and runoff unless sufficient time has been allowed for them to dry.
- Discontinue use of erodible landscape material within 2 days prior to a forecasted rain event and materials should be covered and/or bermed.

- Provide containment for material use areas such as masons' areas or paint mixing/preparation areas to prevent materials/pollutants from entering stormwater.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Ensure employees and subcontractors throughout the job are using appropriate practices.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

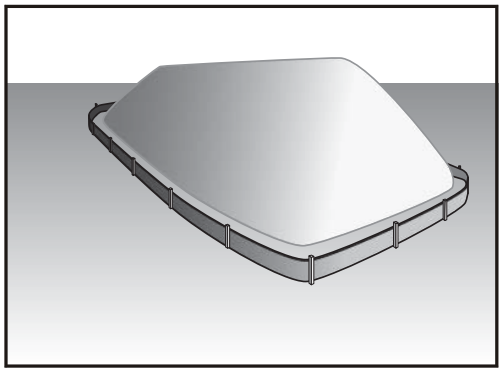
Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Comments on Risk Assessments Risk Reduction Options for Cypermethrin: Docket No. OPP–2005–0293; California Stormwater Quality Association (CASQA) letter to USEPA, 2006.Environmental Hazard and General Labeling for Pyrethroid Non-Agricultural Outdoor Products, EPA-HQ-OPP-2008-0331-0021; USEPA, 2008.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Stockpile Management WM-3



Categories		
EC	Erosion Control	
SE	Sediment Control	☒
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☒
WM	Waste Management and Materials Pollution Control	☑

Legend:
☑ **Primary Category**
☒ **Secondary Category**

Targeted Constituents	
Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Stockpile management procedures and practices are designed to reduce or eliminate air and stormwater pollution from stockpiles of soil, soil amendments, sand, paving materials such as portland cement concrete (PCC) rubble, asphalt concrete (AC), asphalt concrete rubble, aggregate base, aggregate sub base or pre-mixed aggregate, asphalt minder (so called "cold mix" asphalt), and pressure treated wood.

Suitable Applications

Implement in all projects that stockpile soil and other loose materials.

Limitations

- Plastic sheeting as a stockpile protection is temporary and hard to manage in windy conditions. Where plastic is used, consider use of plastic tarps with nylon reinforcement which may be more durable than standard sheeting.
- Plastic sheeting can increase runoff volume due to lack of infiltration and potentially cause perimeter control failure.
- Plastic sheeting breaks down faster in sunlight.
- The use of Plastic materials and photodegradable plastics should be avoided.

Implementation

Protection of stockpiles is a year-round requirement. To properly manage stockpiles:

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Stockpile Management WM-3

- On larger sites, a minimum of 50 ft separation from concentrated flows of stormwater, drainage courses, and inlets is recommended.
- After 14 days of inactivity, a stockpile is non-active and requires further protection described below. All stockpiles are required to be protected as non-active stockpiles immediately if they are not scheduled to be used within 14 days.
- Protect all stockpiles from stormwater runon using temporary perimeter sediment barriers such as compost berms (SE-13), temporary silt dikes (SE-12), fiber rolls (SE-5), silt fences (SE-1), sandbags (SE-8), gravel bags (SE-6), or biofilter bags (SE-14). Refer to the individual fact sheet for each of these controls for installation information.
- Implement wind erosion control practices as appropriate on all stockpiled material. For specific information, see WE-1, Wind Erosion Control.
- Manage stockpiles of contaminated soil in accordance with WM-7, Contaminated Soil Management.
- Place bagged materials on pallets and under cover.
- Ensure that stockpile coverings are installed securely to protect from wind and rain.
- Some plastic covers withstand weather and sunlight better than others. Select cover materials or methods based on anticipated duration of use.

Protection of Non-Active Stockpiles

A stockpile is considered non-active if it either is not used for 14 days or if it is scheduled not to be used for 14 days or more. Stockpiles need to be protected immediately if they are not scheduled to be used within 14 days. Non-active stockpiles of the identified materials should be protected as follows:

Soil stockpiles

- Soil stockpiles should be covered or protected with soil stabilization measures and a temporary perimeter sediment barrier at all times.
- Temporary vegetation should be considered for topsoil piles that will be stockpiled for extended periods.

Stockpiles of Portland cement concrete rubble, asphalt concrete, asphalt concrete rubble, aggregate base, or aggregate sub base

- Stockpiles should be covered and protected with a temporary perimeter sediment barrier at all times.

Stockpiles of "cold mix"

- Cold mix stockpiles should be placed on and covered with plastic sheeting or comparable material at all times and surrounded by a berm.

Stockpiles of fly ash, stucco, hydrated lime

Stockpile Management WM-3

- Stockpiles of materials that may raise the pH of runoff (i.e., basic materials) should be covered with plastic and surrounded by a berm.

Stockpiles/Storage of wood (Pressure treated with chromated copper arsenate or ammoniacal copper zinc arsenate

- Treated wood should be covered with plastic sheeting or comparable material at all times and surrounded by a berm.

Protection of Active Stockpiles

A stockpile is active when it is being used or is scheduled to be used within 14 days of the previous use. Active stockpiles of the identified materials should be protected as follows:

- All stockpiles should be covered and protected with a temporary linear sediment barrier prior to the onset of precipitation.
- Stockpiles of "cold mix" and treated wood, and basic materials should be placed on and covered with plastic sheeting or comparable material and surrounded by a berm prior to the onset of precipitation.
- The downstream perimeter of an active stockpile should be protected with a linear sediment barrier or berm and runoff should be diverted around or away from the stockpile on the upstream perimeter.

Costs

For cost information associated with stockpile protection refer to the individual erosion or sediment control BMP fact sheet considered for implementation (For example, refer to SE-1 Silt Fence for installation of silt fence around the perimeter of a stockpile.)

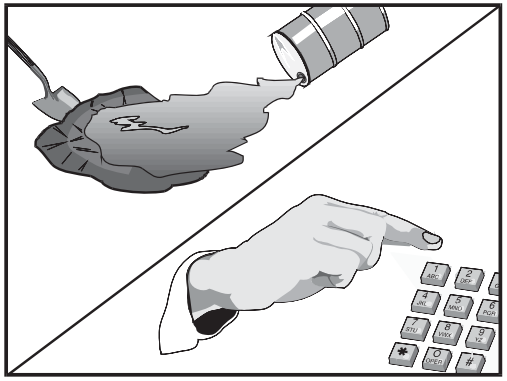
Inspection and Maintenance

- Stockpiles must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- It may be necessary to inspect stockpiles covered with plastic sheeting more frequently during certain conditions (for example, high winds or extreme heat).
- Repair and/or replace perimeter controls and covers as needed to keep them functioning properly.
- Sediment shall be removed when it reaches one-third of the barrier height.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Spill Prevention and Control WM-4



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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Description and Purpose

Prevent or reduce the discharge of pollutants to drainage systems or watercourses from leaks and spills by reducing the chance for spills, stopping the source of spills, containing and cleaning up spills, properly disposing of spill materials, and training employees.

This best management practice covers only spill prevention and control. However, WM-1, Materials Delivery and Storage, and WM-2, Material Use, also contain useful information, particularly on spill prevention. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

This BMP is suitable for all construction projects. Spill control procedures are implemented anytime chemicals or hazardous substances are stored on the construction site, including the following materials:

- Soil stabilizers/binders
- Dust palliatives
- Herbicides
- Growth inhibitors
- Fertilizers
- Deicing/anti-icing chemicals

- Fuels
- Lubricants
- Other petroleum distillates

Limitations

- In some cases it may be necessary to use a private spill cleanup company.
- This BMP applies to spills caused by the contractor and subcontractors.
- Procedures and practices presented in this BMP are general. Contractor should identify appropriate practices for the specific materials used or stored onsite

Implementation

The following steps will help reduce the stormwater impacts of leaks and spills:

Education

- Be aware that different materials pollute in different amounts. Make sure that each employee knows what a "significant spill" is for each material they use, and what is the appropriate response for "significant" and "insignificant" spills.
- Educate employees and subcontractors on potential dangers to humans and the environment from spills and leaks.
- Hold regular meetings to discuss and reinforce appropriate disposal procedures (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.
- Have contractor's superintendent or representative oversee and enforce proper spill prevention and control measures.

General Measures

- To the extent that the work can be accomplished safely, spills of oil, petroleum products, substances listed under 40 CFR parts 110,117, and 302, and sanitary and septic wastes should be contained and cleaned up immediately.
- Store hazardous materials and wastes in covered containers and protect from vandalism.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Train employees in spill prevention and cleanup.
- Designate responsible individuals to oversee and enforce control measures.
- Spills should be covered and protected from stormwater runon during rainfall to the extent that it doesn't compromise clean up activities.
- Do not bury or wash spills with water.

- Store and dispose of used clean up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose in conformance with the provisions in applicable BMPs.
- Do not allow water used for cleaning and decontamination to enter storm drains or watercourses. Collect and dispose of contaminated water in accordance with WM-10, Liquid Waste Management.
- Contain water overflow or minor water spillage and do not allow it to discharge into drainage facilities or watercourses.
- Place proper storage, cleanup, and spill reporting instructions for hazardous materials stored or used on the project site in an open, conspicuous, and accessible location.
- Keep waste storage areas clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

Cleanup

- Clean up leaks and spills immediately.
- Use a rag for small spills on paved surfaces, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to either a certified laundry (rags) or disposed of as hazardous waste.
- Never hose down or bury dry material spills. Clean up as much of the material as possible and dispose of properly. See the waste management BMPs in this section for specific information.

Minor Spills

- Minor spills typically involve small quantities of oil, gasoline, paint, etc. which can be controlled by the first responder at the discovery of the spill.
- Use absorbent materials on small spills rather than hosing down or burying the spill.
- Absorbent materials should be promptly removed and disposed of properly.
- Follow the practice below for a minor spill:
  - Contain the spread of the spill.
  - Recover spilled materials.
  - Clean the contaminated area and properly dispose of contaminated materials.

Semi-Significant Spills

- Semi-significant spills still can be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. This response may require the cessation of all other activities.

- Spills should be cleaned up immediately:
  - Contain spread of the spill.
  - Notify the project foreman immediately.
  - If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.
  - If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.
  - If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

Significant/Hazardous Spills

- For significant or hazardous spills that cannot be controlled by personnel in the immediate vicinity, the following steps should be taken:
  - Notify the local emergency response by dialing 911. In addition to 911, the contractor will notify the proper county officials. It is the contractor's responsibility to have all emergency phone numbers at the construction site.
  - Notify the Governor's Office of Emergency Services Warning Center, (916) 845-8911.
  - For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110,119, and 302, the contractor should notify the National Response Center at (800) 424-8802.
  - Notification should first be made by telephone and followed up with a written report.
  - The services of a spills contractor or a Haz-Mat team should be obtained immediately. Construction personnel should not attempt to clean up until the appropriate and qualified staffs have arrived at the job site.
  - Other agencies which may need to be consulted include, but are not limited to, the Fire Department, the Public Works Department, the Coast Guard, the Highway Patrol, the City/County Police Department, Department of Toxic Substances, California Division of Oil and Gas, Cal/OSHA, etc.

Reporting

- Report significant spills to local agencies, such as the Fire Department; they can assist in cleanup.
- Federal regulations require that any significant oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hours).

Use the following measures related to specific activities:

Vehicle and Equipment Maintenance

- If maintenance must occur onsite, use a designated area and a secondary containment, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.
- Regularly inspect onsite vehicles and equipment for leaks and repair immediately
- Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- Place drip pans or absorbent materials under paving equipment when not in use.
- Use absorbent materials on small spills rather than hosing down or burying the spill. Remove the absorbent materials promptly and dispose of properly.
- Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around
- Oil filters disposed of in trashcans or dumpsters can leak oil and pollute stormwater. Place the oil filter in a funnel over a waste oil-recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask the oil supplier or recycler about recycling oil filters.
- Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Vehicle and Equipment Fueling

- If fueling must occur onsite, use designate areas, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.
- Discourage "topping off" of fuel tanks.
- Always use secondary containment, such as a drain pan, when fueling to catch spills/ leaks.

Costs

Prevention of leaks and spills is inexpensive. Treatment and/ or disposal of contaminated soil or water can be quite expensive.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

Spill Prevention and Control WM-4

- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.
- Keep ample supplies of spill control and cleanup materials onsite, near storage, unloading, and maintenance areas.
- Update your spill prevention and control plan and stock cleanup materials as changes occur in the types of chemicals onsite.

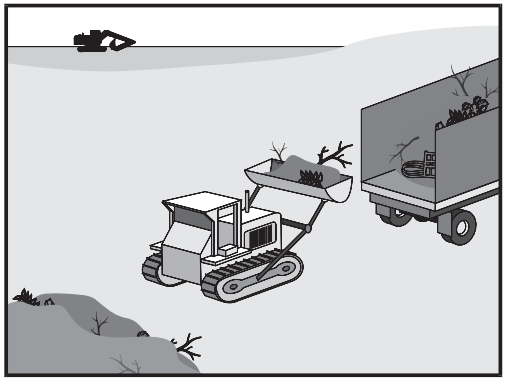
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Solid Waste Management WM-5



Categories		
EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:
☑ **Primary Objective**
☒ **Secondary Objective**

Description and Purpose

Solid waste management procedures and practices are designed to prevent or reduce the discharge of pollutants to stormwater from solid or construction waste by providing designated waste collection areas and containers, arranging for regular disposal, and training employees and subcontractors.

Suitable Applications

This BMP is suitable for construction sites where the following wastes are generated or stored:

- Solid waste generated from trees and shrubs removed during land clearing, demolition of existing structures (rubble), and building construction
- Packaging materials including wood, paper, and plastic
- Scrap or surplus building materials including scrap metals, rubber, plastic, glass pieces, and masonry products
- Domestic wastes including food containers such as beverage cans, coffee cups, paper bags, plastic wrappers, and cigarettes
- Construction wastes including brick, mortar, timber, steel and metal scraps, pipe and electrical cuttings, non-hazardous equipment parts, styrofoam and other materials used to transport and package construction materials

Targeted Constituents	
Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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- Highway planting wastes, including vegetative material, plant containers, and packaging materials

Limitations

Temporary stockpiling of certain construction wastes may not necessitate stringent drainage related controls during the non-rainy season or in desert areas with low rainfall.

Implementation

The following steps will help keep a clean site and reduce stormwater pollution:

- Select designated waste collection areas onsite.
- Inform trash-hauling contractors that you will accept only watertight dumpsters for onsite use. Inspect dumpsters for leaks and repair any dumpster that is not watertight.
- Locate containers in a covered area or in a secondary containment.
- Provide an adequate number of containers with lids or covers that can be placed over the container to keep rain out or to prevent loss of wastes when it is windy.
- Cover waste containers at the end of each work day and when it is raining.
- Plan for additional containers and more frequent pickup during the demolition phase of construction.
- Collect site trash daily, especially during rainy and windy conditions.
- Remove this solid waste promptly since erosion and sediment control devices tend to collect litter.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Do not hose out dumpsters on the construction site. Leave dumpster cleaning to the trash hauling contractor.
- Arrange for regular waste collection before containers overflow.
- Clean up immediately if a container does spill.
- Make sure that construction waste is collected, removed, and disposed of only at authorized disposal areas.

Education

- Have the contractor's superintendent or representative oversee and enforce proper solid waste management procedures and practices.
- Instruct employees and subcontractors on identification of solid waste and hazardous waste.
- Educate employees and subcontractors on solid waste storage and disposal procedures.

- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Require that employees and subcontractors follow solid waste handling and storage procedures.
- Prohibit littering by employees, subcontractors, and visitors.
- Minimize production of solid waste materials wherever possible.

Collection, Storage, and Disposal

- Littering on the project site should be prohibited.
- To prevent clogging of the storm drainage system, litter and debris removal from drainage grates, trash racks, and ditch lines should be a priority.
- Trash receptacles should be provided in the contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods.
- Litter from work areas within the construction limits of the project site should be collected and placed in watertight dumpsters at least weekly, regardless of whether the litter was generated by the contractor, the public, or others. Collected litter and debris should not be placed in or next to drain inlets, stormwater drainage systems, or watercourses.
- Dumpsters of sufficient size and number should be provided to contain the solid waste generated by the project.
- Full dumpsters should be removed from the project site and the contents should be disposed of by the trash hauling contractor.
- Construction debris and waste should be removed from the site biweekly or more frequently as needed.
- Construction material visible to the public should be stored or stacked in an orderly manner.
- Stormwater runon should be prevented from contacting stored solid waste through the use of berms, dikes, or other temporary diversion structures or through the use of measures to elevate waste from site surfaces.
- Solid waste storage areas should be located at least 50 ft from drainage facilities and watercourses and should not be located in areas prone to flooding or ponding.
- Except during fair weather, construction and highway planting waste not stored in watertight dumpsters should be securely covered from wind and rain by covering the waste with tarps or plastic.
- Segregate potentially hazardous waste from non-hazardous construction site waste.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.

Solid Waste Management WM-5

- For disposal of hazardous waste, see WM-6, Hazardous Waste Management. Have hazardous waste hauled to an appropriate disposal and/or recycling facility.
- Salvage or recycle useful vegetation debris, packaging and surplus building materials when practical. For example, trees and shrubs from land clearing can be used as a brush barrier, or converted into wood chips, then used as mulch on graded areas. Wood pallets, cardboard boxes, and construction scraps can also be recycled.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur
- Inspect construction waste area regularly.
- Arrange for regular waste collection.

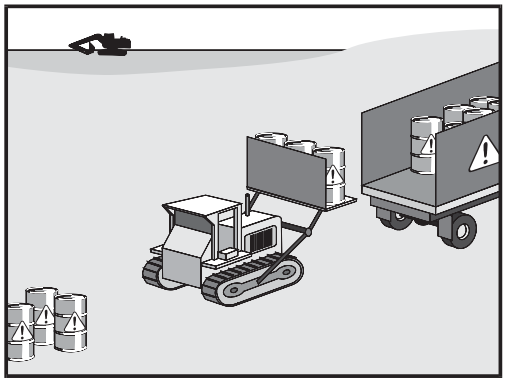
References

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Hazardous Waste Management WM-6



Categories

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SE	Sediment Control	
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WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:
☑ **Primary Objective**
☒ **Secondary Objective**

Targeted Constituents

Sediment	
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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Description and Purpose

Prevent or reduce the discharge of pollutants to stormwater from hazardous waste through proper material use, waste disposal, and training of employees and subcontractors.

Suitable Applications

This best management practice (BMP) applies to all construction projects. Hazardous waste management practices are implemented on construction projects that generate waste from the use of:

- Petroleum Products
- Asphalt Products
- Concrete Curing Compounds
- Pesticides
- Palliatives
- Acids
- Septic Wastes
- Paints
- Stains
- Solvents
- Wood Preservatives
- Roofing Tar
- Any materials deemed a hazardous waste in California, Title 22 Division 4.5, or listed in 40 CFR Parts 110, 117, 261, or 302

In addition, sites with existing structures may contain wastes, which must be disposed of in accordance with federal, state, and local regulations. These wastes include:

- Sandblasting grit mixed with lead-, cadmium-, or chromium-based paints
- Asbestos
- PCBs (particularly in older transformers)

Limitations

- Hazardous waste that cannot be reused or recycled must be disposed of by a licensed hazardous waste hauler.
- Nothing in this BMP relieves the contractor from responsibility for compliance with federal, state, and local laws regarding storage, handling, transportation, and disposal of hazardous wastes.
- This BMP does not cover aerially deposited lead (ADL) soils. For ADL soils refer to WM-7, Contaminated Soil Management.

Implementation

The following steps will help reduce stormwater pollution from hazardous wastes:

Material Use

- Wastes should be stored in sealed containers constructed of a suitable material and should be labeled as required by Title 22 CCR, Division 4.5 and 49 CFR Parts 172, 173, 178, and 179.
- All hazardous waste should be stored, transported, and disposed as required in Title 22 CCR, Division 4.5 and 49 CFR 261-263.
- Waste containers should be stored in temporary containment facilities that should comply with the following requirements:
  - Temporary containment facility should provide for a spill containment volume equal to 1.5 times the volume of all containers able to contain precipitation from a 25 year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest tank within its boundary, whichever is greater.
  - Temporary containment facility should be impervious to the materials stored there for a minimum contact time of 72 hours.
  - Temporary containment facilities should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills should be placed into drums after each rainfall. These liquids should be handled as a hazardous waste unless testing determines them to be non-hazardous. Non-hazardous liquids should be sent to an approved disposal site.
  - Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.

  - Incompatible materials, such as chlorine and ammonia, should not be stored in the same temporary containment facility.
  - Throughout the rainy season, temporary containment facilities should be covered during non-working days, and prior to rain events. Covered facilities may include use of plastic tarps for small facilities or constructed roofs with overhangs.
- Drums should not be overfilled and wastes should not be mixed.
- Unless watertight, containers of dry waste should be stored on pallets.
- Do not over-apply herbicides and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over application is expensive and environmentally harmful. Apply surface dressings in several smaller applications, as opposed to one large application. Allow time for infiltration and avoid excess material being carried offsite by runoff. Do not apply these chemicals just before it rains. People applying pesticides must be certified in accordance with federal and state regulations.
- Paint brushes and equipment for water and oil based paints should be cleaned within a contained area and should not be allowed to contaminate site soils, watercourses, or drainage systems. Waste paints, thinners, solvents, residues, and sludges that cannot be recycled or reused should be disposed of as hazardous waste. When thoroughly dry, latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths should be disposed of as solid waste.
- Do not clean out brushes or rinse paint containers into the dirt, street, gutter, storm drain, or stream. “Paint out” brushes as much as possible. Rinse water-based paints to the sanitary sewer. Filter and reuse thinners and solvents. Dispose of excess oil-based paints and sludge as hazardous waste.
- The following actions should be taken with respect to temporary contaminant:
  - Ensure that adequate hazardous waste storage volume is available.
  - Ensure that hazardous waste collection containers are conveniently located.
  - Designate hazardous waste storage areas onsite away from storm drains or watercourses and away from moving vehicles and equipment to prevent accidental spills.
  - Minimize production or generation of hazardous materials and hazardous waste on the job site.
  - Use containment berms in fueling and maintenance areas and where the potential for spills is high.
  - Segregate potentially hazardous waste from non-hazardous construction site debris.
  - Keep liquid or semi-liquid hazardous waste in appropriate containers (closed drums or similar) and under cover.

- Clearly label all hazardous waste containers with the waste being stored and the date of accumulation.
- Place hazardous waste containers in secondary containment.
- Do not allow potentially hazardous waste materials to accumulate on the ground.
- Do not mix wastes.
- Use all of the product before disposing of the container.
- Do not remove the original product label; it contains important safety and disposal information.

Waste Recycling Disposal

- Select designated hazardous waste collection areas onsite.
- Hazardous materials and wastes should be stored in covered containers and protected from vandalism.
- Place hazardous waste containers in secondary containment.
- Do not mix wastes, this can cause chemical reactions, making recycling impossible and complicating disposal.
- Recycle any useful materials such as used oil or water-based paint.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Arrange for regular waste collection before containers overflow.
- Make sure that hazardous waste (e.g., excess oil-based paint and sludge) is collected, removed, and disposed of only at authorized disposal areas.

Disposal Procedures

- Waste should be disposed of by a licensed hazardous waste transporter at an authorized and licensed disposal facility or recycling facility utilizing properly completed Uniform Hazardous Waste Manifest forms.
- A Department of Health Services certified laboratory should sample waste to determine the appropriate disposal facility.
- Properly dispose of rainwater in secondary containment that may have mixed with hazardous waste.
- Attention is directed to "Hazardous Material", "Contaminated Material", and "Aerially Deposited Lead" of the contract documents regarding the handling and disposal of hazardous materials.

Education

- Educate employees and subcontractors on hazardous waste storage and disposal procedures.
- Educate employees and subcontractors on potential dangers to humans and the environment from hazardous wastes.
- Instruct employees and subcontractors on safety procedures for common construction site hazardous wastes.
- Instruct employees and subcontractors in identification of hazardous and solid waste.
- Hold regular meetings to discuss and reinforce hazardous waste management procedures (incorporate into regular safety meetings).
- The contractor's superintendent or representative should oversee and enforce proper hazardous waste management procedures and practices.
- Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.
- Warning signs should be placed in areas recently treated with chemicals.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- If a container does spill, clean up immediately.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events..
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur
- Hazardous waste should be regularly collected.
- A foreman or construction supervisor should monitor onsite hazardous waste storage and disposal procedures.
- Waste storage areas should be kept clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored.
- Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

Hazardous Waste Management WM-6

- Hazardous spills should be cleaned up and reported in conformance with the applicable Material Safety Data Sheet (MSDS) and the instructions posted at the project site.
- The National Response Center, at (800) 424-8802, should be notified of spills of federal reportable quantities in conformance with the requirements in 40 CFR parts 110, 117, and 302. Also notify the Governors Office of Emergency Services Warning Center at (916) 845-8911.
- A copy of the hazardous waste manifests should be provided.

References

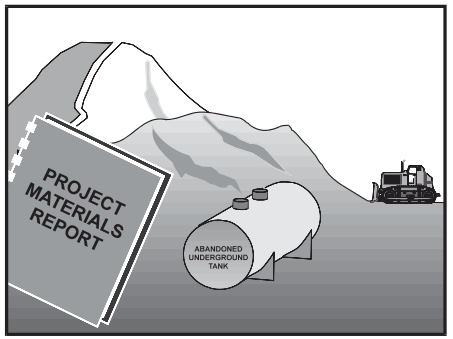
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Contaminated Soil Management WM-7



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:
☑ **Primary Objective**
☒ **Secondary Objective**

Description and Purpose

Prevent or reduce the discharge of pollutants to stormwater from contaminated soil and highly acidic or alkaline soils by conducting pre-construction surveys, inspecting excavations regularly, and remediating contaminated soil promptly.

Suitable Applications

Contaminated soil management is implemented on construction projects in highly urbanized or industrial areas where soil contamination may have occurred due to spills, illicit discharges, aerial deposition, past use and leaks from underground storage tanks.

Limitations

Contaminated soils that cannot be treated onsite must be disposed of offsite by a licensed hazardous waste hauler. The presence of contaminated soil may indicate contaminated water as well. See NS-2, Dewatering Operations, for more information.

The procedures and practices presented in this BMP are general. The contractor should identify appropriate practices and procedures for the specific contaminants known to exist or discovered onsite.

Implementation

Most owners and developers conduct pre-construction environmental assessments as a matter of routine. Contaminated soils are often identified during project planning and development with known locations identified in the plans, specifications and in the SWPPP. The contractor should review applicable reports and investigate appropriate call-outs in the

Targeted Constituents

Sediment	
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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plans, specifications, and SWPPP. Recent court rulings holding contractors liable for cleanup costs when they unknowingly move contaminated soil highlight the need for contractors to confirm a site assessment is completed before earth moving begins.

The following steps will help reduce stormwater pollution from contaminated soil:

- Conduct thorough, pre-construction inspections of the site and review documents related to the site. If inspection or reviews indicated presence of contaminated soils, develop a plan before starting work.
- Look for contaminated soil as evidenced by discoloration, odors, differences in soil properties, abandoned underground tanks or pipes, or buried debris.
- Prevent leaks and spills. Contaminated soil can be expensive to treat and dispose of properly. However, addressing the problem before construction is much less expensive than after the structures are in place.
- The contractor may further identify contaminated soils by investigating:
  - Past site uses and activities
  - Detected or undetected spills and leaks
  - Acid or alkaline solutions from exposed soil or rock formations high in acid or alkaline forming elements
  - Contaminated soil as evidenced by discoloration, odors, differences in soil properties, abandoned underground tanks or pipes, or buried debris.
  - Suspected soils should be tested at a certified laboratory.

Education

- Have employees and subcontractors complete a safety training program which meets 29 CFR 1910.120 and 8 CCR 5192 covering the potential hazards as identified, prior to performing any excavation work at the locations containing material classified as hazardous.
- Educate employees and subcontractors in identification of contaminated soil and on contaminated soil handling and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).

Handling Procedures for Material with Aerially Deposited Lead (ADL)

- Materials from areas designated as containing (ADL) may, if allowed by the contract special provisions, be excavated, transported, and used in the construction of embankments and/or backfill.
- Excavation, transportation, and placement operations should result in no visible dust.
- Caution should be exercised to prevent spillage of lead containing material during transport.

- Quality should be monitored during excavation of soils contaminated with lead.

Handling Procedures for Contaminated Soils

- Minimize onsite storage. Contaminated soil should be disposed of properly in accordance with all applicable regulations. All hazardous waste storage will comply with the requirements in Title 22, CCR, Sections 66265.250 to 66265.260.
- Test suspected soils at an approved certified laboratory.
- Work with the local regulatory agencies to develop options for treatment or disposal if the soil is contaminated.
- Avoid temporary stockpiling of contaminated soils or hazardous material.
- Take the following precautions if temporary stockpiling is necessary:
  - Cover the stockpile with plastic sheeting or tarps.
  - Install a berm around the stockpile to prevent runoff from leaving the area.
  - Do not stockpile in or near storm drains or watercourses.
- Remove contaminated material and hazardous material on exteriors of transport vehicles and place either into the current transport vehicle or into the excavation prior to the vehicle leaving the exclusion zone.
- Monitor the air quality continuously during excavation operations at all locations containing hazardous material.
- Procure all permits and licenses, pay all charges and fees, and give all notices necessary and incident to the due and lawful prosecution of the work, including registration for transporting vehicles carrying the contaminated material and the hazardous material.
- Collect water from decontamination procedures and treat or dispose of it at an appropriate disposal site.
- Collect non-reusable protective equipment, once used by any personnel, and dispose of at an appropriate disposal site.
- Install temporary security fence to surround and secure the exclusion zone. Remove fencing when no longer needed.
- Excavate, transport, and dispose of contaminated material and hazardous material in accordance with the rules and regulations of the following agencies (the specifications of these agencies supersede the procedures outlined in this BMP):
  - United States Department of Transportation (USDOT)
  - United States Environmental Protection Agency (USEPA)
  - California Environmental Protection Agency (CAL-EPA)

- California Division of Occupation Safety and Health Administration (CAL-OSHA)
- Local regulatory agencies

Procedures for Underground Storage Tank Removals

- Prior to commencing tank removal operations, obtain the required underground storage tank removal permits and approval from the federal, state, and local agencies that have jurisdiction over such work.
- To determine if it contains hazardous substances, arrange to have tested, any liquid or sludge found in the underground tank prior to its removal.
- Following the tank removal, take soil samples beneath the excavated tank and perform analysis as required by the local agency representative(s).
- The underground storage tank, any liquid or sludge found within the tank, and all contaminated substances and hazardous substances removed during the tank removal and transported to disposal facilities permitted to accept such waste.

Water Control

- All necessary precautions and preventive measures should be taken to prevent the flow of water, including ground water, from mixing with hazardous substances or underground storage tank excavations. Such preventative measures may consist of, but are not limited to, berms, cofferdams, grout curtains, freeze walls, and seal course concrete or any combination thereof.
- If water does enter an excavation and becomes contaminated, such water, when necessary to proceed with the work, should be discharged to clean, closed top, watertight transportable holding tanks, treated, and disposed of in accordance with federal, state, and local laws.

Costs

Prevention of leaks and spills is inexpensive. Treatment or disposal of contaminated soil can be quite expensive.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Arrange for contractor's Water Pollution Control Manager, foreman, and/or construction supervisor to monitor onsite contaminated soil storage and disposal procedures.
- Monitor air quality continuously during excavation operations at all locations containing hazardous material.
- Coordinate contaminated soils and hazardous substances/waste management with the appropriate federal, state, and local agencies.

- Implement WM-4, Spill Prevention and Control, to prevent leaks and spills as much as possible.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

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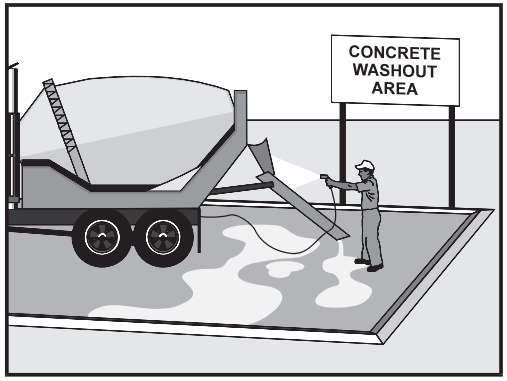
Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Concrete Waste Management WM-8



Categories		
EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☒
WM	Waste Management and Materials Pollution Control	☑

Legend:
☑ **Primary Category**
☒ **Secondary Category**

Targeted Constituents	
Sediment	☑
Nutrients	
Trash	
Metals	☑
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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Description and Purpose

Prevent the discharge of pollutants to stormwater from concrete waste by conducting washout onsite or offsite in a designated area, and by employee and subcontractor training.

The General Permit incorporates Numeric Action Levels (NAL) for pH (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Many types of construction materials, including mortar, concrete, stucco, cement and block and their associated wastes have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows and raising pH to levels outside the accepted range.

Suitable Applications

Concrete waste management procedures and practices are implemented on construction projects where:

- Concrete is used as a construction material or where concrete dust and debris result from demolition activities.
- Slurries containing portland cement concrete (PCC) are generated, such as from saw cutting, coring, grinding, grooving, and hydro-concrete demolition.
- Concrete trucks and other concrete-coated equipment are washed onsite.

Concrete Waste Management WM-8

- Mortar-mixing stations exist.
- Stucco mixing and spraying.
- See also NS-8, Vehicle and Equipment Cleaning.

Limitations

- Offsite washout of concrete wastes may not always be possible.
- Multiple washouts may be needed to assure adequate capacity and to allow for evaporation.

Implementation

The following steps will help reduce stormwater pollution from concrete wastes:

- Incorporate requirements for concrete waste management into material supplier and subcontractor agreements.
- Store dry and wet materials under cover, away from drainage areas. Refer to WM-1, Material Delivery and Storage for more information.
- Avoid mixing excess amounts of concrete.
- Perform washout of concrete trucks in designated areas only, where washout will not reach stormwater.
- Do not wash out concrete trucks into storm drains, open ditches, streets, streams or onto the ground. Trucks should always be washed out into designated facilities.
- Do not allow excess concrete to be dumped onsite, except in designated areas.
- For onsite washout:
  - On larger sites, it is recommended to locate washout areas at least 50 feet from storm drains, open ditches, or water bodies. Do not allow runoff from this area by constructing a temporary pit or bermed area large enough for liquid and solid waste.
  - Washout wastes into the temporary washout where the concrete can set, be broken up, and then disposed properly.
  - Washouts shall be implemented in a manner that prevents leaching to underlying soils. Washout containers must be water tight and washouts on or in the ground must be lined with a suitable impervious liner, typically a plastic type material.
- Do not wash sweepings from exposed aggregate concrete into the street or storm drain. Collect and return sweepings to aggregate base stockpile or dispose in the trash.
- See typical concrete washout installation details at the end of this fact sheet.

Education

- Educate employees, subcontractors, and suppliers on the concrete waste management techniques described herein.

- Arrange for contractor's superintendent or representative to oversee and enforce concrete waste management procedures.
- Discuss the concrete management techniques described in this BMP (such as handling of concrete waste and washout) with the ready-mix concrete supplier before any deliveries are made.

Concrete Demolition Wastes

- Stockpile concrete demolition waste in accordance with BMP WM-3, Stockpile Management.
- Dispose of or recycle hardened concrete waste in accordance with applicable federal, state or local regulations.

Concrete Slurry Wastes

- PCC and AC waste should not be allowed to enter storm drains or watercourses.
- PCC and AC waste should be collected and disposed of or placed in a temporary concrete washout facility (as described in Onsite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures, below).
- A foreman or construction supervisor should monitor onsite concrete working tasks, such as saw cutting, coring, grinding and grooving to ensure proper methods are implemented.
- Saw-cut concrete slurry should not be allowed to enter storm drains or watercourses. Residue from grinding operations should be picked up by means of a vacuum attachment to the grinding machine or by sweeping. Saw cutting residue should not be allowed to flow across the pavement and should not be left on the surface of the pavement. See also NS-3, Paving and Grinding Operations; and WM-10, Liquid Waste Management.
- Concrete slurry residue should be disposed in a temporary washout facility (as described in Onsite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures, below) and allowed to dry. Dispose of dry slurry residue in accordance with WM-5, Solid Waste Management.

Onsite Temporary Concrete Washout Facility, Transit Truck Washout Procedures

- Temporary concrete washout facilities should be located a minimum of 50 ft from storm drain inlets, open drainage facilities, and watercourses. Each facility should be located away from construction traffic or access areas to prevent disturbance or tracking.
- A sign should be installed adjacent to each washout facility to inform concrete equipment operators to utilize the proper facilities.
- Temporary concrete washout facilities should be constructed above grade or below grade at the option of the contractor. Temporary concrete washout facilities should be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.

- Temporary washout facilities should have a temporary pit or bermed areas of sufficient volume to completely contain all liquid and waste concrete materials generated during washout procedures.
- Temporary washout facilities should be lined to prevent discharge to the underlying ground or surrounding area.
- Washout of concrete trucks should be performed in designated areas only.
- Only concrete from mixer truck chutes should be washed into concrete wash out.
- Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area or properly disposed of or recycled offsite.
- Once concrete wastes are washed into the designated area and allowed to harden, the concrete should be broken up, removed, and disposed of per WM-5, Solid Waste Management. Dispose of or recycle hardened concrete on a regular basis.
- Temporary Concrete Washout Facility (Type Above Grade)
  - Temporary concrete washout facility (type above grade) should be constructed as shown on the details at the end of this BMP, with a recommended minimum length and minimum width of 10 ft; however, smaller sites or jobs may only need a smaller washout facility. With any washout, always maintain a sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations.
  - Materials used to construct the washout area should conform to the provisions detailed in their respective BMPs (e.g., SE-8 Sandbag Barrier).
  - Plastic lining material should be a minimum of 10 mil in polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.
  - Alternatively, portable removable containers can be used as above grade concrete washouts. Also called a “roll-off”; this concrete washout facility should be properly sealed to prevent leakage, and should be removed from the site and replaced when the container reaches 75% capacity.
- Temporary Concrete Washout Facility (Type Below Grade)
  - Temporary concrete washout facilities (type below grade) should be constructed as shown on the details at the end of this BMP, with a recommended minimum length and minimum width of 10 ft. The quantity and volume should be sufficient to contain all liquid and concrete waste generated by washout operations.
  - Lath and flagging should be commercial type.
  - Plastic lining material should be a minimum of 10 mil polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.

- The base of a washout facility should be free of rock or debris that may damage a plastic liner.

Removal of Temporary Concrete Washout Facilities

- When temporary concrete washout facilities are no longer required for the work, the hardened concrete should be removed and properly disposed or recycled in accordance with federal, state or local regulations. Materials used to construct temporary concrete washout facilities should be removed from the site of the work and properly disposed or recycled in accordance with federal, state or local regulations..
- Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities should be backfilled and repaired.

Costs

All of the above are low cost measures. Roll-0ff concrete washout facilities can be more costly than other measures due to removal and replacement; however, provide a cleaner alternative to traditional washouts. The type of washout facility, size, and availability of materials will determine the cost of the washout.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Temporary concrete washout facilities should be maintained to provide adequate holding capacity with a minimum freeboard of 4 in. for above grade facilities and 12 in. for below grade facilities. Maintaining temporary concrete washout facilities should include removing and disposing of hardened concrete and returning the facilities to a functional condition. Hardened concrete materials should be removed and properly disposed or recycled in accordance with federal, state or local regulations.
- Washout facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75% full.
- Inspect washout facilities for damage (e.g. torn liner, evidence of leaks, signage, etc.). Repair all identified damage.

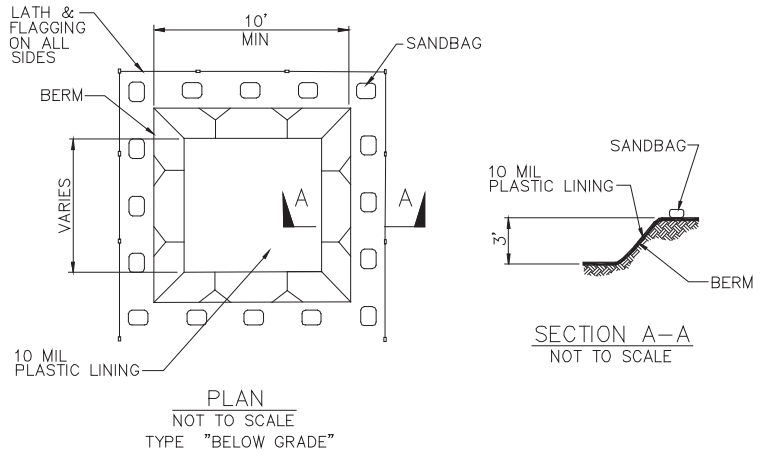
References

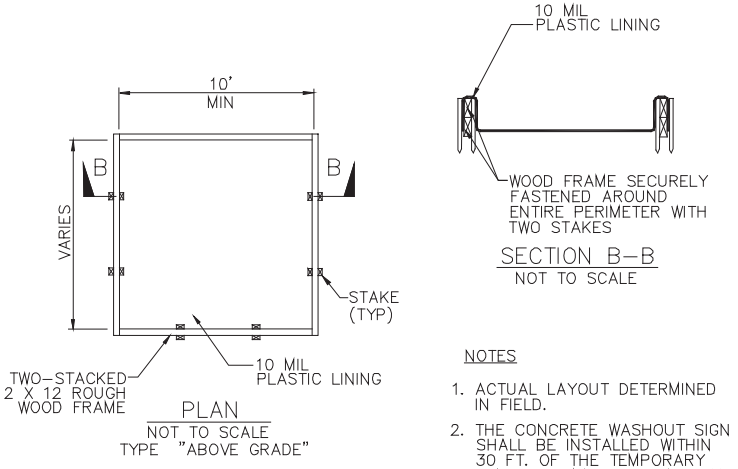
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000, Updated March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Concrete Waste Management WM-8

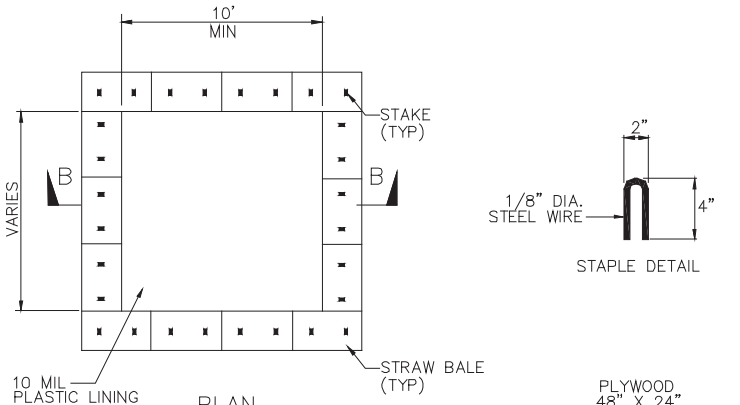




NOTES

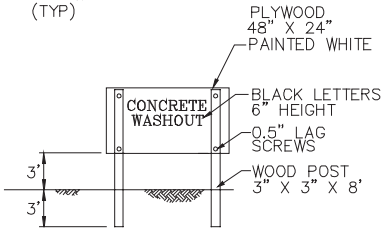
1. ACTUAL LAYOUT DETERMINED IN FIELD.
2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30 FT. OF THE TEMPORARY CONCRETE WASHOUT FACILITY.

Concrete Waste Management WM-8

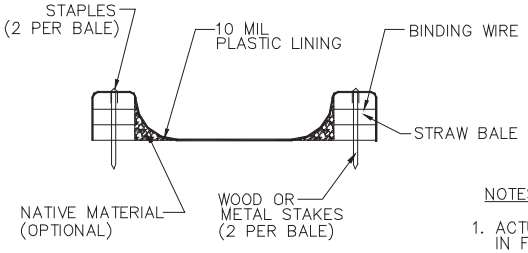


PLAN
NOT TO SCALE
TYPE "ABOVE GRADE"
WITH STRAW BALES

STAPLE DETAIL



CONCRETE WASHOUT
SIGN DETAIL
(OR EQUIVALENT)

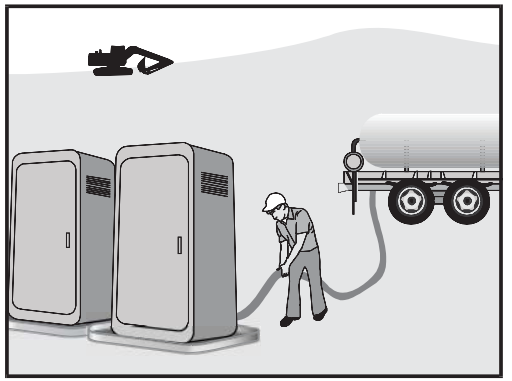


SECTION B–B
NOT TO SCALE

NOTES

1. ACTUAL LAYOUT DETERMINED IN FIELD.
2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30 FT. OF THE TEMPORARY CONCRETE WASHOUT FACILITY.

Sanitary/Septic Waste Management WM-9



Categories

EC	Erosion Control	
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NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:
☑ **Primary Category**
☒ **Secondary Category**

Description and Purpose

Proper sanitary and septic waste management prevent the discharge of pollutants to stormwater from sanitary and septic waste by providing convenient, well-maintained facilities, and arranging for regular service and disposal.

Suitable Applications

Sanitary septic waste management practices are suitable for use at all construction sites that use temporary or portable sanitary and septic waste systems.

Limitations

None identified.

Implementation

Sanitary or septic wastes should be treated or disposed of in accordance with state and local requirements. In many cases, one contract with a local facility supplier will be all that it takes to make sure sanitary wastes are properly disposed.

Storage and Disposal Procedures

- Temporary sanitary facilities should be located away from drainage facilities, watercourses, and from traffic circulation. If site conditions allow, place portable facilities a minimum of 50 feet from drainage conveyances and traffic areas. When subjected to high winds or risk of high winds, temporary sanitary facilities should be secured to prevent overturning.

Targeted Constituents

Sediment	
Nutrients	☑
Trash	☑
Metals	
Bacteria	☑
Oil and Grease	
Organics	☑

Potential Alternatives

None

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- Temporary sanitary facilities must be equipped with containment to prevent discharge of pollutants to the stormwater drainage system of the receiving water.
- Consider safety as well as environmental implications before placing temporary sanitary facilities.
- Wastewater should not be discharged or buried within the project site.
- Sanitary and septic systems that discharge directly into sanitary sewer systems, where permissible, should comply with the local health agency, city, county, and sewer district requirements.
- Only reputable, licensed sanitary and septic waste haulers should be used.
- Sanitary facilities should be located in a convenient location.
- Temporary septic systems should treat wastes to appropriate levels before discharging.
- If using an onsite disposal system (OSDS), such as a septic system, local health agency requirements must be followed.
- Temporary sanitary facilities that discharge to the sanitary sewer system should be properly connected to avoid illicit discharges.
- Sanitary and septic facilities should be maintained in good working order by a licensed service.
- Regular waste collection by a licensed hauler should be arranged before facilities overflow.
- If a spill does occur from a temporary sanitary facility, follow federal, state and local regulations for containment and clean-up.

Education

- Educate employees, subcontractors, and suppliers on sanitary and septic waste storage and disposal procedures.
- Educate employees, subcontractors, and suppliers of potential dangers to humans and the environment from sanitary and septic wastes.
- Instruct employees, subcontractors, and suppliers in identification of sanitary and septic waste.
- Hold regular meetings to discuss and reinforce the use of sanitary facilities (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.

Costs

All of the above are low cost measures.

Sanitary/Septic Waste Management WM-9

Inspection and Maintenance

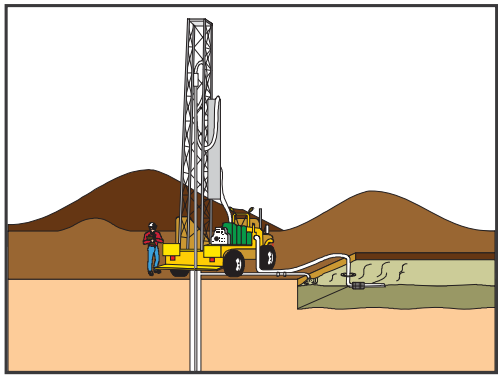
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Arrange for regular waste collection.
- If high winds are expected, portable sanitary facilities must be secured with spikes or weighed down to prevent over turning.
- If spills or leaks from sanitary or septic facilities occur that are not contained and discharge from the site, non-visible sampling of site discharge may be required. Refer to the General Permit or to your project specific Construction Site Monitoring Plan to determine if and where sampling is required.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Liquid Waste Management WM-10



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:
☑ **Primary Objective**
☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

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Description and Purpose

Liquid waste management includes procedures and practices to prevent discharge of pollutants to the storm drain system or to watercourses as a result of the creation, collection, and disposal of non-hazardous liquid wastes.

Suitable Applications

Liquid waste management is applicable to construction projects that generate any of the following non-hazardous by-products, residuals, or wastes:

- Drilling slurries and drilling fluids
- Grease-free and oil-free wastewater and rinse water
- Dredgings
- Other non-stormwater liquid discharges not permitted by separate permits

Limitations

- Disposal of some liquid wastes may be subject to specific laws and regulations or to requirements of other permits secured for the construction project (e.g., NPDES permits, Army Corps permits, Coastal Commission permits, etc.).
- Liquid waste management does not apply to dewatering operations (NS-2 Dewatering Operations), solid waste management (WM-5, Solid Waste Management), hazardous wastes (WM-6, Hazardous Waste Management), or

concrete slurry residue (WM-8, Concrete Waste Management).

- Typical permitted non-stormwater discharges can include: water line flushing; landscape irrigation; diverted stream flows; rising ground waters; uncontaminated pumped ground water; discharges from potable water sources; foundation drains; irrigation water; springs; water from crawl space pumps; footing drains; lawn watering; flows from riparian habitats and wetlands; and discharges or flows from emergency fire fighting activities.

Implementation

General Practices

- Instruct employees and subcontractors how to safely differentiate between non-hazardous liquid waste and potential or known hazardous liquid waste.
- Instruct employees, subcontractors, and suppliers that it is unacceptable for any liquid waste to enter any storm drainage device, waterway, or receiving water.
- Educate employees and subcontractors on liquid waste generating activities and liquid waste storage and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Verify which non-stormwater discharges are permitted by the statewide NPDES permit; different regions might have different requirements not outlined in this permit.
- Apply NS-8, Vehicle and Equipment Cleaning for managing wash water and rinse water from vehicle and equipment cleaning operations.

Containing Liquid Wastes

- Drilling residue and drilling fluids should not be allowed to enter storm drains and watercourses and should be disposed of.
- If an appropriate location is available, drilling residue and drilling fluids that are exempt under Title 23, CCR § 2511(g) may be dried by infiltration and evaporation in a containment facility constructed in conformance with the provisions concerning the Temporary Concrete Washout Facilities detailed in WM-8, Concrete Waste Management.
- Liquid wastes generated as part of an operational procedure, such as water-laden dredged material and drilling mud, should be contained and not allowed to flow into drainage channels or receiving waters prior to treatment.
- Liquid wastes should be contained in a controlled area such as a holding pit, sediment basin, roll-off bin, or portable tank.
- Containment devices must be structurally sound and leak free.
- Containment devices must be of sufficient quantity or volume to completely contain the liquid wastes generated.

- Precautions should be taken to avoid spills or accidental releases of contained liquid wastes. Apply the education measures and spill response procedures outlined in WM-4, Spill Prevention and Control.
- Containment areas or devices should not be located where accidental release of the contained liquid can threaten health or safety or discharge to water bodies, channels, or storm drains.

Capturing Liquid Wastes

- Capture all liquid wastes that have the potential to affect the storm drainage system (such as wash water and rinse water from cleaning walls or pavement), before they run off a surface.
- Do not allow liquid wastes to flow or discharge uncontrolled. Use temporary dikes or berms to intercept flows and direct them to a containment area or device for capture.
- Use a sediment trap (SE-3, Sediment Trap) for capturing and treating sediment laden liquid waste or capture in a containment device and allow sediment to settle.

Disposing of Liquid Wastes

- A typical method to handle liquid waste is to dewater the contained liquid waste, using procedures such as described in NS-2, Dewatering Operations, and SE-2, Sediment Basin, and dispose of resulting solids per WM-5, Solid Waste Management.
- Methods of disposal for some liquid wastes may be prescribed in Water Quality Reports, NPDES permits, Environmental Impact Reports, 401 or 404 permits, and local agency discharge permits, etc. Review the SWPPP to see if disposal methods are identified.
- Liquid wastes, such as from dredged material, may require testing and certification whether it is hazardous or not before a disposal method can be determined.
- For disposal of hazardous waste, see WM-6, Hazardous Waste Management.
- If necessary, further treat liquid wastes prior to disposal. Treatment may include, though is not limited to, sedimentation, filtration, and chemical neutralization.

Costs

Prevention costs for liquid waste management are minimal. Costs increase if cleanup or fines are involved.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.

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- Remove deposited solids in containment areas and capturing devices as needed and at the completion of the task. Dispose of any solids as described in WM-5, Solid Waste Management.
- Inspect containment areas and capturing devices and repair as needed.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

APPENDIX N

FIELD SAMPLING AND LABORATORY ANALYSIS PLAN ADDENDUM

5441 International Boulevard
Oakland, California

Draft Final – October 2019

(EKI B70123.01)

APPENDIX N
FIELD SAMPLING AND LABORATORY ANALYSIS PLAN ADDENDUM

5441 International Boulevard
Oakland, California

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5441 International Boulevard
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FIGURES

Figure N-1 Typical Temporary Soil Gas Probe Construction Detail
Figure N-2 Soil Gas Sampling Setup with Purge Canister

ATTACHMENT

Field Sampling and Laboratory Analysis Plan from Geosyntec, 2012

1. INTRODUCTION

EKI Environment & Water, Inc. ("EKI") has prepared this Field Sampling and Laboratory Analysis Plan Addendum ("SAP Addendum") on behalf of Bridge Acquisition, LLC ("Bridge" or "Developer") for the property located at 5441 International Boulevard, Oakland, California ("site"). This SAP Addendum modifies the Field Sampling and Laboratory Analysis Plan ("SAP") of the Department of Toxic Substances Control ("DTSC")-approved Remedial Design Implementation Plan ("RDIP") (attached; Geosyntec, 2012) to include additional sampling activities to be conducted during and after site redevelopment, which are described in the main text of the RDIP Addendum, to which this plan is an Appendix.

The 2012 SAP included standard operating procedures ("SOPs") for water sampling (including storm water), treatment system vapor sampling, and soil sampling for waste characterization. These SOPs will still apply for the work described in the RDIP Addendum. This SAP Addendum includes additional SOPs for the following: (1) polychlorinated biphenyl ("PCB") sampling of concrete; (2) PCB and lead sampling in support of the Building 1 façade abatement; (3) collection of soil gas samples from temporary soil gas probes; (4) collection of indoor air samples; (5) sub-slab vacuum monitoring for the vapor intrusion mitigation system ("VIMS"); (6) sub-slab vapor monitoring for the VIMS; (7) storm water sediment sampling for PCBs during (if needed) and after redevelopment; and (8) extraction well sampling during wet-season operation of the groundwater extraction and treatment system ("GETS") while the site is uncapped during redevelopment.

The Perimeter Air Monitoring Plan (Appendix K of the RDIP Addendum), presents a detailed plan for perimeter air monitoring sampling and associated analysis; therefore, perimeter air sampling and analysis are not discussed herein.

2. STANDARD OPERATING PROCEDURES FOR PCB SAMPLING OF CONCRETE

Concrete structures and pads are planned to be crushed for reuse on-site if PCB concentrations are less than 50 milligrams per kilogram ("mg/kg"), and TCE is less than 10 mg/kg and other COCs meet the criteria described in Appendix O – Site Demolition of the RDIP Addendum. Concrete is considered a porous surface. Therefore, for concrete structures and pads that will be crushed for placement on-site under the new cap and where previous sampling data for PCBs are not available, samples will be collected in general accordance with U.S Environmental Protection Agency ("EPA") Region 1 "Standard Operating Procedure for Sampling Porous Surfaces for PCBs" ("SOP;" EPA, 2011). Sampling frequency for the concrete will be one sample per 1,600 square feet (equivalent to an approximately 40-foot grid), similar to the sampling frequency for previously collected samples (see Figure O-1 of Appendix O, Site Demolition).

The SOP document (EPA, 2011) describes how hard surfaces, such as concrete, can be sampled using an impact hammer drill to generate a uniform, finely ground, powder to be extracted and analyzed for PCBs. This procedure is primarily geared at providing enough sample quantity for two analyses.

2.1 Sampling Protocol

To generate a fine powder sample suitable for extraction and analysis of PCBs from a porous surface, a 1-inch or another size diameter carbide drill bit will be locked into the impact hammer drill. Sample locations may be pre-marked using a marker or paint, but the actual drilling point will not be marked. If debris is present, it will be removed with a clean brush or cloth prior to drilling.

Samples will be collected at ½-inch depth intervals (a ½-inch deep hole with a 1-inch diameter drill bit generates about 10 grams of powder). Multiple holes located closely adjacent to each other may be needed to generate sufficient sample volume for PCB extraction and analysis.

A clean catch surface (Cubitainer with the top cut off, aluminum foil, or other disposable aluminum or plastic vessel or pan) will be used to contain the powdered sample. Drilling will be performed in the designated location(s). The drill's finely ground powder will be collected in a glass jar of sufficient size (e.g., 2-ounce). At least 10 grams will be collected for the sample.

2.2 Decontamination

All used drill bits and sampling equipment will be decontaminated between sampling locations. Each piece of equipment to be decontaminated will be placed in a bucket that contains a solution of detergent and potable water and will be scrubbed thoroughly using a scrub brush (the powder tends to cling to metal surfaces, so care will be taken during this step, especially with the twists and curves of the drill bits). Next, each piece will be rinsed with a solution of potable water and hexane. The rinsed pieces will be then placed on clean paper towels and individually dried and inspected.

Lightly contaminated drill bits and sampling equipment may also be wiped with a hexane-soaked cloth and hexane rinsed for decontamination.

2.3 Sample Analysis

Each sample will be labeled and properly sealed immediately after collection. Samples will be packaged in zip-closure plastic bags and then placed on ice in a cooler for storage and transport to the analytical laboratory under chain-of-custody procedures.

Concrete and other porous samples for PCB analysis will be extracted using EPA Method 3540C (Soxhlet) and analyzed for PCBs by EPA Method 8082. Concentrations will be reported on a dry-weight basis as micrograms/gram or milligram/kilogram. Laboratory

results will be reported for each Aroclor and as total PCBs. Moisture content for each sample will also be reported by the laboratory. In addition, selected concrete samples will also be analyzed for asbestos using California Air Resources Board ("CARB") Method 435. Brick samples will also be analyzed for lead using EPA Method 6020.

3. STANDARD OPERATING PROCEDURES FOR PCB AND LEAD SAMPLING DURING BUILDING 1 FAÇADE ABATEMENT

It is likely that the existing Building 1 façade facing International Boulevard will be preserved and incorporated into the planned redevelopment at the request of the City of Oakland. PCBs and lead may be present in the paint on the brick. A plan for how the design will be incorporated into the façade has not yet been developed; however, two options for the abatement are most likely to be feasible: (1) paint removal; and (2) encapsulation. Because an abatement option cannot be decided-upon at this time, a dynamic cleanup plan for the façade was developed and is described in Sections 4.2 and 4.3 of Appendix O, Site Demolition. The following types of samples are proposed as part of the dynamic cleanup plan and are described herein:

- Wipe samples for testing of potential PCB bulk product waste prior to paint removal;
- Paint samples for testing of potential PCB bulk product waste prior to paint removal;
- Wipe samples for non-porous surfaces after paint removal (for pilot test); and
- Multi-increment sampling ("MIS") of porous surfaces after paint removal (for pilot test).

The sampling procedures and analytical analysis for these samples are discussed below.

3.1 Sampling Protocol for Wipe Samples

Wipe samples will be collected for PCB analysis and may also be collected for lead analysis. Wipe samples will be collected in accordance with Association for Testing and Materials ("ASTM") D6661-10 (for PCBs) or California Department of Public Health ("CDPH") Title 17 35001-36100 and ASTM E1728-16 (for lead). The sampling team will be supplied with copies of the referenced standards and instructed in the proper execution of the defined protocols prior to commencement of work. Additional details are presented below.

The general sampling procedures for wipe sampling are as follows: identify the sample area (the area to be wiped). The sample area will be a minimum of 1 square foot for lead and 100 square centimeters for PCBs. It is recommended that single use sampling templates be used to define the extent of the sampling area. The sampling area should not be touched prior to and during installation of the sampling template. Where the use

of a sampling template is not feasible, a 2-inch wide low-tack painters' tape will be used to define the sampling area; tape used to define the sampling area will not be reused.

PCB wipe samples will be collected using clean sample wipes saturated with hexane. Lead wipe samples will be collected using clean sample wipes saturated with deionized water or pre-moistened wipes. After the wipe sample is collected, it will be immediately placed in a glass vial with a tight-fitting cap. All wipe samples will be maintained in chilled condition, delivered under standard chain-of-custody protocols, extracted using EPA Method 3540C (Soxhlet), and analyzed for PCBs by EPA Method 8082 or for lead by EPA Method 6020.

Sampling frequency of wipe samples will depend on the objectives of the sampling and phase of work:

- For testing of paint on the façade as a potential bulk product waste, where the underlying substrate will most likely be a flat surface, one wipe sample per single feature or homogenous paint area will be collected.
- During the pilot test, wipe sampling frequency for non-porous substances after paint has been removed will be one per feature.

Wipe sampling for lead and PCBs will generally be conducted as follows:

a. Don new, powder-free disposable gloves.
b. Install the sampling template or tape the sampling area without disturbing coatings or settled dust.
c. Select an unused wipe, ensure that it is moist and free from dust, fungus or other materials. For PCBs moisten the wipe with hexane, for lead moisten the wipe with deionized water or use a pre-moistened wipe.
d. Begin sampling at one corner, make first pass side-to-side in an "s" motion within the template opening.
e. Fold wipe over (dirty side in), make second pass, from top-to-bottom in an "s" motion within the template opening.
f. If the wipe is for PCBs, go to Step h, if the wipe is for lead, go to Step g.
g. For lead, start with a clean wipe and perform Steps a through e, then fold the wipe over again (dirty side in) and make a third pass around the edges of the template.
h. Fold wipe over and place in a glass vial (for PCBs) or centrifuge tube (for lead).
i. Label container, noting the sample location on drawing and logging on chain-of-custody form.
j. Place in cooler.
k. Record the dimensions and/or size of the sampling area.
l. Discard sampling template or tape and gloves in appropriate container for disposal by Contractor.

3.2 Sampling Protocol for Paint Samples

Paint samples for testing of potential PCB bulk product waste prior to paint removal will be collected in general accordance with the SOP document (EPA, 2011) for soft porous surfaces. The sample collection protocols and analysis methods will follow those described in Section 2, except instead of an impact hammer, paint, as a soft surface, will be sampled using a chisel or sharp knife to generate a representative sample to be extracted and analyzed for PCBs.

Paint samples will be collected as close to the surface as possible using a metal chisel or sharp cutting knife at no more than a ½ -inch depth interval, in accordance with the SOP document. Thus, the initial surface sample will be collected from 0 to up to 0.5 inches. Care will be taken not to sample the material below the paint. At least 10 grams will be collected for analysis.

Paint samples will be extracted using EPA Method 3540C (Soxhlet) and analyzed for PCBs by EPA Method 8082.

3.3 Multi-Increment Sampling Procedures for Pilot Test

For verification of a porous substrate after paint removal has been completed as determined by visual review during the pilot test, one sample using MIS procedures will be collected per substrate type included in the pilot test (e.g., brick, mortar, wood). A multi-increment sample is a "composite" sample that comprises approximately 20 to 30 discrete samples collected within a designated "decision unit" or sampling area. While the term MIS procedure is being used to represent a large number of increments or samples to create the composite sample, the full MIS laboratory preparations of a “bulk” sample will not be performed on the composite.

All the media of similar type within the pilot test area will comprise one decision unit, such that there will be one decision unit per media. Each discrete sample comprising the composite will be collected following the EPA SOP document,[1] although the multiple holes called for in EPA SOP will be spread throughout the decision unit following MIS procedures instead of closely adjacent. In addition, the size of each increment will be smaller than called for in the EPA SOP (e.g., a smaller drill bit than 1-inch will be used) so that the total amount of sample material collected is similar to that called for in the EPA SOP (10 to 90 grams) even though more increments will be collected.

Each multi-increment sample will be analyzed for PCBs by EPA Method 8082 after Soxhlet extraction, lead by EPA Method 6020, and moisture content by ASTM D-2216.

[1] See Section 2 for approach for hard porous surfaces such as concrete and Section 3.2 for approach for soft porous surfaces such as paint.

4. STANDARD OPERATING PROCEDURES FOR SOIL GAS SAMPLING

Temporary soil gas probes ("SGPs") will be installed on-site to assist with the evaluation of subsurface concentrations of volatile organic compounds ("VOCs"). Typical SGP construction details are included on Figure N-1. The DTSC/Water Board Soil Gas Advisory (2015) recommends that probes be installed above the capillary fringe, but it also indicates that soil gas samples collected less than 5 feet below ground surface ("bgs") may be prone to barometric pressure effects and prone to breakthrough of ambient air through the soil column.

Depth to groundwater in monitoring wells within the site generally ranges from approximately 5 to 8 feet bgs, although the uppermost 10 feet of the subsurface is generally unsaturated. The SGPs will be installed in hand-augered boreholes drilled up to approximately 5.5 feet bgs. SGPs will generally not be installed at a particular location if groundwater is encountered during drilling at a depth of 3.5 feet bgs or less, which is very unlikely given historical water levels at the site and the depth to first water encountered during drilling.

A drilling permit for the SGPs will be obtained from the Alameda County Public Works Agency ("ACPWA"). Underground Services Alert ("USA") will be notified at least 48 hours prior to groundbreaking activities. If SGPs are installed after belowground utility installation for the redevelopment, a private utility locator will also investigate for the presence of underground utilities using appropriate geophysical methods.

Each SGP will consist of a 3-inch long, ½-inch diameter stainless steel wire mesh screen attached to a length of continuous ¼ inch diameter fluorinated ethylene propylene ("FEP") or Teflon® tubing (or equivalent) fitted at the top with a stainless-steel laboratory-grade plug valve using Swagelok-type compression-ferrule connections.

SGPs will be emplaced using an approximately 1-inch diameter threaded flush-joint PVC emplacement "guide" pipe, to keep the screen and tubing centered in the borehole at the proper depth. SGP screens will be backfilled with a one-foot vertical filter pack consisting of prewashed silica sand, tremied slowly into the borehole. The SGP screen will be suspended using the guide pipe at the approximate center of the sand pack interval. After emplacement of the sand pack, the guide pipe will be withdrawn, and slight tension will be maintained on the tubing to ensure it remains centered during sealing and grouting.

Above the sand pack, each SGP will be sealed with a six-inch layer of dry medium granular bentonite, and above this layer, each borehole will be backfilled to approximately one foot below existing grade using neat cement mixed with 1-5% bentonite (DTSC/Water Board, 2015). Each SGP will be completed at the surface with a traffic-rated well vault to protect the sampling valve. The vault will be set into rapid-set structural concrete (or similar) to prevent infiltration of water or ambient air into the subsurface.

4.1 SGP Static Vacuum or Pressure Measurements

Ambient vacuum or pressure in each SGP will be measured prior to soil gas sampling using a vacuum/pressure gauge or digital manometer. The negative (vacuum) port of the gauge will be attached to the SGP using a short length of tubing, and the valve will be opened. If the gauge registers pressure instead of vacuum, the valve will be closed, and the tubing will be attached to the positive (pressure) port. In either case, the final ambient vacuum or pressure value will be recorded in the field documents for the sampling event. After recording the measurement, the SGP valve will be closed, and the field gauge will be removed.

4.2 SGP Sampling Restrictions

Soil gas samples will be collected at least 48 hours after installation of the SGPs, in order to allow subsurface conditions to re-equilibrate from drilling and SGP construction. As noted by DTSC/Water Board (2015), soil gas sampling will not be performed during rainfall or within 5 days of a significant rainfall event (i.e., 0.5-inches or more of rain in a 24-hour period).

4.3 SGP Purging and Sampling Setup

Soil gas sampling will be conducted using laboratory-supplied pre-evacuated Summa®-passivated stainless-steel canisters. A schematic of the sampling setup is shown on Figure N-2. Sample canisters will be setup in a sampling manifold with two canisters, including a 1-liter canister for sample collection and a 6-liter canister for SGP purging. Each canister will be fitted with a canister inlet valve and a vacuum gauge to indicate the vacuum in the canister when the canister valve is open.

Tubing from the canisters will be connected to a tee in the manifold. Tubing between the tee and the valve on the top SGP will include: (1) a flow controller calibrated for a flow rate of approximately 125 milliliters per minute ("mL/min") during purging and sampling, (2) a vacuum gauge to measure the vacuum in the canisters during purging and sampling, and (3) a manifold valve to isolate the manifold tubing and fittings during shut-in testing, as described below. Tubing from the manifold valve will be connected to the valve on the top of the SGP. The canisters, gauges, and flow restrictors will be connected with FEP or Teflon tubing (or equivalent) and stainless-steel compression fittings.

4.4 Shut-In Test

A shut-in test will be performed after the sampling manifold is connected to the SGP valve. For the shut-in test, the SGP valve and the sample canister valve will remain closed.

The valve on the purge canister will be opened briefly and then closed to establish a vacuum in the sampling manifold tubing and fittings. The vacuum on the purge canister vacuum gauge will be recorded and then observed for 5 minutes. If there is a significant leak in the sampling manifold, the vacuum will decrease. If the vacuum decreases, manifold fittings will be checked and tightened as needed, and the shut-in test will be repeated. If there is no observable change in the vacuum, the shut-in test is successful and purging and sampling will proceed. If the shut-in test is not successful, the sampling setup will be replaced, and the shut-in test will be repeated.

After the shut-in test is successful and the SGP valve and purge canister valve are closed, the sample canister valve will be opened briefly to measure the vacuum in the sample canister to verify it is at full vacuum (or within 5% of full vacuum, which is typically 29.9-inches of mercury ("in-Hg")).

4.5 SGP Purging

After the shut-in test and prior to sampling, approximately three purge volumes of soil gas will be purged from each SGP. One purge volume includes the internal volume of the tubing and screen and the interstitial space in the sand pack and dry granular bentonite in the SGP annular space. For the proposed SGPs, one purge volume is approximately 1.2 liters, so three purge volumes are a total of 3.6 liters. Purging will be performed using the 6-liter pre-evacuated purge canister with a 125 mL/min flow restrictor. The volume purged will be measured based on the change in vacuum in the purge canister; the vacuum in the canister will decrease approximately 5 in-Hg for every one liter purged into the canister. For a purge of 3.6 liters, the vacuum in the purge canister will decrease approximately 18 in-Hg.

To perform the purge, (1) the purge canister valve will be opened and the vacuum on the canister gauge recorded, (2) the manifold inlet valve and the SGP valve will be opened to begin the purge, (3) the vacuum on the purge canister gauge will be monitored until the vacuum decreases the required amount for the desired purge volume, and (4) the vacuum in the sampling manifold will be observed on the probe vacuum gauge during the purge to verify it does not exceed 100 inches of water (7.4 in Hg). After the purge is complete, the purge canister valve will be closed, and the manifold valve and SGP valve will remain open for sampling to begin after implementation of leak detection procedures described below.

4.6 Leak Detection Setup and Shroud Sampling

A quantitative leak-detection protocol will be included during sampling as a quality-control check for field sampling system leaks (DTSC/Water Board, 2015). A plastic bag ("shroud") will cover: (1) the aboveground sampling assembly, (2) the annular space above the SGP, and (3) all of the connections. The opening of the shroud will be weighted to the ground around the SGP. After purging and before sample collection, the air inside the shroud will be spiked with controlled bursts of a tracer gas,

approximately every 10 minutes, through ¼-inch tubing routed under the bag to the interior. The tracer gas will be 1,1-difluoroethane ("DFA"), provided in a pressurized can by the analytical laboratory. The target DFA concentration in shroud air is approximately 3,000 to 30,000 parts per million by volume. A shroud air sample will be collected in a Summa canister at each SGP sampling location to quantify the DFA concentration during sampling.

In the event that DFA is detected in a soil gas sample, the DFA concentration in the soil gas sample will be compared the shroud air sample. If the DFA concentration in the soil gas sample is less than 5% of the shroud air sample then the soil gas sample will be determined to be representative of soil gas conditions (DTSC/Water Board, 2015).

4.7 SGP Sampling

After the purge is complete and the leak detection procedures are implemented, the sample canister will be allowed to fill until some small residual vacuum remains (approximately 3-in Hg, +/- 2-in Hg), at which point the valves will be closed and the vacuum remaining in the canisters will be recorded. One duplicate sample will be collected per sampling event. The sample canisters will be labeled, boxed, and sent via courier to the analytical lab under chain-of-custody protocols. One ambient air sample will also be collected at least during the first sampling event (see Section 5).

4.8 SGP Sample Analysis

The SGP samples will be analyzed for VOCs and DFA using EPA Method TO-15.[2] Samples will be analyzed using TO-15 SIM if needed to meet the laboratory reporting limits. Shroud air samples will be analyzed for DFA using EPA Method TO-3.

4.9 SGP Destruction

After analytical results are received for the SGP samples planned for collection, and if a determination is made that no further SGP sampling will be needed, the SGPs will be destroyed by removing the tubing, hand-augering out the bentonite seal down to the top of the filter pack, and backfilling with neat Portland cement to grade in accordance with an ACPWA permit.

5. STANDARD OPERATING PROCEDURES FOR INDOOR AND OUTDOOR AIR SAMPLING

Indoor and outdoor (ambient) air samples will be collected in general accordance with DTSC's Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air (2011). Field staff will complete a standard indoor air facility conditions survey, noting any activities or other personnel in the building at the time of sampling. Field staff will record sample collection logs during sampling. Indoor air samples will be

[2] The EPA Method TO-15 has a maximum holding time of 30 days.

collected under typical occupied conditions with heating, ventilating, and air conditioning ("HVAC") on. At least one outdoor sample will be collected during each indoor air monitoring event concurrently with an indoor air sample.

Indoor air samples representative of typical occupied conditions will be collected during normal business hours.

5.1 VOCs

Indoor and outdoor air samples will be collected in pre-evacuated 6-liter Summa®-passivated, stainless steel sample canisters. Each sample canister will be fitted with (a) a flow controller to collect the sample over approximately an 8-hour[3] period, and (b) a vacuum gauge to monitor the vacuum in the canister during sampling. The flow regulator restricts the air flow into the canister so that a time integrated sample can be collected. The flow regulator is used only for a single sample and is set by the analytical laboratory. Each canister, flow controller, and gauge will be provided and individually certified by the analytical laboratory to be free of the selected VOCs at the specified respective analytical reporting limits.

Prior to setting each canister at sample locations, the canister's protective cap will be removed, and an initial vacuum reading will be measured and recorded to ensure that the canister did not leak during shipment. The assembled canister and flow controller will also be checked for leaks prior to setting the canisters for sample collection.

The sample canisters for the indoor and outdoor air samples will be setup with the sampling inlet at a breathing zone height of approximately 3 to 5 feet above the building floor or ground surface, respectively. A duplicate sample will be collected at one of the indoor sampling locations per sampling event by placing two Summa® canisters side-by-side with intake valves set at the same elevation.

During the 8-hour sample collection period, field staff will periodically record the vacuum in each sample canister, as indicated on the vacuum gauge provided with the canister, to verify acceptable sample collection rates. At the end of the 8-hour sampling period, the valve on the Summa® canister will be closed, and the protective cap will be replaced.

The sample canisters will be labeled, boxed, and sent via courier to the analytical lab under chain-of-custody protocols. After receipt of the canisters at the laboratory, the vacuum will be measured again to ensure that the canister did not leak during shipment.

[3] Samples will be collected over an 8-hour period consistent with current guidance for commercial settings (DTSC, 2011). The sampling period may be modified based on objectives of the sampling.

5.2 PCBs

Battery-powered air sampling pumps (Gilian Model GilAir5 or equivalent) will be used to collect indoor and outdoor air samples for analysis of PCBs. The pumps will be running at approximately 4 liters per minute for an 8-hour period. The units will be fitted with a PM10 Personal Environmental Monitor (SKC 761-200A or equivalent) coupled to a polyurethane foam ("PUF") cartridge, which consists of a glass sampling cartridge in which the PUF plug is retained. The PUF cartridges will be prepared and provided by the analytical laboratory. Certified clean cartridges are considered clean up to 30 days when stored in sealed containers.

The PUF cartridges will be attached to the pumps with flexible tubing. The sampling assemblies will be positioned with the intake downward or in horizontal position. Samplers will be located in an unobstructed area at least 100 feet from any obstacle to air flow. The PUF cartridge intake will be positioned approximately 5-feet off the ground to capture air at the average person breathing zone height.

The battery-powered air sampling pumps will be calibrated in general accordance with the manufacturer's instructions. During the 8-hour sample collection period, field staff will periodically check the pumps and record any abnormal conditions on the air monitoring field logs. Ambient air temperatures and barometric pressures will be measured and recorded periodically. Flow rates and start/stop times will be recorded on the air monitoring field logs.

Following sample collection, the PUF cartridge will be rewrapped with its original aluminum foil and placed in a cooler in individual labeled receptacles for shipment to the analytical laboratory under chain-of-custody procedures. Samples will be stored at <4˚ C or below until analyzed in the laboratory.

5.3 Indoor and Outdoor Air Sample Analysis

Indoor and outdoor air samples will be analyzed for VOCs using EPA Method TO-15 SIM. Outdoor air samples and up to 6 indoor air samples will be analyzed for PCBs using EPA Method TO-10A. If VOC data is available from sub-slab probes ("SSPs"), the indoor air analyte list will be consistent with detected compounds in the sub-slab soil gas.

6. STANDARD OPERATING PROCEDURE FOR SUB-SLAB VACUUM MONITORING

SSPs will be used to monitor sub-slab vacuum (depressurization) during operation of the sub-slab depressurization ("SSD") system. Sub-slab vacuum in each SSP will be measured periodically using a vacuum/pressure gauge or digital manometer. The negative (vacuum) port of the gauge will be attached to the SSP using a short length of tubing, and the valve will be opened. The measured vacuum relative to ambient air pressure will be recorded in the field documents for the sampling event. After recording the measurement, the SSP valve will be closed, and the field gauge will be removed.

The sub-slab vacuum may also be monitored using a differential pressure data logger ("DPDL"). The DPDL will be a portable battery-operated device such as a MadgeTech PRTC110 or equivalent with a pressure resolution of 0.002 in-WC. The DPDL will be setup to measure the differential pressure between the SSP and ambient air pressure, with readings recorded once per minute or as needed based on project requirements.

7. STANDARD OPERATING PROCEDURES FOR SUB-SLAB SOIL GAS MONITORING

Sub-slab soil gas samples may be collected from SSPs beneath the building floor and from riser pipes in the SSD system. Samples may be analyzed for VOCs and/or methane. The protocols for these monitoring activities are described below.

7.1 Sub-Slab Soil Gas Sampling at SSPs

Sub-slab soil gas samples will be collected from SSPs in pre-evacuated 1-liter Summa®-passivated stainless-steel canisters using a 125 mL/min flow restrictor. One end of the Teflon tubing (or equivalent) will be connected to the sample canister inlet using a stainless-steel compression fitting; the other end of the tubing will be connected to the end of the hose barb on the SSP fitting using an outer sleeve of tight-fitting flexible tubing over both the hose barb and the sampling tubing to provide an air-tight seal. The sample canister, tubing, and fittings will be provided by the analytical laboratory.

Prior to collecting the sub-slab soil gas sample, a volume of air equal to three purge volumes will be removed from the SSP. For the sub-slab gas probes, one purge volume is equal to the interior volume of the SSP tubing. Purging SSPs will utilize either a plastic syringe or a dedicated 6-liter Summa®-passivated stainless-steel canister. After purging is complete at the SSP, the SSP valve will be closed until the 1-liter Summa® canister is connected to the probe for sample collection.

During soil gas sample collection, a temporary plastic shroud will be placed over the sampling apparatus at each SSP. A small amount of "leak-check" compound (DFA), will be sprayed into the shroud to create a measurable concentration of DFA in the air around the sampling apparatus. An air sample from within the shroud will be collected at each SSP location, and the shroud air samples will be analyzed for DFA to determine representative DFA concentrations in the shrouds during sample collection.

In the event that DFA is detected in a sub-slab vapor sample, the DFA concentration in the sub-slab vapor sample will be compared the shroud air sample. If the DFA concentration in the sub-slab vapor sample is less than 5% of the shroud air sample then the sub-slab vapor sample will be determined to be representative of soil gas conditions (DTSC/Water Board, 2015).

The sub-slab soil gas samples will be analyzed for VOCs and DFA using EPA Method TO-15 and the shroud samples will be analyzed for DFA using EPA Method TO-3. The

samples may be analyzed using TO-15 SIM if needed to achieve lower analytical reporting limits.

7.2 Sub-Slab Soil Gas Monitoring at SSD System Riser Pipes

Sub-slab soil gas samples will be collected by sampling from a sampling port in the SSD system riser pipes while the SSD system is in operation. The soil gases in the SSD riser pipes are representative of sub-slab soil gases removed by the SSD system from the suction trenches beneath the building, and thus provide integrated samples representative of sub-sab soil gas conditions beneath the building.

Soil gas samples will be collected from the riser pipes in pre-evacuated 1-liter Summa®-passivated stainless-steel canisters. One end of the Teflon tubing (or equivalent) will be connected to the sample canister inlet using a stainless-steel compression fitting; the other end of the tubing will be connected to the end of the hose barb on the sampling port using an outer sleeve of tight-fitting flexible tubing over both the hose barb and the sampling tubing to provide an air-tight seal. The sample canister, tubing, and fittings will be provided by the analytical laboratory. A flow restrictor is not used for this sampling, as the sample will be a grab sample from an operating SSD system. The sample will be collected by opening the canister inlet valve until the canister fills with soil gas, after which the canister inlet valve and the sample port valves will be closed and the sample canister removed.

7.3 Methane Monitoring

Soil gas in the SSPs or in the SSD system piping may be screened for methane. Methane will be measured in the field using a MultiRAE or equivalent meter by attaching the field instrument to the sampling port at the monitoring location with flexible tubing. Prior to daily use, field instruments will be calibrated according to the manufacturer's guidelines. Field readings and instrument calibration will be recorded on the field forms.

8. STANDARD OPERATING PROCEDURES FOR STORM WATER AND SEDIMENT SAMPLING DURING AND AFTER REDEVELOPMENT ACTIVITIES

During redevelopment, storm water sampling and analysis requirements will be consistent with the National Pollution Discharge Elimination System ("NPDES") General Permit for Storm Water Discharges Associated with Construction Activity, Water Quality Order 2009-0009-DWQ amended by 2010-0014-DWQ and 2012-0006-DWQ ("General Permit") issued by the State of California Water Resources Control Board ("SWRCB") under which the redevelopment activities will be conducted.

The General Permit categorizes construction projects according to Risk Levels, which are determined based on the sediment and receiving watersheds risks at the site. Sites with low sediment risk and low receiving water risk are classified as Risk Level 1 for

purposes of storm water monitoring and reporting, as described in the General Permit. A Risk Level 1 was established for the site in the Construction Storm Water Pollution Prevention Plan ("SWPPP;" see Appendix M of the RDIP Addendum). Risk Level 1 projects are subject to minimum Best Management Practices ("BMPs") and visual monitoring requirements. Storm water sampling is not required for Risk Level 1 projects; therefore, storm water sampling will not be conducted at the site during remediation and redevelopment activities, except for accumulated storm water that is intended for off-site disposal or onsite use for dust control after treatment, if needed. In the case of off-site disposal of storm water during redevelopment activities, sampling of stored, accumulated storm water will be conducted as required by the receiving or permitting entity (disposal facility, East Bay Municipal Utility District via sanitary sewer, or Regional Water Quality Control Board via the storm drain).

However, during site demolition and remediation, when the site is still capped, the existing storm drain system is in place, and the off-site storm drain is not plugged, sampling for PCBs will be performed during the wet season[4] to meet EPA requirements using the methods described in this section. A storm water sample and a sediment sample (if sediment is present) will be collected from MH-24 for qualifying storm events per General Permit requirements (i.e., one producing precipitation of ½ inch or more with greater than 48 hours between events), if possible, given the work schedule and weather when site demolition begins[5] and until the storm drain is plugged to prevent off-site discharge of storm water in preparation for removal of the cap.

After redevelopment activities have been completed, storm and surface water runoff on the site will be collected using a new system consisting of a new retaining wall/curb around the perimeter of the site, drainage for the entire site (hardscape, parking lot, driveways, building, truck aprons, and lined landscaped areas) and conveyed to a new storm drain system beneath the site (see Appendix D of the RDIP). Because of the intended site use after redevelopment, the NPDES Industrial General Permit for Storm Water Discharges Associated with Industrial Activities, Water Quality Order 2014-0057-DWQ ("Industrial Permit") will not apply. However, storm water and sediment sampling will be conducted after redevelopment at the final discharge point before the water leaves the site to meet EPA requirements.

8.1 Storm Water Sample Collection and Analytical Methods

Storm water sampling after redevelopment will be conducted at the final discharge point (i.e., at location MH-24R) using the sampling protocols and analytical methods

[4] The City of Oakland requires storm water BMPs be in place and maintained from October 15th through April 15th, i.e. during the wet season (City, 2019).

[5] Not including work done within enclosures, e.g., asbestos abatement.

described in the 2012 SAP. Storm water samples will, however, only be analyzed for PCBs.

The 2012 SAP required that "storm water samples at the site be collected for two discrete precipitation events during the wet season. Discrete precipitation events lead to surface runoff at the site (typically greater than 0.15 inches of rainfall for a given event) that is preceded by three days where discharge did not occur." Storm water samples under the 2012 SAP had to be collected during the first hour of discharge to meet the criteria of the Industrial Permit. This SAP Addendum modifies the 2012 SAP so storm water samples can be collected within four hours of the start of discharge during operational hours of the facility at the sampling location and also decreases the number of preceding dry days (i.e., days with no discharge) from three to two, to be consistent with the current Industrial Permit. Sampling during redevelopment will be performed for qualifying storm events as required by the General Permit.

8.2 Sediment Sample Collection and Analytical Methods

During and after redevelopment, sediment sampling will be conducted at the final discharge location before water leaves the site (MH-24R). Sediment samples will be collected at the same time as storm water samples if sufficient sediment is visible in the catch basin or inlet filter (if present). Sediment will be scraped from the catch basin or filter fabric (if present) with a decontaminated trowel or spoon. Sediment samples will be collected in pre-cleaned 4-ounce glass jars with Teflon-lined lid as provided by the laboratory. Samples will be placed in containers, sealed, and shipped in accordance with standard sample handling and chain-of-custody procedures specified in Section 7.2 of the 2012 SAP. Sample labels containing site ID, sample ID, sampling date and time, analysis method(s), and sampler's initials will be affixed to each sample container. Samples will be transported to a State-certified laboratory in accordance with standard sample handling and chain-of-custody procedures specified in Section 7.2 of the 2012 SAP.

Sediment samples will be extracted using EPA Method 3540C (Soxhlet) and analyzed for PCBs by EPA Method 8082.

9. STANDARD OPERATING PROCEDURES FOR EXTRACTION WELL SAMPLING DURING REDEVELOPMENT ACTIVITIES

During redevelopment when the cap is removed and storm water can infiltrate into site soil, groundwater will be sampled from existing extraction wells EW-1, EW-2, and EW-3 on a quarterly basis. Samples will be collected during the wet season[6] until the new cap is in place. Extraction well groundwater samples will be collected using the sampling

[6] The City requires storm water BMPs be in place and maintained from October 15th through April 15th, i.e. during the wet season (City, 2019).

protocols described in Sections 3.1 and 3.2 of the 2012 SAP and the existing Operation, Maintenance and Monitoring Plan for the GETS (Geosyntec, 2015)[7]. Consistent with the existing sampling protocols for the GETS, samples collected from EW-1, EW-2 and EW-3 will be analyzed for:

- VOCs by EPA Method 8260B; and
- PCBs by EPA Method 8082, Ultra Low Level ("ULL").

Sample labels containing site ID, sample ID, sampling date and time, analysis method(s), and sampler's initials will be affixed to each sample container. Samples will be transported to a State-certified laboratory in accordance with standard sample handling and chain-of-custody procedures specified in Section 7.2 of the 2012 SAP.

[7] GETS sampling protocols are described in the *Operation, Maintenance and Monitoring Plan, General Electric Site, 5441 International Boulevard, Oakland, California,* prepared by Geosyntec, dated 24 November 2015.

10. REFERENCES

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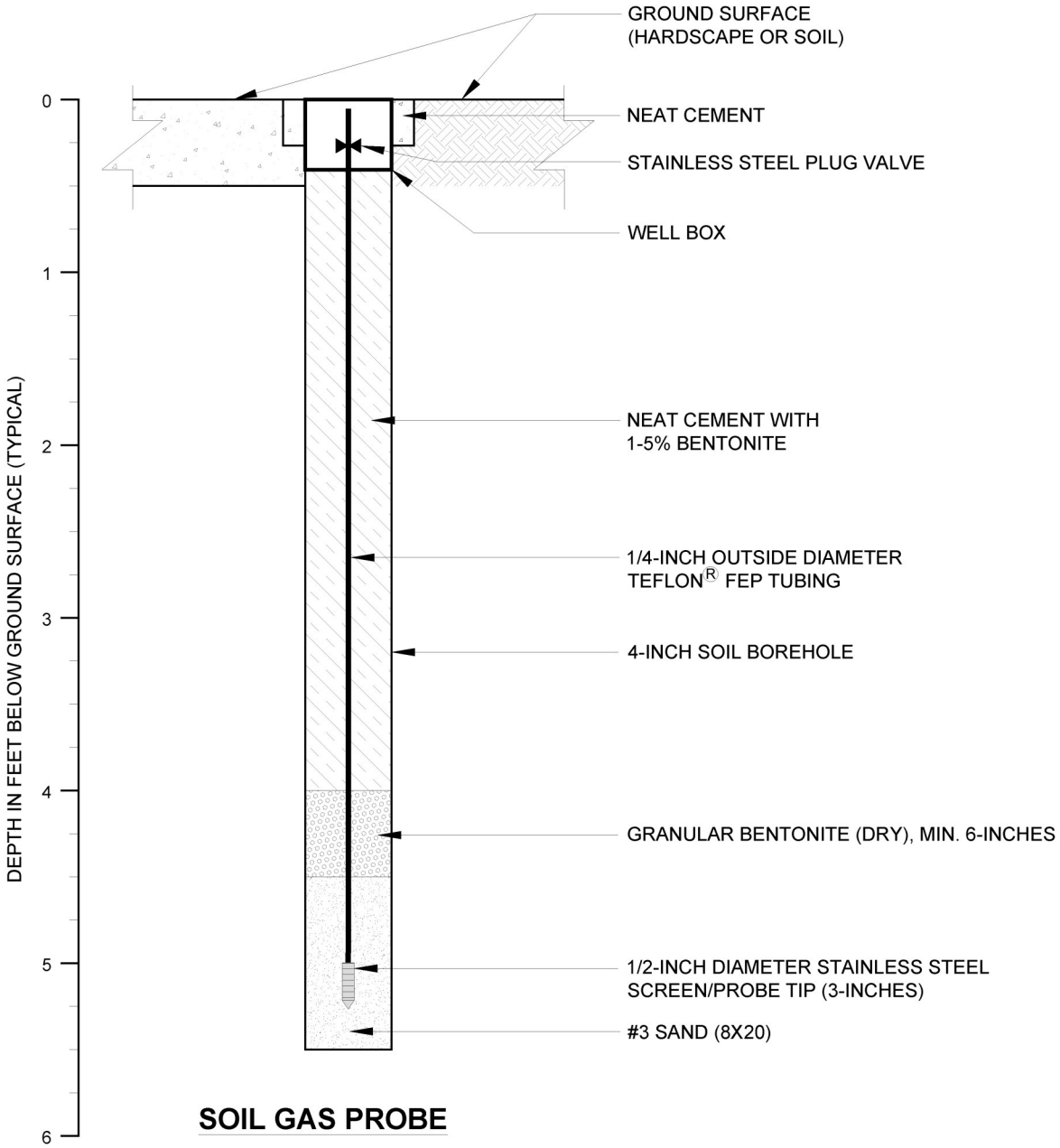


SOIL GAS PROBE

Notes

1. Scale is approximate.

Abbreviations

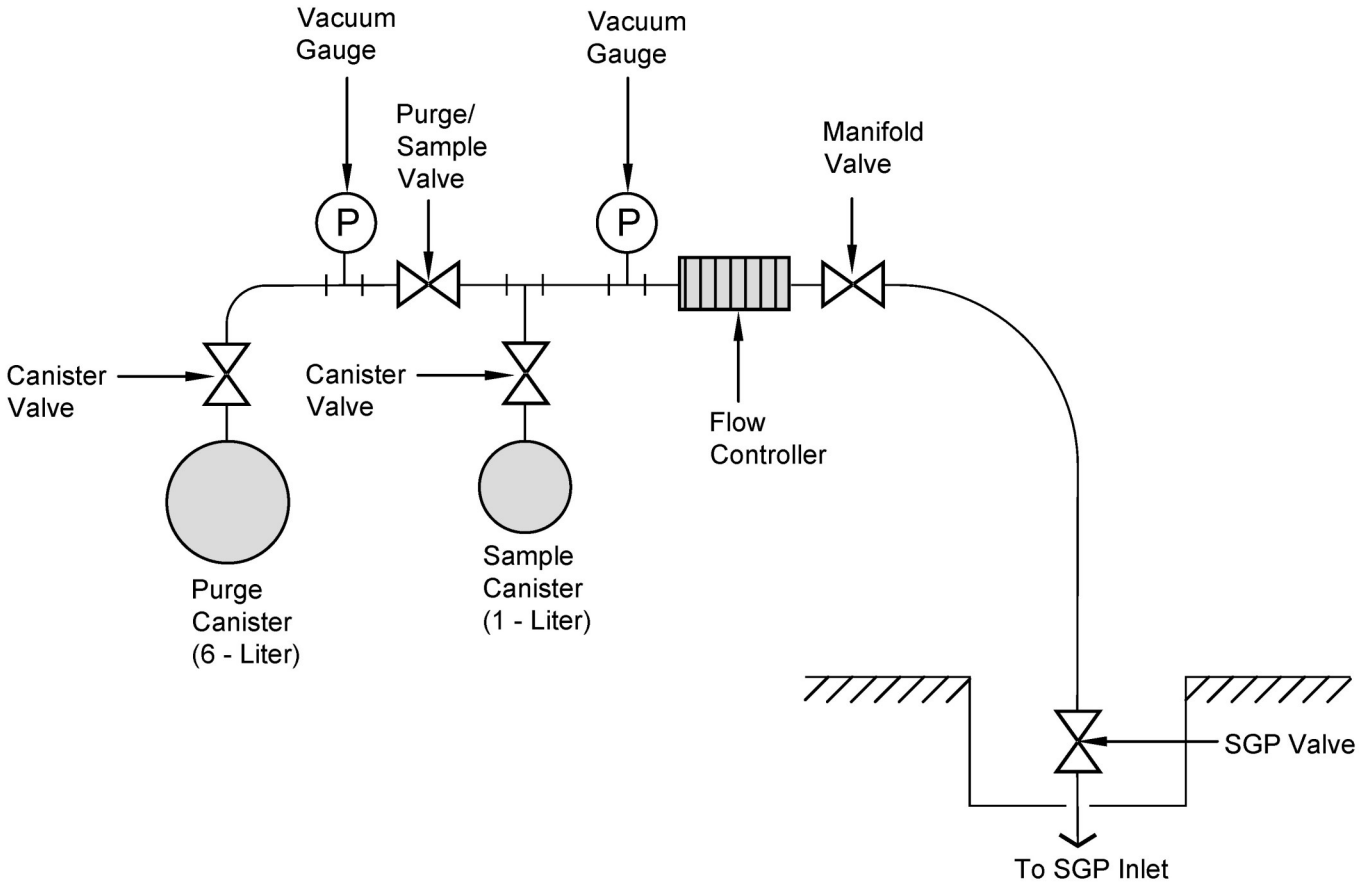
MIN. = minimum

Typical Soil Gas Probe
Temporary Construction Detail

DRAFT FINAL

5441 Industrial Blvd.
Oakland, CA
August 2019
EKI B70123.01

Figure N-1



Legend

- Stainless Steel Plug Valve
- Vacuum Gauge (0-30 in-Hg)
- Compression Fitting
- Flow Controller (125 mL/min)

Soil Gas Sampling Setup with Purge Canister

Abbreviations

in-HG = inches-mercury
mL/min = milliliters per minute
SGP = soil gas probe

DRAFT FINAL

5441 Industrial Blvd.
Oakland, CA
August 2019
EKI B70123.01

Figure N-2

FIELD SAMPLING AND LABORATORY ANALYSIS PLAN FROM GEOSYNTEC, 2012

5441 International Boulevard
Oakland, California

26 April 2012

Prepared for

General Electric Company
King of Prussia, Pennsylvania

FIELD SAMPLING AND LABORATORY ANALYSIS PLAN

General Electric Site
5441 International Boulevard
Oakland, California

Prepared by

Geosyntec consultants

engineers | scientists | innovators

1111 Broadway, 6th Floor
Oakland, California 94607

Project Number: WR1507

31 October 2011

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Appendix A: Field Forms

1. INTRODUCTION

This Field Sampling and Laboratory Analysis Plan (SAP) was prepared on behalf of General Electric Company (GE) by Geosyntec Consultants to address sampling during remedy implementation and monitoring at 5441 International Boulevard, Oakland, California (the site). The following media may be collected from the site for analysis: water (including groundwater, stormwater, and treatment system effluent), vapor (from air stripper effluent), and soil.

1.1 General

The following sections contain standard operating procedures for on-site sampling activities. These procedures are intended to provide field personnel with protocols to collect samples and obtain valid and reliable data.

Field personnel shall follow these procedures, unless field conditions require deviations from the protocols described below. In those cases, field personnel shall document the alternate procedures employed and the reasons for the deviations. Analyses will be performed in accordance with the procedures listed below unless project requirements necessitate the adoption of alternative methods. If an alternative method is used, it will be documented and reported.

Data will be used to achieve the following objectives:

- Evaluate the performance of remedy elements;
- Meet regulatory monitoring requirements (East Bay Municipal Utility District and Bay Area Air Quality Management District); and
- Characterize soil or water for off-site disposal.

1.2 Report Organization

The remainder of this SAP is organized the following way:

- Section 2, "*Pre-Sampling Activities*," summarizes the steps to be completed prior to collecting samples and the recommended equipment to bring.
- Section 3, "*Standard Operating Procedures for Water Sampling*," presents the process for collecting groundwater, treatment system effluent, and stormwater samples and typical analytical methods.
- Section 4, "*Standard Operating Procedures for Vapor Sampling*," presents the typical analytical methods and approach for collecting vapor samples from the groundwater extraction and treatment system (GETS) air stripper effluent.
- Section 5, "*Standard Operating Procedures for Soil Sampling*," presents the requirements for collecting soil samples and typical analytical methods.

- Section 6, "*Quality Assurance and Quality Control Requirements*," summarizes the protocols and samples required for ensuring valid and reliable data is obtained.
- Section 7, "*Post-Sampling Activities*," summarizes the steps to be completed at the end of a sampling event.
- Section 8, "*References*," presents the documents referenced in this SAP.

2. PRE-SAMPLING ACTIVITIES

2.1 Health and Safety

Prior to the start of field activities, the site-specific Health and Safety Plan (HASP) shall be reviewed and signed by field personnel, and reviewed by subcontractors. The HASP contains information pertaining to site conditions, potential hazards, hazard control, monitoring procedures, personal protective equipment (PPE), emergency procedures, and hospital location. The HASP shall be available on site for field personnel in the event of a potentially hazardous situation.

If two or more Geosyntec personnel are on site, a tailgate meeting will be held at the beginning of each day to discuss important health and safety issues concerning tasks to be performed during that shift. Topics discussed in the tailgate meetings must be documented in a daily tailgate field log (Appendix A).

2.2 Document Review

Field personnel will review additional relevant work plans, such as the Operation, Maintenance, and Monitoring (OMM) Plan (Geosyntec, 2011).

2.3 Laboratory

Contact the laboratory and arrange for delivery of required sample containers and coolers. Also arrange for a laboratory courier to pick-up samples from the site upon completion of sample collection. Otherwise, samples will be delivered per Section 7.1 below.

2.4 Equipment

Equipment, materials, and supplies that should be brought to the site include, but may not be limited to:

- Personal protective equipment (PPE) as specified in the HASP;
- Clean field forms (see Appendix A) and chain-of-custody forms;
- Sampling containers and coolers, as provided by the laboratory above;
- Labels;
- Packaging materials (resealable zipper storage bags, large bags, ice, bubble wrap, etc.);
- Ball point pens;
- Fine-tipped permanent markers;
- Scissors;

- Camera with full charge;
- Gloves for all those involved in sampling;
- Distilled water and non-phosphate detergent to decontaminate equipment as needed;
- Buckets and scrub brush for decontaminating equipment as described in Section 7.3;
- Tools, as required;
- Bring, or have delivered, disposal containers (i.e., 55-gallon drums), as necessary.

For groundwater sampling also bring:

- Water level meter;
- Low-flow pump (i.e., bladder) and controller;
- Tubing;
- Field instrument to continuously measure temperature, pH, specific conductance, oxidation reduction potential (ORP), and turbidity, such as a Horiba U-22 or YSI Multiprobe 556;

For stormwater sampling, also bring:

- Wet weather observation sheet printed on waterproof paper;
- Long-arm sampling pole;
- Long-arm sampling bottle clips (alligator clips);
- Man-hole hook;
- pH meter with a minimum detection limit of 0.2 pH units; and
- Turbidity meter with a minimum detection limit of 1 NTU.

2.5 Instrument Calibration

The manufacturer's guidelines on calibration of any field meter should be followed, and at a minimum, field personnel shall calibrate all field meters prior to all sampling events and document calibration activities (Appendix A). Calibration standards should not be used beyond their expiration date. For consistency, the same field meters should be used, if possible, throughout the life of the project, as different meters can produce different results even when calibrated. Each meter shall be numbered or given unique identification for reference and recording purposes. Samples for field analysis will be tested in accordance with the field instrument manufacturer's instructions.

3. STANDARD OPERATING PROCEDURES FOR WATER SAMPLING

3.1 Groundwater Monitoring

3.1.1 Groundwater Depth Measurement

The depth to water within each monitoring well at the site shall be measured at the beginning of a sampling event. These measurements will be used to plot the potentiometric surface of the aquifer being sampled. Depth to static water level shall be performed by measuring the vertical distance from a standard reference point on the well casing to the water level within a groundwater well. The reference point should be a location on the top of the well casing which has been surveyed. At each monitoring well, field personnel shall perform the following:

- The depth to water shall be measured to the nearest 0.01 feet using an electric water level indicator consisting of a graduated cable and probe. The water level indicator shall be decontaminated prior to introduction into the well according to the procedures described in Section 7.3.
- The water level indicator probe shall be lowered into the well at a controlled pace. The water level indicator will create a sound or turn on a light when the probe comes into contact with water.
- Confirm that the water encountered by the water level indicator probe is the groundwater level by raising and lowering the indicator into and out of the water several times. False indications of water level may be provided by condensation along the well casing or high humidity within the well.

3.1.2 Groundwater Sampling

Prior to sampling, field personnel will purge the well to remove stagnant water present within the well casing. The appropriate purge volume (i.e. casing volume of water) will be calculated based on the measured water level and depth and diameter of the well. Water purged from the wells shall be monitored for temperature, pH, specific conductance, and turbidity to document changes in water quality. Field personnel shall collect at least two sets of water quality parameter measurements during purging for each calculated well casing volume. The water quality parameters shall be measured by devices designed for field use. The devices shall be calibrated according to the procedures specified in Section 2.5 and decontaminated per Section 7.3.

Monitoring wells will be purged using a bladder pump or other acceptable low-flow submersible pump. The pump will be lowered into the well and placed in the middle of the screen at a maximum depth of approximately 1 to 5 feet above the total depth of the well. If the well has two screens, place the pump in the middle of the lower screen interval. The pump will be operated at a controlled rate below 0.5 gallons per minute (gpm) to avoid agitation of the water within the well. Once the equipment has been turned on, the purge flow rate will be adjusted as necessary to meet the flow rate requirement specified above. The purging process will continue

until water parameter measurements stabilize to within 10 percent of the previous reading and/or at least three casing volumes of water are removed.

A new pair of nitrile sample gloves shall be used for each sample collected. The samples will be collected by carefully allowing a steady, non-turbulent flow of water into sample containers provided by a certified laboratory.

3.1.3 Analytical Methods

The laboratory analyses will be conducted in accordance with standard United States Environmental Protection Agency (EPA) methods or other regulatory approved methods. Quality control requirements for the analyses are included in the Section 6.

Groundwater samples from the extraction or monitoring wells may be analyzed for, but not limited to, the following:

- CVOCs using EPA Method 8260B;
- Priority pollutant metals and cations via EPA Method 6010B;
- Cyanide using EPA Method 9010B;
- Oil and grease using EPA Method 1664;
- Phenolic compounds using EPA Method 420.1; or
- Total suspended solids using Standard Methods (SM) 2540D;

Not all groundwater samples will be analyzed for the chemicals listed above. The list of chemicals will depend on the location and purpose of the sample collection. Refer to the OMM Plan (Geosyntec, 2011) for details.

3.2 Groundwater Extraction and Treatment System Sampling

3.2.1 GETS Sampling Methods

Grab water samples will be collected from dedicated sample ports on the groundwater extraction and treatment system (GETS) piping manifold, combined GETS influent, influent to air stripper, influent to liquid-phase granular activated carbon (LGAC) vessels, mid-LGAC, and discharge piping. The sampling frequency details are presented in the OMM Plan. The samples will be collected by carefully opening the sample port valve to allow a steady, non-turbulent flow of water into the sample containers.

Field parameters to be measured on site using field instrumentation are pH and temperature. Prior to analysis, the pH meter will be calibrated using a pH 7.0 standard buffer. Discharge water will also be measured for temperature and recorded in the field notes.

3.2.2 Analytical Methods

The laboratory analyses will be conducted in accordance with standard EPA methods or other regulatory approved methods. Quality control requirements for the analyses are included in the Section 6.

Water samples from the GETS may be analyzed for the following:

- CVOCs using EPA Method 8260B;
- Priority pollutant metals and cations via EPA Method 6010B;
- Cyanide using EPA Method 9010B;
- Oil and grease using EPA Method 1664;
- Phenolic compounds using EPA Method 420.1;
- Polychlorinated biphenyls (PCBs) using EPA Method 1668C or 8082A (analytical method will depend on actual permit requirement); or
- Total suspended solids using Standard Methods (SM) 2540D;

Not all GETS water samples will be analyzed for the chemicals listed above. The list of chemicals will depend on the location and purpose of the sample collection. Refer to the OMM Plan (Geosyntec, 2011) for details.

3.3 Stormwater Monitoring

3.3.1 Stormwater Sample Collection

Under the Industrial General Permit, stormwater samples at the site must be collected for two discrete precipitation events during the wet season. Discrete precipitation events lead to surface runoff at the site (typically greater than 0.15 inches of rainfall for a given event) that is preceded by three days where discharge did not occur. Samples must be collected during the first hour of discharge to meet the criteria of the Industrial General Permit. Staff will mobilize and head to the site once a qualifying storm (likely to exceed 0.06 inches) starts, to be on site when discharge begins. Sampling will be conducted at the new catch basin upgradient of MH24, along with a field duplicate, referred to as MH99. Under the Construction General Permit, field monitoring must also occur for pH and turbidity.

Prior to a wet weather event sampling, equipment, bottles, and labels should be prepared to allow for quick mobilization.

Stormwater sampling is performed using the following protocol:

- Sampling at the new catch basin should be performed using the long-arm sampling pole with each sample bottle attached using an alligator clip.

- Sampling would ideally involve the collection of stormwater directly into the labeled bottles. However, typical stormwater conditions would require the use of the additional unlabeled1-liter amber bottle as a "transfer bottle" to fill all bottles.
- The bottom of an additional 500 mL high density polyethylene (HDPE) bottle may be cut with scissors and decontaminated with DI water to concentrate flow through the former bottle's mouth.

Wet weather stormwater observations should also be recorded on the appropriate waterproof form with a ballpoint pen. Photos should be taken to document discharge and abnormal site conditions (i.e., presence of sediment or turbidity of samples).

3.3.2 Analytical Methods

The laboratory analyses will be conducted in accordance with standard United States Environmental Protection Agency (EPA) methods. Quality control requirements for the analyses are included in the Section 6.

Based on the current Stormwater Pollution Prevention Plan (SWPPP), stormwater samples may be analyzed for the following:

- PCBs using EPA Method 8082A;
- CVOCs using EPA Method 8260B;
- Oil and grease using EPA Method 1664A;
- TSS using EPA Method 2540D;
- Specific conductance using SM 2510B; or
- pH using EPA Method 9040B.

The SWPPP will be revised following remediation activities to incorporate changes at the site. Therefore, the list of analyses may change.

4. STANDARD OPERATING PROCEDURES FOR VAPOR SAMPLING

The vapor treatment system is monitored using a handheld photoionization detector (PID) and/or via collection of grab vapor samples in Tedlar bags/Summa canisters. The GETS system is equipped with sample ports, which are used to collect vapor samples. The vapors are monitored by opening the sample port valve and collecting a Tedlar bag sample. The vapor concentration of the sample is then measured directly from the bag using a PID and/or sent to a California state certified laboratory for analysis, depending on the requirements of BAAQMD.

Vapor samples submitted to the laboratory will be analyzed for CVOCs using EPA Method TO-15. If the vapor sample is collected in a Tedlar bag, the sample will be analyzed within the sample hold time of 72 hours. If the vapor sample is collected in a Summa canister, the sample will be analyzed within the sample hold time of 1 month.

5. STANDARD OPERATING PROCEDURES FOR SOIL SAMPLING

Soil samples may need to be collected for waste characterization for disposal following excavation or groundwater well installation.

5.1 Sample Collection

Soil samples will be collected in glass 4-ounce jars with a teflon-lined lid as provided by the laboratory. Samples will be placed in containers, sealed, and shipped in accordance with standard sample handling and chain of custody procedures specified in Section 4.6. Sample labels containing: site ID, sample ID, sampling date and time, analysis method(s), and sampler's initials will be affixed to each sample container. Samples will be transported to a State-certified laboratory in accordance with standard sample handling and chain-of-custody procedures specified in Section 7.2.

5.2 Analytical Methods

Soil samples may be analyzed for the following based on results of previous investigations, source area, disposal facility, and/or regulatory agency requirements. This list is not limited to the methods listed below:

- CVOCs using EPA Method 8260B;
- PCBs using EPA Method 8082;
- Title 22 metals using EPA Method 6010B; or
- TPH using EPA Method 8015B.

Based on disposal facility requirements for soil samples used for waste characterization, toxic characteristic leaching procedure (TCLP), total threshold limit concentration (TTLC), and/or soluble threshold limit concentration (STLC) sample preparation may need to occur for CVOC and metals analyses (EPA Method 8260B and 6010B, respectively) to determine if the waste is hazardous under Federal or State regulations.

6. QUALITY ASSURANCE AND QUALITY CONTROL REQUIREMENTS

6.1 General

Quality control of laboratory analysis is ensured by (i) performing analytical methods according to prescribed protocols and (ii) analyzing laboratory QA/QC samples to measure precision and accuracy of laboratory methods and equipment, instrument calibration, and preventive maintenance. These procedures are described below.

6.2 Materials and Supplies

Supplies and materials used either in the field or the laboratory shall be standard industry material. The supplies and materials shall be inspected prior to use, be in good working condition and within the expiration date requirements specified by the manufacturer.

6.3 Field Quality Assurance and Quality Control Samples

Field QA/QC samples that will be collected during the proposed investigation include field, trip and equipment blanks. The description and purpose of these samples is discussed in this section.

6.3.1 Field Blanks

Field blank samples are obtained for water by filling a clean sampling container with reagent-grade deionized water. The sample is prepared in the field and then submitted for analysis. One field blank sample will be collected and analyzed each day of sampling to assess potential background contamination or errors in the sampling process.

6.3.2 Field Duplicates

Field duplicates also will be collected and analyzed for water and vapor samples (field duplicates will not be collected for soil or other solid samples). One field duplicate will be collected per 20 environmental samples. For each field duplicate, one additional set of jars/bottles will be filled for each analysis, as appropriate.

6.3.3 Trip Blanks

Trip blank samples are only submitted for water analyses and are obtained in the laboratory by filling a clean sampling container with reagent-grade deionized water. The sample is then taken to the site and handled with the other project samples and then submitted for analysis. One trip blank sample will be included in each container used to transport samples to and from the laboratory. They will be analyzed to assess potential contamination associated with sample handling.

6.3.4 Equipment Blanks

Equipment blank samples are obtained by filling decontaminated sampling equipment with distilled water, sampling this water, and submitting the sample for analysis. One equipment blank sample will be collected each day of sampling and analyzed to assess potential contamination from the sampling equipment.

6.4 Laboratory Quality Assurance and Quality Control Samples

Laboratory QA/QC samples that will be analyzed during the proposed investigation include method blanks, laboratory control samples, matrix spikes, duplicates, and surrogates.

6.4.1 Method Blanks

A method blank is a sample of deionized, distilled water prepared by and analyzed by the laboratory. It is used to assess potential contamination in the laboratory process (e.g., contaminated reagents, improperly cleaned or calibrated equipment). The laboratory will analyze one method blank sample per every 20 primary samples.

6.4.2 Laboratory Control Samples

A laboratory control sample is a known matrix (e.g., washed sea sand, reagent water) that has been spiked with a known concentration of specific target analytes. It is used to demonstrate the precision of the analytical process. A laboratory control sample will be analyzed once per 20 primary samples.

6.4.3 Matrix Spikes

The matrix spike is an actual sample matrix spiked with known concentrations of specific target analytes. The purpose of a matrix spike is to access the effect of a sample matrix on the recovery of target analytes (i.e., assess the accuracy of the analytical measurements on the particular matrix). One matrix spike will be analyzed per every 20 primary samples.

6.4.4 Laboratory Duplicates

Duplicate samples are used to assess precision in the analytical method. An additional aliquot is extracted from the primary sample and analyzed using the identical procedures as the primary sample. Then the results are compared to assess the precision. Duplicates will be of two kinds - laboratory control sample duplicates and matrix spike duplicates. Duplicates will be analyzed each time a laboratory control sample or matrix spike sample is analyzed.

6.4.5 Surrogates

A surrogate is an analyte isomer compound spiked into each sample analyzed. Surrogates assess the precision and accuracy of each individual analysis based on the surrogate recoveries. A surrogate (typically more than one) will be analyzed for each primary sample.

7. POST-SAMPLING ACTIVITIES

7.1 Sample Handling

Immediately following purging or collection activities, samples will be collected and transferred to laboratory-provided sample containers. Sample labels containing: site ID, sample ID, sampling date and time, preservative (if applicable), analysis method(s), and sampler's initials will be affixed to each sample container and placed in a cooler with ice packs or bagged ice. Breakable or otherwise fragile sample containers will be stored in travel cases or wrapped in plastic bubble-wrap to prevent damage during shipment. Cooler contents should be double-checked to ensure that all samples are properly labeled, present, and documented on the chain-of-custody.

Samples will be delivered to the laboratory within 48 hours of collection either by courier or overnight shipping service.

7.2 Chain-of-Custody Requirements

Chain-of-custody records will be maintained for samples collected to provide an accurate written record of the possession and holding of samples from the time of collection through data analysis and reporting. The following information will be specified for each sample on the chain-of-custody form:

- Sample identification;
- Sample matrix (soil, water, air);
- Sample date;
- Sample time;
- Sample location and depth, if appropriate;
- Preservative, if appropriate;
- Analyses to be performed; and
- Special instructions to the laboratory.

The sampler and any other intermediate handlers of the samples (i.e., shipping company representative, laboratory courier) shall sign the form and record the date and time at which the samples changed possession. The completed chain-of-custody form will be sealed inside of the cooler or other sampling container. Upon receipt of samples by the laboratory, the laboratory will be responsible for maintaining internal chain-of-custody of the samples.

7.3 Equipment Decontamination

Non-dedicated sampling equipment will be decontaminated before and after samples are collected. Decontamination will consist of (in the following order): detergent (e.g., Alconox) and water wash, potable water rinse, and distilled water rinse. Decontamination of PPE is addressed in the HASP.

7.4 Investigation-Derived Waste Disposal

Investigation-derived waste, consisting of soil, groundwater, decontamination solutions, used PPE, and other contaminated materials will be stored in drums or other appropriate disposal container, labeled, and left on site for disposal pending analytical results. Non-hazardous waste will be placed in plastic trash bags or other suitable container for appropriate disposal.

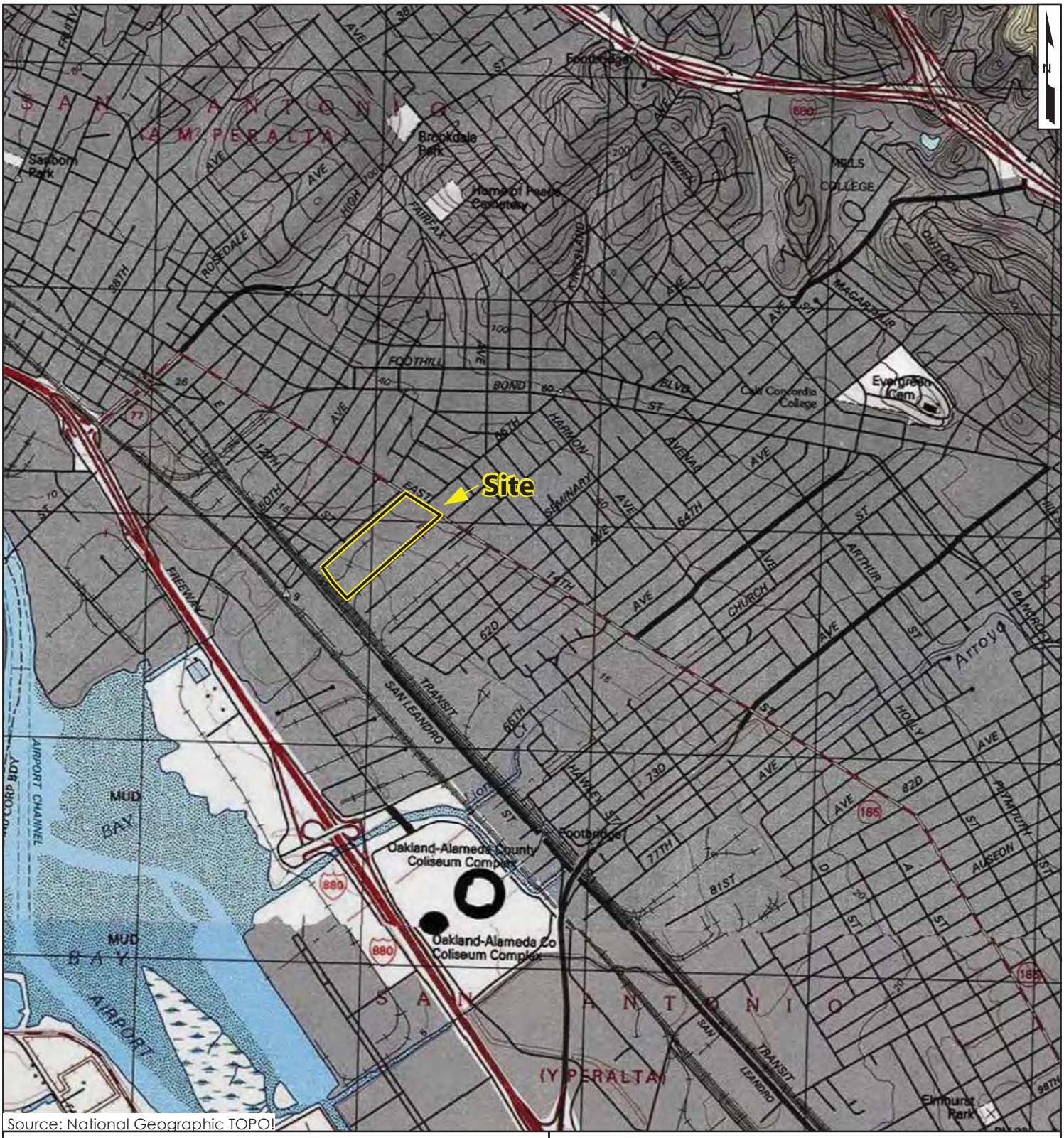
7.5 Reporting

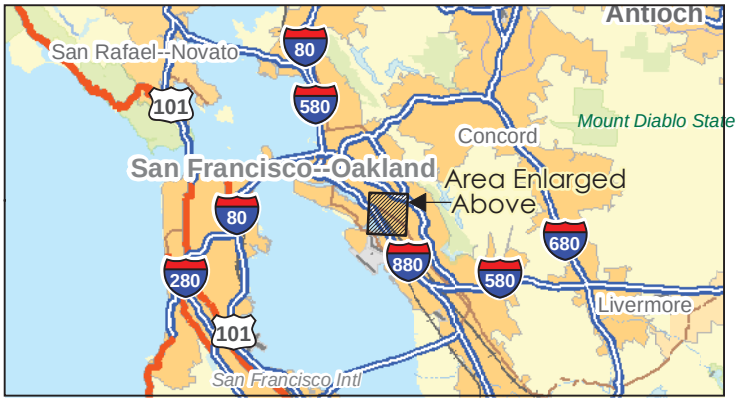
Sampling and field activities will be documented by Geosyntec personnel daily. Field forms are provided in Appendix A.

8. REFERENCES

Geosyntec, 2011. *Operation, Maintenance, and Monitoring Plan*. Prepared for General Electric, October.

FIGURES





2,000 1,000 0 2,000 Feet

Site Location

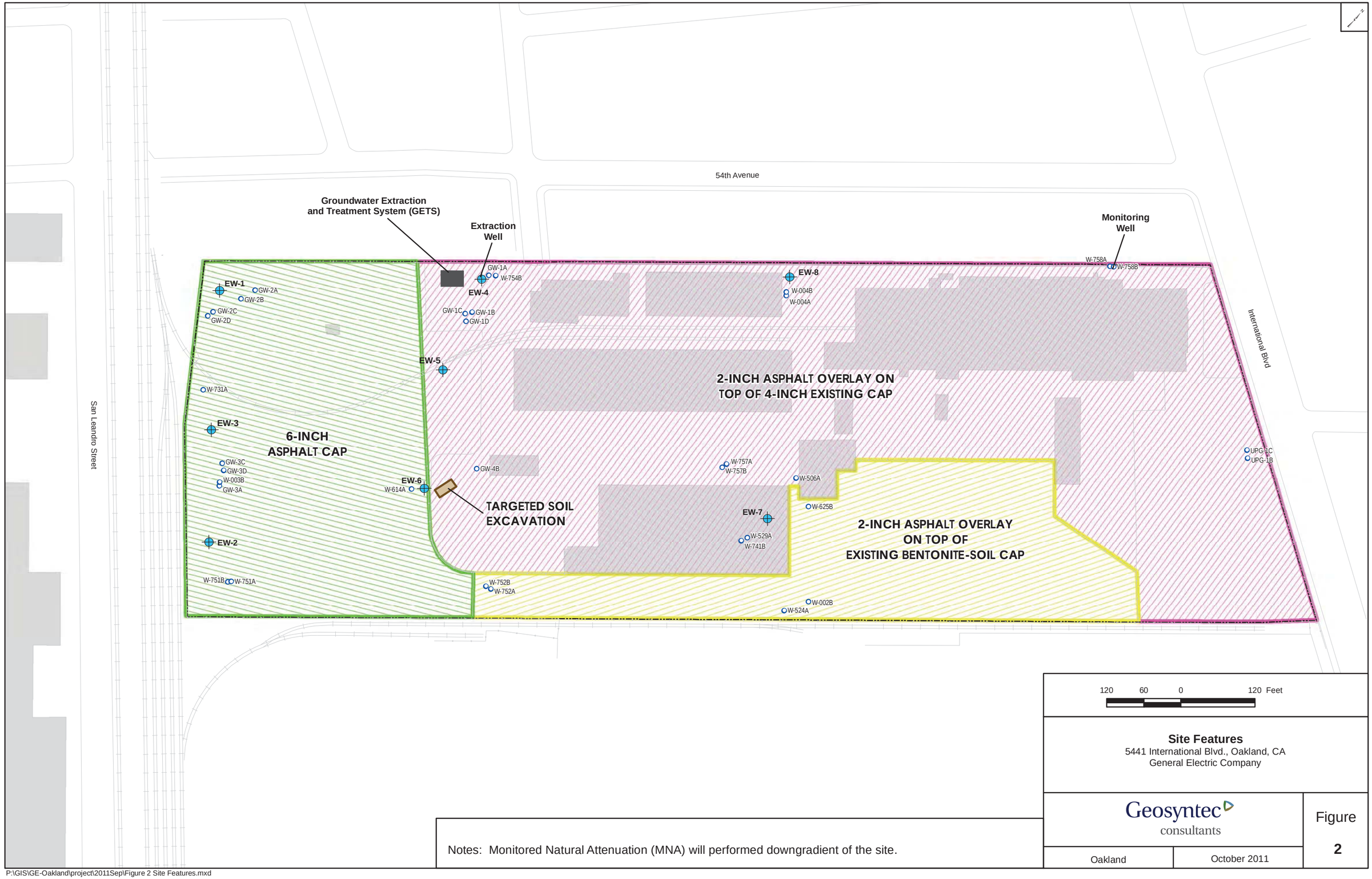
5441 International Boulevard
Oakland, California

Geosyntec consultants

San Diego | October 2011

Figure 1

P:\GIS\SC0609\SiteLocation_mxd.jlarson



Notes: Monitored Natural Attenuation (MNA) will performed downgradient of the site.

Site Features
5441 International Blvd., Oakland, CA
General Electric Company

Geosyntec consultants

Oakland | October 2011

Figure **2**

P:\GIS\GE-Oakland\project\2011Sep\Figure 2 Site Features.mxd

APPENDIX A

Field Forms

Geosyntec consultants

TAILGATE SAFETY MEETING

Project Name: GE Oakland Date:
Client: General Electric Project No.:
Site Address: 5441 International Blvd., Oakland, CA

Items discussed in this meeting:

Recommended PPE:

Hospital Location/Directions:

Urgent Care facility: QUICKHEALTH, 3351 International Boulevard, Oakland, CA

Hospital: Alameda County Medical Center, 1411 East 31st Street, Oakland, CA

- see directions in the HASP

Attendance/Signatures:

Print Name/Company	Signature

Project Manager Date

Geosyntec consultants

Name: _____

Date: _____ Page _____ of _____

DAILY FIELD REPORT

Project No.: _____ Task No.: _____

Site: GE Oakland, 5441 International Blvd. Weather: _____

Signature: _____ Date: _____

Geosyntec consultants

PHOTOGRAPH LOG

Project No.: _____ Task No.: _____

Site: GE Oakland, 5441 International Blvd.

Date	Photo #	Initals	Direction Facing	Description

APPENDIX O

SITE DEMOLITION

5441 International Boulevard
Oakland, California

Draft Final – August 2019

(EKI B70123.01)

APPENDIX O
SITE DEMOLITION

5441 International Boulevard
Oakland, California

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ATTACHMENT

Building Materials Sampling Memorandum (EKI, 2019)

1. INTRODUCTION

This Site Demolition appendix to the Remedial Design and Implementation Plan ("RDIP") Addendum has been prepared by EKI Environment & Water, Inc. ("EKI") on behalf of Bridge Acquisition, LLC ("Bridge" or "Developer") for the property located at 5441 International Boulevard, Oakland, California ("site"). The redevelopment plan will involve demolition of the existing aboveground features at the site and belowground utilities and structures that conflict with redevelopment. Except in the two cases described below, materials generated from demolition of aboveground features will be appropriately disposed of off-site after characterization and profiling as required (1) by the City of Oakland ("the City") for their compliance with the Bay Area Municipal Regional Stormwater Permit ("MRP") issued by the California Regional Water Quality Control Board, San Francisco Bay Region ("Water Board") and (2) for acceptance by the selected disposal or recycling/salvage facilities.[1]

Existing aboveground building materials to be retained on-site after redevelopment include:

- The two-story brick portion of Building 1 facing International Boulevard, that will be incorporated into the new warehouse building (Section 4); and
- Concrete with polychlorinated biphenyls ("PCBs") less than 50 milligram per kilogram ("mg/kg") and trichloroethene ("TCE") less than 10 mg/kg will be crushed and placed on-site beneath the new cap (Section 2.3).

While site demolition is not a part of the approved remedy, for the purpose of the RDIP Addendum and Toxic Substances Control Act ("TSCA") cleanup application, the following demolition activities are discussed below:

- Concrete sampling, crushing, and placement on-site under the new cap (Section 2);
- Sampling and handling of PCB-containing demolition waste (Section 3); and
- Building 1 brick cleanup plan (Section 4).

This section describes demolition of aboveground structures and is based on information presented in General Electric Company ("GE")'s Phase II Building Materials Characterization Report ("GE's Building Materials Report") (Geosyntec, 2010; see Appendix G of the RDIP Addendum); management of known and unknown underground structures is discussed in Section 3.10 of the RDIP Addendum.

[1] To the extent practicable, demolition waste will be recycled or salvaged off-site (e.g., asphalt used to construct the caps during Phase I of the remedy implementation in 2013-2015 may be recycled).

2. CONCRETE SAMPLING AND PLACEMENT UNDER CAP

Concrete with PCBs less than 50 mg/kg and TCE less than 10 mg/kg will be crushed and placed on-site as aggregate base or fill material under the new concrete pavement cap above the water table. Recycled concrete base will transition to import baserock within 2 feet of a belowground utility structure that is intended to be installed in a clean corridor.

For other potential chemicals of concern ("PCOCs"), i.e., metals, other volatile organic compounds ("VOCs"), and semi-volatile organic compounds ("SVOCs"), results will be compared with hazardous waste criteria in California Code of Regulations ("CCR"), Title 22, Section 66261.2 (i.e., the applicable Toxicity Characteristic Leaching Procedure ["TCLP"], Soluble Threshold Limit Concentration ["STLC"], Total Threshold Limit Concentration ["TTLC"], among other applicable criteria) and to the concentrations previously detected on-site expected to remain under the cap summarized in Appendix K of the RDIP Addendum (Perimeter Air Monitoring Plan, Table K-1 Selection of PCOCs). If concrete concentrations are below these values, the concrete will meet the chemical criteria for placement under new cap.[2]

Concrete that cannot be placed on-site because it does not meet the chemical criteria described above or for other construction-related considerations (e.g., construction quality assurance) will be removed and appropriately disposed of off-site at a permitted facility as described below.

Previously collected data, when available, will be used to determine if concrete can be placed on-site or if concrete must be removed and disposed of off-site. If concrete data are not available, concrete samples for PCBs will be collected in general accordance with United States Environmental Protection Agency ("EPA") Region 1 "Standard Operating Procedure for Sampling Porous Surfaces for PCBs" ("EPA SOP"; EPA, 2011) and analyzed for PCBs by EPA Method 8082 after Soxhlet extraction (EPA Method 3540C).

As described in EKI's Building Materials Sampling memorandum, provided to EPA and the Department of Toxic Substances Control ("DTSC") on 11 July 2019 (EKI, 2019; attached), additional concrete cores will also be collected for characterization of non-PCB PCOCs in concrete that will be placed under the new cap. The proposed concrete sampling and removal approach is described in more detail below.

[2] Risks associated with placement of crushed concrete from site demolition under the cap are evaluated in Section 1 of the main text in the RDIP Addendum.

2.1 Building Slabs

Sampling and analysis of building slabs for PCBs and other COCs was conducted by others in 2009 and 2010. The results are summarized on Figure O-1 and in the Building Materials Sampling memorandum (EKI, 2019). Sampling methods and additional details are provided in Appendix G of the RDIP Addendum. Based on these results, the known locations of PCBs in concrete ≥50 mg/kg and/or TCE ≥10mg/kg[3] are limited to the following Building 1 locations, also shown on Figure O-1 (locations adjacent to each other are grouped with "/"): B1-018, B1-024/B1-030/B1-046/B1-052, B1-026, B1-034/B1-044/1BH-19, B1-048/B1-049, and unnamed location near sample E07.

No additional sampling of concrete slabs will be conducted, except as shown on Figure O-1. The number and location of the additional concrete slab sampling locations were identified based on the following criteria:

Sampling for PCBs

- A sampling frequency of 1 sample per 1,600 square foot ("sf") (equivalent to a 40-foot grid) for slabs not previously sampled (i.e., slabs for former Buildings 6 and 7). Concrete slab sampling previously conducted in 2009 and 2010 by others was performed at a similar frequency (see Figure O-1);
- Previous known PCB use. For example, liquid waste possibly containing 10C oil and pyranol was drained from a sink in former Building 7 (former laboratory) but PCB use was unlikely in Buildings 4, 6, and 17, which were used for storage and warehousing (Brown & Caldwell, 1981, Figure 2-1);
- Input from EPA. EPA has requested additional sampling of slabs for Buildings 4 and 17;
- Field observations. Sampling locations shown on Figure O-1 may be adjusted based on inspection of the slab for staining, other evidence of former spills, and access considerations; and
- During the September 2018 investigation (Appendix C of the RDIP Addendum), a buried slab was discovered underneath Building 1. This slab will be uncovered, cleaned of loose soil to the extent feasible, and sampled at the same frequency as described above.

[3] No other chemicals besides TCE at location 1BH-19 were identified as PCOCs based on concrete sampling results or were detected above California hazardous waste levels.

Sampling for Other PCOCs

- Sampling will be conducted as described in the Building Materials Sampling memorandum (EKI, 2019, attached).

2.2 Other Concrete Features

In addition to building slabs, a number of other concrete features are present on-site including equipment pads, sumps, and tanks, for which PCB sampling data are not available. These features will be evaluated by Bridge's demolition contractor and, if identified for placement on-site under the new cap, will be sampled for PCBs at a similar frequency as building slabs (1 sample per 1,600 sf). Potential concrete sampling areas in addition to existing building slabs have been identified on Figure O-2. Anticipated concrete sampling locations for PCBs, including building slabs and other concrete features, are compiled and summarized in Table O-1.

2.3 Concrete Removal and Off-Site Disposal

Concrete removal areas will be determined based on sampling results. The vertical extent of the concrete removal will include the entire uppermost slab at the locations listed above in Section 2.1. The horizontal extent will be determined by nearby sampling locations with PCBs <50 mg/kg and TCE <10 mg/kg. Where sampling data are not available to inform the horizontal extent, an additional 5 feet of concrete around a sampling location will be removed. For isolated locations, this approach will result in removal of 10-foot by 10-foot areas of concrete. Based on previously collected sampling data, approximately 180 cubic yards ("cy") of concrete associated with the Building 1 slab has been identified for off-site disposal, although sampling of other concrete features may increase this quantity.

Removed concrete will be placed in covered stockpiles consistent with the Dust Control Plan (see Appendix J of the RDIP Addendum) pending sampling for disposal characterization, profiling, and transportation to an appropriate licensed disposal facility. Removed concrete with PCBs ≥50 mg/kg will be disposed of at a Resource Conservation and Recovery Act ("RCRA") Class II landfill (e.g., Kettleman Hills Facility). Concrete characterized with PCBs less than 50 mg/kg that cannot be placed on-site under the new cap because of other considerations (e.g. construction quality assurance) will be disposed of at a non-hazardous landfill (e.g., Altamont Landfill).[4]

It is anticipated that concrete removal for Building 1 will likely be conducted after most of Building 1 has been demolished except for the front portion along International Boulevard and the slab. During concrete removal activities, the Contractor will

[4] Proposed disposal facilities require approval by EPA to dispose of PCB-containing waste as a non-TSCA waste. In addition, toxicity characteristic leaching procedure testing indicates non-hazardous disposal for TCE may be appropriate (EKI, 2019).

implement the Transportation Plan, Decontamination Plan, Dust Control Plan, Contractor's site-specific health and safety plan ("HASP"), and storm water pollution prevention plan ("SWPPP") and Bridge's representative will implement the Perimeter Air Monitoring Plan as described in Section 3.2 of the RDIP Addendum and in the respective RDIP Addendum Appendices. The Dust Control Plan outlines dust control measures that will be used and the Perimeter Air Monitoring Plan describes the location of air monitoring stations and action levels during crushing operations.

Concrete crushing activities will be located on-site in an area downwind and approximately 250 feet from the adjacent residences in the general area between existing Buildings 2 and 17 (Figure O-2). Concrete crushing equipment will include a jaw crusher (Premiertrak 300 by Powerscreen or similar) and screen (Warrior 600 by Powerscreen or similar). Concrete will be crushed and screened until the design particle size is achieved for use as backfill or base below the new cap. Concrete crushing is anticipated to occur one time during demolition over a 1- to 2-week period.

Removed concrete that will be disposed of off-site will be stockpiled on plastic sheeting and covered with plastic sheeting or placed in roll-off bins with covers, per Section 02 61 13 of the Technical Specifications from the 2012 RDIP (Geosyntec, 2012). Stockpiled materials will be characterized for disposal as described in the Field Sampling and Analysis Plan ("SAP") and addendum (see Appendix N of the RDIP Addendum) followed by transportation and disposal off-site as described in the Transportation Plan and addendum (see Appendix H of the RDIP Addendum).

3. SAMPLING AND HANDLING OF PCB-CONTAINING DEMOLITION WASTE

Bridge will employ an experienced contractor to assist in the characterization of the demolition waste and identification of appropriate permitted disposal facilities. The characterization information collected by GE (Appendix G of the RDIP Addendum; Geosyntec, 2010)[5] will be supplemented as needed to appropriately dispose of building materials other than concrete off-site.[6] The previously collected data indicates that materials in on-site buildings to be demolished may contain PCBs, lead, asbestos, VOCs, and SVOCs at hazardous waste levels. This characterization sampling is described in

[5] Note that GE's recommendations regarding building materials disposition in Geosyntec, 2010 are no longer applicable and will not be implemented because they assumed a different future site use. Recommendations provided in this appendix and RDIP Addendum supersede those included in the Phase II Building Materials Characterization Report.

[6] Other than concrete, which is addressed separately in Section 2, referenced building materials include suspected PCB-containing products such as paint, exterior caulking and sealants, window gaskets, and flooring adhesives.

EKI's Building Materials Sampling (EKI, 2019). Bridge has engaged ACC Environmental Consultants of Oakland, California ("ACC") to perform the sampling.

Depending on results of the sampling and ACC's recommendations, the City's waste reduction and recycling[7] and MRP requirements, Bay Area Air Quality Management District ("BAAQMD") demolition requirements with respect to asbestos, and disposal facility requirements, a demolition plan will be developed as part of the demolition permit package that will be submitted to the City. This package will be provided to EPA when available.

In addition, friable building materials with PCBs >1,000 mg/kg (e.g., part of the concrete slab in Building 1) will be abated in enclosures or will not be disturbed during mass demolition and will be abated afterwards within enclosures.[8] Based on available data, one concrete location in Building 1 has a PCB concentration >1,000 mg/kg (B1-034/B1-044/1BH-19, see Section 2.1).

During demolition of non-friable building materials or building materials with PCBs ≤1,000 mg/kg,[9] the Contractor will implement the Transportation Plan, Decontamination Plan, Dust Control Plan, Contractor's HASP, and SWPPP and Bridge's representative will implement the Perimeter Air Monitoring Plan as described in Section 3.2 of the RDIP Addendum and in the respective RDIP Addendum Appendices. The Dust Control Plan outlines dust control measures that will be used and the Perimeter Air Monitoring Plan describes the location of air monitoring stations and action levels during demolition operations.

Building materials may either be pre-characterized for direct off-haul or segregated as needed, stored on-site in appropriately managed stockpiles, and then sampled for characterization and profiling prior to identification of an appropriate, permitted landfill or recycling/salvage facility for off-site disposal.

In the case of PCB-containing building materials, appropriate, permitted waste disposal facilities will be identified based on the characteristic PCB concentration, estimated quantity, and type of waste (e.g., bulk product waste[10] vs. remediation waste). If required by the disposal facility, additional samples may be collected to supplement available data either prior to demolition or after demolition, segregation, and stockpiling. Stockpiling of demolition debris will be managed as described in the Dust

[7] The City requires recycling (by weight) of 100% asphalt and concrete and 65% of all other debris, where feasible.

[8] PCB abatement will occur before mass demolition if it does not affect the structural integrity of the building and endanger demolition workers. Abatement of non-friable materials such as window glazing is not expected to generate dust when removed and therefore, will not require enclosure.

[9] Based on available data, PCBs in building materials are <600 mg/kg, except for one concrete location in Building 1 (B1-034/B1-044/1BH-19, see Section 2.1).

[10] The definition of bulk waste is defined in 40 Code of Federal Regulations ("CFR") 761.3 requirements as interpreted by EPA, 2012b.

Control Plan (Appendix J of the RDIP Addendum). Disposal profiling and identification of appropriate disposal facilities will occur after the results of the building materials sampling described in EKI, 2019 are available.

4. BUILDING 1 FAÇADE

As required by the City, the Building 1 façade facing International Boulevard will be retained and incorporated into the new building. As shown on Figure 2 of the RDIP Addendum, the entire front façade of both the ground floor and upper mezzanine will be preserved, in addition to a certain portion of the adjacent northern and southern façades (final dimensions of façade to be saved will be determined based on input from the City). This front area of Building 1 was part of the original structure when GE began operations at the site in 1924.

Use in the front of the building adjacent to the façade was originally office space on both the ground floor and second-floor mezzanine beginning in 1924 through 1975, when PCB use at the site ceased (Brown & Caldwell, 1981). The use of this area as an office appears to have remained as such until operations ended in the mid-1990s. Remnants of the office space are still visible in this area of Building 1 based on a site visit conducted in March 2019 by EKI (see photo below).

In order to allow preservation, the façade will need to be seismically retrofitted and windows and associated framing materials (e.g., caulking, trim, and sill) will be replaced. The façade consists of a double layer of brick, and the interior layer is painted on the inside face. The other elements of the façade that will be retained and/or replaced will depend on evaluation by the structural engineer, architect, restoration specialist, and input from the City and other stakeholders.

In addition, the façade may contain PCBs and lead. Because it is unknown at this time which features of the original façade will be retained and incorporated into the new façade of the planned building, a dynamic investigation and cleanup plan has been developed to assess and abate PCBs (and thereby lead), if needed, in the façade elements that will be retained. The available data and dynamic work plan are presented in the sections below.



4.1 PCBs and Lead – Building 1 Perimeter Wall, Office Area

In 2008 and 2010, GE performed building materials sampling at the site. During these sampling events, two interior brick samples (including paint), one interior brick sample (paint removed), one exterior brick sample (no paint), and one interior sample of paint on the brick wall were collected from the perimeter wall in the office area for laboratory analysis of lead and/or PCBs. In addition, field screening of the paint using x-ray fluorescence ("XRF") technology was conducted for lead. The available PCB and lead data from GE's sampling are summarized below and in Table O-2, with GE's Building Materials Report included in Appendix G of the RDIP Addendum.

- For the two core samples collected in 2008, where paint was included in the samples, PCBs were reported at a concentration of 0.310 and 0.191 mg/kg, below the 1 mg/kg cleanup level for unrestricted use under TSCA (40 CFR 761.61[a][4]). Lead in these samples was reported at 86 and 120 mg/kg, respectively, below the DTSC screening level for soil of 320 mg/kg (commercial site use; DTSC, 2019).

- For the chipped brick sample collected from the interior in 2010, after decontamination and paint removal, PCBs were reported as non-detect (<0.5 mg/kg). The reported concentration of PCBs in the removed paint at this location was 18 mg/kg. XRF measurements of lead before and after decontamination and removal of the paint in this sample location was reported

as 1.3±1.5 and 0.00±0.02 milligrams per square centimeter ("mg/cm^2"), respectively.[11]

- For the sample of unpainted, chipped brick collected from the exterior in 2010, PCBs were non-detect (<0.50 mg/kg) and lead was detected using the XRF at 0.03±0.08 mg/cm^2.[12]

Based on this data set, PCBs and lead are present in the paint on the interior brick, but likely not in the underlying brick.[13] The cleanup plan presented below has been developed in consideration of these results.

4.2 Building 1 Façade Cleanup Plan

Two alternatives for the Building 1 façade are presented below and were developed based on the available information regarding which aspects of the façade will be retained (e.g., existing bricks, steel support beams, concrete sills, and other trim and framing features, as described above) and sampling results. These two alternatives are:

A. Paint removal, and

B. Coating and encapsulation of the paint and underlying substrate.

The feasibility of these two alternatives will be evaluated together with requirements from the City, comments from interested stakeholders, and input from preservation technical experts (e.g., architect, structural engineer, and abatement specialists). As part of the evaluation, Bridge will assess the paint removal via a pilot test. Because information is not available to assess the feasibility of the two alternatives at the writing of this report, a "dynamic" cleanup plan has been developed that can be adapted once this information is received. The following sequence of activities is anticipated for Building 1 façade decision-making process and comprise the dynamic cleanup plan.

1. Information Collection: Ascertain the City's requirements and obtain recommendations from technical experts. It is anticipated that information collected during this step will be via visual inspection and sampling as described in the Building Materials Sampling memorandum (EKI, 2019).

[11] The U.S. Department of Housing and Urban Development ("HUD") definition for lead-based paints is ≥1mg/cm^2.

[12] This value is below the HUD definition for lead-based paints of ≥1mg/cm^2.

[13] Similarly, in GE's Building Materials Report, Geosyntec concluded that "[o]nsite paint typically appears to be manufactured with lead and PCBs. The assumption that PCBs are in the paint is based on the low results during wipe samples, and the PCB concentrations in paint chip samples following decontamination of paints. Most PCB concentrations in paint were below 50 ppm [parts per million]; however, PCBs were detected above 50 ppm in some locations."

2. Feasibility Study: Assess feasibility of paint removal based on information collected during step 1. If paint removal is not feasible at this time, proceed with Alternative B, coating and encapsulation of the paint and brick (step 5).

3. Pilot Test: If paint removal is feasible, proceed with the pilot test. The pilot test will evaluate at least one paint removal technique. The objectives of the pilot test will be to: (a) evaluate the effectiveness of the paint removal technique; and (b) assess a visual cleanup standard as an approach to confirm that paint removal is complete rather than confirmation sampling for the full-scale implementation. If paint removal is not feasible at this time, proceed with Alternative B, coating and encapsulation of the paint and brick (step 5), otherwise proceed with Alternative A, paint removal (step 4).

4. Paint Removal: Conduct paint removal, visual review, and compliance verification (Alternative A).

5. Encapsulation: Construct a cap by coating the paint and underlying substrate and placing coated areas behind false wall to prevent access and protect the coating (Alternative B).

These steps are described below based on the available information. Where applicable, the design and rationale are discussed below, with the implementation details provided in Section 4.3.

4.2.1 Step 1 – Information Collection

During this step, a design for incorporation of the Building 1 façade into the redevelopment plan will be developed by Bridge with input from the City, interested stakeholders, and Bridge's technical experts. Information to develop this design will be obtained by visual inspection and non-invasive techniques, review of previously published reports, and experience with similar projects. No invasive sampling is anticipated unless required for structural or architectural design purposes. This step will be complete after sufficient certainty in the final design is obtained, i.e., an approach for preservation and rehabilitation (if needed) has been developed to meet structural requirements and architectural goals, and the City's requirements and the components of the façade that will be retained have been identified. Retained façade components may include elements other than brick, such as existing steel beams, concrete sills, or other framing and trim features.

In addition, the paint on the interior of the Building 1 walls planned for preservation will be sampled as described in the Building Materials Sampling memorandum (EKI, 2019). With EPA concurrence, this sampling is in progress. Sampling results will be summarized in a data table with an accompanying sample location figure and provided to EPA prior to proceeding with Step 3, pilot test.

4.2.2 Step 2 – Feasibility Study

The feasibility of Alternative A (paint removal) will be evaluated based on available information, some of which will be collected as part of Step 1, described above. This study is intended to be an internal assessment to assist Bridge in decision-making regarding the appropriate alternative that works best for the redevelopment project and the need for a pilot test.

As part of this process, at least one paint removal technique will be identified, and an abatement concept will be developed. Paint removal techniques that will be considered will depend on the painted substrate (e.g., porous surface such as brick vs. non-porous surface such as a steel beam) but is anticipated to include abrasive blasting (potential blasting media evaluated may include sand [with and without sponges] and walnut shells) followed by hand methods using small tools such as scraping and/or grinding for touch up.

Although the proposed feasibility study is not intended to be a formal Comprehensive Environmental Response, Compensation, and Liability Act-like document, it will use similar criteria for decision-making, e.g., implementability, effectiveness, and cost. This paper study will evaluate data gaps and provide recommendations to address the data gaps as part of Step 3, pilot test, discussed below. If paint removal is retained as feasible after this evaluation, Bridge may elect to perform a pilot test, as described in Step 3. If paint removal is not retained, abatement will proceed via encapsulation, as described below in Step 5. EPA will be notified via phone or email communication of the intended path forward after completion of this step.

4.2.3 Step 3 – Pilot Test

The objectives of the pilot test will be to: (a) evaluate the effectiveness of the paint removal technique identified in Step 2 above; and (b) assess a visual cleanup standard as an approach to confirm that paint removal is complete rather than confirmation sampling for the full-scale implementation.[14] If the pilot test is successful in demonstrating that a visual standard can be used to confirm paint removal, no confirmation sampling is intended for the full-scale implementation.

The pilot test of the selected technology(ies) will be conducted on two 10-foot by 10-foot sections of wall. The location of the tests will be selected in the field based on safety, logistical, and representativeness considerations. If possible, the actual façade to be retained will be tested in an area where paint sampling was previously conducted as part of Step 1 and with as many different media types as the overall façade that will

[14] A similar approach (pilot demonstration of the visual standard, prior to approval of full-scale implementation with no confirmation sampling) was approved for paint removal with brick as the substrate in the risk-based disposal for the Rainier Commons Facility, 3100 Airport Way South, Seattle, WA (EPA ID No. WAD 05123 9944).

be retained. Otherwise the test(s) will be conducted on a nearby similar perimeter wall location prior to its demolition.

If pilot testing is conducted in an area where paint sampling data is not available from Step 1, paint samples concurrent with pre-paint removal wipe samples will be collected from two randomly selected locations within the test areas.

The pre-paint removal wipe sample will be collected first, as described in ASTM D6661-17 (ASTM, 2017). Then the surface will be decontaminated using the double wash/rinse method per 40 CFR Part 761, Subpart S. Next, a sufficient amount of paint for laboratory analysis will be removed (chipped or peeled using hand tools) and collected consistent with the EPA SOP. Both pre-paint removal wipe samples and paint samples will be analyzed for PCBs using EPA Method 8082 after Soxhlet extraction.

The pilot test will be conducted to address both PCBs and lead in paint. The cleanup goals for PCBs and lead will be based on unrestricted or commercial use, as follows:

- For porous substrates (brick, concrete, caulk, wood, etc.) under paint that will be retained, the proposed cleanup goal for PCBs will be 1 mg/kg, equal to the unrestricted use cleanup standard for PCBs on porous surfaces (40 CFR 761.61[a][4][iii][15]). The proposed cleanup goal for lead is 320 mg/kg, the DTSC soil screening level, commercial site use (DTSC, 2019).

- For non-porous structures that are present and will be retained (e.g. steel beams), the proposed cleanup goal for PCBs will be ≤10 micrograms per ("ug/") 100 square centimeters ("cm^2"), equal to the unrestricted use cleanup standard for PCBs on non-porous surfaces (40 CFR 761.61 and 761.79). The proposed cleanup goal for lead will be <250 ug/square feet ("ft^2"), equal to CCR Title 17 cleanup standard for interior horizontal surfaces.

Determination of when paint removal has been completed will be based on a visual review against a visual cleanup standard by a qualified inspector. The visual review will be conducted after paint removal and will involve visually scanning the abated surface at each level (either ground or scaffolding) for any residual paint after the surface has dried and dust and debris is removed. Small amounts of paint (flecks) may remain post-abatement and is unavoidable; however, the visual cleanup standard will be removal of all visible paint. A qualified inspector can be a certified lead abatement contractor with paint removal experience or an experienced environmental professional.

[15] 40 CFR 761.61(a)(4)(iii) refers to 761.61(a)(4)(i) which provides a cleanup goal of 1 mg/kg for bulk remediation waste for high occupancy areas (i.e., unrestricted use for both commercial and residential use).

During the pilot test, the visual review approach will be verified by sampling; different verification sampling approaches will be used for porous and non-porous surfaces. For verification of a porous surface after paint removal has been completed as determined by visual review, one sample using multi-increment sampling ("MIS") procedures[16] will be collected per substrate type included in the pilot test (e.g., brick, mortar, wood). A multi-increment sample is a "composite" sample that comprises approximately 20 to 30 discrete increments or samples collected within a designated "decision unit" or sampling area. All the media of similar type within the pilot test area will comprise one decision unit, such that there will be one decision unit per media. Each discrete sample comprising the composite will be collected following the EPA SOP, although the multiple holes called for in this SOP will be spread throughout the decision unit following MIS procedures instead of closely adjacent. Each multi-increment sample will be analyzed for PCBs by EPA Method 8082 after Soxhlet extraction, lead by EPA Method 6020, and moisture content, for comparison to the cleanup goals described above.

For pilot test verification of non-porous surfaces after paint removal has been completed as determined by visual review, wipe samples will be collected. For each non-porous feature (e.g., steel beam or window, even if the window consists of multiple panels), one 10 cm by 10 cm wipe sample will be collected for PCBs per ASTM D6661-10 and one 1-foot by 1-foot wipe sample for lead per ASTM E1728-16 (ASTM, 2016). Wipe samples will be analyzed by the laboratory in accordance to the EPA methods described above for comparison to the cleanup goal. Additional details about the pilot test implementation approach and sampling are provided in Section 4.3, and the appendices referenced therein.

Paint removal will be retained as a technology after pilot testing if:

- Data that may be collected during this Step and/or Step 1 support previously collected data that indicate that PCBs have not migrated into the underlying substrate (e.g., pre-paint removal wipe samples have low PCB concentrations compared to paint samples);

- Paint can be removed without deterioration of the façade, and the resulting façade is of appropriate condition that it can be retained for incorporation of the original elements into the planned building, including architectural and structural considerations;

- Cleanup goals can be met based on verification sampling, demonstrating that the paint removal approach is effective, and the visual standard alone can be used in the full-scale without sampling; and

[16] EKI is using the term MIS procedures to represent a large number of increments or samples to create the composite sample; EKI does not anticipate that the full MIS laboratory preparations of a "bulk" sample will be performed on the composite.

- Criteria evaluated in Step 2, Feasibility Study, have not substantially changed such that the alternative is no longer feasible due to implementability and/or cost.

If paint removal is retained, it will be implemented in full-scale, as discussed in Step 4 below. If paint removal is not retained, abatement will proceed via encapsulation, as described below in Step 5. EPA will be consulted for concurrence regarding the findings of the pilot study and recommendations for future work, either by via phone, email, or in-person communication, including transmittal of any relevant sampling results.

4.2.4 Step 4 – Paint Removal

If paint removal is the selected alternative for abatement of the Building 1 façade, paint will be removed from the interior façade elements that will be retained. If a pilot test has been conducted prior to full-scale implementation, the results of the pilot test will be used to develop the full-scale paint removal approach.[17] Assuming use of a visual standard has been demonstrated in the pilot test, after paint removal and dust/debris cleanup, visual review by a qualified inspector will be conducted for all (100%) of the façade to determine if removal work is complete. Upon meeting the visual standard (no visible paint), compliance inspections to photo-document approximately 2% of the façade will be conducted as described in Section 4.3.

After construction of the new building incorporating the preserved, abated façade, indoor air will be sampled for PCBs, as described in Section 4.3.4.

4.2.5 Step 5 – Encapsulation

If paint removal is deemed not feasible, paint and underlying substrate will be encapsulated by coating the painted surfaces that will be retained with two coats of Macropoxy 646-100 manufactured by the Sherwin Williams Company. Macropoxy 646-100 is a low-VOC (i.e., <100 grams per liter ["g/L"] VOC), high solids, and high build polyamide epoxy coating that was identified in a 2012 EPA study, which evaluated the effectiveness of various coatings in reducing PCB concentrations in indoor air and contaminated surface materials (EPA, 2012a). The coating has a two-part system, an epoxy resin and a catalyst, which are mixed prior to application. The primary solvents in Macropoxy 646-100 are xylene and polyamide.

Prior to application of the coating, the surface will be prepared per the manufacturer's instructions and will include activities such as removal of loose and peeling paint and, if necessary, application of a primer (Macropoxy 5000 or equivalent). Additional surface

[17] For the scenario where the pilot test has been conducted, it has been assumed that the pilot test has been successful to demonstrate that a visual standard can be used to confirm paint removal, instead of confirmation sampling. Confirmation sampling is only proposed for the scenario where the pilot test is not conducted.

preparation or use of a cleaner or primer will be determined at the time of surface preparation and coating application based on observations by the coating contractor.

After coating is completed, and during the interior construction of the building, the coated façade will be placed behind a false wall, with a gap in between the false wall and original, coated façade. The false wall will serve to prevent access to the original building materials from the interior and protect the coating. The false wall will be finished to match the adjacent new interior wall for the planned warehouse or with drywall.

After construction of the new building incorporating the preserved, abated façade, indoor air will be sampled for PCBs, as described in Section 4.3.4.

4.3 Building 1 Façade Abatement Implementation

The dynamic cleanup plan consists of three steps that potentially will be implemented in the field, depending on collected information (Step 1) and a paper feasibility study (Step 2): pilot test (Step 3); paint removal (Step 4); or encapsulation (Step 5). The approach for implementing Steps 3 through 5, should Bridge elect to do so, is described in this section.

4.3.1 Pilot Test

The pilot test will be conducted on the interior of the Building 1 façade either before the rest of the building is demolished or after partial demolition of the building. It is assumed that existing cap and surface water controls will be in place during the pilot test. The paint removal technologies that may be tested will range from abrasive and/or blasting technologies that will generate dust to stripping technologies that will likely generate minimal dust (e.g., use of a chemical paint remover followed by scrapers/brushes to remove the paint).

For pilot test of stripping technologies, work will be performed indoors within containment at the ground surface (e.g., drop cloth) as described below except without use of an enclosure.

In the case of a pilot test of abrasive and/or blasting technologies, the area of the pilot test will be fully enclosed during testing, following protocols similar to those used during lead abatement. The enclosure will be used to contain paint potentially containing PCBs, blasting media, and generated dust, water, or debris. Barriers will be placed over any windows or openings to the building within containment area and a secondary containment at the ground surface around the main containment structure will be provided. Should Bridge elect to do so, viewports will be installed in the containment structure. After set-up in the field, the work area will be inspected and accepted by Bridge's representative prior to proceeding with the pilot test. Negative pressure containment will be used only if needed for lead abatement.

On-site personnel that will be performing work within the containment structure during the pilot test will be EPA-accredited "Certified Renovators" for lead-based paint removal work and have 40-hour Hazardous Waste Operations and Emergency Response ("HAZWOPER") certification and will perform the work in accordance with a site-specific HASP for their organization, as described in Section 3.2.5 of the RDIP Addendum. Contractor will implement the Transportation Plan (Appendix H of the RDIP Addendum) and Decontamination Plan (Appendix I of the RDIP Addendum) during the pilot test, as applicable. Because work will be performed indoors and/or within an enclosure during paint removal pilot testing, other dust control measures and perimeter air monitoring will not be required during this phase of work.

A work plan for the pilot test will be developed by the Contractor and will be provided to and approved by Bridge or Bridge's representative prior to Contractor mobilization. The plan will provide a description of the work set-up and enclosure / secondary containment equipment information, including specifications for plastic used for creating the enclosure and barriers over windows or openings. The work plan will describe the paint removal approach and equipment that will be used for removal. It will also provide procedures for entry into the containment structure and decontamination and exit using a staged approach. The work plan will also include the Contractor's site-specific HASP.

If negative pressure containment is used, the differential pressure between the outside and inside of the containment structure will be measured on an hourly basis to provide a record that a negative pressure was maintained.

Existing Best Management Practices ("BMPs") protecting nearby downslope on-site catch basins will be maintained and inspected at least three times, before, during, and after the pilot test. If needed, enclosure/containment measures will be modified or adjusted based on inspections. Spill kits and emergency supplies will be on-hand during the pilot test.

Disposal of waste generated during the pilot test will follow applicable laws and regulations for both PCBs and lead. The disposal scenarios discussed below are based on PCBs and may be modified as required based on laws and regulations for disposal of lead-based paint. If the paint is designated as PCB bulk product waste based on pilot test sampling, removed paint and spent blasting media generated during the pilot test will be disposed of as PCB bulk product waste consistent with the applicable requirements of 40 CFR 761.62(a) or (b) and the containment structure material, personal protective equipment, and all non-liquid cleaning materials will be disposed of consistent with 40 CFR 761.61(a)(5)(v). If the paint is not designated as PCB bulk product waste because PCB concentrations in paint are less than <50 mg/kg, non-liquid waste will be disposed of as demolition debris at a municipal solid waste landfill or a non-hazardous landfill (e.g., Altamont Landfill).

If paint is designated a PCB remediation waste, paint and spent blasting media will be characterized and disposed of based on its characteristic PCB concentration. Paint and spent blasting media with PCBs ≥50 mg/kg will be disposed of at a RCRA Class II landfill (e.g., Kettleman Hills Facility). Paint and spent blasting material characterized with PCBs <50 mg/kg will be disposed of at a non-hazardous landfill (e.g., Altamont Landfill), if appropriate considering other characteristics.

Liquid wastes will be characterized for disposal per the requirements of the disposal facility, and if designated as a PCB liquid waste, will be disposed of at a RCRA Class II landfill (e.g., Kettleman Hills Facility) or TSCA landfill. If the liquid waste is not designated as a PCB liquid waste, the waste will be disposed of at a non-hazardous landfill, if appropriate considering other characteristics. PCB wastes will be stored pending disposal in compliance with 40 CFR 761.65(b) or 761.65(c).

Documentation of the pilot test will be included in the Completion Report, described in Section 4.7 of the RDIP Addendum.

4.3.2 Paint Removal

If paint removal is selected as the abatement approach for the Building 1 façade that is retained, the methods and procedures developed for the pilot test described above will be used in the full-scale implementation. If Bridge elects to conduct the pilot test, modifications may be made to the procedures and methods described above based on the findings of the pilot test (e.g., warning signs may be posted at containment structure entrances). Although the overall work sequencing for the redevelopment is not yet known, paint removal will likely occur prior to building demolition, if the building interior can be made safe for abatement workers. Otherwise, abatement work will be conducted in coordination with structural and architectural rehabilitation.

Assuming that the visual standard and visual review process is demonstrated during the pilot test, after paint removal and dust/debris cleanup, visual review of the dry substrate by a qualified inspector will be conducted as described in Section 4.2.3 for all (100%) of the façade to determine if removal work is complete.

Upon meeting the visual standard (no visible paint), compliance inspections to photo-document approximately 2%[18] of the façade will be conducted. The location of compliance inspections will be determined randomly by dividing the area where the paint was removed into a 10-foot by 10-foot grid and assigning a number to each grid. A random number selector will be used to select 2% of the grids for photo-documentation. Photo-documentation will involve: (a) clearly marking the inspection area either at the corners or all four sides; (b) closely photographing the inspection area

[18] A similar approach (visual review of 100%, with compliance inspections for 2% in the full-scale) was approved for paint removal with brick as the substrate in the risk-based disposal for the Rainier Commons Facility, 3100 Airport Way South, Seattle, WA (EPA ID No. WAD 05123 9944).

to show paint has been removed; (c) photographing the inspection area from afar to document the location in relation to other façade features; and (d) creating a photolog that includes the photographs with captions. The compliance inspection photo-documentation, along with a description of the abatement activities will be included in the Completion Report, described in Section 4.7 of the RDIP Addendum.

4.3.3 Encapsulation

If encapsulation is selected as the abatement approach for the Building 1 façade that is retained, it will be implemented in coordination with the structural and architectural façade rehabilitation and the new building construction. While the work sequencing for these phases of redevelopment construction is not yet known, it is likely that encapsulation will occur in stages as the redevelopment progresses. For example, loose paint removal and preparation of the interior surface of the façade may be conducted prior to the demolition of the remainder of Building 1. Coating of the interior of the façade may not be conducted until the façade is rehabilitated (e.g., windows have been replaced) and structurally reinforced, and it is incorporated into the new building.

Personnel that will be performing abatement work will be EPA-accredited "Certified Renovators" for lead-based paint removal work and have 40-hour HAZWOPER certification and will perform the work in accordance with a site-specific HASP for their organization, as described in Section 3.2.5 of the RDIP Addendum. The Contractor will implement the Transportation Plan and Decontamination Plan during the abatement work, as applicable. Because abatement work will be conducted in the building interior, other dust control measures and perimeter air monitoring will not be required during this phase of work.[19]

Preparation of the interior surface of the façade will involve setting up ground-level or scaffold-level containment (e.g., plastic or tarp) to catch loose material and debris and sealing any openings in the façade to retain generated debris within the containment. Hand tools, e.g., hand scrapers, wire brushes, mechanical grinders, will be utilized to scrape loose and peeling paint off the interior side of the brick walls. No free or running water will be used during this phase of work, except possible small amounts for decontamination. Non-liquid debris generated during this step will be drummed, stored, and disposed of off-site as described above for the pilot test above.

After the surface is prepared and cleaned to remove dust and debris via vacuuming or wiping, a primer (if needed) and two coats of the coating will be applied per the manufacturer's instructions. If other activities have occurred after surface preparation and cleaning that generate additional dust, debris, or loose material on the interior surface, e.g., façade rehabilitation, surface preparation will be repeated to the extent

[19] If abatement work is completed during or after building demolition when the interior façade will be exposed, it will be conducted concurrently with other phases of redevelopment construction that require perimeter air monitoring and/or dust control.

needed prior to coating. After coating, the false wall will be constructed along with the other interior construction in the building. A description of the abatement activities will be included in the Completion Report, described in Section 4.7 of the RDIP Addendum.

4.3.4 Pre-Occupancy Indoor Air Sampling

Concurrent with pre-occupancy indoor air sampling for VOCs, indoor air sampling for PCBs will be conducted following construction of the building shell. Details regarding the proposed pre-occupancy indoor air sampling program are provided in Section 4.3 of the main text of the RDIP Addendum.

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Table O-1
Preliminary Concrete Sampling Plan for PCBs
5441 International Boulevard
Oakland, California

Area (a)	Number of Samples (b,c)
Building 1 buried slab	15
Building 4 slab - requested by EPA	1
Building 17 slab - requested by EPA	4
Former Building 6 slab	6
Former Building 7 slab	2
Railroad corridor outside Building 2	5
Oil recovery sump near Building 21	2
Pad outside Building 17	5
Pad outside Buildings 4 and 6	5
Miscellaneous small pads	8
TOTAL	**53**

Abbreviation:
EPA = U.S. Environmental Protection Agency
PCB = Polychlorinated Biphenyl

Notes:
(a) Specific locations for each sample will be determined at the time of sampling based on field observations (e.g., staining, access, type of feature and other considerations). Sampling areas may be added or removed depending on determination by Contractor if feature is appropriate for recycling and placement onsite. If concrete is not intended for placement onsite, it will be characterized and profiled as needed for off-site disposal.
(b) Number of samples is based on the estimated area of the feature and sampling frequency is similar to sampling conducted previously by others for building slabs (approximately 1 sample per 1,600 square feet; see Figures O-1 and O-2).
(c) Samples will be collected in general accordance with EPA Region 1 "Standard Operating Procedure for Sampling Porous Surfaces for PCBs" (EPA, 2011) and analyzed for PCBs by EPA Method 8082 after Soxhlet extraction by EPA Method 3540C.

Reference:
EPA, 2011. Standard Operating Procedure for Sampling Porous Surfaces for Polychlorinated Biphenyls, Office of Environmental Measurement and Evaluation, EPA New England - Region 1, May 2011.

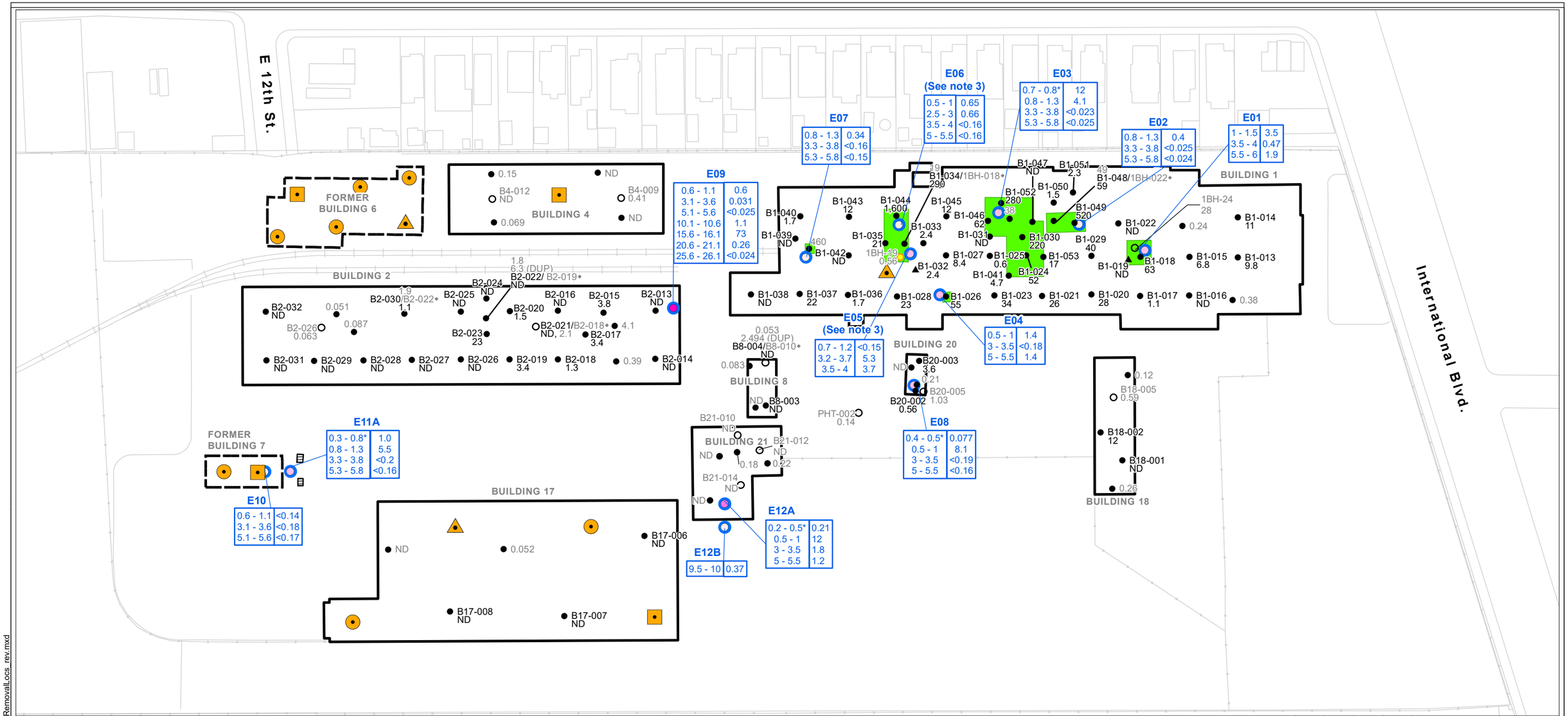
Table O-2
PCB and Lead Sampling Data - Building 1 Perimeter Wall in Office Area
5441 International Boulevard
Oakland, California

Sample ID	Location/Description	Sample Date	Sample Type	Result (mg/kg or as shown)
1B1-BW-CHWP-029	Painted brick wall, south end (double layer of brick)	11/12/2008	6-8" deep core including paint	PCBs = 0.310
				Lead = 86
1B1-BW-CHWP-032	Painted brick wall, second story north	11/12/2008	6-8" deep core including paint	PCBs = 0.191
				Lead = 120
B1-BW-CP-006	Office east perimeter brick wall at entry door (interior, see Note b)	5/14/2010	Chipped brick after paint was removed	PCBs = <0.50
				Lead = NA
B1-BW-CP-006-EX	Office east perimeter brick wall at entry door (exterior, see Note c)	5/18/2010	Chipped brick	PCBs = <0.50
				Lead = 0.03±0.08 mg/cm^2
B1-BW-PP-006	Office east perimeter brick wall at entry door with beige paints	5/14/2010	Chipped/peeling paint; lead measured before (pre) and after (post) decontam-ination and paint removal	PCBs = 18 mg/kg
				Lead (pre) = 1.3±1.5 mg/cm^2
				Lead (post) = 0.00±0.02 mg/cm^2

Abbreviations:
EPA = U.S. Environmental Protection Agency
mg/kg = milligrams per kilogram
mg/cm^2 = milligrams per square centimeter
NA = Not analyzed
PCB = Polychlorinated Biphenyl
< = Compound not detected at or above indicated laboratory detection limit

Notes:
(a) Information in this table is compiled from ARDADIS, 2009, Geosyntec, 2010, or SCA, 2010. Samples were analyzed for PCBs by EPA Method 8082 and lead by EPA Method 6010. Lead data obtained via field screening using x-ray fluorescence technology is reported in mg/cm^2 units. Where applicable, sample IDs were shortened by removing sample date.
(b) Available information indicates that this sample was collected from the interior brick layer of a double layer brick wall.
(c) Available information indicates that this sample was collected from the exterior brick layer of a double layer brick wall that was not painted.

References:
ARCADIS, 2009. Phase I Building Assessment Report. Prepared for General Electric, January.
Geosyntec, 2010. Phase II Building Materials Characterization Report. Prepared for General Electric, July.
SCA, 2010. Summary Report: Phase 2 Hazardous Materials Survey. Prepared for Geosyntec Consultants, June.



Legend for 2018 Data

- Not Detected
- >0 and <1 mg/kg
- >1 and <=10 mg/kg
- >10 and <=25 mg/kg
- >26 and <50 mg/kg
- >50 and <100 mg/kg
- >100 and <1,000 mg/kg
- >1,000 mg/kg
- Proposed PCB concrete sampling location - per USEPA, 2011
- Proposed PCB sampling location plus concrete coring for VOCs, SVOCs, and metals
- Proposed PCB sampling location plus concrete coring for VOCs, SVOCs, metals, and asbestos
- Soil sample location by EKI in 2018
- Existing concrete sample location
- Existing concrete sample location sampled for metals, VOCs and SVOCs in addition to PCBs (ARCADIS, 2009)
- TCE above criteria for concrete placement under new cap
- Existing concrete sample location sampled for VOCs and SVOCs in addition to PCBs (SCA, 2010)
- Former UST
- Former Building
- Existing Building
- Concrete to be Removed, PCBs ≥50 mg/kg

Result Key

ND	Total PCB data (ppm) from ARCADIS 2009 Report (USEPA Method 8082)
B18-029	Partial Sample ID from ARCADIS 2009 Report
B2-022	Partial Sample ID from SCA 2010 Report
B1-032/1BH-018♦	Partial Sample ID from SCA 2010 with Co-Located ARCADIS Sample ID - See Note 4
ND	Total PCB data (ppm) from SCA 2010 Report (USEPA Method 8082)

Soil Sample Depth Range in Feet Below Ground Surface: 0.5 - 1 | 1.4; 3 - 3.5 | <0.18; 5 - 5.5 | 1.4 — PCB Concentration in Soil (mg/kg)

Abbreviations

* = baserock sample
ND = non-detect
mg/kg = milligrams per kilogram
PCBs = polychlorinated biphenyls
ppm = parts per million
SVOCs = semivolatile organic compounds
TCE = trichloroethene
UST = underground storage tank
VOCs = volatile organic compounds

Notes

1. 2018 data collected by EKI and analyzed for PCBs by EPA Method 8082 after extraction by EPA Method 3540C (Soxhlet). Results are reported on a dry weight basis as total PCBs. Baserock samples were collected immediately below slab.
2. Concrete sampling was completed prior to the finalization of the "Standard Operating Procedure (SOP) for Sampling Porous Surfaces for PCBs" (USEPA, 2011).
3. A buried slab was encountered at E06 at a depth of 3-3.5 feet below ground surface and at E05 at a depth of 4 feet below ground surface.
4. Sample locations marked with an diamond (♦) have co-located ARCADIS (2009) and SCA (2010) data but inconsistent sample IDs between the two reports. For these samples, both sample IDs are shown.
5. Proposed concrete sampling locations may be adjusted based on field observations, e.g., staining, or access issues.

Sources

1. Adapted from Figure 1, PCB Concrete Core Sample Results, by Geosyntec Consultants dated April 2013.
2. ARCADIS, 2009. Phase I Building Assessment Report, January 2009.
3. SCA, 2010. Summary Report: Phase 2 Hazardous Materials Survey, June 2010.

0 100 200 Feet

Concrete Sampling and Removal Locations – Existing Building Slabs

DRAFT FINAL

eki environment & water

5441 International Blvd.
Oakland, CA
August 2019
B70123.01

Figure O-1

Path: X:\B70123\Maps_012019\08FigO-1_ExistingBldgSlabConcreteSamplingRemovalLocs_rev.mxd



Legend

- Site Property Boundary
- Anticipated Concrete Sampling Area

Note

1. All locations are approximate.
2. See Table O-1 for number of samples for each feature. Specific locations for each sample will be determined at the time of sampling based on field observations (e.g., staining, access, type of feature and other considerations). Sampling areas may be added or removed depending on determination by Contractor if feature is appropriate for recycling and placement onsite. If concrete is not intended for placement onsite, it will be characterized and profiled as needed for off-site disposal.

Source

1. Imagery: Google Earth Pro, 2017.

N

0 125 250

Feet

Concrete Areas Anticipated for Sampling Pads and Other Features

DRAFT FINAL

eki environment & water

5441 International Blvd.
Oakland, CA
August 2019
B70123.01

Figure O-2

Path: X:\B70123\Maps\...01\2019\08\FigO-2_ConcSampLocs2.mxd

BUILDING MATERIALS SAMPLING MEMORANDUM EKI, 2019

5441 International Boulevard
Oakland, California

11 July 2019

11 July 2019

MEMORANDUM

To:	Brendan Kotler (Bridge)
From:	Deepa Gandhi, P.E. (EKI) Michelle King, Ph.D. (EKI)
Copy to:	Ronald Leach (EPA) Yongsheng Sun (DTSC) Pam Andes, Esq. (Allen Matkins) Lance Hauer (GE) Stephen Jackson (ACC)
Subject:	Building Materials Sampling 5441 International Boulevard, Oakland, California (EKI B70123.01)

This memorandum has been developed by EKI Environment & Water, Inc. ("EKI") to outline the scope of work and approach for sampling certain above-ground building materials at the property located at 5441 International Boulevard, Oakland, California ("the site"). This work is being conducted on behalf of Bridge Acquisition LLC ("Bridge" or "Developer"), who is considering purchase of the property. Three tasks are proposed for this effort, to supplement available information regarding chemicals of concern ("COCs"), particularly polychlorinated biphenyls ("PCBs"), in building materials collected previously on behalf of the current owner, General Electric Company ("GE"), and described in the Phase II Building Materials Characterization Report (Geosyntec, 2010).[1] These tasks are:

- Task 1 – Building 1 Historic Preservation Sampling: The purpose of this sampling will be to assess PCB concentrations in paint on the interior of the Building 1 wall section that is planned to be preserved as part of the redevelopment. The collected data will also be used to assist in the designation of the paint as either PCB bulk product waste or PCB remediation waste for removal and disposal purposes.
- Task 2 – Concrete Sampling: The purpose of this sampling will be to fill data gaps in characterization of concrete that is intended for crushing and placement on-site under the new cap that will be part of the proposed development. Concrete sampling for PCBs will be conducted as described in Appendix O – Site Demolition, of the Draft Remedial Design and Implementation Plan ("RDIP") Addendum (EKI, 2019).[2] Concrete sampling

[1] Geosyntec, 2010. Phase II Building Materials Characterization Report, GE Facility, Oakland, California, Geosyntec Consultants, Inc., July.

[2] EKI, 2019. Draft Remedial Design and Implementation Plan Addendum, 5441 International Boulevard, Oakland, California, April.

for other COCs as requested by the Department of Toxic Substances Control ("DTSC") is described herein.

- Task 3 – General Building Materials Sampling: The purpose of this sampling will be to characterize and profile PCBs in building materials for offsite disposal as part of demolition.

The information collected during the work described herein will be evaluated and reported in the revised Draft RDIP Addendum, along with recommendations for follow-on actions.

BACKGROUND

The site is approximately 24 acres and entirely covered by buildings, asphalt, or asphalt/bentonite caps. The site is currently inactive, and no industrial activities have occurred since 2005. Investigation and remediation of the site are being conducted under the oversight of tDTSC via a 1997 Consent Order. The U.S. Environmental Protection Agency ("EPA") also has an environmental oversight role at the site with respect to PCBs.

BUILDING MATERIALS SAMPLING OVERVIEW

The approach and rationale for the building materials sampling is described for each task below. Implementation methods are described in the following section.

Task 1 – Building 1 Historic Preservation Sampling

The front exterior wall of existing Building 1 is planned for preservation and incorporation into the new development as required by the City of Oakland. The wall facing International Boulevard is planned to be preserved, along with the 35-foot return on either end of the wall. This "U" shaped section of the front of Building 1 is approximately 200 linear feet ("LF"), consists primarily of brick wall and windows, and formerly housed administrative offices. As shown in the photo below, the interior of the wall is painted, and previous sampling indicates that PCBs are present at a concentration of 18 milligrams per kilogram ("mg/kg") in paint as a bulk product (EKI, 2019).

To supplement this data, the following sampling is proposed:

- Up to 20 sampling locations will be selected, at a sampling frequency of 1 location per 100 square feet ("sf") along the approximately 200 LF of painted wall surface. Contiguous 100 sf sampling areas will be measured in the field starting on the northern end of the "U" and following the perimeter wall to the southern end. Sampling areas will not include windows and therefore will be irregularly shaped. The height of the sampling areas will depend on the condition of the building interior, the height of the

drop ceiling and/or mezzanine floor deck, and other safety and access considerations, but is expected to range from 8 to 15 feet. Within each sampling area, a sampling location will be randomly selected.

- Up to 5 additional targeted sampling locations will be selected based on observed field conditions, e.g., staining or differences in paint color, layering, or type.
- At each location, the following samples will be collected:
    - A wipe sample, as described in ASTM D6661-17 (ASTM, 2017);[3]
    - After decontamination of the paint surface using the double wash/rinse method described in 40 Code of Federal Regulations 761 Subpart S, a paint sample will be collected. The paint will be removed (chipped or peeled using hand tools) consistent with EPA Region 1 Standard Operating Procedure for Sampling Porous Surfaces for PCBs ("EPA SOP"; EPA, 2011).[4]
- Wipe and paint samples will be analyzed for PCBs using EPA Method 8082 after extraction by EPA Method 3540C (Soxhlet).



[3] ASTM, 2017. Standard Practice for Field Collection of Organic Compounds from Surfaces using Wipe Sampling, ASTM D6661-17, ASTM International, West Conshohocken, PA, December 2017.

[4] EPA, 2011. Standard Operating Procedure for Sampling Porous Surfaces for Polychlorinated Biphenyls (PCBs), The Office of Environmental Measurement and Evaluation, EPA New England - Region 1, May.

Task 2 – Concrete Sampling

Concrete sampling for PCBs will be conducted as described in Appendix O, Section 2 of EKI (2019).[5] In addition, concrete cores from select locations will be analyzed for other COCs to document COC concentrations for concrete that will be crushed and placed as fill under the cap. The Contractor has estimated that approximately 11,000 cubic yards ("cy") of concrete is planned to be crushed and placed as fill under the cap. A total of eighteen samples would be needed to satisfy the sampling frequency recommendations in Information Advisory Clean Imported Fill Material ("DTSC Fill Guidance;" DTSC, 2001).[6,7] In previous work performed by GE and reported by Geosyntec (2010), 13 concrete core samples and one duplicate were collected from stained areas and analyzed for volatile organic compounds ("VOCs"), semi-volatile organic compounds ("SVOCs"), and California Title 22 metals. Two additional concrete core samples were collected for VOC and SVOC analysis from the Building 1 slab. These results are provided in Table 1, with sampling location information presented in Table 2 and on Figure 1. Seven additional samples will be collected to supplement this data from the approximate locations shown on Figure 1 as follows:

- A 3- to 4-inch diameter concrete core will be collected from the full thickness of the concrete feature (e.g., slab or pad), up to a thickness of 12 inches.
- Sampling locations may be adjusted in the field based on field observations such as staining or access considerations.
- The concrete cores will be submitted to laboratory for:
    - Crushing and grinding;
    - Subsampling and performance of these analyses:
        - California Title 22 Metals using EPA Method 6020 and EPA Method 7471;
        - SVOCs using EPA Method 8270C; and
        - VOCs using EPA Method 8260B.
    - Three samples will also be analyzed for asbestos using California Air Resource Board Method 435 (polarized light microscopy).

[5] Sampling of the Building 1 buried slab will be conducted during a separate mobilization during demolition, as access to this slab for sampling will not be possible until the upper slab is demolished, and the buried slab is uncovered.

[6] DTSC, 2001. Information Advisory Clean Imported Fill Material, California Department of Toxic Substances Control, October 2001.

[7] The sampling frequency recommended by DTSC, 2001 is: 4 samples for the first 1,000 cy, 1 sample for each 500 cy after 1,000 cy and up to a total of 5,000 cy, and 1 sample per 1,000 cy after 5,000 cy.

Task 3 – General Building Materials Sampling

As reported in Geosyntec (2010), PCBs are present in various above-ground building materials at the site. To prepare a demolition and disposal plan for these materials, ACC Environmental Consultants of Oakland, California ("ACC"), has proposed collection of up to 120 samples of suspected PCB-containing products including exterior caulkings and sealants, window gaskets, and flooring adhesives. Sampling will be conducted to meet the Bay Area Storm Water Management Agencies Associated Protocol dated August 2018, and to allow profiling and identification of disposal facilities. ACC's sampling plan is included in Attachment A.

IMPLEMENTATION SCOPE OF WORK AND APPROACH

- Project preparation, which will include:
  - preparation of a site-specific health and safety plan by ACC, whose staff will be performing all the sampling;
  - one scoping visit to the site to enter buildings and plan sampling locations; and
  - coordination and contracting with sampling and laboratory contractors.
- Field work will include collection of building materials samples as described above.
- Personnel on-site when the cap is breached during Task 2 – Concrete Sampling will be 40-hour HAZWOPER trained. ACC will transmit its health and safety plan to DTSC once it is prepared.
- Samples will be collected as described above. Non-disposable sampling equipment will be cleaned between locations using decontamination procedures consistent with the EPA SOP. Samples will be placed in pre-cleaned glass jars provided by the analytical laboratory. Jars will be labeled with a unique identification number and placed in a chilled cooler for transport to the analytical laboratory under chain-of-custody procedure. Samples will be analyzed using the methods described above on a standard 10-day turnaround time from the receipt of the samples by the laboratory.
- After coring is complete at the selected seven locations, holes will be grouted. Grout will be allowed to settle and topped off as needed prior to restoring the ground surface to match existing conditions with quickset concrete. Other sampling locations will be left as-is and not restored.
- Investigation-derived wastes, including decontamination materials and personal protective equipment, will be placed in sealed drums, labeled, and stored on-site at a location coordinated with GE or its representatives, pending profiling and disposal in accordance with applicable laws and regulations.
- Results will be tabulated into summary data tables with an accompanying sample location figure for discussion with project stakeholders. Information collected during this work will be evaluated and reported in the revised Draft RDIP Addendum, along with recommendations for follow-on actions.

ATTACHMENTS

Table 1: Concrete Sampling Results
Table 2: Concrete Sampling Locations and Descriptions
Figure 1: Concrete Sampling Locations
Attachment A: Suspect PCB-Containing Materials Sampling Plan (ACC Environmental Consultants)

Table 1

Concrete Sampling Results[a,b,c]

5441 International Boulevard

Oakland, California

Sample ID		1BH-CF-CHWP-019	1BH-CF-CHWP-024	B2-CF-CHWP-018	B2-CF-CHWP-026	B4-CF-CHWP-009	B4-CF-CHWP-012	B8-CF-CHWP-010	B8-CF-CHWP-010 DUP	B18-CF-CHWP-005	B20-CF-CHWP-005	B21-CF-CHWP-010	B21-CF-CHWP-012	B21-CF-CHWP-014	PHT-CF-CHWP-002	B1-CF-CP-019	B1-CF-CP-032
Figure 1 Sample ID		1BH-019	1BH-024	B2-018	B2-026	B4-009	B4-012	B8-010	B8-010	B18-005	B20-005	B21-010	B21-012	B21-014	PHT-002	SCA-019	SCA-032
Date Collected		11/11/2008	11/11/2008	11/12/2008	11/13/2008	11/10/2008	11/10/2008	11/12/2008	11/12/2008	11/7/2008	11/10/2008	11/13/2008	11/14/2008	11/14/2008	11/10/2018	5/20/2010	5/20/2010
Depth	in	6 - 8	2	6 - 8	6	6	6	6	6	6	6	6	8	3 - 4	6	1 -3 (d)	1 - 3 (d)
TCLP METALS																	
Barium	mg/L	0.34	0.42	0.21	0.56	0.43	0.46	1.1	1.3	0.29	0.34	0.49	0.44	0.89	0.34	NA	NA
Chromium	mg/L	NA	<0.10	<0.10	<0.10	<0.10	<0.10	0.11	0.10	0.15	<0.10	<0.10	<0.10	<0.10	0.20	NA	NA
TOTAL METALS																	
Mercury	mg/kg	0.026	0.069	0.024	0.04	0.020	0.028	0.045	0.034	0.024	0.026	0.032	0.023	0.068	0.025	NA	NA
Arsenic	mg/kg	4.2	4.1	4.2	4.4	2.5	4.1	3.8	4.4	4.2	3.8	3.5	ND	ND	3.0	NA	NA
Barium	mg/kg	100	100	110 M2	150	79	100	230	340	130	110	130	120	160	140	NA	NA
Cadmium	mg/kg	ND	0.70	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	NA	NA
Chromium	mg/kg	37	44	46	45	19	30	53	56	39 M2	29	43	38	44	35	NA	NA
Cobalt	mg/kg	6.5	9.2	6.5 M2	7.6	4.2	5.9	7.5	6.9	9.2 M2	7.0	7.9	6.5	6.4	6.9	NA	NA
Copper	mg/kg	25	86	21.0	26.0	23.0	29	21	25	32 M2	29	23	19	22	24	NA	NA
Lead	mg/kg	4.8	14	4.1 M2	6.9	2.3	4.1	4.7	4.6	4.4 M2	3.6	3.4	3.3	2.9	4.5	NA	NA
Molybdenum	mg/kg	NA	<2.0	<2.0	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NA	NA
Nickel	mg/kg	31	47	39 M2	46	22	33	47	43	40 M2	30	38	45	48	34	NA	NA
Silver	mg/kg	ND	1.8	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NA	NA
Vanadium	mg/kg	30	33	33	34	14	24	48	55	33 M2	26	45	33	44	54	NA	NA
Zinc	mg/kg	41	59	30 M2	27	38	49	37	36	48 M2	49	32	28	32	33	NA	NA
TCLP VOCs																	
p-Isopropyltoluene	mg/L	ND	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	NA	NA
1,1,1-Trichloroethane	mg/L	0.030	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	NA	NA
Trichloroethene	mg/L	0.27	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	NA	NA
TOTAL VOCs																	
Benzene	mg/kg	NA	<0.099	<0.099	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.099	<0.10	<0.099	<0.099	<0.099	0.0012	<0.0005
Styrene	mg/kg	NA	<0.099	<0.099	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.099	<0.10	<0.099	<0.099	<0.099	0.0013	<0.0005
Isopropylbenzene	mg/kg	NA	<0.099	<0.099	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.099	0.14	<0.099	0.33	<0.099	NA	NA
p-Isopropyltoluene	mg/kg	ND	<0.099	<0.099	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.099	<0.10	<0.099	<0.099	<0.099	NA	NA
Naphthalene	mg/kg	ND	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.0005	0.0034
n-Propylbenzene	mg/kg	ND	<0.099	<0.099	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.099	<0.10	<0.099	0.49	<0.099	<0.0005	<0.0005
1,2,4-Trichlorobenzene	mg/kg	ND	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.0005	<0.0005
1,2,4-Trimethylbenzene	mg/kg	ND	0.25	<0.099	<0.10	<0.10	<0.10	0.17	0.11	<0.10	<0.099	1.4 L	0.76 L	4.9 L	<0.099	<0.0005	0.001
1,3,5-Trimethylbenzene	mg/kg	ND	0.11	<0.099	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.099	1.3	0.58	2.3	<0.099	<0.0005	0.00066
m,p-Xylenes	mg/kg	4	1.10	<0.099	<0.10	<0.10	<0.10	1.4	0.83	<0.10	<0.099	<0.10	<0.099	<0.099	<0.099	NA	NA
o-Xylene	mg/kg	11	0.68	<0.099	<0.10	<0.10	<0.10	0.24	0.14	<0.10	<0.099	<0.10	<0.099	0.18	<0.099	NA	NA
1,1-Dichloroethene	mg/kg	2	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.0005	<0.0005
1,2-Dichlorobenzene	mg/kg	NA	<0.099	<0.099	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.099	<0.10	<0.099	<0.099	<0.099	0.0012	0.0026

Table 1

Concrete Sampling Results[a,b,c]

5441 International Boulevard

Oakland, California

Sample ID		1BH-CF-CHWP-019	1BH-CF-CHWP-024	B2-CF-CHWP-018	B2-CF-CHWP-026	B4-CF-CHWP-009	B4-CF-CHWP-012	B8-CF-CHWP-010	B8-CF-CHWP-010 DUP	B18-CF-CHWP-005	B20-CF-CHWP-005	B21-CF-CHWP-010	B21-CF-CHWP-012	B21-CF-CHWP-014	PHT-CF-CHWP-002	B1-CF-CP-019	B1-CF-CP-032
Ethylbenzene	mg/kg	1	0.19	<0.099	<0.10	<0.10	<0.10	0.37	0.22	<0.10	<0.099	<0.10	<0.099	<0.099	<0.099	0.00057	<0.0005
Toluene	mg/kg	0.96	<0.099	<0.099	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.099	<0.10	<0.099	<0.099	<0.099	<0.005	<0.005
1,1,1-Trichloroethane	mg/kg	40	<0.099	<0.099	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.099	<0.10	<0.099	<0.099	<0.099	<0.0005	<0.0005
Trichloroethene	mg/kg	63	<0.099	<0.099	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.099	<0.10	<0.099	<0.099	<0.099	<0.005	<0.005
Xylenes	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0035	0.0017
TCLP SVOCs																	
4-Methylphenol	mg/L	ND	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	NA	NA
Benzyl alcohol	mg/L	1.5 M1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	NA	NA
Phenol	mg/L	NA	<0.050	<0.050	<0.050	<0.050	<0.050	0.31	0.10	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	NA	NA
TOTAL SVOCs																	
4-Methylphenol	mg/kg	ND	<33	<8.3	<1.7	<8.3	<8.3	<1.7	<8.3	<33	<17	<6.7	<0.67	<0.33	<8.3	<1.6	<0.33
Isophorone	mg/kg	NA	<33	18 RL3	<1.7	17 RL3	12 RL3	<1.7	10 RL3	<33	<17	14 RL3	<0.67	<0.33	10 RL3	<1.6	<0.33
Benzyl alcohol	mg/kg	54	<33	<8.3	<1.7	<8.3	<8.3	<1.7	<8.3	<33	<17	<6.7	<0.67	<0.33	<8.3	<8.0	<1.6
Butyl benzyl phthalate	mg/kg	ND	<33	<8.3	<1.7	<8.3	<8.3	<1.7	<8.3	<33	<17	<6.7	<0.67	<0.33	<8.3	<1.6	<0.33
Di-n-butyl phthalate	mg/kg	ND	<33	<8.3	<1.7	<8.3	<8.3	<1.7	<8.3	<33	<17	<6.7	<0.67	<0.33	<8.3	<1.6	<0.33
Phenol	mg/kg	NA	<33	<8.3	<1.7	<8.3	<8.3	<1.7	<8.3	<33	<17	<6.7	<0.67	<0.33	<8.3	3.3	<0.33
IGNITABILITY, CORROSIVITY																	
Ignitability	SU	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA
pH	pH units	12.2	9.49	12.2 H-1	12.3 H-1	12.2	12.2	12.1	12.2	12	12.2	12.2 H-1	12.2 H-1	8.55 H-1	12.3	NA	NA

Abbreviations:

1BH = Building 1
B# = Building number sample was taken fom
PHT = Pump house
CF = concrete floor
CHWP = Core, hazardous waste characterization and polychorinated biphenyl (PCB)
CP = core PCB
DUP = duplicate sample
in = inches
L= Laboratory control sample and/or Laboratory Control Sample Duplicate recovery was above acceptance limits.
M1 = The MS and/or MSD were above the acceptance limits due to sample matrix interference. See Blank Spike.
M2 = The MS and/or MSD were below the acceptance limits due to sample matrix interference.
M3 = Results exceeded the linear range in the MS/MSD and therefore are not available for reporting.
mg/kg = milligrams per kilogram
mg/L = milligrams per liter
PHT = Pump house
NA = Data not available
ND or "<" = Constituent not detected at a concentration above the reported detection limit.
RL1 = Reporting limit raised due to sample matrix effects.
RL3 = Reporting limit raised due to high concentrations of non-target analytes.
STLC = Soluble Threshold Limit Concentration from 22 CCR 66261.24.
SU = Standard units
SVOCs = Semi-volatile organic compounds
TCLP = Toxicity Characteristic Leaching Procedure
VOCs = Volatile organic compounds

References:

ARCADIS, 2009. Draft Phase I Building Assessment Report. Prepared for General Electric, January.
SCA, 2010. Summary Report: Phase 2 Hazardous Materials Survey. Prepared for Geosyntec Consultants, June.

Notes:

a. Except for B1-CF-CP-019 and B1-CF-CP-032, sample depths, dates, and results were compiled from ARCADIS, 2009 Tables 2A through 12C. As reported in ARCADIS, 2009, samples were analyzed by TestAmerica Laboratories, Inc. located in Irvine, CA for:
- -TCLP VOCs using United States Environmental Protection Agency (USEPA) SW-1311 Method 8260
- -TCLP SVOCs using USEPA SW-1311 Method 8270
- -TCLP Metals using USEPA SW-1311 Methods 7470, 6010
- -Ignitability using USEPA SW-1010
- -Corrosivity using USEPA SW-9045
- -VOCs using USEPA SW-846 Method 8260
- -SVOCs using USEPA SW-846 Method 8270
- -Total metals using USEPA SW-846 Method 6010

b. Sample results and dates for B1-CF-CP-019 and B1-CF-CP-032 were compiled from SCA,2010 "Summary of Sampling Results" table or available laboratory report. Samples were analyzed by McCampbell Analytical, Inc. located in Pittsburg, CA for VOCs and SVOCs using EPA methods indicated in Note a.

c. Only detected constituents are listed in the table above.

d. Sample depths obtained from Sections 3.3 and 3.4 of SCA, 2010.

Table 2
Concrete Sampling Locations and Descriptions
5441 International Boulevard
Oakland, California

Reported Sample ID	Figure 1 Sample ID	Location and Description	Depth (in)
1BH-CF-CHWP-019	1BH-019	Concrete floor. 1/4" sealant layer present	6 - 8
1BH-CF-CHWP-024	1BH-024	Concrete floor. East central. Thin slab. 1/8" thick sealant.	2
B2-CF-CHWP-018	B2-018	Concrete floor. Central location. Light staining.	6 - 8
B2-CF-CHWP-026	B2-026	Painted brick wall. West central.	6
B4-CF-CHWP-009	B4-009	Concrete floor. East-Central.	6
B4-CF-CHWP-012	B4-012	Concrete floor. West-Central. Light color fading.	6
B8-CF-CHWP-010	B8-010	Concrete floor. North room. Sandblasting area	6
B8-CF-CHWP-010 DUP	B8-010	dup	6
B18-CF-CHWP-005	B18-005	Concrete floor. Center.	6
B20-CF-CHWP-005	B20-005	Concrete floor. Containment area.	6
B21-CF-CHWP-010	B21-010	Painted/ sealed concrete floor. North central. Slab >6" thick.	6
B21-CF-CHWP-012	B21-012	Painted/ sealed concrete floor. North. Near oil receiving tank. Refusal.	8
B21-CF-CHWP-014	B21-014	Painted/ Sealed containment. Near tank 3. 1/2" thick layer of extra concrete/seal. Thin slab.	3 - 4
PHT-CF-CHWP-002	PHT-002	Concrete floor. Center. Dusty.	6
B1-CF-CP-019	SCA-019	Shop interior. Central east. Concrete floor.	1 -3
B1-CF-CP-032	SCA-032	Shop interior. Central west. Concrete floor.	1 - 3

Abbreviations:

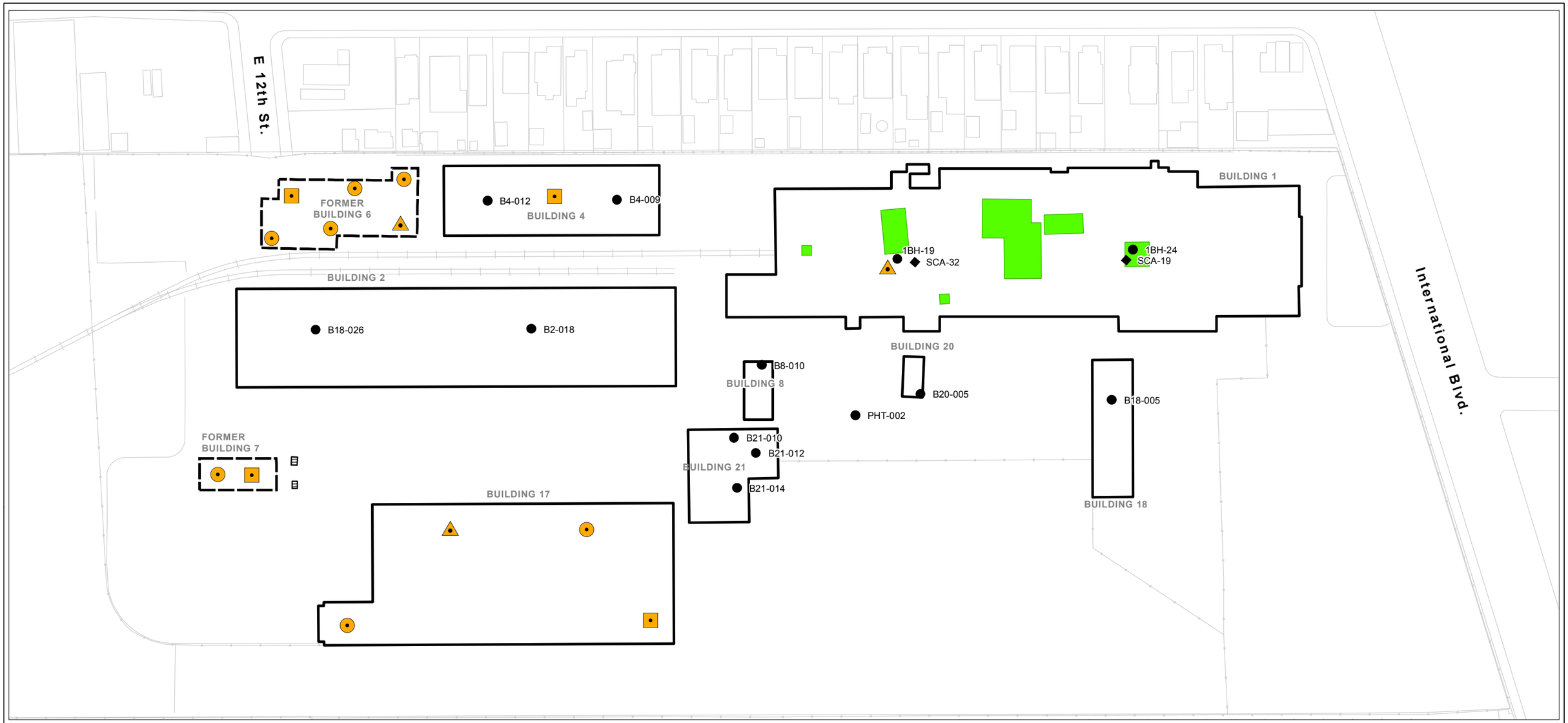
1BH = Building 1
B# = Building number
PHT = Pump house
CF = concrete floor
CHWP = Core - hazardous waste characterization and PCB
CP = Core PCB
DUP = duplicate sample
in = inches
PCB = polychlorinated biphenyls

References:

ARCADIS, 2009. Draft Phase I Building Assessment Report. Prepared for General Electric, January.
SCA, 2010. Summary Report: Phase 2 Hazardous Materials Survey. Prepared for Geosyntec Consultants, June.

Notes:

a. Except for B1-CF-CP-019 and B1-CF-CP-032, sample depths, locations, and descriptions were compiled from ARCADIS, 2009, including Tables 2A through 12C.
b. Sample depths, locations, and descriptions for B1-CF-CP-019 and B1-CF-CP-032 were compiled from SCA,2010, including table "Summary of Sampling Results."



Legend

- Concrete sample location fom ARCADIS, 2009
- Concrete sample location from SCA, 2010
- Proposed PCB concrete sampling locations - per USEPA, 2011
- PCB sampling location plus concrete coring for VOCs, SVOCs, and metals
- PCB Sampling location plus concrete coring for VOCs, SVOCs, metals, and asbestos
- Former building
- Existing building
- Concrete to be removed, PCBs ≥50 mg/kg
- Former UST

Abbreviations

mg/kg = milligrams per kilogram
PCBs = polychlorinated biphenyls
SVOCs = semivolatile organic compounds
VOCs = volatile organic compounds

Note

1. Sampling locations maybe adjusted based on field observations, (e.g., staining or access issues).

Source

1. ARCADIS, 2009. Phase I Building Assessment Report, January 2009.
2. SCA, 2010. Summary Report: Phase 2 Hazardous Materials Survey, June 2010.
3. USEPA, 2011. Standard Operating Procedure (SOP) for Sampling Surfaces for PCBs.

0 100 200
Feet

Concrete Sampling Locations

5441 International Blvd.
Oakland, CA
July 2019
B70123.01
Figure 1

eki environment & water

Path: X:\B70123\Maps\...01\2019\07\Fig1_ConcreteSamplingLocs.mxd

Attachment A

Suspect PCB-Containing Materials Sampling Plan

(ACC Environmental Consultants)

A·C·C ENVIRONMENTAL CONSULTANTS
An Employee Owned Company

Suspect PCB-Containing Materials Sampling Plan
5441 International Boulevard
Oakland, California

ACC proposes to collect samples of suspect PCB-containing materials following the Bay Area Stormwater Management Agencies Association (BASMAA) Protocol for Evaluating Priority PCB-Containing Materials before Building Demolition (August, 2018) ("The Protocol").

Visual Inspection
ACC will conduct a visual inspection to identify suspect PCB-containing materials described in The Protocol from the interior and exterior of each of the following buildings/structures:

- Building 1
- Building 2
- Building 3
- Building 4
- Building 8
- Building 17
- Building 18
- Building 20
- Building 21
- Miscellaneous Slabs (Expansion Joint Sealant Systems Only)
- Slab at Former Building 6 (Expansion Joint Sealant Systems Only)

During the visual inspection, ACC will quantify any of the suspect PCB-containing materials referenced in The Protocol. After the suspect materials are quantified samples of each material will be collected at the frequency described in the tables below.

Table 1
Sampling of Window, Door Frame and Expansion Joint Caulking

Quantity of Material Identified	Number of Sample to Collect
< 50 linear feet	1 sample
51-250 linear feet	3 samples
251-1,000 linear feet	5 samples
1,001-2,500 linear feet	7 samples
>2,500 linear feet	9 samples

Table 2
Sampling of Thermal System Insulation

Type of Material	Number of Sample to Collect
Each Homogeneous Material	Minimum of 1 sample per material

Table 3
Sampling of Adhesive/Mastic

Type of Material	Number of Sample to Collect
<1,000 square feet	3 samples
1,001-5,000 square feet	5 samples
>5,000 square feet	7 samples

Table 4
Rubber Window Seals/Gaskets

Quantity of Material Identified	Number of Sample to Collect
< 50 linear feet	1 sample
51-250 linear feet	3 samples
251-1,000 linear feet	5 samples
1,001-2,500 linear feet	7 samples
>2,500 linear feet	9 samples

Sample Collection and Analysis

Non-disposable sampling equipment will be cleaned between locations using decontamination procedures consistent with the EPA SOP.

Samples collected to evaluate building materials for PCBs will be analyzed for Aroclors by EPA Method 8082/8082A after Soxhlet extraction by EPA Method 3540C by an accredited analytical laboratory. The minimum reporting limit will be 50 micrograms per kilogram (µg/kg). Samples will immediately be chilled in an ice cooler and then kept at 4 degrees Celsius (39.2 degrees Fahrenheit) or colder during storage and transportation to the laboratory. Proper chain-of-custody procedures will be followed from the time the samples are collected until they are delivered to the laboratory for analysis.

APPENDIX P

RESPONSE TO COMMENTS ON DRAFT RDIP ADDENDUM

5441 International Boulevard
Oakland, California

Draft Final – October 2019

(EKI B70123.01)

APPENDIX P
RESPONSE TO COMMENTS ON DRAFT RDIP ADDENDUM

5441 International Boulevard
Oakland, California

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1. INTRODUCTION

EKI Environment & Water, Inc. ("EKI")[1] has prepared this response to the comment letters listed below received from the California Environmental Protection Agency, Department of Toxic Substances Control ("DTSC") and United States Environmental Protection Agency ("EPA") regarding the 19 April 2019 Draft Remedial Design and Implementation Plan ("RDIP") Addendum[2] and the 26 August 2019 Draft Final RDIP Addendum[3] prepared on behalf of Bridge Acquisition, LLC ("Bridge" or "Developer") for the property located at 5441 International Boulevard in Oakland, California.

- EPA, 2019. Letter from Steve Armann, Manager, Corrective Action Office - *Re: EPA Comments on TSCA Approval Application, April 19, 2019,* dated 12 July 2019 (Section 2).

- DTSC, 2019c. Memorandum from Renato A. Medrano, PG, Geological Services Unit ("GSU"), Site Mitigation and Restoration Program- *Draft Remedial Design and Implementation Plan (RDIP) Addendum, 5441 International Boulevard, Oakland, California*, dated 24 June 2019 (Section 3).

- DTSC, 2019d. Memorandum from Coby Graham, CIH, Health and Safety Program ("HSP") – *Review of Perimeter Air Monitoring Plan and Dust Control Plan for Redevelopment Activities, 5441 International Boulevard, Oakland, California: April 2019*, dated 24 June 2019 (Section 4).

- DTSC, 2019b. Memorandum from Chinh Q. Vu, PE, Engineering and Special Projects Office ("ESPO"), Sacramento –*Draft Remedial Design and Implementation Plan Addendum - 5441 International Boulevard, Oakland, California (Site Code 202244)*, dated 19 June 2019 (Section 5).

- DTSC, 2019e. Comments from DTSC's Toxicologist, provided via email by Yongsheng Sun, DTSC, on 3 July 2019 (See Section 6).

- DTSC, 2019g. Comments from DTSC regarding the vapor intrusion mitigation system ("VIMS"), provided via email by Yongsheng Sun, DTSC, on 12 August 2019 (See Section 7).

[1] As indicated, certain responses were prepared by the property owner, General Electric Company ("GE") or Wood Environment and Infrastructure Solutions, Inc. ("Wood").
[2] The RDIP Addendum (EKI, 2019a), along with transmittal letter dated 13 May 2019 (EKI, 2019b) comprises the Toxic Substances Control Act ("TSCA") Application to EPA for approval of a risk-based polychlorinated biphenyl ("PCB") cleanup and disposal.
[3] The Draft Final RDIP Addendum (EKI, 2019d), along with transmittal letter (EKI, 2019e).

- DTSC, 2019a. Memorandum from Coby Graham, CIH, Health and Safety Program – *Review of Health and Safety Plan for Redevelopment Activities, 5441 International Boulevard, Oakland, California: April 2019*, dated 14 June 2019 (Section 8).

- DTSC, 2019h. Memorandum from Chinh Q. Vu, PE, ESPO, Sacramento –*Draft Remedial Design and Implementation Plan Addendum - 5441 International Boulevard, Oakland, California (Site Code 202244)*, dated 24 September 2019 (Section 9).

In the following sections, DTSC and EPA staff comments are listed in italic font and are numbered to match the staff memoranda, where applicable. Responses follow each comment. Where changes to the document have been made, the impacted sections or parts of the Draft Final RDIP Addendum (August 2019, revised October 2019), to which this response to comments ("RTCs") document is an Appendix, have been cited. Note that due to the addition of sections, the section numbering has changed accordingly; previous section numbers from the April 2019 Draft RDIP Addendum are referred to as "former" while the section numbering for the Draft Final RDIP Addendum (August 2019, revised 2019) are referred to as "current."

2. EPA LETTER FROM CORRECTIVE ACTION OFFICE

This section contains responses to comments from Steve Armann of the EPA's Corrective Action Office, dated 12 July 2019.

General Comments

2.1 Comment 1

Application Title Change Needed, Certification Letter and TSCA Application, General Comment. *The proposed title of the TSCA Application as provided in the May 13, 2019 transmittal letter is "Toxic Substances Control Act (TSCA) risk-based disposal approval application." The title does not include any references to the PCB cleanup work that is included in the Draft Remedial Design Implementation Plan (RDIP) Addendum. We suggest that the title be changed to read as follows: "Toxic Substances Control Act (TSCA) Application for a Risk- Based PCB Cleanup and Disposal Approval."*

Response: The requested title change has been made to the TSCA Application and transmittal letter.

2.2 Comment 2

Discussion of Public Notification of Construction Activities Needed, General Comment. *Include a new section that discusses how the local residents and community will be notified about the project and the start of construction activities at the site. For example, there needs to be signs placed at key locations explaining what is going on and who to contact with concerns and questions. Similar language should also be added in the Dust Control Plan and Air Monitoring Plan.*

Response: The requested discussion has been added as Section 3.1.5 to the Draft Final RDIP Addendum. Similar language has been added to the Dust Control Plan ("DCP") and Perimeter Air Monitoring Plan ("AMP").

Certification Transmittal Letter

2.3 Comment 3

Clarifications Needed - Certification and Request for Action Pursuant to 40 CFR Part 761. *The Transmittal Letter dated May 13, 2019 states it "serves as certification" and the application is being submitted "in collaboration with the property owner, General Electric Company (GE) with the same reservation of rights reserved previously by GE, to challenge the application of 40 CFR 761.61 to the remediation, should that prove necessary." First, the application should state clearly who is certifying. Certification*

language should not be ambiguous.[4] Second, EPA's May 2013 approval states that "GE's cleanup activity is subject to regulation under TSCA. Moreover, by submitting a risk-based cleanup application and implementing the requirements set forth in this Approval, GE has accepted such applicability." That remains our position. EPA must have reason to conclude that conditions placed on the approval, in order to ensure no unreasonable risk to human health and the environment, will be honored and fulfilled by the project applicants. Remove from the application language that undercuts the commitment of the project applicants to implement the terms of a conditional approval issued by EPA pursuant to 40 CFR 761.61.

Response: The language in the transmittal letter has been modified as requested.

2.4 Comment 4

Clarification Needed - EPA Concurrence on Bridge's Proposed PCB Cleanup Plan, May 13, 2019 TSCA Application Transmittal Letter, First Paragraph. *The last sentence of the first paragraph states that "In addition, Bridge's consultant, EKI Environment & Water, Inc. (EKI) submitted a memorandum to EPA on November 8, 2018 outlining Bridge's PCB cleanup plan for the subject property, which received EPA concurrence (with comments) on December 6, 2018." To clarify, EPA provided written comments on the November 8, 2018 memorandum which outlined the key components of Bridge's proposed PCB cleanup plan for the redevelopment. We had discussions regarding possible technical approaches for the PCB cleanup, but did not "concur" on the memorandum or any particular cleanup approach. Please revise the cover letter and TSCA Application to delete any references to EPA's concurrence.*

Response: Reference to EPA's concurrence has been removed from the transmittal letter.

Draft Remedial Design and Implementation Plan (RDIP) Addendum

2.5 Comment 5

Discussion of Toxic Substances Control Act Application Needed, Section 1, Introduction, Page 1. *The Introduction Section does not sufficiently discuss the Toxic Substances Control Act (TSCA) Application in relation to the RDIP Addendum. We suggest that the following language be added as a second paragraph to Section 1: "The RDIP Addendum constitutes both a new Toxic Substances Control Act ("TSCA") Application for a Risk-*

[4] 40 CFR 761.3 defines Certification to mean a written statement regarding a specific fact or representation that contains the following language: Under civil and criminal penalties of law for the making or submission of false or fraudulent statements or representations (18 U.S.C. 1001 and 15 U.S.C. 2615), I certify that the information contained in or accompanying this document is true, accurate, and complete. As to the identified section(s) of this document for which I cannot personally verify truth and accuracy, I certify as the company official having supervisory responsibility for the persons who, acting under my direct instructions, made the verification that this information is true, accurate, and complete.

Based PCB Cleanup and Disposal Approval and a modification of the 2012 RDIP approved by the California Department of Toxic Substances Control ("DTSC"). The RDIP Addendum/TSCA Application presents a new cleanup plan that accommodates the redevelopment and modifies elements of (1) the RDIP DTSC approved in 2012, and (2) the TSCA Application U.S. EPA approved in 2013."

Response: The requested edit has been made to Section 1 of the Draft Final RDIP Addendum main text.

2.6 Comment 6

Discussion of Roles and Responsibilities Needed, Section 1, Introduction, Page 1. *Section 1 should be revised to include a discussion of the roles and responsibilities (including financial responsibilities) of General Electric and Bridge for each stage of the project including post construction. Be clear and specific in delineating the roles and responsibilities for compliance with TSCA and assurance of financial responsibility.*

Response: A new section, Section 1.4.2, has been added with the requested information.

2.7 Comment 7

Clarification of Land Use Covenant Requirements Needed, Section 1.4, Remedy Implementation Under Redevelopment, Page 4 and Section 4.5, Land Use Controls, Page 45. *The discussion on Pages 4 and 45 of the RDIP Addendum state that the Land Use Covenant (LUC) "..... prohibits penetration of the cap except after notification of DTSC and EPA". The current LUC was signed in 1993 and does not include notification of EPA prior to penetrating the site cap. EPA was not a party to the 1993 LUC for the General Electric Site, although EPA's May 2013 approval included a condition that the LUC must be amended to add EPA as a third party beneficiary with enforcement rights to the LUC and revise the LUC to include a discussion of the PCB soil contamination at the site. The RDIP also states that DTSC, EPA and GE have prepared a revised LUC. EPA understands that this revised document is still a draft. Please clarify if that is the situation. The LUC will need to be updated to reflect the new development plans. Please revise the discussions in Sections 1.4 and 4.5 to (1) delete EPA from the reference to the 1993 LUC, (2) add language indicating that the LUC will be updated to include the new development plans, (3) discuss the timing for updating and filing of a revised LUC (e.g., will EPA be added as a third party beneficiary before the property is transferred to Bridge?), and (4) indicate that the LUC and soil management plan (Section 4.5.1) will identify known contaminants along with their concentrations that are being left on site.*

Response: The sections Remedy Implementation under Redevelopment (former Section 1.4, current Section 1.4.1) and Land Use Controls (former Section 4.5, current Section 4.6) have been updated as requested.

2.8 Comment 8

Clarification of Hazardous Waste Needed, Section 2.1.3, Other Soil Excavation, Page 14. *This first sentence of Section 2.1.3 states that "known locations of PCBs in soil above hazardous waste levels (PCB concentrations of 50 mg/kg or greater) will be excavated"*

Please revise this sentence to add the word "California" before the word "hazardous". This change is needed to clarify that the reference is to California state regulations. The PCB Regulations issued pursuant to the Toxic Substances Control Act do not define "hazardous waste" but rather define "PCB waste." PCB waste, which is regulated for disposal under Subpart D of 40 CFR Part 761, may include wastes that have PCB concentrations of less than 50 mg/kg.

Response: The requested edit has been made to Section 2.1.3 of the Draft Final RDIP Addendum main text.

2.9 Comment 9

Submission of Documents to U.S. EPA, Section 3.2, Preparation of Plans, Page 24. *The last paragraph of Section 3.2 indicates that a Completion Report will be submitted to DTSC. EPA should also receive a copy of the Completion Report along with any other pertinent documents related to the TSCA Application.*

Response: The requested edit has been made to Section 3.2 of the Draft Final RDIP Addendum main text.

2.10 Comment 10

Clarification of "on-site reuse of decontamination wastes", Section 3.2.2, Decontamination Plan, Page 25. *The last sentence of the first paragraph mentions the "on-site reuse of decontamination wastes". Please clarify how decontamination wastes will be reused onsite.*

Response: As described in Appendix I, Decontamination Plan, reuse of decontamination wastes onsite would include placement of access road materials and soil and sediment decontamination waste under the new permanent cap to be constructed. Text has been added to Section 3.2.2 of the Draft Final RDIP Addendum for clarification.

2.11 Comment 11

Notification of EPA if Unknown Underground Structures Uncovered, Section 3.10, Management of Known and Unknown Underground Structures Uncovered during Redevelopment Activities, Page 34. *Please revise Section 3.10 to indicate that EPA will be notified by Bridge if an unknown below grade structure is discovered. In general, all notifications to DTSC should also be provided to EPA.*

Response: The requested edit has been made to Section 3.10 of the Draft Final RDIP Addendum main text.

2.12 Comment 12

Wet Season Sampling for PCBs, Section 4.4.3, Storm Water Management, Page 45. *The last sentence of Section 4.4.3 indicates that wet season sampling for PCBs in stormwater and sediment will be conducted twice during the first year after redevelopment and once every two years thereafter. Stormwater and sediment should be sampled for PCBs at least once per year during the wet season following the first year after redevelopment.*

Response: This edit has been made to the requested section, now Section 4.5.3, of the Draft Final RDIP Addendum main text.

Appendix F, Groundwater Remedy Modifications

2.13 Comment 13

Reporting Needed for PCB Monitoring of Groundwater Treatment System, Appendix F, Groundwater Modifications, General Comment*. Please discuss the protocols and schedule for sampling the influent and effluent of the groundwater treatment system for PCBs. Also, specify the schedule for submitting groundwater monitoring reports that contain this information.*

Revised response by GE/Wood, October 2019: PCB sampling of influent and effluent of the groundwater treatment system is performed quarterly in accordance with EBMUD Wastewater Discharge Permit No 40300524. These data are reported in semiannual reports submitted to EBMUD in May and November. At EPA's request, Section 6.1 of Appendix F has also been updated to provide additional information for the groundwater treatment system, including the PCB discharge limit, analytical method, reporting limitations and contingency measures if the PCB discharge limit is exceeded.

2.14 Comment 14

Groundwater Contingency if PCB Detected Offsite, Appendix F, Groundwater Modifications, General Comment. *If total PCBs are detected in offsite groundwater monitoring wells located downgradient of the site (e.g., OW-1, OW-2 and OW-3 well clusters) at concentrations that exceed 0.03 ug/L, a corrective action plan shall be immediately developed to mitigate the offsite migration. The 0.03 ug/L concentration is the current Saltwater Ecotox Aquatic Habitat Goal taken from the California Regional Water Quality Control Board (RWQCB) Environmental Screening Levels (ESLs). The corrective action plan shall, at a minimum, describe the offsite migration of PCBs and propose measures to prevent further migration. Please add language to Appendix F to include development of a corrective action plan should PCBs be detected offsite.*

Appendix F shall also specify that the most current version of the RWQCB ESLs will be used to derive the Saltwater Ecotox Aquatic Habitat Goal for use at the site.

Response: Appendix F, Section 6.0 of the RDIP Addendum has been changed to include sampling of PCBs in offsite wells OW-1A and 1B and OB-3A and 3B to indicate that a corrective action plan will be submitted to USEPA and DTSC for review with 15 days if PCB concentrations are detected above the Saltwater Ecotox Aquatic Habitat Goal from the ESL (0.03 µg/L).[5]

2.15 Comment 15

Downgradient A Zone and B Zone Monitoring Wells, Appendix F, Groundwater Remedy Modifications, Figure F-2a. *As shown on Figure F-2a, downgradient monitoring wells W-731A and W-805B are proposed for destruction. These wells cover a gap in the downgradient monitoring network (A Zone and B Zone) between extraction wells EW-1 and EW-3 (see Figure F-2b) and should not be destroyed. Instead, these wells should be redeveloped and added into the groundwater monitoring program for the site. Please revise Appendix F to reflect this comment.*

Response: GE agrees to maintain, redevelop, and incorporate both wells W-731A and W-805B into the groundwater monitoring program. Figure 2b of Appendix F has been revised to show that these wells will be retained.[6]

Appendix J, Dust Control Plan

2.16 Comment 16

Lower Wind Speeds for Demolition/Construction Activities, Appendix J, Dust Control Plan, Section 2, Dust Control Procedures, Page 2. *The last bulleted item states that "In the event that wind speeds exceed 25 miles per hour for more than 10 minutes or when dust control measures are not able to prevent visible dust emissions, ...soil moving activities will be halted... ". Section 2 should be revised to indicate that Bridge will cease any dust generating activities if the wind speed is greater than 15 miles per hour averaged over a 15-minute period or instantaneous wind speeds exceed 25 miles per hour. These wind speed action levels are consistent with the South Coast Air Quality Management District Rule 1466, Control of Particulate Emissions form Soils with Toxic Air Contaminants (see Section (e) Requirements to Minimize Fugitive Dust Emissions, paragraph 8).*

Response: As requested, the DCP has been revised to indicate that dust generating activities will be temporarily halted when wind speeds are greater than 15 miles per

[5] Response prepared by GE/Wood.
[6] *Id*.

hour (averaged over a 15-minute period) or instantaneous wind speeds exceed 25 miles per hour.

Appendix K. Perimeter Air Monitoring Plan

2.17 Comment 17

Perimeter Air Monitoring Needed During Building Demolition, General Comment. *The perimeter air monitoring plan must be revised to include air monitoring during the demolition of all surface structures. Demolition of the buildings will create considerable dust that could be contaminated with PCBs from building materials. This is particularly important as a protective measure considering that residential and commercial areas are located adjacent to the northern site boundary and to the east across International Boulevard.*

Response: The AMP includes air monitoring during the demolition of all surface structures. During these activities, PM10 will be monitored using real time monitoring equipment at the proposed perimeter air monitoring stations. In the revised AMP, a 5-minute time-weighted average ("TWA") PM10 Trigger Level of 50 ug/m^3 is proposed as the particulate matter Trigger Level for the project during demolition based on sampling results for PCBs in building materials (50 mg/kg ≤ PCBs ≤ 600 mg/kg) and EPA's requested approach for calculation of Action Levels described below in Comment 19. In addition, an approximately 16-foot tall privacy fence will be installed as a noise/dust barrier along the northern boundary of the site, adjacent to the residences. Background air samples will be collected to evaluate site-specific upwind concentrations of PCBs to determine if, consistent with SCAQMD Rule 1466, subtraction of PM10 concentrations (i.e., difference between PM10 concentrations measured at upwind and the downwind monitoring station(s)) is appropriate.

2.18 Comment 18

Fugitive Dust Action Level Needed, General Comment. *The revised Perimeter Air Monitoring Plan and Dust Control Plan must specify the following: If visible fugitive dust is observed at or beyond the site perimeter during activities that generate dust, Bridge's demolition contractor must take immediate action to reduce dust levels.*

Response: The AMP and DCP have been revised to include the following phrase: "If visible fugitive dust is observed at or beyond the site perimeter during activities that generate dust, the Contractor will increase its dust suppression efforts by implementing additional dust control measures to reduce dust levels."

2.19 Comment 19

Revised Action Levels for PCBs Needed, Section 3.7, Action Levels for Dust and PM_{10}, Page 10. *EPA recommends a modification to the proposed strategy and action level derivation for the assessment of PCB contaminated dust pursuant to perimeter air*

monitoring. The derivation of the action level for PCBs shown in Section 3.7 does not include the most conservative assumptions.

EPA has derived two reference doses to assess the non-cancer or systemically toxic impacts from exposure to PCBs when measured as aroclors. The reference dose (RID) is defined as an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure amount to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime.

A reference dose for PCB aroclor 1016 is provided in EPA's IRIS database, in addition to a reference dose that is more specific to highly-chlorinated PCBs with increased toxicity estimates. Based on the PCB aroclor content found on-site, EPA recommends the use of the PCB aroclor RID 2E-5 mg/kg-day. Because the primary route of human exposure to on-site releases is inhalation, this RID should be converted to a Reference Concentration (RfC). In addition, because of the potential exposure threat to residential receptors directly adjacent to this site - the RfC should be converted to a child-specific RfC using a generic composite child receptor (15 kg bw & 10 m^3/day inhalation rate).

This results in a modified RfC for childhood receptors of 0.03 ug/m^3

This results for an airborne dust action level is 2.3 ug/m^3 based on a maximum PCB soil concentration of 13,000 ppm.

The results for an airborne dust action level is 12 ug/m^3 based on a maximum PCB soil concentration of 2,500 ppm.

The results for an airborne dust action level is 50 ug/m^3 based on a maximum PCB soil concentration of 50 ppm.

Response: Consistent with the EPA's conservative calculations presented above, EKI calculated potential PM10 Trigger Levels for residential and commercial receptors[7] based on the maximum concentration of PCBs in soil in the planned excavation and/or work areas included in the Draft Final RDIP Addendum (see revised AMP Table K-7 and summary table presented below).

For context on potential upwind PM10 concentrations, background levels of PM10 in San Pablo, California, the nearest PM10 monitoring station to the site, were 21.4 ug/m^3 as an annual average in 2018. Based on these data, the background PM10 concentration in the East Bay is anticipated to be approximately 20 ug/m^3.

[7] Similar to PM10 Trigger Levels for residential areas, Trigger Levels for commercial areas were calculated using typical exposure assumptions for workers (i.e., 80 kg body weight and inhalation rate of 20 m^3/day).

Excavation Area(s)/PCB Abatement Area/Construction Activity	Volume Excavation (cubic yards)	PCBs (mg/kg)	PM10 Trigger Level for Residential Areas (ug/m^3)	PM10 Trigger Level for Commercial Areas (ug/m^3)
Trench 1	69	13,000 (hotspot)	2.3	6.2
S-626, W-613, W-792	648	11,000 (hotspot)	2.7	7.3
S-604	20	3,400 (hotspot)	8.8	24
S-602 and S-702	52	2,500 (hotspot)	12	32
S-704 and Trench 2	100	1,900	16	42
B1-034/B1-044/1BH-19	180	1,600 (concrete)	19	50
S-015	26	1,500	20	53
S-012 and S-014	33	1,400	21	57
S-703, G-002	44	600<PCBs≤1,000	30	80
Other building materials abatement, building demolition, and soil remediation excavations	--	50≤PCBs≤600	50	130
Mass grading and post-remediation/abatement soil handling activities	--	<50	600	1,600

To determine whether available real-time dust monitoring equipment is capable of accurately measuring the PM10 Trigger Levels presented above, EKI reviewed (1) the accuracy and precision values presented in the technical specifications for the real-time dust monitoring equipment mentioned by the EPA in Comment 24 (i.e., the Thermo Scientific ADR-1500, the TSI Dusttrak II and Dusttrak DRX, and the Met One E-Bam) and (2) the accuracy and precision values presented in the technical specifications and/or available data for other real-time dust monitoring equipment (e.g., TSI AM520, the Turnkey DustMate, and several of the air quality sensors evaluated by the SCAQMD's Air Quality Sensor Performance Evaluation Center). Based on these data and the use of 5-minute TWA values (i.e., the time-averaging approach requested by EPA in Comment 24), it is infeasible to accurately measure a PM10 concentration difference for comparison to Trigger Levels of less than approximately 10 ug/m^3 with available real-time dust monitoring equipment.

Due to the combination of instrument limitations and anticipated background PM10 concentrations on the order of 20 ug/m^3, Bridge has elected to (a) conduct excavations in areas where known PCBs are present in soil at concentrations greater than 1,000 mg/kg within an enclosure that is vented to air pollution control equipment (i.e., particulate air filters) and (b) directly load the excavated materials into bins that can be sealed. Consistent with Section (k)(2) of SCAQMD's Rule 1466, when enclosures vented to air pollution control equipment are used to mitigate the release of PM10 dust, PM10 monitoring is not required. As such, during the excavation of soil containing PCBs at concentrations greater than 1,000 mg/kg, which will be performed in enclosures vented to air pollution control equipment, no PM10 monitoring will be performed. Other dust

generating activities that disturb PCBs with concentrations greater than 1,000 mg/kg (e.g., concrete removal for off-site disposal) will also be performed in enclosures. Additional details about the planned real-time PM10 monitoring and dust sampling are provided below in the response to Comment 21.

2.20 Comment 20

Additional Perimeter Air Monitoring Stations Needed, Appendix K Perimeter Air Monitoring Plan, Section 4.2, Air Monitoring Station Locations, Page 13, and Figure K-1, Proposed Perimeter Air Monitoring Station Locations*. The proposed number and locations of perimeter air monitoring stations is not adequate to assess possible offsite impacts from dust generated during building demolition, excavation of PCB contaminated soils, and the breaking up and crushing of concrete foundations during site construction activities. The proposed plan includes three monitoring stations (one background location) along the approximately 1,600-foot long northern site boundary that is adjacent to residential areas, one air monitoring station along the southern site boundary that is adjacent to industrial areas, and no air monitoring stations along the eastern site boundary that is adjacent to residential and commercial areas along International Boulevard. In determining how many monitoring stations are appropriate, it is important to consider the following factors:(1) the prevailing wind can be channeled as it moves between buildings on the site causing it to move generated dust in unexpected directions, (2) an excavations proximity to the site perimeter, (3) the length of the site perimeter, and (4) sensitivity of receptor populations along a given perimeter. For example, the volatile organic compound (VOC) hotspot removal excavation is directly adjacent to residential areas just across the northern site boundary and should be monitored for PM_{10} dust emissions.*

To be protective of residential areas located adjacent to the northern site boundary, industrial areas to the south, and residential/commercial areas located to the east across International Boulevard, additional perimeter monitoring stations are needed to cover these areas. In addition, we suggest that the monitoring stations be wired for telemetry such that one person could monitor activities at all of the stations from a single location. Please revise the Perimeter Air Monitoring Plan to include the additional monitoring stations along with the telemetry.

Response: As requested, EKI will work with the equipment suppliers to set up the perimeter air monitoring stations with telemetry.

In the revised AMP (see Figure K-1), EKI has added the following air monitoring stations:

- A perimeter air monitoring location, located a minimum of 75 feet[8] from the northern property boundary, has been added to monitor for potential exposures across International Boulevard located northeast of the site;

- The furthest upwind air monitoring stations at the western corner of the site and on the property boundary shared with residences was shifted closer to International Boulevard (to just before E 12 Street) for a total of three upwind monitoring stations on that portion of the property boundary between International Boulevard and approximately E 12th Street, except when work on the southwestern portion (San Leandro Street side) of the site is being performed; and

- Two perimeter air monitoring locations have been added along the southeastern property boundary (boundary with the former PepsiCo/Gatorade property) to better monitor for potential exposures for the industrial areas located southeast of the site.

As discussed in DTSC Comment 4 on the AMP (see Section 4.5), the placement of the air monitoring stations considers the prevailing wind direction and appropriate spacing consistent with BAAQMD's Manual of Procedures. In addition, an approximately 16-foot tall privacy fence will be installed as a noise/dust barrier along the northern boundary of the site with adjoining residences.

For the work that will be conducted in close proximity to the property boundary outside of enclosures (e.g., VOC hotspot and PCB excavations G-121, G-118, W-736, G-119, and W-622), at least one perimeter air monitoring station is located within 125 feet of the work.

2.21 Comment 21

Perimeter Air Monitoring Needed Throughout Site Demolition and Construction, Appendix K, Perimeter Air Monitoring Plan, Section 4.3, Air Monitoring Parameters, Duration, and Frequency, Page 13. *The duration of the perimeter air monitoring program for PCBs as described in Section 4.3 is primarily based on the sampling results during the first five days of excavation activities. If action levels are not exceeded during this initial time period, then the perimeter air monitoring program will be reduced and ultimately eliminated. This approach is not acceptable since dust potentially contaminated with PCBs could be generated throughout the site demolition and construction process and not just during the first five days of work. To be protective of residential and commercial areas located adjacent to the site boundaries, perimeter air monitoring is needed throughout the demolition and construction phases of the project. Please revise the Perimeter Air Monitoring Plan to include: (1) daily real time continuous*

[8] A set back of approximately 75 feet is proposed to avoid potential PM10 dust impacts from vehicular traffic and road dust along International Boulevard.

air monitoring for PM_{10} dust throughout all phases of the project, and (2) daily collection of dust samples for PCB analysis along the site perimeters and downwind of the hotspot areas during activities that generate dust (e.g., soil excavation, building demolition, concrete crushing, cap removal). Either EPA Method TO-4A or TO-10A can be used to collect the dust samples for laboratory PCB analysis depending on which one can best detect down to the EPA Regional Screening Level (RSL) of 0.05 ug/m^3. The TO-4A or TO-10A monitors should be collocated with the dust monitors such that the analytical PCB data can be correlated with the PM_{10} dust levels. After sufficient analytical data is collected, the PM_{10} dust levels may be used as our primary basis for assessing dust suppression effectiveness and protecting off-site receptors. Based on the air sampling results, the level of monitoring needed can be reassessed as the project moves forward. If the RSL for PCBs in residential air of 0.05 ug/m^3 is exceeded, the demolition contractor must implement more aggressive dust control measures.

Response: As discussed above in our response to Comment 19 (see Section 2.19), during dust generating activities that will disturb materials with PCBs at concentrations greater than 1,000 mg/kg (e.g., hot spot areas and concrete removal at one location), work will (a) be conducted within an enclosure that is vented to air pollution control equipment (i.e., particulate air filters) and (b) the wastes will be directly loaded into bins that can be sealed. Due to the use of enclosures vented to air pollution control equipment, the release of PM10 dust will be mitigated, and as a result, real-time PM10 monitoring is not proposed during these activities.[9] Nevertheless, if other dust generating activities (e.g., aboveground demolition activities) will be conducted concurrent with excavations within the enclosures, real-time PM10 monitoring will be conducted at the perimeter air monitoring stations as described below.

During aboveground demolition activities and/or excavation in areas where PCB concentrations are equal or less than 1,000 mg/kg, a TSI DustTrak II Aerosol Monitor 8530[10] (or equivalent) will be used to monitor PM10 concentrations at the perimeter air monitoring locations. In addition, PM10 dust samples will be collected from the perimeter air monitoring stations; these samples will be submitted to a State of California-certified analytical laboratory for the analysis of PCBs using EPA Method TO-10A (the detection limits will be below the Aroclor 1260 Action Level of 0.03 ug/m^3, see Table K-9). The PM10 dust samples will be collected for PCB laboratory analysis during the first five days of each representative type of dust generating activity (e.g., demolition, excavation) to demonstrate that the dust control measures being implemented by the Contractor are sufficient to prevent potentially significant exposures; thereafter, real-time PM10 dust monitoring equipment will be used to demonstrate that the Contractor's dust control measures are adequate.

[9] This approach is consistent with Section (k)(2) of SCAQMD Rule 1466.
[10] This unit is one of the SCAQMD Rule 1466 Executive Officer Pre-Approved Monitors (https://www.aqmd.gov/home/rules-compliance/compliance/rule-1466/pre-approved-monitors)

As indicated in response to Comment 17 (see Section 2.17), background air samples will be collected to evaluate site-specific upwind concentrations of PCBs to determine if, consistent with SCAQMD Rule 1466, subtraction of PM10 concentrations (i.e., difference between PM10 concentrations measured at upwind and the downwind monitoring station(s)) is appropriate.

2.22 Comment 22

PM_{10} Monitoring and Action Levels Needed, Perimeter Air Monitoring Plan, Section 4.3, Air Monitoring Parameters, Duration, and Frequency, Page 13. *The proposed perimeter air monitoring plan primarily relies on an action levels based on total dust that is supported by laboratory PCB analysis of total dust samples for the first five days of excavation activities. EPA believes that it would be more protective to use PM_{10} based action levels of (1) 2.3 ug/m^3 for hot spot excavations, (2) 12 ug/m^3 for soil excavations and concrete removal/grinding with PCB concentrations up to 2,500, and 50 ug/m^3 for all other site demolition activities (see Comment 19 regarding action level derivation). We believe that PM_{10} action levels are more applicable to this project because larger than normal volumes of PM_{10} fine dust, which is inhalable, will be generated during the breaking up and crushing of concrete foundations. These action levels are for continuous real-time dust monitoring during site demolition and PCB cleanup activities that generate dust and should be used to regulate dust suppression activities. These action levels are protective of sensitive receptors (children) who live in residential areas located adjacent to the northern site boundary.*

Response: Please see the response to Comment 19 (Section 2.19) regarding hotspot excavations with PCBs greater than 1,000 mg/kg. All of the dust monitoring performed at the site has been modified to be PM10 monitoring, not total dust monitoring. In the revised AMP, the proposed direct-read 5-minute TWA PM10 Trigger Levels at the site perimeter for dust generating activities (e.g., demolition, excavation, concrete crushing) until the temporary cap is installed are as follows (see Table K-8):

- 30 ug/m^3 5-minute TWA (600 mg/kg < PCBs ≤ 1,000 mg/kg).
- 50 ug/m^3 5-minute TWA (50 mg/kg ≤ PCBs ≤ 600 mg/kg).
- 110 ug/m^3 5-minute TWA (PCBs < 50 mg/kg).

2.23 Comment 23

Continuous Real Time Dust Monitoring for PM_{10} Needed, Perimeter Air Monitoring Plan, Section 4.4, Air Monitoring Collection Methods and Equipment, Page 15. *Continuous real- time dust monitoring for PM_{10} must be conducted at the perimeter of the site using an appropriate monitoring network that includes both mobile and fixed monitoring equipment during the duration of activities that generate dust. The proposed monitoring network positioning and spacing must ensure that real-time dust data is*

readily available (i.e., available in real-time vs at the end of the work day) from strategic locations around the perimeter of the site to (1) determine in a timely manner if applicable action levels for dust are being exceeded, and (2) implement actions to reduce dust levels when this target concentration is exceeded.

Response: Continuous real-time dust monitoring for PM10 will be conducted at the perimeter of the site at the locations described in the response to Comment 20 (see Section 2.20). The use of telemetry will aid in determining in a timely manner if the PM10 Action Level, Trigger Level, or Suspend Work Level are being exceeded at the site perimeter; whenever the PM10 Trigger Level is exceeded, additional dust suppression activities will be implemented. Whenever the PM10 Suspend Work Level is exceeded, the Contractor will temporarily suspend work and reassessment of site activities and dust control measures will be required. As necessary, real-time monitoring locations will be adjusted based on field conditions (e.g., during excavation of the VOC hotspot).

2.24 Comment 24

Real Time Dust Monitoring Equipment Needed for PM_{10}, Perimeter Air Monitoring Plan, Section 4.4, Air Monitoring Collection Methods and Equipment, Page 15. *EPA is recommending that real-time monitoring equipment that uses light scattering technology to measure dust in air, and that can measure relative air humidity while automatically correcting dust measurements for humidity be used during site demolition activities. The monitor must be capable of measuring dust concentrations below the target dust concentration action level and of integrating real-time dust measurements every five minutes. Bridge must use a maximum of 5- minute data integration. Bridge must report real-time dust monitoring data to EPA without making any corrections to the data based on upwind or downwind conditions.*

Bridge may consider using the Thermo 1500, TSI-Dust Track, or a wired or wireless Beta Attenuation Monitor. The monitors selected must be properly calibrated and have a calibration certificate available indicating the date when the instrument was calibrated.

Response: As discussed in Comment 21 (see Section 2.21), a TSI Dusttrak II Aerosol Monitor 8530 (or equivalent) will be used to monitor PM10 concentrations at the perimeter air monitoring locations. The equipment will have a heated inlet sample conditioner to minimize potential condensation issues due to humidity.

Since the TSI Dusttrak II cannot record 5-minute TWA values,[11] the unit will be set up to collect 1-minute average values and 5-minute average values will be calculated from these data. These data will be provided to the EPA without corrections to the data based on upwind or downwind conditions. The monitors will be properly calibrated and

[11] Similarly, other monitors considered in Comment 19 cannot record 5-minute TWA values.

will have a calibration certificate available indicating the date when the instrument was calibrated.

Appendix M, Construction Storm Water Pollution Prevention Plan

2.25 Comment 25

On Site PCB Sampling for Storm Water and Sediment Needed During Demolition/ Construction Activities, Appendix M, Construction Storm Water Pollution Prevention Plan, General Comment. *The Storm Water Pollution Prevention Plan should address how all storm water and associated sediments/soil generated during demolition/construction activities (e.g., building demolition, soil hotspot removals, earth moving) will be collected onsite and tested for PCBs prior to being discharged from the property. Discharges of storm water from the site must meet the applicable permit requirements related to PCBs for discharges of stormwater to the sanitary sewer system or to the City of Oakland storm drain system. If PCBs are detected in the collected stormwater and/or associated sediments/soils, treatment may be needed to meet required limits prior to discharge of the stormwater from the property. EPA must be notified in writing of any PCB detection in stormwater within 3 days of discovery. The written notification should include, but not be limited to, the medium sampled, the date of sampling, the PCB concentrations detected, response actions taken (e.g., storm water treatment), and any mitigation measures taken to prevent future detections of PCBs in stormwater. EPA suggests that Bridge consider building a stormwater treatment system to remove PCBs assuming that it will be needed to meet applicable discharge requirements especially during demolition and construction work after the existing cap is removed.*

Response: A description of the proposed storm water management, erosion and sediment controls, and on-site treatment systems is provided in Section 4 of the SWPPP, Erosion and Sediment Control. This section has been expanded to include the storm water management approach before the existing system is demolished and the off-site storm drain is plugged, including storm water sampling for PCBs. Language has also been added to this section to clarify EPA notification requirements in the event of detections of PCBs in stormwater.

Appendix O, Site Demolition

2.26 Comment 26

Discussion of Surface Structure/Building Demolition Needed, Appendix O, Site Demolition, General Comment. *Appendix O does not include a discussion of how the surface structures/buildings will be demolished. This is important because the buildings and other surface structures contain PCB building materials which will need to be managed appropriately. Please revise Appendix O to include a discussion of the surface structure/building demolition including how PCB building materials will be managed.*

Response: EKI provided a Building Materials Sampling memorandum to EPA and DTSC on 11 July 2019. The memorandum details (1) proposed sampling to assess PCB concentrations in paint on the interior of the Building 1 wall section to be preserved as part of the redevelopment; (2) concrete sampling for PCBs to fill data gaps in characterization of concrete that is intended for crushing and placement on-site under the new cap that will be part of the proposed development; and (3) general building materials sampling to characterize and profile PCBs in building materials for off-site disposal as part of demolition. The results of the building materials sampling will be used to develop a building demolition plan that describes the disposal of PCB-containing wastes and will be submitted to EPA for review and approval under a separate cover prior to disposal of demolition wastes.

2.27 Comment 27

Discussion of Concrete Crushing Needed, Appendix O, Site Demolition, Section 1, Introduction, Page 1 and Section 2, Concrete Sampling and Reuse, Page 1. *Sections 1 and 2 indicate that concrete containing PCBs at concentrations less than 50 mg/kg will be crushed and placed as an aggregate base or fill material under the new concrete pavement cap. Please add a discussion of (1) how and where on the site will the concrete be crushed, (2) what measures will be taken to minimize dust emissions during concrete crushing, and (3) what air monitoring will be done to protect nearby residential and commercial areas. EPA recommends that (1) the concrete crushing operation be located in an onsite area generally downwind of the neighboring residential areas, (2) the concrete crushing operations take place during days with wind speeds less than 15 miles per hour averaged over a 15-minute period or instantaneous wind speeds that are less than 25 miles per hour, and (3) the air monitoring stations be located upwind and downwind of the concrete crushing operations. Please note that if visible dust is present, crushing operations should be halted until dust levels subside.*

Response: Section 2 of Appendix O has been revised to include details regarding concrete crushing operations. Dust monitoring during concrete crushing operations will be conducted in accordance with the AMP, Appendix K.

2.28 Comment 28

Additional PCB Sampling for Interior Paint Needed, Appendix O, Site Demolition, Section 4.2, Building Façade Cleanup Plan, Page 7. *As required by the City of Oakland, the Building 1 façade facing International Boulevard will be retained and incorporated into the new warehouse building. The entire front façade of both the ground floor and upper mezzanine will be saved. The façade consists of a double layer of brick. The interior layer of brick is painted on the inside face. Based on very limited sampling data, the paint on the interior walls contains PCBs with a concentration of at least 18 mg/kg.*

Section 4.2 presents two alternatives to address the PCB contaminated paint, removal or coating and encapsulation. A pilot test is proposed to evaluate the paint removal option.

The purpose of the pilot test is to (1) evaluate the effectiveness of paint removal techniques, (2) assess a visual cleanup standard as an approach to confirm that the paint removal is successful and that the walls have been adequately decontaminated, and (3) collect information to support the conclusion that the removed paint is bulk product waste.

In order to evaluate the acceptability of using a visual cleanup standard and to gather further information on whether the removed paint can be considered bulk product waste, EPA is requesting that additional samples of paint be taken and analyzed for PCBs. It has been our experience that PCB concentrations in paint can vary significantly. The additional data will help us get a more representative picture of the PCB concentrations in the paint which will better inform our decision regarding the use of a visual standard to confirm successful decontamination of the brick walls for PCBs.

Please revise Section 4.2 to include additional sampling of the brick wall paint for PCBs on the ground floor. It is our understanding from discussions with Bridge's consultant EKI, that the upper mezzanine level is not accessible for taking paint samples for PCB analysis due to structural safety concerns. One discrete paint sample per 100 ft^2 of brick wall should be taken for PCB analysis at representative locations on the ground floor. Additional contingency paint samples should be taken if different colored paint or other anomalies are encountered. The sampling effort should be documented with pictures of the paint as well as the painter's observations noted in the project report. Also, if it is decided to move forward with the pilot study, we request that two pilot study locations be done on the ground floor in order to provide additional support for using a visual standard to confirm that the full-scale paint removal was successful.

Response: EKI provided a Building Materials Sampling memorandum to EPA and DTSC on 11 July 2019. The memorandum details proposed sampling to assess PCB concentrations in paint on the interior of the Building 1 wall section to be preserved as part of the redevelopment. The proposed sampling frequency is one location per 100 square feet, with up to five additional contingency paint samples to be selected based on field observations, consistent with this comment. Appendix O has been revised to include these proposed sampling details. The sampling effort will be documented with photographs of the paint at sampling locations and the sampler's field observations.

Appendix O has also been revised to include two pilot test patches.

2.29 Comment 29

Indoor Air Sampling for Building Façade Needed to Confirm Success of Paint Removal or Sealing of Interior walls, Appendix O, Site Demolition, Section 4.2, Building Façade Cleanup Plan, Page 7. *As discussed in Comment 28 above, Section 4.2 presents two alternatives to address the PCB contaminated paint, removal or coating and encapsulation. Whichever approach is selected, EPA is requiring that preoccupancy indoor air sampling for PCBs be done after the remediation work is completed on the*

ground floor and upper mezzanine to ensure that the PCB remediation of the contaminated paint has been successful and that the building is safe for use. Please revise Appendix O to include the preoccupancy indoor air sampling for PCBs.

Response: Pre-occupancy indoor air sampling for PCBs will be conducted as requested and described in Appendix O and Section 4.3 of the Draft Final RDIP Addendum main text.

2.30 Comment 30

EPA Approval Needed Prior to Implementing Selected Path Forward for Addressing PCB Contaminated Paint, Section 4.2.3, Step 3 - Pilot Test, Page 9. *The last sentence of Section 4.2.3 indicates that EPA will be notified of the path forward for addressing the PCB contaminated paint on the interim· walls of the Building 1 Façade. Please revise the text to indicate that (1) EPA will be consulted regarding the findings of the Pilot Study, and (2) Bridge must first obtain EPA concurrence before implementing any remedy to address the PCB contaminated paint.*

Response: The requested edits have been made to Section 4.2.3 of Appendix O.

National Historic Preservation Act (NHPA)

2.31 Comment 31

Discussion of National Historic Preservation Act (NHPA) and Cultural Resources Study Follow-up Needed, General Comment. *The Cultural Resources Study, General Electric Remediation and Reuse Project, prepared by LSA, dated April 2019 (Cultural Resources Study), concluded that the adverse effects caused by the partial demolition of Building 1 and the complete demolition of Building 2 at the General Electric Site in Oakland, California needs to be mitigated before demolition and redevelopment construction can be begin. A summary of the Cultural Resources Study findings along with a Historic Property Treatment Plan for implementing the recommended mitigation measures (see Section 7, Summary of Findings and Recommendations, Cultural Resources Study) shall be included in the revised RDIP Addendum/TSCA Application.*

Response: A summary of the Cultural Resources Study findings has been added to the Draft Final RDIP Addendum as new Section 3.1.6. The Historic Property Treatment Plan will be provided under separate cover to EPA for review by 15 September 2019.

3. DTSC LETTER FROM GSU

This section contains responses to comments from Renato A. Medrano, PG, of the DTSC's GSU, Site Mitigation and Restoration Program, dated 24 June 2019.

3.1 Comment 1a

Appendix F Groundwater Remedy Modifications. *Well decommissioning (EW-5 and EW-6) and Well Replacement for the Groundwater Extraction and Treatment System (GETS) Performance Monitoring Wells (GW-1BR, GW-1CR, GW-2BR, W-004AR, and W-004BR) and Monitored Natural Attenuation (MNA) Performance Monitoring Well (GW-4DR) (proposed locations shown on Figure F2b). The proposed well decommissioning and replacement locations are acceptable. However, upgradient monitoring of the plume is required, to evaluate the capture zone of the GETS and to determine that contaminants are not migrating offsite.* ***Recommendation:*** *Consider installing two upgradient monitoring wells in Zone A and two upgradient monitoring wells in Zone B.*

Response: GE proposes that monitoring well pair W-758A and W-758B located near the northwestern corner of the site be retained as one of the up-gradient monitoring locations, and that one new pair of monitoring wells be installed, one in the A Zone and one in the B Zone. The proposed wells have been added to Figure 2b in Appendix F.[12]

3.2 Comment 1b

Appendix F Groundwater Remedy Modifications; ***Change in sampling frequency from semi-annual to annual.*** *GE proposes changing monitoring frequency from semi-annual to annual. However, sufficient data should be collected from new replacement wells to evaluate seasonality and concentration trends.* ***Recommendation:*** *Semi-annual sampling should be retained.*

Response: GE agrees to retain a semi-annual frequency for two years of future monitoring, followed by annual monitoring thereafter. The proposed monitoring frequency has been added to Section 6.0 in Appendix F.[13]

3.3 Comment 1c

Appendix F Groundwater Remedy Modifications; ***Statistical Methods for Monitoring.*** *The recommended method for statistical evaluation of groundwater is using confidence intervals together with a trend analysis, as described in USEPA's Evaluating Completion of Groundwater Restoration Remedial Actions at a Groundwater*

[12] Response prepared by GE/Wood.
[13] *Id.*

*Monitoring Well[14] and ITRC's Groundwater Statistics for Monitoring and Compliance[15]. **Recommendation:** Semi-annual sampling should be retained.*

Response: GE agrees to use confidence intervals together with a trend analysis in accordance with USEPA and ITRC guidance in future reports.[16]

3.4 Comment 2a

Remedy and Mitigation Protectiveness Evaluation; ***Offsite Residents.*** *Maximum Contaminant Levels Allowable in Drinking Water (MCLs) are the clean-up goals selected for the facility. However, MCLs may not be protective with respect to vapor intrusion to indoor air. Recent changes to approaches regarding indoor-air concerns should be considered.*

The most recent measurements of volatile organic compounds (VOCs) in groundwater exceed the residential and the commercial/industrial environmental screening levels (ESLs) for trichloroethene (TCE) and other VOCs as presented in the San Francisco Bay Region Water Quality Control Board's (SFRWQCB's) ESL Workbook[17] revised in January 2019. Table GW-3: Groundwater Vapor Intrusion Human Health Risk Screening Levels (VI HHR ESLs) presents groundwater screening levels based on DTSC's VI screening levels for indoor air.[18]

For example, elevated concentrations of trichloroethane (TCE) in groundwater along the northern fence line may be a cause for concern with respect to offsite residents.

*Soil gas has to be investigated in this area. VI HHR ESLS for Soil Gas are presented in SFRWQCB's Table SG-1: Sub-slab Soil Gas and Exterior Soil Gas Vapor Intrusion Human Health Risk Screening Levels (Volatile Chemicals Only). **Recommendation:** A work plan for a fence-line soil gas investigation along the northern boundary should be submitted, with a subsequent assessment of the potential for vapor intrusion to indoor air. Geological Services Unit (GSU) defers to DTSC's Health and Environment Risk Office (HERO) with respect to risk assessment.*

Revised response by GE/Wood, October 2019: In 2009, off-site soil gas monitoring from a residential property adjacent to the northern property boundary did not identify site-related compounds in soil gas that would indicate a risk to receptors. As discussed in Sections 2.1.2.1 and 4.2 and shown on Figure 4 of the Draft Final RDIP Addendum, to further mitigate chlorinated VOC impacts on-site, soil from an area with

[14] USEPA. 2014. Recommended Approach for Evaluating Completion of Groundwater Restoration Remedial Actions at a Groundwater Monitoring Well. August.
[15] ITRC's approach is available at: http://www.itrcweb.org/qsmc1/Default.htm#Welcome.htm%3FTocPath%3D.
[16] Response prepared by GE/Wood.
[17] https://www.waterboards.ca.gov/sanfranciscobay/water issues/proqrams/esl.html
[18] DTSC. 2019. Human and Ecological Office, Human Health Risk Assessment Note 3-DTSC-Modified Screening Levels (DTSC-SLs), April 2019 Update (HERO HHRA Note 3). April.

elevated chlorinated VOCs located between Buildings 1 and 4 near the northern property boundary will be excavated and disposed of offsite. The excavation will encompass a 40-foot by 45-foot area to a depth of 20 feet and will include removal of soil from sample location 5GP5 where TCE at 21 mg/kg was previously detected at 13 feet below ground surface ("bgs") and from sample locations where the highest soil gas concentrations were observed. Following excavation, temporary soil gas probes will be installed and two rounds of soil gas sampling will be conducted to assess soil gas conditions post soil removal. If the soil gas results from the two rounds of sampling from the point closest to the property boundary are above applicable screening levels, then following placement of the cap, GE will attempt to collect soil gas samples from off-site. Consistent with previous efforts, GE will request access to three adjacent residential properties, including the property that was sampled in 2009 and the two properties immediately north of the excavation area (see Figure 4) and will collect soil gas samples once access is granted. GE will attempt to collect soil gas samples from a depth of 5 feet bgs depending upon field conditions and the depth of groundwater. Samples will be sampled and analyzed for VOCs as described in Appendix N – Field Sampling and Laboratory Analysis Plan with Addendum. In accordance with DTSC/Water Board guidance (DTSC/Water Board, 2015), two rounds of soil gas sampling will be conducted at least three months apart to account for seasonal variability. If the soil gas results exceed applicable screening levels, then a monitoring plan will be developed to collect indoor air samples.

As a proactive contingency measure, a permeable material will be used to backfill the north perimeter of the VOC hot spot excavation to the subgrade elevation to disrupt a potential vapor migration pathway from the site to adjacent off-site residences.

3.5 Comment 2b(i)

Remedy and Mitigation Protectiveness Evaluation; ***Validation of indoor-air concentrations in the warehouse; pre-occupation.*** *The "If and when" process stated in sections 4.3 (e.g., two rounds of indoor air sampling) is not acceptable. Equilibration time of soil vapor after construction is uncertain and may extend longer than anticipated by EKI. Also, the groundwater is a source for vapor intrusion. Variability in indoor air as well as groundwater concentrations must be established prior to discontinuing sampling. GSU supports the recommendations of DTSC Engineering and Special Projects Office (ESPO) regarding post installation indoor-air monitoring.*

Response: This comment is addressed in RTC 3.b from DTSC ESPO (Section 5 of this RTC document).

3.6 Comment 2b(ii)

Remedy and Mitigation Protectiveness Evaluation; ***Validation of indoor-air concentrations in the warehouse; post-occupation.*** *EKI proposes using indirect approaches to monitor indoor-air monitoring. However, indoor air concentration*

maybe required to satisfy the provisions of CERCLA regulation under 40 CFR § 300.430 (f) (5) (iii) A to D, which states (note A and C):

> *(A) Indicate, as appropriate, the remediation goals, discussed in paragraph (e)(2)(i) of this section, that the remedy is expected to achieve. Performance shall be measured at appropriate locations in the ground water, surface water, soils, air, and other affected environmental media. Measurement relating to the performance of the treatment processes and the engineering controls may also be identified, as appropriate;*
>
> *(B) Discuss significant changes and the response to comments described in paragraph (f)(3)(i)(F) of this section;*
>
> *(C) Describe whether hazardous substances, pollutants, or contaminants will remain at the site such that a review of the remedial action under paragraph (f)(4)(ii) of this section no less often than every five years shall be required; and*
>
> *(D) When appropriate, provide a commitment for further analysis and selection of long-term response measures within an appropriate time-frame."*
>
> ***Recommendation:** The indoor air investigation must satisfy the provisions of 46 CFR § 300.430 (f) (5) (iii) A to D.*

Response: Indoor air sampling to satisfy the provisions of 46 CFR § 300.430 (f) (5) (iii) A to D has been included in the Draft Final RDIP Addendum (see Section 4.3), as described in the RTC 14 from DTSC ESPO (Section 5 of this RTC document).

3.7 Comment 3

Use of Background Distributions of Metals in the Soil at Lawrence Berkeley National Laboratory, Lawrence Berkeley National Laboratory Environmental Restoration Program, April 2009 (LBNL Study). Recommendation: *GSU does not recommend use of the LBNL Study for background concentrations of metals. The topographical characteristics and bedrock sources of soil in the study may be completely different from the Site.*

Site-specific background values for metals should be determined.

For regional comparison, especially with respect to arsenic concentrations, Establishing Background Arsenic in Soil of the Urbanized San Francisco Bay Region is used by SFRWQCB and is recommended to be used for arsenic.

Response: After further discussion with DTSC, Bridge proposes to use 17 mg/kg as the background concentration for arsenic for the site, which is based on the 95th percentile level in the LBNL Study. For lead and other metals, background will be established by the 99th percentile level in the LBNL Study. Use of the LBNL study has been proposed because there are limited metals in soil data for the site, so

meaningful site-specific background concentrations would be difficult to estimate. Section 3.5 of the Draft Final RDIP Addendum has been modified accordingly.

3.8 Comment 4

Compliance with the California Business and Professions Code. *The Report/Plan must satisfy both the California Professional Geologists and Professional Engineers requirements for stamps and signatures indicating responsible charges for the geological and engineering plans.*

Response: This Draft Final RDIP Addendum contains work product from a number of different parties. Each section with new information[19] has been or will be stamped by a California registered responsible professional in charge of the work. Sections that are included in the EKI's Draft Final RDIP Addendum but were not developed by EKI include:

RDIP Addendum Section	Organization in Responsible Charge
Appendix B Shoring Plan	Innovative Construction Solutions
Appendix B Tenting Plan	Innovative Construction Solutions
Appendix D Preliminary Site Improvement Plans of GE Site	Kier & Wright Civil Engineers & Surveyors, Inc.
Appendix D Surface Water Management Memorandum	Kier & Wright Civil Engineers & Surveyors, Inc.
Appendix D Construction Details	Kramer Engineering, Inc.
Appendix F Groundwater Remedy Modifications and Off-Site Vapor Intrusion Assessment	Wood Environment and Infrastructure Solutions, Inc.

Please note that the Shoring Plan and Tenting Plan for the soil remediation excavations (Appendix B) will be finalized and stamped by a responsible professional after the RDIP Addendum is finalized and approved by DTSC and EPA, as part of the permitting process with the City of Oakland. The approved soil remediation excavation scope of work will be used to develop these plans before the work is performed, as described in Section 3.1 of the Draft Final RDIP Addendum main text.

[19] Pieces containing historical reports/information included for ease of reference are not listed.

4. DTSC LETTER FROM HSP REGARDING AMP AND DCP

This section contains responses to comments from Coby Graham, CIH, of the DTSC's Health and Safety Program, dated 24 June 2019, regarding the Perimeter Air Monitoring Plan and DCP.

4.1 General Comment: Request for Revision

Please include all applicable Bay Area Air Quality Management District ("BAAQMD" or "Local District") rules in the CAMP & DCP. Applicable Local District rules include rule 1-301, "Public Nuisance"; Rule 6-1, "Particulate Matter," for Visible Emissions; Regulation 7, "Odorous Substances"; Rule 11-2, "Asbestos", for applicable demolition activities. Additionally, the BAAQMD's Manual of Procedures, Volume VI, Air Monitoring Procedures, Subsection 2.4 provides guidance on instrument siting and Appendix A provides guidance for meteorological monitoring. These recommendations from the Local District's Manual of Procedures should be incorporated into the CAMP & DCP, as appropriate.

Because the Local District does not have a rule specific to the earth-moving activities of soils contaminated with toxic air contaminants and VOCs, the CAMP & DCP shall include Applicable or Relevant and Appropriate Requirements ("ARARs") from the South Coast Air Quality Management District's ("SCAQMD's") Rule 1166, "Volatile Organic Compound Emissions from Decontamination of Soil", and Rule 1466, "Control of Particulate Emissions from Soils with Toxic Air Contaminants."

Please incorporate both the Air Monitoring and Minimizing Fugitive Dust Emissions requirements from SCAQMD Rule 1466 into the CAMP & DCP. [See SCAQMD Rule 1466(d) & (e).] Additionally, the approved dust control monitors in Appendix 1 of Rule 1466 and the dust control measures in Appendix 2 of the Rule should be included in the CAMP & DCP.

Response:

The DCP and AMP have considered and have been written to comply with the rules and regulations listed in the General Comment that are Applicable or Relevant and Appropriate Requirements ("ARAR"), as described below. [20]

- The DCP and AMP have been developed to prevent the site from being considered a "Public Nuisance" with respect to potential air contaminants as defined in BAAQMD Regulation 1, Section 301. In the event that a Public Nuisance Notice of Violation is issued for the site, work will temporarily be

[20] South Coast Air Quality Management District ("SCAQMD") Rule 1166 is not Applicable or Relevant and Appropriate as the BAAQMD's Regulation 8, Rule 40 addresses the excavation of soil contaminated with volatile organic compounds.

suspended to identify and implement additional measures to prevent further Notices of Violation.

- Per BAAQMD Regulation 6, Section 203 and BAAQMD Regulation 6, Rule 1, Section 203, during construction activities at the site, the site is considered a Bulk Material Site. Monitoring at the site for fugitive dust and visible emissions (BAAQMD Regulation 6, "Particulate Matter") will be conducted throughout demolition and soil handling activities until the temporary cap is installed. This monitoring will be performed by a combination of visual observations during fugitive dust generating activities,[21] real-time monitoring for particulates using light-scattering monitoring equipment at the site perimeter, and the sampling of particulates for chemical analysis at the site perimeter. In the event that fugitive visible dust is observed or if PM10 dust Trigger Levels are exceeded, the DCP describes contingency dust control measures that will be implemented to reduce dust emissions at the site perimeter.

- The limitations in BAAQMD Regulation 7 only become effective once odor complaints from a specified number of complainants are received within a designated period. To mitigate the potential for complaints about odors from volatile organic compounds ("VOCs") at the site, the AMP includes an Action Level for Total VOCs at the site perimeter and the DCP describes several contingency vapor and odor control measures that will be implemented if Total VOCs exceed the Action Level or if significant odors are noted at the site perimeter.

- All demolition and/or abatement work involving asbestos containing materials ("ACM") will be performed by certified asbestos consultants in accordance with BAAQMD Regulation 11, Rule 2, Section 203 and ACM-containing demolition wastes will be disposed of in accordance with BAAQMD Regulation 11, Rule 2, Section 204. Due to the use of negative pressurized enclosures equipped with high efficiency particulate air filters, there will be no visible emissions during demolition and/or abatement work involving ACM.

- To comply with BAAQMD Regulation 8, Rule 40, the Contractor will (1) use an organic vapor analyzer in accordance with 8-40-604 to monitor excavation spoils for the presence of contaminated soil (i.e., excavated soil with an organic concentration of greater than 50 parts-per-million by volume ("ppmv") when measured within 3 inches of the surface of the material) and (2) will manage contaminated soil during excavation activities and their removal the site in accordance with 8-40-306 (e.g., during excavation activities, above grade exposed soil will be kept visibly moist, treated with an approved vapor

[21] As the goal of the DCP and AMP are to prevent visible fugitive dust emissions from the site, the monitoring for visible fugitive dust emissions will be conducted in general accordance with U.S. EPA Method 22.

suppressant, or covered with plastic; contaminated soil shall be stockpiled separately from soil that is not contaminated; all contaminated soil will be covered with plastic or other covering to minimize emissions to the atmosphere during transport to the disposal or treatment facility). In accordance with 8-40-402, the BAAQMD will be notified a minimum of 5 days in advance of the excavation of soil known to be contaminated with organic compounds at concentrations greater than 50 parts-per-million by weight ("ppmw") and in the event that previously unknown VOC contaminated soil is encountered during excavation activities, the BAAQMD will be notified as early as possible and a written summary of the activities conducted will be provided to the BAAQMD within 30 days of the completion of excavation activities.

- The BAAQMD does not have a Regulation or Rule that addresses particulate emissions from soils toxic air contaminants, and, consistent with an email clarification from Coby Graham (DTSC, 2019f), the SCAQMD Rule 1466 is not considered an ARAR by DTSC. However, the SCAQMD Rule 1466 was reviewed to identify potential monitoring strategies and mitigation measures for use on the project. Based on this review, the revised AMP includes the use of SCAQMD-approved direct-read PM10 monitors (i.e., a Dusttrak II or equivalent) to monitor PM10 concentrations at the site perimeter.

  In addition, SCAQMD Rule 1466 defines the real-time PM10 concentration for comparison to the Action Level as equal to the difference between the upwind and downwind perimeter air monitoring stations. Given that ambient PM10 concentrations are anticipated to be approximately 20 ug/m^3, Bridge has proposed using the "difference" approach after site-specific evaluation of PCBs concentrations in ambient PM10 by collection of air samples from the upwind monitoring station prior to the start of perimeter air monitoring. Samples will be analyzed for PCBs by EPA Method TO-10A. If PCBs are not detected above the analytical reporting limit in any of the upwind ambient air samples, the Trigger Levels, Suspend Work Levels, and Action Levels proposed in the AMP will be compared to the difference between the 5-minute TWA PM10 concentrations measured at the upwind and downwind perimeter air monitoring stations. Additional details are provided in the AMP, Section 3.

  Also, to minimize fugitive dust emissions, Section 2 of the DCP has been revised to include recommendations within SCAQMD Rule 1466 that were not originally included in this section (e.g., that fencing that is a minimum of 6 feet tall and equipped with a windscreen be installed around the site, a minimum of 6-inches of space between the soil and top of the truck bed while transporting material within the site, to inspect stockpiles on a daily basis, to apply a dust suppressant to the material prior to loading).

- EKI reviewed the guidance on instrument siting presented in the BAAQMD's Manual of Procedures, Volume VI, Air Monitoring Procedures, Subsection 2.4 (i.e., Instrument Siting for the Atmospheric Sampling of Ground Level Lead Concentrations). Based on the wind data from the Oakland Airport, located approximately 3 miles southwest of the site, the direction of the most frequent winds is from west/west northwest and approximately 50% of the time, the wind is from within ±22.5 degrees of this centerline. Based on this information, and EPA comments, EKI has (1) added two additional perimeter air monitoring stations along the southeastern boundary of the site at the boundary with the former PepsiCo/Gatorade property; (2) added a new perimeter air monitoring location approximately 75 feet[22] from the northeastern property boundary of the site adjacent to International Boulevard, and (3) shifted the furthest upwind air monitoring stations at the western corner of the site and on the property boundary shared with residences closer to International Boulevard (to just before E 12th Street) for a total of three upwind monitoring stations on that portion of the property boundary between International Boulevard and approximately E 12th Street, except when work on the southwestern portion (San Leandro Street side) of the site is being performed. The locations of these monitoring stations are shown on Figure K-1 of the revised AMP.

- EKI reviewed the Meteorological Monitoring Guidance in Appendix A of the BAAQMD's Manual of Procedures, Volume VI, Air Monitoring Procedures; this guidance outlines recommendations for collecting "valid" meteorological data (e.g., temperature, wind speed and direction, rainfall, etc.) that may be used by the BAAQMD for modelling new or modified sources, for health risk assessments, analyses of ground level monitoring exceedances, and analyses of odor complaints. In the revised AMP, we propose locating the meteorological station at the construction trailer (see Figure K-1 of the revised AMP) and positioning the wind sensor a minimum of 20 feet away from other nearby structures of greater height and a minimum of four feet above the top of the construction trailer. We believe that the data collected at this location will be representative of weather conditions at the site during demolition and construction activities.

4.2 Comment 1

Particulate matter and VOC monitoring instruments capable of datalogging shall be used continuously during baseline monitoring and during all regulated soil activities at the site. *Air monitoring and dust controls shall be conducted prior to and during all site activities involving redevelopment and remediation activities regulated by the Department. All instruments should be capable of datalogging and alerting on-site personnel when an action level has been exceeded. Summary reports of the*

[22] A set back of approximately 75 feet is proposed to avoid potential PM10 dust impacts from vehicular traffic and road dust along International Boulevard.

instruments' data logs should be provided to the Department at a frequency and in a manner to be agreed upon.

Response: As indicated in the AMP, air monitoring will be implemented during demolition and soil handling activities until the temporary cap is installed at the site. Real-time data logging instruments (e.g., PM10 and organic vapor analyzer) will be used at the air monitoring stations and EKI will work with the equipment suppliers to equip the perimeter air monitoring stations with telemetry. The monitors will be properly calibrated and will have a calibration certificate available indicating the date when the instrument was calibrated. The use of telemetry will aid in determining in a timely manner if a Trigger Level, Suspend Work Level, or Action Level has been exceeded at the site perimeter. Data from the instruments will be provided to DTSC at least twice per month starting one month after perimeter air monitoring is initiated.

4.3 Comment 2

Air sampling and monitoring locations for community air monitoring must be both within the Site and near the Site's perimeter. *On-site air monitoring near the work area must also be conducted to protect the community. Here the community includes co-located—working nearby—construction workers not involved in the disturbance, removal, characterization, handling, or transportation of impacted or potentially impacted soils.*

Please consult with DTSC HERO to develop on-site community action levels and perimeter community action levels. Community action levels must be established to protect co-located workers at the Site, as well as the public; whereas, occupational action levels shall be used to protect workers employed in soil activities involving impacted or potentially impacted soils.

Response: All work (e.g., excavation and/or demolition) involving PCBs at concentrations greater than 1,000 mg/kg that would generate dust if disturbed will be performed within enclosures that will be vented to air pollution control equipment (i.e., particulate air filters). In addition, excavation of the VOC area located outside the southwestern corner of Building 1 will also be performed using vapor and odor suppressing foam (e.g., Hydroseal, RusFoam, or equivalent), that, based on past professional experience, has been successful in meeting project Action Levels.

Based on discussions with the Contractor, no exterior non-excavation/non-demolition activities are anticipated at the site while construction activities involving demolition of existing structures or handling of potentially contaminated soil is ongoing. As a result, the only applicable on-site community action levels are the occupational action levels and each entity whose workers will be working at the site shall monitor its personnel for potential exposures in accordance with their respective Health and Safety Plans ("HASPs"). If there is a change in the work sequencing, on-site workers will either be required to be health and safety trained and work under a HASP or work

inside the new building after it is built, in which case, the soil exposure pathways will not be complete.

4.4 Comment 3

Provide all equations and assumptions used to calculate the expected community exposures during regulated soil activities, the use of PM10 as a surrogate for Total Suspended Particulates ["TSP"], and the dust action levels. *PM_{10} concentrations would seem to underreport the TSP concentration for recording and analyzing community and occupational exposures. Please show the assumptions and calculations used to determine this use of PM_{10} as a surrogate for TSP.*

> ***Please Note****: SCAQMD Rule 1466 uses an action level of 25 µg/m^3 over two hours. The CAMP & DCP should, at a minimum, show whether this action level is protective of community health than the previously calculated action levels. The more protective action level shall be used for air monitoring during regulated soil activities.*

Response: In response to comments from EPA, the revised AMP proposes real-time PM10 concentration-based Trigger Levels (see EPA Comment 19, Section 2). In the revised AMP, no monitoring for Total Suspended Particulates is proposed.

Also, as discussed above in RTC in Section 4.1, consistent with an email clarification from Coby Graham (DTSC, 2019f), the SCAQMD Rule 1466 is not considered an ARAR by DTSC. Therefore, the Action Level proposed in SCAQMD Rule 1466 has not been included in the AMP.

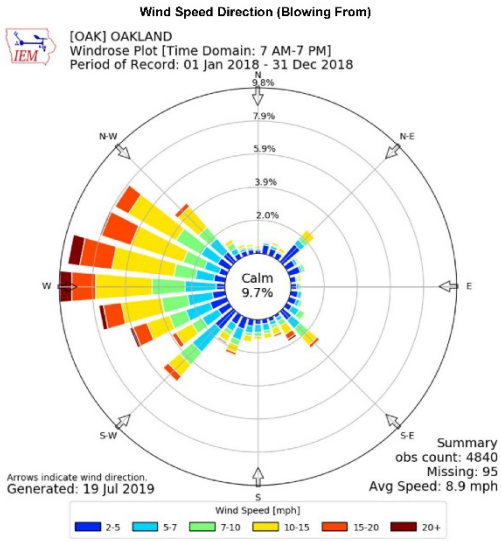
4.5 Comment 4

Air sampling and monitoring locations near the Site's perimeter shall be determined daily by expected wind conditions to the extent practicable; one monitoring station shall be upwind and the other(s) shall be downwind from the source activity located between the activity and the Site property line. *Air sampling and monitoring locations should be determined daily based on the observed wind conditions at the site and the location of scheduled soil activities. Sampling and monitoring locations should lie within 22.5 degrees of the centerline of a vector in the direction of the most frequent winds and passing through the planned source activity; this vector is the centerline of a sector of 45 degree of arc. [See BAAQMD, Manual of Procedures, Volume VI Subsection 2.4.]*

Prior to establishing local wind conditions, historic wind rose date should be reviewed to establish initial monitoring locations and provided to the Department for review.

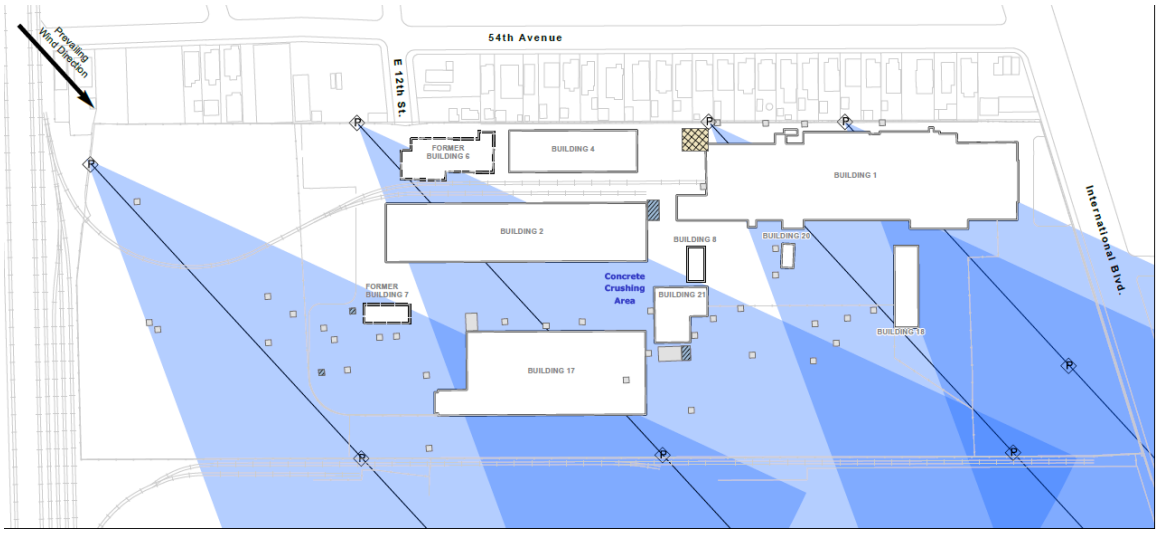
The number of downwind monitoring locations should be sufficient to ensure that the sectors as a group encompass at least one-half of the exposure indicated by the observed wind direction.

Response: Based on 2018 wind data from the Oakland Airport (see Figure K-2 in the revised AMP), located approximately 3 miles southwest of the site, between 07:00 and 19:00, the direction of the most frequent winds is from west/west northwest and, approximately 50% of the time, the wind is from within ±22.5 degrees of this centerline. Less than 10% of the time, the wind blows at speeds greater than 7 miles per hour towards the northwest of the site, where residences are located.



Based on this information and EPA comments, EKI has (1) added two additional perimeter air monitoring stations along the southeastern boundary of the site at the boundary with the former PepsiCo/Gatorade property; (2) added a new perimeter air monitoring location approximately 75 feet[23] from the northeastern property boundary of the site adjacent to International Boulevard, and (3) shifted the furthest upwind air monitoring stations at the western corner of the site and on the property boundary shared with residences closer to International Boulevard (to just before E 12th Street) for a total of three upwind monitoring stations on that portion of the property boundary between International Boulevard and approximately E 12th Street, except when work on the southwestern portion (San Leandro Street side) of the site is being performed. The locations of these perimeter air monitoring stations and approximate area of coverage is shown below.

[23] A set back of approximately 75 feet is proposed to avoid potential PM10 dust impacts from vehicular traffic and road dust along International Boulevard.



4.6 Comment 5

The CAMP & DCP shall describe how meteorological monitoring (e.g., wind speed and direction) will be conducted during regulated soil activities at the Site; it shall also include the wind speed at which soil activities will stop. *Meteorological monitoring instrumentation and location shall be determined in consultation with the Department. Meteorological data must be accurate and representative.*

Meteorological monitoring should be conducted using the recommendations from the BAAQMD's Manual of Procedures, Volume VI, Air Monitoring Procedures, Appendix A, Meteorological Guidance.

Response: As discussed above, EKI reviewed the Meteorological Monitoring Guidance in Appendix A of the BAAQMD's Manual of Procedures, Volume VI. Based on this review, we propose locating the meteorological station for the project at the construction trailer (see Figure K-1 of the revised AMP) and positioning the wind sensor a minimum of 20 feet away from other nearby structures of greater height, and a minimum of four feet above the top of the construction trailer. We believe that the data collected at this location will be representative of weather conditions at the site during demolition and soil handling activities until the temporary cap is installed.

The DCP has been revised to indicate that dust generating activities will be temporarily halted when (1) wind speeds are greater than 15 miles per hour (averaged over a 15-minute period) or (2) instantaneous wind speeds exceed 25 miles per hour.

4.7 Comment 6

The CAMP & DCP shall include all the Basic Construction Mitigation Measures from the BAAQMD, CEQA Air Quality Guidelines (May 2010) Subsection 8.1.2, Mitigating Criteria Air Pollutants and Precursors. *Please include requirements to complete all roadways, driveways, and sidewalks to be paved as soon as possible. Also, building*

pads should be laid as soon as possible after grading unless seeding or soil binders are used.

Please post a publicly visible sign with the telephone number and person to contact at DTSC regarding dust complaints. The Air District's phone number should also be visible to ensure compliance with applicable regulations.

Response: Based on discussions with the Contractor, following the completion of vertical demolition and soil remediation excavations, the existing site cap will be removed. The next phase of work (where PCBs are <50 mg/kg) will involve removal of any remaining concrete foundations, slabs, underground utilities, and other site features in conflict with the redevelopment construction, followed by rough and fine grading, excavations for clean corridors, ground improvement activities for geotechnical purposes, concrete crushing, and the construction of the new building foundation. Upon completion of these activities, a temporary cap will be installed at the site.

EKI reviewed Table 8-2 ("Basic Construction Mitigation Measures Recommended for ALL Proposed Projects"), in the BAAQMD's CEQA Air Quality Guidelines (May 2017) and added dust-related mitigation measures not previously included in Section 2 to the revised DCP.[24]

Publicly visible signs will be posted along International Blvd informing people how to contact a site representative, DTSC, and/or the BAAQMD about potential issues related to dust emissions from the site. The name and telephone number for each of the entities listed above will be included on the sign.

4.8 Point of Clarification

The American Conference of Governmental Industrial Hygienists, the International Organization for Standardization, and the European Standards Organization refer to "respirable dust" as particulate matter less than 4 microns in diameter (PM_4). [See WHO, "Hazard Prevention and Control in the Work Environment: Airborne Dust," p.8.] For community exposures, it is better to use "respirable dust" to refer to PM_4 (or $PM_{2.5}$) rather than to coarse particulates (PM_{10}).

Response: EKI has revised the AMP to refer to PM10 or PM10 dust instead of "respirable dust."

[24] While emissions from the project are anticipated to be below applicable Thresholds of Significance, EKI also reviewed Table 8-3 ("Additional Construction Mitigation Measures Recommended for Projects with Construction Emissions Above the Threshold"), to identify whether additional dust mitigation measures should be added to Section 2 of the DCP. Potentially applicable measures were already included in Section 2 of the DCP.

5. DTSC LETTER FROM ESPO

This section contains responses to comments from Chinh Q. Vu, PE, of the DTSC's Engineering and Special Projects Office, dated 19 June 2019.

5.1 Comment 1

This RDIP should be signed and stamped by a California licensed Civil Engineer in accordance with the requirements of the California Business and Professions Code Section 6735.

Response: This comment is addressed in RTC 4 from DTSC GSU (see Section 3).

5.2 Comment 2

The trichloroethylene (TCE) groundwater plume extends beyond the site to the adjacent residential properties to the northwest. Thus, it is likely that vapor intrusion (VI) is an issue for the residential properties northwest of the Site. Please discuss past, current, and future remedial efforts for these residential units.

Revised response, October 2019: Prior investigations and results from on-site monitoring wells along the property boundary indicate that TCE is present in groundwater on the site and that groundwater from this area flows downgradient into the site. Therefore, it is unknown if the TCE plume extends beyond the site. In 2009, soil gas monitoring conducted onsite near the property boundary adjacent to residential properties detected VOCs associated with chemicals of concern in groundwater. Soil gas testing was also conducted at an adjacent residence in 2009. However, the residential soil gas results did not contain site-related VOCs above detection limits. See proposed soil gas investigation response to RTC 2a from DTSC GSU; Section 3.[25]

5.3 Comment 3a (Section 1.4 Remedial Implementation Under Redevelopment)

The first bullet from the brief overview of the remedy states that "these [additional] hotspot excavations are not needed to meet remedial action objectives ("RAOs")." However, as stated in Comment 3, hotspot removal does increase the effectiveness of the groundwater RAOs. Please consider revising the text.

Response: The text of the referenced section (former Section 1.4, current Section 1.4.1 of the Draft Final RDIP Addendum) has been revised in consideration of this comment.

5.4 Comment 3b (Section 1.4 Remedial Implementation Under Redevelopment)

The proposed plan to install the Vapor Intrusion Mitigation System (VIMS) in two

[25] Response prepared by GE/Wood.

phases, where "a contingent sub-slab depressurization ("SSD") system with liner that will be operated, if needed, based on results from sampling after the new building is constructed," may not be an adequate remedial action for the VI mitigation. The proposed Phase I plan to cap conveyance pipes on the roof eliminates the benefit of an SSD system and leaves the sub-slab liner as the only mitigation measure for VI. The sub-slab liner is considered a secondary mechanism whose purpose is to provide a redundant layer of protection and it cannot be relied on to attenuate concentrations of COCs by itself. Thus, another method of VI mitigation is required when indoor or sub-slab TCE concentrations reach the EPA commercial/industrial screening level of 3.0 µg/m3 or 100 µg/m3 (a 0.03 attenuation factor is given between sub-slab and indoor concentration), respectively. In addition, DTSC's 2011 Vapor Intrusion Mitigation Advisory (Advisory) states that sub-slab liners "are not able to completely eliminate VI due to the likelihood of punctures, perforations, tears, and incomplete seals. Thus, sub-slab liners by themselves are not an acceptable VI mitigation system". Based on the TCE groundwater concentration of 11,000 µg/L at 3HP04 in Figure 4a of Appendix E, it is likely that either indoor or sub-slab concentrations will reach the screening level, which will trigger the requirement for VI mitigation. Therefore, a complete VIMS (including venting) is likely required and should be considered the primary option. If a phased approach is chosen, see Comment 19a [17h] for a discussion on the use of dual vapor probes sub-slab to assess sub-slab concentrations above the membrane.

Response: The plan to install the SSD system in two phases has been changed based on this comment. As described in the Draft Final RDIP Addendum (particularly, Appendix E), the SSD system will be fully installed and will be activated from the start, rather than the proposed phased implementation approach that was dependent on indoor air sampling results.

It should be clarified that the proposed VIMS is not intended to perform as a passive venting system. The sub-slab vent piping and the sub-slab liner are proposed as the sub-grade infrastructure for an active SSD system, but is not intended for passive mitigation when off, both in this version and the previous draft.

We understand and agree that a liner by itself is not sufficient for VI mitigation, and therefore the proposed VIMS design does not rely on the liner for VI mitigation. VI mitigation will be provided by the active SSD system as proposed. The liner is included based on DTSC guidance that it should be a component of active SSD systems for redundancy, although active SSD systems are also proven effective without a liner.

See Response to Comment 17h in this section regarding dual soil vapor probes.

The groundwater sample from the A-zone at 3HP04 was a grab sample collected from 18-22 feet bgs in November of 2006. More recent data from A-zone groundwater extraction wells show TCE concentrations an order of magnitude lower than that, as discussed in Attachment E-2 of Appendix E. Nonetheless, we acknowledge the potential

for the TCE screening level of 100 ug/m^3 to be exceeded in sub-slab soil gas below the liner.

5.5 Comment 4

Section 1.57 and 1.58 Off-Site Residential and Commercial/Industrial Worker after Redevelopment. *As indicated in Figure 6, the inhalation exposure pathway for off-site residential and commercial/industrial workers is complete, even though it is listed as "Not Significant". According to Figure 4A of Appendix E, the TCE groundwater plume extends beyond the Site to the south beyond the railroad track and northwest toward 54th Street. This RDIP Addendum should address these complete pathways.*

Revised response, October 2019: See response to DTSC GSU June 24, 2019 comment 2a in Section 3, regarding the proposed approach for assessing potential offsite residential vapor intrusion. Regarding the inhalation pathway for commercial/industrial workers to the south of the site, in 2009 GE conducted a soil gas assessment along the west side of San Leandro Boulevard, adjacent to the property at 5401 San Leandro Boulevard. Based on the DTSC HERO Note 3 and USEPA risk screening levels ("RSLs") at that time, no inhalation risk was identified for commercial/industrial Workers and DTSC required no further action.

Due to the recent changes in VI protocols and RSLs, GE plans to include further evaluation of the commercial/industrial VI pathway south of the Site. GE will update the September 2008 Work Plan to include current guidance and protocols. Soil gas samples will be collected from approximately the same three locations along the west side of San Leandro Boulevard that were sampled in 2009. If the analytical results from these samples exceed applicable screening levels, then GE will collect soil gas samples from a minimum of three locations on the property at 5401 San Leandro Boulevard. Consistent with previous efforts, GE will request access from the City for sampling along San Leandro Boulevard and, if necessary, from the property owner and will collect soil gas samples once access is granted. If commercial soil gas results exceed applicable screening levels, then a monitoring plan will be developed to collect indoor air samples.

In 2009, GE made two attempts to collect soil gas samples in January, however sampling was unsuccessful due to the shallow water table and sampling was postponed until July after temporal high groundwater water levels had dropped. To increase the likelihood that sampling will be successful, GE propose to again conduct the sampling in July 2020 and will submit a work plan addendum by March 2020 for DTSC's review.[26]

Figure 6 has been changed from "Not Significant" to "Complete or Potentially Complete" as described below in Section 6.3.

[26] Response prepared by GE/Wood.

5.6 Comment 5

Section 2.0 Remedial Design. *The final design of the VIMS should be submitted to DTSC for review and approval prior to construction.*

Response: The final design will be submitted to DTSC for review and approval prior to construction. Section 1 of Appendix E of the Draft Final RDIP Addendum has been revised to reflect this.

5.7 Comment 6

Section 2.2.3 Landscaping. *The design of the liner/cap system for the belowground landscaping location(s) needs to be reviewed and approved by DTSC prior to implementation. The demarcation fabric should be placed at least six inches above the HDPE liner, with clean fill in between. This will reduce the risk that a future groundskeeper or maintenance worker will accidentally damage the HDPE liner if they penetrate through the demarcation fabric.*

Response: No belowground landscaping is included in the current design and this option has been removed from the Draft Final RDIP Addendum. Therefore, this comment is no longer applicable.

5.8 Comment 7

Section 2.2.5 Clean Corridors. *The proposed clean corridor for future subgrade utilities should prevent future on-site groundskeeper/maintenance workers from coming into contact with the contaminated soil. However, it is not clear how they will be protected from VI through the clean corridor, since there are no other proposed mitigation measures. VI concern also extends to other subgrade features such as manholes and drop inlets. Please provide monitoring and validation methods to verify that VI is not a concern at these locations for future on-site groundskeeper/maintenance workers.*

Response: Future on-site groundskeeper/maintenance workers will be protected from potential VI through the clean utility corridor and other subgrade features by the protocols to be included in the soil management plan ("SMP"). The SMP will include a requirement for monitoring the breathing zone of future on-site groundskeeper/ maintenance workers for VOCs with an OVM or similar equipment during work in clean corridors. The SMP is described in current Section 4.6.1 of the Draft Final RDIP Addendum.

5.9 Comment 8

Section 3.2.6 Construction Storm Water Pollution Prevention Plan.[27] *The second paragraph in this Section states that "accumulated storm water will be allowed to*

[27] SWPPP

infiltrate or, if needed for the construction, will be captured and stored onsite prior to sampling, treatment (if needed), and discharge under permit to the sanitary sewer or the storm drain as described in Appendix M." Allowing storm water to infiltrate would be a divergence from the intent of the 1993 deed restriction, which requires a cap to prevent infiltration. Infiltration should not be an option for managing storm water. In addition, Section 3.2 of Appendix M should also include measures to prevent storm water infiltration after the Site's cap is partially or completely removed.

Response: Given DTSC's concern about infiltration of storm water, the RDIP Addendum has been modified such that during the wet season, existing groundwater extraction wells EW-1, EW-2, and EW-3, located on the western (downgradient) property boundary will be operated and monitored to the extent practicable. The objective of the monitoring is to demonstrate that storm water infiltration while the site is not capped does not result in significant changes in the trends for COCs in extracted groundwater. These wells extract groundwater from the uppermost water bearing zone (A-zone, generally 15 to 35 feet depth) and the underlying B-zone (35 to 75 feet depth). Groundwater from extraction wells EW-1, EW-2, and EW-3 will be sampled quarterly when the wells are operating during the wet season until the new cap is in place. Extraction well groundwater samples will be collected as described in the Field Sampling and Laboratory Analysis Plan Addendum ("SAP"; Appendix N of the RDIP Addendum). Consistent with the existing sampling protocols for the groundwater extraction and treatment system ("GETS"),[28] samples collected from EW-1, EW-2 and EW-3 will be analyzed for VOCs by EPA Method 8260B and PCBs by EPA Method 8082, ULL. Section 3.2.6 of the Draft Final RDIP Addendum and Section 2.4 of Appendix M (SWPPP) have been revised to reflect this.

5.10 Comment 9

Section 3.4 Soil Excavation*. As states in Section 2.1.2.1, "the approved remedy calls for targeted excavation of elevated cVOCs [chlorinated VOCs] in soil characterized by TCE concentrations in excess of 10 mg/kg," and Section 2.1.3, "known locations of PCBs in soil above hazardous waste levels (PCB concentration of 50 mg/kg or greater) will be excavated." However, this section states that "no post-excavation soil confirmation sampling is proposed after excavation." Absent of post-excavation confirmation sampling, it is not clear how soil excavation goal for TCE will be achieved, since there is not a way to verify that all soils remaining are below the 10 mg/kg limit.*

Response: As stated in the 2012 RDIP, the concentration for TCE of 10 mg/kg for the previously completed VOC hotspot excavation was a consideration in the excavation design and intended to reduce the timeframe for the attainment of groundwater remediation goals in downgradient areas, but not a requirement. Similarly, PCB excavations proposed in the Draft Final RDIP Addendum are intended to remove

[28] GETS sampling protocols are described in the *Operation, Maintenance and Monitoring Plan, General Electric Site, 5441 International Boulevard, Oakland, California,* prepared by Geosyntec, dated 24 November 2015.

known locations with PCB concentrations above California hazardous waste levels (PCB concentration of 50 mg/kg or greater). These concentrations for TCE and PCBs are considerations not remedial goals (risk-based or otherwise).

During the remedial investigation for the site, completed as part of the remedy selection process, more than 700 soil samples were collected for site characterization throughout the site. These data together with additional samples collected during the Phase I remedy implementation in 2013-2015 and the 2018 screening level soil sampling for PCBs, provides a detailed historical record of soil COC concentrations. The main objective of the proposed excavations is to remove COC mass. Therefore, additional soil characterization via post-excavation confirmation sampling of remaining soils that have been beneath the existing site cap and will remain beneath the new cap is not warranted.

In addition, as described in Section 1.5 of the Draft Final RDIP Addendum (Screening Level Risk Evaluation), potentially exposed on-site populations after redevelopment of the site will be protected by (1) removal of VOC and PCB hotspots, (2) presence of the new permanent low-permeability cap, (3) creation of clean utility corridors, (4) installation of a VIMS for the new building, (5) implementation of health and safety requirements in the SMP, and (6) operation of the GETS by GE.

See also additional discussion in Section 9.

5.11 Comment 10

Section 3.9 Soil Management Protocols for Free Product or Oily Soil. *In addition to excavation of soil with visible free product, confirmation soil samples should be collected from the side walls and bottom of excavations to confirm PCB and TCE concentrations are below 50 mg/kg and10 mg/kg, respectively. ESPO recognizes that Bridge has an agreement with the EPA to not collect confirmation sample post-excavation for PCBs. However, we believe this scenario is different from the proposed excavation based on historical sampling and warrants confirmation sampling. In addition, excavation as a result of observable free product will not be backfilled until analytical data demonstrates PCBs and TCE concentration are below 10 mg/kg and 50 mg/kg, respectively.*

Response: Excavation as a result of observable free product will continue until no visible free product or oily soil is observed in place. As indicated in response to Comment 9 above, the concentrations for TCE and PCBs in the Draft Final RDIP Addendum are not remedial goals (risk-based or otherwise), but reflect the maximum concentrations that may remain in place underneath the cap. The main objective of an excavation related to discovery of free product or oily soil will be to remove encountered free product and COC mass that has been in place under the existing cap placed as part of the currently-approved remedy. It will, therefore, be inaccessible to potentially exposed populations, as described above in response to Comment 9.

Therefore, verification that all soils remaining are below a certain COC concentration through post-excavation confirmation sampling is not warranted.

See also additional discussion in Section 9.

5.12 Comment 11a

Section 3.10, Management of Known and Unknown Underground Structures Uncovered During Redevelopment Activities. *This section states that known and unknown concrete underground structures encountered during soil disturbance for redevelopment may be crushed and reused, if consistent with the approach for concrete reuse. Please provide the approach for concrete reuse. Concrete is considered a porous material and can absorb contaminants. Thus, concentrations of COCs may exist on/in the known and unknown concrete underground structures. To prevent further soil and groundwater impacts from potentially contaminated crushed concrete, the concrete reuse protocol should follow DTSC's Advisory for Clean Import Fill Material.*

Response: Concrete with PCBs less than 50 mg/kg and TCE less than 10 mg/kg will be crushed and placed above the water table as aggregate base or fill material under the new concrete pavement site cap. Concrete base produced from crushing existing on-site structures will transition to import baserock within 2 feet of a belowground utility structure that is intended to be installed in a clean corridor. Concrete that cannot be placed on-site because of the presence of PCBs ≥50 mg/kg, TCE ≥10 mg/kg, other potential COCs ("PCOCs"), or for other construction-related considerations (e.g., construction quality assurance) will be removed and appropriately disposed of off-site at a permitted facility.

Previously collected data, when available, will be used to determine if concrete can be placed on-site or if concrete must be removed and disposed of off-site. If concrete data are not available, concrete samples for PCBs will be collected in general accordance with EPA Region 1 "Standard Operating Procedure for Sampling Porous Surfaces for PCBs" ("EPA SOP"; EPA, 2011) and analyzed for PCBs by EPA Method 8082 after Soxhlet extraction (EPA Method 3540C).

EKI provided a Building Materials Sampling memorandum to EPA and DTSC on 11 July 2019 (EKI, 2019c). As described in EKI's Building Materials Sampling memorandum, additional concrete cores will also be collected for characterization of non-PCB PCOCs in concrete that will be placed under the new cap.

As described in Section 1.5 of the Draft Final RDIP Addendum (Screening Level Risk Evaluation), placement of crushed concrete generated from on-site demolition activities below the new permanent cap will not create an unreasonable risk to on-site or off-site receptors. Potentially exposed populations will be protected from exposure to PCBs and other COCs in the crushed concrete by: (1) lack of direct contact due to

placement of the crushed concrete under the cap; (2) transitioning of crushed concrete to import baserock within 2 feet of a clean utility corridor to protect onsite groundskeeper/maintenance workers; (3) placement of the crushed concrete well above the groundwater table and under the low-permeability cap to minimize the potential for leaching to groundwater; and (4) health and safety protocols in the SMP to protect on-site groundskeeper/ maintenance workers from potential VI through the clean utility corridor and other subgrade features. Sampling for PCBs and other PCOCs in concrete is described in Appendix O (Site Demolition).

See also additional discussion in Section 9.

5.13 Comment 11b

Section 3.10, Management of Known and Unknown Underground Structures Uncovered During Redevelopment Activities. *This Section also states that soil sampling associated with these structures will not be conducted unless free product or oily soil is encountered, or if required for underground storage tank closure. See Comment 10.*

Response: See response to Comment 10 in this section.

5.14 Comment 12

Section 3.11 Clean Corridor. *If soil excavated to form the clean corridor is to be reused on-site, it should only be used in areas where COC concentrations are greater than the COC concentrations at the clean corridor.*

Response: Soil excavated for the creation of clean utility corridors is currently under the existing cap and will be placed under the new permanent cap after redevelopment. It will, therefore, be inaccessible to potentially exposed populations as described below.

Potentially exposed populations will be protected from exposure to PCBs and other COCs in the soil below the permanent cap by: (1) lack of direct contact due to placement of soil under the cap; (2) creation of clean utility corridors to protect onsite groundskeeper/maintenance workers; (3) placement of the soil well above the groundwater table and under a low-permeability cap to prevent potential leaching of PCBs and other COCs to groundwater; and (4) health and safety protocols in the SMP to protect onsite groundskeeper/maintenance workers from potential VI through the clean utility corridor and other subgrade features. Therefore, the COC concentrations from the excavation location and the placement location should not be a concern.

See also additional discussion in Section 9.

5.15 Comment 13

Section 4.2 Soil Gas Sampling. *This section states that three soil gas probes will be installed, and samples collected in two rounds post excavation to compare with previous high concentrations in soil gas. However, there are no clear remedial goals or trigger levels to determine if either no further action, or additional investigation, is warranted based on the results of the soil gas sampling. Please include a remedial goal or a trigger level to assess the soil gas concentrations post excavation. In addition, please include a copy of Appendix N, Field Sampling and Laboratory Analysis Plan.*

Response: The soil gas sampling discussed in this comment has been proposed to assess post-redevelopment soil gas concentrations post-VOC hotspot excavation. As discussed above in this section in the RTC for Comment 9, the objective of the VOC hotspot excavation is to remove COC mass, rather than reach a numeric concentration criterion in any subsurface media. On-site exposure to soil gas will be mitigated by the VIMS, which will be an active SSD system as described in this section above in the RTC for Comment 3b. Potential VI impacts to off-site receptors will be addressed via a separate work plan to be prepared and implemented by GE (see RTC 2a from DTSC GSU; Section 3).

5.16 Comment 14

Section 4.3 Indoor Air Sampling Pre-Occupancy. *Regardless of the path taken, based on the result of the initial indoor air sampling (no further action, or build Phase II of the VIMS) the Advisory "recommends two sampling events per year of the first three years or until consistent verification that the mitigation system is meeting established indoor air performance measures." These sampling events should include collecting samples from the sub-slab monitoring probes. In addition, the Advisory recommends indoor air sampling "should be conducted during the potentially "worst case" months of January/February and June/July." If possible, indoor air samplings should take place during these months.*

Response: For reference, DTSC's Advisory clearly notes that less indoor air sampling is recommended for active SSD systems:

> - DTSC Advisory, page 39, for active SSD systems: "Indoor air quality should be measured periodically, but is unlikely to be directly measured as frequently as vapor samples and pressure measurements. Indoor air quality should be acceptable as long as an adequate negative pressure is maintained below the building foundation and the mitigation system effectiveness has been demonstrated. Thus, one advantage of a SSD system over a SSV system is less frequent sampling of indoor air."

- While page 39 of the Advisory specifically recommends semi-annual indoor air sampling for three years for SSV systems, page 39 of the Advisory also notes that "one advantage of a SSD system over a SSV system is less frequent sampling of indoor air," indicating the three years of indoor air sampling is not necessary for active SSD.

As discussed with DTSC and consistent with the Advisory the Draft Final RDIP Addendum has been revised to provide for indoor air testing pre-occupancy, six months later, and prior to the five-year review.

To assess sub-slab soil gas concentrations during indoor air testing, the Draft Final RDIP Addendum has been revised to include sampling the soil gases in the SSD lateral pipes on each day of the indoor air testing. There are seven lateral pipes, each conveying soil gases from one suction trench beneath the floor. The samples from the SSD lateral pipes will provide a representative sample of sub-slab soil gas removed from each SSD extraction area. At the request of DTSC and to supplement lateral pipe soil gas samples, sub-slab soil gas samples will also be collected from all of the sub-slab probes ("SSPs") during the first round of indoor air sampling for comparison to the soil gas samples collected from the lateral pipes.

There are no performance criteria for VOC concentrations in the sub-slab soil gas during active SSD operations, since active SSD systems are effective for vapor intrusion mitigation as long as the targeted sub-slab vacuum is maintained. However, the analytical results for the lateral pipe soil gas samples can be useful in evaluating whether any VOCs detected in indoor air samples are potentially the result of vapor intrusion from the subsurface. Sub-slab soil gas samples can provide similar information; however, one lateral pipe sample is representative of the conditions over the entire area the associated suction trench influences, while a sub-slab soil gas sample covers a smaller area of influence. Therefore, data to meet the same objectives can be collected more efficiently and with less samples using lateral pipe samples compared to sub-slab samples.

The VOC concentrations measured in soil gas samples in the SSD lateral pipes will also be used in conjunction with the SSD flow rate in each lateral pipe to quantify the total VOC flux from the subsurface. VOC flux from the subsurface is maximized when an SSD system is operating and would be lower during stagnant conditions without active SSD. The measured VOC flux with SSD operating will be evaluated in conjunction with building ventilation rates to assess the theoretical upper limit of VOC concentrations in indoor air that could occur in the building by vapor intrusion in the absence of the SSD system. Analytical results from these samples will be evaluated to assess the change in flux over time and to assist in the evaluation of whether continued vapor intrusion mitigation is necessary.

See also additional discussion in Section 9.

5.17 Comment 15

Section 4.3 Indoor Air Sampling Pre-Occupancy, page 43. *The last sentence in this section states that "Bridge may elect to collect sub-slab samples for VOC and methane analysis to assist with interpretation of indoor air sampling results." As stated in Comment 14, sub-slab samples should be collected along with indoor air samples to aid in evaluating the effectiveness of the VIMS. In the scenario which indoor air quality does not warrant the VIMS Phase II construction, sub-slab VOC concentrations will be crucial to determine the needs for Phase II, as stated in Comment 4b. In addition, it is not clear why methane analysis is required at the Site. Please clarify the need for methane analysis.*

Response: See RTC for Comment 14 above in this section for proposed scope of sub-slab soil gas sampling. Methane analysis was considered based on a prior request from DTSC to evaluate whether methane is a concern at the site. Methane is not thought to be a concern at the site. However, field screening of soil gases extracted by the active SSD system for methane during startup testing has been added to the Draft Final RDIP Addendum.

5.18 Comment 16

Table 2. *The proposed excavation list in the table only separates VOC excavation from all of PCBs excavations. However, Section 2 segregates hot spot PCBs excavation from other soil excavation with PCB concentrations above 50 mg/kg. Please consider segregating PCB hotspot excavations from other soil excavation with PCB concentrations above 50 mg/kg on this table to mirror the Text in Section 2.*

Response: The requested edit has been made to Table 2.

5.19 Comment 17

Appendix E. *The proposed phased approach of constructing a portion of the VIMS (passive VIMS) in Phase 1, to be constructed with the new building, and converting to an active system in Phase 2, if indoor air concentrations exceed the screening level, may not be appropriate for TCE since it is heavier than air. As stated in Comment 4b, sub-slab TCE concentrations will likely reach the screening level, and thus VI mitigation through the use of an active system will be required. ESPO recommends that an active VIMS be considered as the primary option for vapor intrusion mitigation. In addition, the VIMS design should follow the DTSC Advisory. The following comments are specific to the design of the VIMS.*

Response: The Draft Final RDIP Addendum has been revised to eliminate the phased VIMS approach. The complete active SSD system will be installed and started prior to building occupancy.

5.20 Comment 17a

Section 1 Design Overview. *The proposed future use of the Site is a warehouse. It is likely some equipment will need to be anchored into the concrete slab. To protect the sub-slab liner from accidental damage from concrete slab penetrations, EPSO recommends a permeable protective layer between the slab and the membrane throughout the building's footprint. This permeable protective layer can also be used in conjunction with a dual sub-slab probe configuration as indicated Comment 19j. In addition, please indicate the active VIMS trigger level, following indoor air testing.*

Response: Anchor bolts are required by Code[29] to have an embedment less than full concrete thickness; drilling through the concrete for anchor bolt holes is not allowed by Code. Contractors, therefore, take measures to avoid accidentally drilling through the concrete (e.g., drill stops) because drilling through the concrete would require abandoning the hole and moving the anchor, which would then require moving the equipment to be anchored. In the event a hole is accidentally drilled through the concrete, it would be filled with anchor cement that provides a tight seal with the existing concrete. As described in Section 7.1 below, procedures for slab penetration (both accidental and planned), will be included in the operations, maintenance, and monitoring (OMM) plan for the site.[30] Given the Code requirements to not penetrate the concrete with holes for anchor bolts and the institutional controls proposed in the OMM Plan, a permeable protective layer is not necessary to protect the liner and is not included in the VIMS.

Because the Draft Final RDIP Addendum includes an active SSD system from the start, a trigger level for activation is no longer applicable and has not been proposed.

See also additional discussion in Section 9.

5.21 Comment 17b

Section 2 Sub-Slab Liner. *The sub-slab liner should be constructed with approved materials and thicknesses (60-mil of high density polyethylene [HDPE], rubberized asphalt, or equivalent). The proposed 15-mil Stego Wrap Vapor Barrier or equivalent is insufficient as a primary vapor barrier, unless data demonstrate the 15-mil material is as protective and has the same survivability as a 60-mil product for the lifetime of the VIMS. In addition, ESPO recommends a protective layer between the permeable layer and the sub-slab liner to reduce the risk of sharp, angular rock in the permeable layer from puncturing the sub-slab liner during the construction of the slab.*

Response: The proposed 15 mil thick Stego Wrap liner has a Class A puncture rating under ASTM E1745 for sub-slab vapor barriers and is specifically designed for installation on sub-slab base rock directly beneath the floor, as proposed. Given the

[29] American Concrete Institute ("ACI") *Building Code Requirements for Structural Concrete* (ACI 318-19)
[30] The OMM Plan is described in current Section 4.5 of the Draft Final RDIP Addendum.

puncture resistance of the liner, a protective layer between the permeable layer and the sub-slab liner is not necessary and is not required by the manufacturer. The liner will also undergo smoke testing for leaks following installation, and all identified leaks will be sealed following manufacturer instructions. No liner can be guaranteed to be 100% leak free, but as noted in DTSC ESPO Comment 3b and our response, a liner cannot be and is not relied upon for VI mitigation since mitigation will be provided by the active SSD system. The liner is made from polyethylene and thus is chemically resistant to chlorinated VOCs for long-term survivability.

5.22 Comment 17c

Section 4 Suction Trenches, Design Criteria, Service Coverage. *The United State Environmental Protection Agency (US EPA) guidance for constructing SSD systems in large commercial buildings is for radon prevention and has not been demonstrated as appropriate for use as a basis of design for TCE contamination. The design should focus on providing sufficient depressurization, a minimum of 0.02 in. water column (WC), for the entirety of the sub-slab.*

Response: We agree that the goal of the active SSD system is to provide the 0.02 in-WC depressurization for the entirety of the slab, as stated in the Draft Final RDIP Addendum. The sub-slab vacuum will be monitored for performance verification as described in the Draft Final RDIP Addendum. The 0.02 in-WC criterion is a conservative goal as lower depressurization levels are also effective for VI mitigation.

EPA guidance for constructing SSD systems in large commercial building (EPA, 1993) is specifically for active SSD systems, such as the proposed active SSD system. The fluid dynamics that determine air flow and vacuum propagation to create depressurization in the sub-slab using an active SSD system is the same whether the soil gas contains trace levels of radon or trace levels of VOCs. Therefore, the guidance is directly applicable to the proposed active SSD system.

5.23 Comment 17d

Section 4 Suction Trenches, Design Criteria, Spacing. *The design trench spacing of 220 feet between trenches is too large. The Advisory recommends "ventilation trenches should be placed such that no portion of the foundation is more than 25 feet from a ventilation trench. In addition, there are uncertainties over the lifetime of the VIMS that may reduce the effectiveness of the suction and therefore the trench spacing likely needs to be closer. If any portion the foundation is more than 25 feet from a ventilation trench, please demonstrate that the proposed trench spacing provides sufficient depressurization at a minimum of 0.02 in-WC for the furthest location from the collection pipe (i.e. the entirety of the sub-slab).*

Response: We understand that this comment partly reflected an assumption by DTSC that the proposed system was designed for passive venting. As discussed in the RTC for DTSC ESPO Comment 3b (see above in this section), the system was designed for

active SSD. We agree that a passive venting system would require many more venting pipes as well as air inlets and passive ventilators.

The guidance in the Advisory for 25-foot spacing is based on standard design for passive venting systems for methane mitigation. Passive venting systems for methane mitigation operate on a completely different principle than active SSD systems, as methane mitigation systems rely on methane pressure to passively vent the methane gas. Thus, the design practices for passive methane systems are not applicable to active SSD systems. The proposed vent pipe spacing in the active SSD design is based on design principles for active SSD systems, as described below.

The objective for the active SSD system is to maintain sub-slab depressurization across the entire building footprint. It has been known for over 25 years, as expressed in EPA guidance (EPA, 1993), a single suction pit within a well-designed sub-slab gravel venting layer in a new building can provide adequate depressurization over an area of up to 100,000 square feet. In the proposed SSD system, each suction trench serves an area of approximately 75,000 square feet, well within EPA guidance for coverage from a single suction point. Additionally, the proposed design includes suction trenches (rather than suction pits) to allow for more efficient extraction. Also, the relatively low permeability soil beneath the building (underlying the permeable aggregate venting layer added for the SSD system) will limit the amount of soil gas flow up into the permeable venting layer beneath the building. This low permeability in the underlying soil is very favorable to lateral vacuum propagation by reducing the flow rate required to propagate the vacuum.

The SSD trench design has been changed in the Draft Final RDIP Addendum to lengthen the trenches from 100 feet to 200 feet to extend the direct application of vacuum within the vent pipes to approximately 50 feet from the building perimeter and further aid in vacuum propagation.

5.24 Comment 17e

Section 4 Suction Trenches, Design Criteria, Capacity per suction trench: 375 cfm. *The system should be designed with the flexibility to increase the flow rate if sub-slab vacuum readings are insufficient.*

Response: We will measure the sub-slab vacuum readings during startup and adjust the flow rate as needed to meet the sub-slab vacuum goal. From experience, we believe 375 cfm, based on 5 cfm per 1,000 square feet of coverage, is an adequate flow rate from each trench. As a contingency, we have revised the preliminary SSD blower selection to allow for an additional 50% flow rate from each suction trench (e.g., 560 cfm per trench), which would be approximately 3,920 cfm overall. The new preliminary blower selection is the Cincinnati Fan Model HDBI-150, which can provide 4,000 cfm at 8-in WC static pressure. A variable frequency drive is included in the

design to allow operation at the design flow rate (375 cfm per trench) if the added capacity of this larger blower is not necessary.

We have also revised the piping pressure loss calculations based on the higher potential flow rate and increased the size of the SSD suction trench laterals, riser pipes, and rooftop conveyance laterals from 6-inch to 8-inch diameter to lessen pressure drops at the higher flow rate.

5.25 Comment 17f

Section 4 Suction Trenches, Design Criteria, Installation. *There is a discrepancy with the amount of permeable aggregate on all sides of the perforated pipe. This section states a 2" minimum, however, Suction Trench detail in Sheet SSD-M2, Attachment E-3 shows a 3" minimum. Please correct the discrepancy.*

Response: The Suction Trench detail on Sheet SSD-M2 in Appendix E of the Draft Final RDIP Addendum has been revised to show minimum 2-inch permeable aggregate on all sides.

5.26 Comment 17g

Section 5 Conveyance Piping, Maintenance. *All mechanical equipment, including valves and sensors should be included in the preventative maintenance cycle per manufacture requirements or industry standards. In addition, visual leak detection is not sufficient. Leak detection should be conducted using a hand-held detector, able of detecting VOC concentrations below trigger levels/screening levels.*

Response: As requested, mechanical equipment, including valves and sensors will be included in the preventative maintenance cycle per manufacturer requirements or industry standards. Leak detection for the conveyance piping cannot be performed with a handheld OVM. Piping will be under vacuum and any leaks would be of outdoor air into the piping. As such, no soil vapor with VOCs would leak outward for detection in the field.

5.27 Comment 17h

Section 7, Sub-Slab Probes. *ESPO recommends the sub-slab probes be a dual probe design, with one probe below the membrane in the gravel blanket and the other above the membrane and below the slab. The probe above the membrane should be imbedded in the permeable protective layer that communicates throughout the entire building's footprint. VOC concentrations collected from these dual probes will be used to determine the performance of the liner and concentrations directly below the slab will be used in evaluating VI risk to occupants of the building.*

Response: We understand that this comment partly reflected an assumption by DTSC that the proposed system was designed for passive venting. Because sub-slab probes

above the liner are not applicable for the active SSD system proposed for the site where the liner is not relied on for mitigation, no sub-slab probes above the liner have been proposed in the Draft Final RDIP Addendum. See the RTC for Comment 14 in this section for further discussion of sub-slab soil gas monitoring.

5.28 Comment 17i

Section 7, SSD Blower System, Alarms. *The alarm connected to the building management system should also indicate a power loss in addition to a 50% decrease in flowrate.*

Response: The alarm will include notification of power loss as requested. See revision to the Draft Final RDIP Addendum, Section 8 in Appendix E.

5.29 Comment 17j

Section 9.3 Contingency for Emission Control. *The current head loss calculation does not include the additional piping from the roof to the proposed treatment area to the southwest of the Site, or losses through the entire system as stated below. In addition, ESPO recommends a separate head loss calculation for this contingent scenario similar to Table E-1.*

Response: The pressure loss calculations for the piping to the contingent blower location have been added to Tables E-1a and E-1b in Appendix E of the Draft Final RDIP Addendum.

5.30 Comment 17k(i)

Table E-1. *This pressure loss estimate table needs to be updated to match the final design of the VIMS and to ensure the losses do not exceed the 2 in-WC of the design. The following comments are specific to the current loss estimate table. The lateral length of ST-7 as shown on SSD-M1, Attachment E-3, appears to be longer than 50 feet. Please update the calculation for the longest lateral length.*

Response: The line item for "Lateral or Riser Pipe" was intended to refer to the total length of (a) the underground lateral pipe from the tee connection point at the suction trench and (b) the vertical riser pipe up to the roof, for a total length of 50 feet. That lateral pipe at ST 7 is much less than 50 feet. The suction trench piping is longer than 50 feet, but pressure losses in that perforated piping are negligible because flow rate will split into two branches at the tee and drop dramatically as flow spreads into the sub-slab aggregate venting layer, so pressure losses in the suction trench piping are not calculated. The design target is to provide a 2 in-WC applied suction at the tee in the suction trench piping.

With that clarification about the prior table, we have revised the current pressure loss calculation Tables E-1a and E-1b in Appendix E to the Draft Final RDIP Addendum to

explicitly show the underground lateral on a separate line from the riser piping for clarity. The longest underground lateral is approximately 30 feet, at suction trench ST-2.

5.31 Comment 17k(ii)

Table E-1. *It appears the pressure loss through the vertical components, changes in elevation from the sub-slab lateral to the top of the stack, is not included in this table. Please ensure the complete length of pipe from the lateral perforated/slotted pipe to the stack are accounted for in this loss estimate table.*

Response: The complete length of pipe in the calculations for horizontal and vertical components, from the connection to the suction trench pipe through the stack, was included in the prior table. For air systems near atmospheric pressure (such as the proposed SSD system), changes in vertical elevation do not result in pressure losses and therefore are not a part of the pressure loss calculations.

5.32 Comment 17k(iii)

Table E-1. *The same Fanning friction factor is used for both the 6" PVC lateral and schedule 10 galvanized steel pipe pressure loss. Please include the calculation and a diagram showing how the Fanning friction factors are obtained for both piping materials.*

Response: In the Draft RDIP Addendum, a Fanning friction factor of 0.005 for spiral duct provided equivalent estimated pressure loss as use of pressure loss factors provided by the manufacturer. Therefore, the Fanning friction factor of 0.005 was used for calculations, which was the same as the factor derived for the galvanized steel piping (0.005).

In the Draft Final RDIP Addendum, we have substantially revised Table E-1 (now Tables E-1a and E-1b) to show more calculation details, although the results are similar. For the Fanning friction factor, we have used an equation to calculate it directly based on pipe roughness and the flow parameters. The equation used is applicable in the design flow regime for the SSD system. The equation, reference, and parameters are listed in the Tables E-1a and E-1B. The calculated friction factor for the galvanized steel conveyance pipe is 0.0052, which is essentially the same as what was used in the prior version (0.005).

For spiral duct piping we have changed the pressure loss estimating method to use an empirical equation specifically applicable to spiral duct. The calculated pressure losses with this revised approach are approximately the same as before when using a friction factor of 0.005.

There are now two versions of Table E-1. Table E-1a shows the pressure loss calculations for the anticipated flow rate (375 cfm per suction trench) and is

comparable to the prior Table E-1. Table E-1b shows the pressure loss calculations for the potentially higher flow rate (560 cfm per suction trench) as discussed in this section above in the RTC to Comment 17e.

See also additional discussion in Section 9.

5.33 Comment 17k(iv)

Table E-1. *The total pressure loss in this table does not appear to include the length of the 6' stack. In addition, all minor losses, such as valves, elbows, and tees, should be calculated because the calculated total pressure loss is close to the design limit of 2 in-WC of pressure loss, and as stated in Comments above, not all pressure losses have been accounted for in the current calculation.*

Response: The length of the 6-foot stack was included in the calculations, with its own line in the table. In the revised table (now Tables E-1a and E-1b), we have added line items for fittings such as tees, elbows, and valves and have estimated their pressure losses using the equivalent length approach.

5.34 Comment 17l

Attachment E-3, Sheet SSD-M3. *The low permeability soil fill may not be an appropriate fill material below the footing. If the design has to change, the Advisory recommends the trench cutoff extends at a minimum 3 feet from the edge of the building and 6 inches above the perimeter footing.*

Response: The project structural engineer will verify fill material suitability during final building design, but we expect that a narrow trench of fill passing under the footing will be acceptable. Consistent with the Advisory, we have expanded the length of the cutoff wall to 3 feet beyond the building perimeter as shown on the revised drawing. The low permeability fill will extend 12 inches above the bottom of footing, as shown on the drawing.

5.35 Comment 17m

Attachment E-3, Sheet SSD-M5. *The liner details on this sheet should be shown with the completed sub-slab system.*

Response: Sheets SSD-M1, SSD-M2 and SSD-M3 have been revised to provide specific call-outs to the applicable manufacturer's liner details.

5.36 Comment 17n

Attachment E-3, Sheet SSD-G3. *Note number 60 states that an auto dialer will be installed at the conclusion of Phase II. This item is not mentioned SSD blower system. Please clarify if the system will have an auto dialer.*

Response: In the Draft RDIP Addendum, monitoring by the Building Management System ("BMS") was included. The mention of an "autodialer" in Note 60 was incorrect and has been removed. The design has now been revised to include remote monitoring with real-time internet access instead of the connection to the BMS, to facilitate operator review of operating conditions. The remote monitoring unit is specified in the last row of the Equipment and Instrument List on Sheet SSD-T1 in the SSD system drawings in Appendix E of the Draft Final RDIP Addendum.

5.37 Comment 18

Appendix F. *The groundwater remedy modifications include a proposed 48- week shut down of the GETS during redevelopment at the Site. As indicated in the groundwater model, the upper range of particle movement during this period is 62 feet. However, it is not clear if this 62-foot movement accounts for stormwater to infiltration due to removal of the cap during Site redevelopment. Please indicate the risk to down-gradient property and off-site receptor during this period.*

Response: Wood's groundwater model does not account for stormwater infiltration due to removal of the cap. However, Wood believes that the 62-foot particle movement estimated in the upper-range, high-gradient model analysis is very conservative and is greater than particle movement that would result from any reasonable amount of stormwater infiltration through the uncapped area. Quarterly monitoring of off-site groundwater wells OW-1A and 1B and OB-3A and 3B will be used to assess potential risk to downgradient receptors during the shutdown period.[31]

5.38 Comment 19

Please include Appendix G (Geosyntec Phase II Building material Characterization Report, 2010) and Appendix H in this report.

Response: Appendix G (Geosyntec Phase II Building Materials Characterization Report, 2010) and Appendix H (Transportation Plan Addendum) are both included with this Draft Final RDIP Addendum.

5.39 Comment 20

Text on Sheet SSD-G3 in Appendix E is not showing completely. Please resubmit with complete text.

Response: Text on Sheet SSD-G3 prints completely in the drawing set included in the Draft Final RDIP Addendum.

[31] Response prepared by GE/Wood.

6. DTSC LETTER FROM TOXICOLOGIST REGARDING SITE CHARACTERIZATION AND HUMAN HEALTH RISK ASSESSMENT

This section contains responses to comments from the DTSC Toxicologist, submitted via email by Yongsheng Sun, dated 3 July 2019.

Following comments pertaining to site characterization and human health risk assessment section:

The post-remedial conceptual site model (CSM) should identify the vapor intrusion (VI) exposure pathway to offsite residential receptors as potentially complete. The RDIP Addendum should propose to assess risk for this pathway. This comment should be specifically addressed in the following sections:

6.1 Section 1.4

Off-site elements of the remedy (MNA) should include soil vapor monitoring as well, which should trend downward and below health-based residential vapor screening levels, if the onsite remedy is to be protective of off-site receptors, as the Addendum suggests.

Response: GE proposes to conduct a soil gas investigation after the cap is restored as part of the site redevelopment. See RTC 2a from DTSC GSU; Section 3.[32]

6.2 Section 1.4

Target cleanup goals for excavation of cVOCs are informed by soil concentrations, not soil vapor. Therefore, the remedial action did not consider the vapor intrusion pathway. While the remedy and redevelopment propose VIMS for the onsite building, a strategy for offsite VI management should be proposed if proximal soil vapor exceeds residential screening levels.

Response: See RTC 2a from DTSC GSU (Section 3).

6.3 Section 1.5

The Section acknowledges "human health risk estimates presented in the [2003 Baseline Risk Assessment] may underestimate or overestimate actual risks" yet the CSM (Figure 6) considers offsite VI "not significant." The basis for this assessment is unclear and will need to be empirically supported.

Response: Off-site VI was deemed not significant based on (1) lifetime incremental cancer risk and hazard index calculated in the 2003 BRA for downgradient residents (2x10-9 and 0.00001, respectively) and (2) results of the limited soil gas investigation

[32] Response prepared by GE/Wood.

conducted by GE in March 2009 at one of the residences along the northwestern perimeter (Geosyntec, 2009b). TCE and vinyl chloride were not detected above the reporting limit of 2.4 ug/m^3 in the soil gas sample (or in the duplicate sample) collected on the property. As requested by DTSC in their general comment above, the VI exposure pathway for off-site residential receptors on Figure 6 has been changed from "Not Significant" to "Complete or Potentially Complete."

6.4 Section 1.5.7

HERO is unclear how capping of site would be protective of off-site receptors, as well as how this would be assessed after redevelopment.

Response: Capping will protect off-site receptors from chemicals of concern present in soil underneath the cap (i.e., no potential inhalation of non-volatile COCs in soil in respirable dust from the site). Potential VI impacts to off-site receptors will be addressed via a separate work plan to be prepared by GE (see RTC 2a from DTSC GSU; Section 3).

6.5 Section 3.5

The LBNL, 2009 study may not provide site-specific nor sufficiently protective background levels for arsenic to inform import fill requirements. Additional support for selection of the 28 mg/kg arsenic level should be provided, using data sets pertinent to the subject Site in Oakland.

Response: See RTC for Comment 3 from DTSC GSU (Section 3.7).

6.6 Section 4.2

Soil vapor samples should be proposed along the residential fence line to assess offsite vapor intrusion potential. Samples are only proposed perpendicular to the property boundary.

Response: See RTC for Comment 2a from DTSC GSU; Section 3.

7. DTSC COMMENTS REGARDING VIMS

This section contains responses to comments from the DTSC regarding the VIMS, submitted via email by Yongsheng Sun, dated 12 August 2019.

7.1 Comment 1

The purpose of a protective layer between the slab and the membrane is to minimize the risk of damage to the membrane by accidental slab penetration. This added protection may reduce the likely hood of a costly membrane repair from accidental damages. If this layer is not included, the O&M plan will need to include certain institutional controls, such as detail procedure for all slab penetration to ensure the integrity of the membrane, which may include third party verification.

Response: The OMM Plan will include institutional controls for slab partial penetrations (e.g., anchor bolts) to avoid penetrating the slab and liner. In the event of an accidental or planned penetration of the slab and liner, the liner will be required to be repaired in accordance with liner manufacturer recommendations and with a third-party inspection of the integrity of the repaired repair.

7.2 Comment 2

The active SSD system requires that adequate vacuum is applied to the entire footprint of the building, even at the edges of the building. To ensure the safety of the future occupant, there should be data that verify the SSD is operating as designed. Since the source has not been removed, the membrane is not a robust 60 mil membrane, and the reduce sampling, an increase in the frequency of vacuum monitoring, especially at the edge of the building, is warranted to verify the system is operating as designed. An economical option maybe with the use of a continuous data logger that can record subslab vacuum of the probes located at the edge of the building and a review of those subslab vacuum at a set interval to confirm subslab pressure is within design parameter. In addition, sub surface condition may take some time to equilibrate and the vacuum at each probe will likely change overtime. Thus, vacuum monitoring data should be closely monitored until sufficient data indicate monitoring interval can be reduced.

Response: We agree that it is necessary to sustain sufficient vacuum at the probes along the perimeter. Fortunately, while vacuums can vary slightly over time, they tend to stay at the same order of magnitude over the long term given constant operation of the SSD blower system. The gravel venting layer beneath the building is physically stable over the long term, as is required for structural integrity of the building, resulting in a stable medium for airflow and therefore stable vacuum readings over the long term when SSD blower operation is consistent.

By continuously monitoring the suction in the SSD blower system and sending an alarm to the operator if there is a substantial change, we can be confident that the sub-slab

vacuums are being maintained at the initially measured levels. Therefore, continuously monitoring the suction in the blower system is the most practical way of monitoring the ongoing operational effectiveness of the system. In response to this comment, however, we have revised the Draft Final RDIP Addendum to provide manual measurements of the sub-slab vacuum on a daily basis for five days, weekly for one month, and monthly for one year during the first year of SSD operations to provide a rigorous assessment and demonstration for this building of the consistency of the sub-slab vacuum readings, followed by annual readings thereafter. We have also revised the Draft Final RDIP Addendum to include a datalogger for pressure readings at two of the perimeter probes for a minimum of one week after startup to illustrate the characteristics of any short-term intra-day variations.

7.3 Comment 3

The initial subslab soil gas sampling event should include sampling of all probes. This data will be used as a baseline and verify the functionality of the probes. Regarding the monitoring frequency, please provide a list detailing when each monitoring event will occur.

Response: The initial sub-slab soil gas sampling event has been revised to include sampling of all probes. The Final Draft RDIP Addendum includes the proposed schedule for these monitoring activities (see Section 5).

8. DTSC LETTER FROM HSP REGARDING HASP

Thirteen comments were received from Coby Graham, CIH, of the DTSC's HSP, dated 14 June 2019, related to the EKI HASP submitted as Appendix L to the Draft RDIP Addendum. Bridge proposes to address these comments under a separate cover from the Draft Final RDIP Addendum. A RTC document will be provided with the revised HASP for review and approval by DTSC prior to the start of field work by EKI. In addition, other personnel on-site that will perform work described in the Draft Final RDIP Addendum requiring a HASP will provide, under a separate cover, a HASP from their organization to DTSC for review and approval prior to start of field work. The revised EKI HASP and associated RTCs will be provided to DTSC by 30 September 2019, pending discussion with DTSC regarding their comments. Therefore, Appendix L (EKI HASP) has been omitted from this version of the RDIP Addendum.

9. DTSC LETTER FROM ESPO, ADDITIONAL COMMENTS

This section contains responses to comments from Chinh Q. Vu, PE, of the DTSC's ESPO, dated 24 September 2019. Many of these comments were follow-up comments to RTCs provided to ESPO's letter dated 19 June 2019 (Section 5). For clarity and brevity, comments that did not require further response beyond the Section 5 RTCs are not included in this section. ESPO's follow-up comments are presented below their original June 2019 comments for clarity.

9.1 Comment 9

Section 3.4 Soil Excavation*. As states in Section 2.1.2.1, "the approved remedy calls for targeted excavation of elevated cVOCs [chlorinated VOCs] in soil characterized by TCE concentrations in excess of 10 mg/kg," and Section 2.1.3, "known locations of PCBs in soil above hazardous waste levels (PCB concentration of 50 mg/kg or greater) will be excavated." However, this section states that "no post-excavation soil confirmation sampling is proposed after excavation." Absent of post-excavation confirmation sampling, it is not clear how soil excavation goal for TCE will be achieved, since there is not a way to verify that all soils remaining are below the 10 mg/kg limit.*

> *ESPO Response: ESPO understands the challenge with collecting meaningful VOC samples at depth. Please include the technical challenges and reasoning as to why VOC samples will not be sampled.*

Response: As described in Sections 1.3 and 1.4 of the Draft Final RDIP Addendum, soil excavation and movement will be required to depths up to 15 feet bgs throughout the site for the redevelopment construction, including for site grading, soil improvement for geotechnical purposes, installation of underground utilities and/or creation of clean corridors. Within this zone of soil disturbance, confirmation samples post-excavation will be of limited value for future use. There are two excavations that are expected to extend below this zone: the VOC hotspot and the PCB hotspot at the former pyranol tank area adjacent to Building 2. These excavations will be shored using slide rail shoring and as a result, excavation sidewalls will not be accessible for sampling. Samples can be collected from the bottom of the excavation from the bucket of the excavator; however, the bottom of the excavation is below the water table and the soil will be disturbed. As such, VOC results of samples collected in this manner may not be representative of in-place VOC soil concentrations and may be more representative of groundwater conditions. For this reason, we have proposed soil gas sampling to assess conditions post-excavation. Soil gas sampling is described in Section 4.2 of the Draft Final RDIP Addendum.

9.2 Comment 10

Section 3.9 Soil Management Protocols for Free Product or Oily Soil. *In addition to excavation of soil with visible free product, confirmation soil samples should be collected from the side walls and bottom of excavations to confirm PCB and TCE concentrations are below 50 mg/kg and10 mg/kg, respectively. ESPO recognizes that Bridge has an agreement with the EPA to not collect confirmation sample post-excavation for PCBs. However, we believe this scenario is different from the proposed excavation based on historical sampling and warrants confirmation sampling. In addition, excavation as a result of observable free product will not be backfilled until analytical data demonstrates PCBs and TCE concentration are below 10 mg/kg and 50 mg/kg, respectively.*

ESPO Response: See response to Comment 9.

Response: See response to Comment 9 above regarding anticipated soil movement during redevelopment.

9.3 Comment 11a

Section 3.10, Management of Known and Unknown Underground Structures Uncovered During Redevelopment Activities. *This section states that known and unknown concrete underground structures encountered during soil disturbance for redevelopment may be crushed and reused, if consistent with the approach for concrete reuse. Please provide the approach for concrete reuse. Concrete is considered a porous material and can absorb contaminants. Thus, concentrations of COCs may exist on/in the known and unknown concrete underground structures. To prevent further soil and groundwater impacts from potentially contaminated crushed concrete, the concrete reuse protocol should follow DTSC's Advisory for Clean Import Fill Material.*

ESPO Response: ESPO understands a confined aquifer exists below the Site, and groundwater levels in the monitoring well network may not be representative of the groundwater table. However, it is not clear what the historical highest groundwater level has been at the Site. Please indicate the highest recorded groundwater level. In addition, it appears there is no consideration for future sea level rise potentially effecting the groundwater table and the assumption for the remedial design that' waste placed below the low permeability cap will remain above the groundwater table. Please discuss the potential effect of future sea level rise or explain why it is not a concern.

Response: Crushed concrete from existing site structures will primarily be placed in areas requiring fill to make the design grade of the redevelopment (i.e., above the

current ground surface elevation) and as subgrade beneath the concrete pavement, at a depth of up to 1 foot below design grade. As discussed below, the groundwater table is significantly below the anticipated depth of the crushed concrete, even with consideration of sea level rise. As described in Sections 4.1 (Post-Remediation Activities, Surveying) and 4.7 (Completion Report) of the Draft Final RDIP Addendum, the topography of crushed concrete from existing structures that is placed under the new cap will be surveyed post-remediation to document the as-built condition of the remedy and will be provided to DTSC in the Completion Report.

As described in 2006-2008 Field Investigations Report (Geosyntec, 2009):

> "The A-zone generally consists of 1- to 5-foot-thick, lenticular, and isolated sand lenses between 15 and 35 feet below ground surface (bgs). Except for the area along the southwestern-most edge of the Site during times of high water levels, the uppermost 10 feet is generally unsaturated. The potentiometric surface of the A-zone occurs at 5 to 8 feet bgs, indicating that the sands are hydraulically confined."

The southwestern-most edge of the site referred to above is an area planned for the placement of 0 to more than 4 feet of fill above the current grade to reach the design grade for the redevelopment. Based on this information, crushed concrete placed under the cap is not expected to contact groundwater, even where it is highest in the south/southwest portion of the site.

In 2018, a geotechnical investigation was conducted by Cornerstone Earth Group ("Cornerstone") as part of due diligence for the redevelopment (Cornerstone, 2018). Cornerstone's findings support this evaluation, excerpted below:

> "Groundwater was inferred at depth of 16½ and 14½ feet below current grade…based on pore pressure dissipation tests. Historic high groundwater levels are mapped at a depth of approximately 5 feet below the ground surface at the south/southwest side of the site and at about 10 feet below ground surface at the north/northeast side of the site (CGS, Oakland East 7.5-Minute Quadrangle, 2003)…Based on the above information and our experience in the site vicinity, we recommend a groundwater depth of 5 feet to be used for design and evaluation of liquefaction potential at the south/southwest side of the site transitioning up to a depth of 10 feet at the north/northeast side of the site."

As reported in the Sea Level Rise Road Map for the City of Oakland, dated 2017, projections indicated the most likely sea level rise offshore of Oakland is 36 inches by year 2100. Even in the unlikely event that this sea level translates to an equivalent increase in groundwater levels at the site, which is 0.6 mile inland and under confined conditions, groundwater would not be expected to contact crushed concrete placed under the new cap, even in the south/southwest part of the site.

Evaluation of the effect of sea level rise for this site would involve: (1) measurement of groundwater elevations and their change over time; (2) evaluation of groundwater quality and change over time; and (3) evaluation of GETS capture zone and change over time. These evaluations are performed by GE semi-annually as part of the groundwater remedy monitoring and reporting and also as part of the five-year review with respect to performance of the groundwater remedy. GE will continue to perform these evaluations going forwards as outlined in the DTSC-approved OMM Plan for the groundwater remedy (Geosyntec, 2015c), with modifications as described in Appendix F of the Draft Final RDIP Addendum. This program will thereby provide a mechanism for continued monitoring and assessment of potential sea level rise impacts on groundwater quality.

At DTSC's request, EKI reviewed available groundwater level monitoring data from 1999-2005 (URS, 2006), and from 2015-2019 ([Geosyntec, 2015a-2016]; [Amec, 2016a-2017c]; [Wood, 2018a-2019]). Based upon this review, the highest recorded groundwater elevation in A-zone monitoring wells was measured in well W-36A, located on the eastern portion of the site, on 20 February 2001, at 16.53 ft above mean sea level ("ft MSL"), National Geodetic Vertical Datum of 1929 ("NGVD 1929") (URS, 2006). This value equates to an elevation of 19.25 ft MSL,[33] North American Vertical Datum of 1988 ("NAVD 1988").[34]

9.4 Comment 11b

Section 3.10, Management of Known and Unknown Underground Structures Uncovered During Redevelopment Activities. *This Section also states that soil sampling associated with these structures will not be conducted unless free product or oily soil is encountered, or if required for underground storage tank closure. See Comment 10.*

ESPO Response: See *response to Comment 9.*

Response: See response to Comment 9 above regarding anticipated soil movement during redevelopment.

[33] Note that groundwater in this aquifer is under confined conditions.

[34] Elevation converted from NGVD 1929 to NAVD 1988 by adding a factor of 2.717. The 2.717 conversion factor was obtained using the National Oceanic and Atmospheric Administration's ("NOAA's") VERTICON conversion tool to determine the datum shift at the site coordinates of 37 45 54.560 latitude, 122 12 23.360 longitude. The tool is located at the following URL: https://www.ngs.noaa.gov/cgi-bin/VERTCON/vert_con.prl.

9.5 Comment 12

Section 3.11 Clean Corridor. *If soil excavated to form the clean corridor is to be reused on-site, it should only be used in areas where COC concentrations are greater than the COC concentrations at the clean corridor.*

> *ESPO Response: See response to Comment 11*a *regarding the highest groundwater level at the Site.*

Response: See response to Comment 11a above.

9.6 Comment 14

Section 4.3 Indoor Air Sampling Pre-Occupancy. *Regardless of the path taken, based on the result of the initial indoor air sampling (no further action, or build Phase II of the VIMS) the Advisory "recommends two sampling events per year of the first three years or until consistent verification that the mitigation system is meeting established indoor air performance measures." These sampling events should include collecting samples from the sub-slab monitoring probes. In addition, the Advisory recommends indoor air sampling "should be conducted during the potentially "worst case" months of January/February and June/July." If possible, indoor air samplings should take place during these months.*

> *ESPO Response: The initial assessment of* VOC *concentrations in indoor air should also include scenarios with the active SSD running and building · ventilation on and off. Depending on the conditions at the site, having the building ventilation on or off may negatively affect the SSD vacuum.*

Response: The initial assessment of VOC concentrations in indoor air will occur with the SSD system operating and will include samples collected with the heating, ventilation and air conditioning ("HVAC") system on and with the HVAC system off. Sub-slab vacuum monitoring during system start-up and shakedown will include vacuum measurement under HVAC off and HVAC high/max scenarios to confirm that sufficient vacuum is maintained in the sub-slab gravel layer across the range of potential HVAC operation.

9.7 Comment 17a

Section 1 Design Overview. *The proposed future use of the Site is a warehouse. It is likely some equipment will need to be anchored into the concrete slab. To protect the sub-slab liner from accidental damage from concrete slab penetrations, EPSO recommends a permeable protective layer between the slab and the membrane throughout the building's footprint. This permeable protective layer can also be used in conjunction with a dual sub-slab probe configuration as*

indicated Comment 19j. In addition, please indicate the active VIMS trigger level, following indoor air testing.

> *ESPO Response: With no protective layer, it is likely that any hole accidentally drilled through the concrete slab will damage the membrane. If the membrane is damaged, simply filling the hole with cement is not sufficient. Please follow the membrane manufacturer's procedure for membrane penetration repair.*

Response: The OMM Plan Addendum will indicate that if the building foundation and liner are penetrated, concrete around the penetration will be removed, the liner will be exposed, inspected, and repaired according to the liner manufacturer's specifications, and then the concrete will be repaired. Procedures for this will be described in the OMM Plan Addendum. Following the repair, the vacuum in the four SSPs closest to the damaged section will be measured to confirm that the system is meeting required depressurization.

9.8 Comment 17k(iii)

Table E-1. *The same Fanning friction factor is used for both the 6" PVC lateral and schedule 10 galvanized steel pipe pressure loss. Please include the calculation and a diagram showing how the Fanning friction factors are obtained for both piping materials.*

> *ESPO Response: ESPO was not able to replicate the empirical calculation for the pressure loss of the spiral duct. However, ESPO was able to verify the pressure loss using another empirical equation. Please review the equation and verify that it is correct.*

Response: The original equation is shown on p. 6 of the reference listed in the table (SMI, 2006; Engineering Data. Catalog Volume 5. Spiral Manufacturing, Inc.), and provides friction losses as inches of water per 100 feet of pipe. We have added the (ΔL/100) term to normalize the equation and provide friction losses as inches of water for a given length of pipe or equivalent length of fitting. This can be demonstrated simply by assuming a 100-foot length of pipe. In this case, the (ΔL/100) term is equal to 1 and the equation reduces to the original form from SMI, 2006.

<u>September 20, 2019 Additional Comments on the revised RDIP Addendum</u>

9.9 Comment 21

Section 3.4 Soil Excavation. *Please ensure the Technical Specifications from the 2012 RDIP are still appropriate and applicable for this Site. Technical specifications such as dewatering and sheet pilling should be submitted to DTSC for review prior to implementation. If final design and or technical specifications are not available, please*

submit these documents to DTSC when they are available, with sufficient time for review and comment prior to implementation.

Response: The technical specifications from the 2012 RDIP for dewatering are appropriate and applicable to the Draft Final RDIP Addendum. Technical specifications for slide rail shoring, the shoring approach described in the Shoring Plan included in Appendix B of the Draft Final RDIP Addendum, will be developed by the Contractor and their Engineer of Record as part of the final stamped shoring plan. The final stamped shoring plan will be provided to DTSC for review and comment 60 days prior to implementation. Section 3.4 of the main text has been modified to add this clarification.

9.10 Comment 22

Section 3.1.1 Permitting. *Please provide DTSC with a copy of all notifications and reporting required by the BAAQMD Regulation 8 Organic Compound Rule 40.*

Response: DTSC will be provided with copies of the requested notifications and reporting in the Completion Report. Section 3.1.1 (Permitting) of the Draft Final RDIP Addendum has been modified accordingly.

9.11 Comment 23

Section 4.4.2. Sub-Slab Vacuum Monitoring. *Sub-slab vacuum monitoring shall remain at a monthly frequency following the first year, until sufficient data is provided to DTSC for review and approval of changes in monitoring frequency.*

Response: Section 4.4.2 has been modified to indicate that monthly sub-slab vacuum monitoring will continue after the first year until DTSC approval of a change in frequency is obtained.

9.12 Comment 24

Appendix B, Installation Procedures. *Step 4 of the installation procedure indicated that up to three feet of the existing ground surface may be excavated and stockpiled at the center of the excavation area. However, Section 2.1 Soil Excavation, states that "excavated soil from areas with known PCBs concentration above 1,000 mg/kg will be directly loaded into bins that can be sealed and stored on-site pending characterization and transport for off-site disposal." Please clarify the installation process and ensure that it meets the requirements stated in Section 2.1 and include any figure or drawing that illustrates the site preparation. See comment 21 regarding submitting these documents to DTSC at a later time.*

Response: Step 4 refers to use of soil from outside and adjacent to the boundaries of design excavation; this “non-target” soil is planned for placement under the new site-wide cap that will be installed as part of the redevelopment. This activity is only needed

for the top 3 feet of the excavation and will not be needed at depth. "Target" soil from within the design excavation boundaries will be loaded directly into bins that can be sealed. The shoring plan in Attachment B has been clarified accordingly.

9.13 Comment 25

Appendix B, Attachment A Side Rail Shoring System. *Please include the final engineered shoring design. The final shoring design should indicate the site-specific conditions used to determine the suitability of the proposed system, which include site specific soil conditions, and the anticipated load of the excavator and any other structures and equipment required for the excavation. See comment 21 regarding submitting these documents to DTSC at a later time.*

Response: The final engineered shoring design will be submitted to the DTSC as part of the stamped shoring plan when it is available, at least 60 days prior to implementation.

9.14 Comment 26

Appendix D Preliminary Design. *Please ensure the pavement design of the cap is adequate for the future warehouse and meets the requirements to prevent infiltration.*

Response: The preliminary pavement design shown in Appendix D will be further developed the Civil Engineer for the redevelopment (Kier & Wright) during construction design and will be based on the recommendations of the Geotechnical Engineer (Cornerstone) and the minimum cap thickness of 6 inches for environmental purposes. The final pavement design will be provided to DTSC 60 days prior to pavement construction.

9.15 Comment 27

Appendix E, Section 2 Sub-Slab Liner, Maintenance. *The SSD system may be short-circuited following any membrane penetration, and the sub-slab minimum vacuum may be affected. Therefore, membrane penetrations should be promptly repaired, and vacuum readings should be conducted at all monitoring points following membrane penetration repair, to ensure the sub-slab's minimum pressure of 0.02 inches of water is maintained.*

Response: As discussed in the response to Comment 17a above, the OMM Plan Addendum will indicate that if the building foundation and liner are penetrated, concrete around the penetration will be removed, the liner will be exposed, inspected, and repaired according to the manufacturer's instructions, and then the concrete will be repaired. Procedures for this will be described in the OMM Plan Addendum. Following repair of the sub-slab liner, the vacuum in the four SSPs closest to the repair will be measured to confirm that the system is meeting required depressurization. If the

penetration and repair resulted in short circuiting, it would be observed in the SSPs closest to the repair.

9.16 Comment 28

Appendix E, Section 4 Suction Trenches, Product. *The perforated pipe is listed as 8-inches in this section. However, the SSD Drawings show the perforated pipe as 6-inches. Please correct the discrepancy.*

Response: The solid-wall SSD lateral pipe 'SSD(S)' was increased to 8 inches in size, however the perforated suction trench pipe 'SSD(P)' was not changed from 6 inches to 8 inches. Our drawings are consistent and show the 6-inch SSD(P) pipe throughout. The text of Appendix E has been updated to clarify that the 6-inch SSD(P) will be used for suction trenches, and that the 8-inch SSD(S) will be used for suction trench laterals.

9.17 Comment 29

Appendix E, Section 5 Conveyance Piping, Installation. *Please include protection of the SSD riser at the concrete slab penetration from accidental damage through use of a barricade structure, such as bollards. The barricade structure should be included in the specifications, and on Detail 1 of Sheet SSD-M2 or as a separate detail.*

Response: Interior piping is adequately protected by the placement of interior walls and shelving, and may also be protected by bollards as necessary. The bollard footnote on Detail 1 of SSD-M2 has been updated.

9.18 Comment 30

Appendix E Section 9.3 Contingency for Emissions Control. *Similar to the SSD riser, the exterior spiral duct, if used, will also need to be protected from accidental damage with barricades. In addition, if treatment is required; please provide updated and additional(s) detail related to the treatment area.*

Response: Exterior spiral duct piping is located in landscape areas and is protected from vehicular traffic by driveway curbs, see Appendix D for information about driveway curbs. The use of a treatment system is contingent, and will be added to the design if system effluent VOC concentrations show that treatment is required to reduce VOC concentrations leaving the site. If a treatment system is required, it will be implemented immediately, and treatment area details will be provided to DTSC as soon as possible after implementation (within 30 days).

9.19 Comment 31

Appendix E-3, Sheet SSD-M1. *The sub-slab vapor probe located west of the office should be relocated closer to the edge of the future warehouse or an additional sub- slab vapor probe should be installed at that location as that location appears to be the furthest*

from any suction trench and may have the lowest vacuum. The minimum vacuum of 0.02 inches of water is required below the entire footprint of the future warehouse.

Response: The SSP location west of the office was moved closer to the building edge on SSD-M1 and on Figure 2, as requested.

9.20 Comment 32

Appendix E-3, Sheet SSD-G3. *Please clarify all specifications relating to the membrane overlap, including repair and installation. The manufacture specification is a minimum of 6-inches overlap, but text in Appendix E states a 12-inch overlap.*

Response: The liner manufacturer's documents on SSD-M4 indicate 6-inch minimum overlap. Sheet SSD-G3 already requires that the Contractor "seal liner per manufacturer specification at all utility or floor penetrations, seams, edges, footings, etc." (SSD-G3, 1.E.i) and "install sub-slab liner according to the liner manufacturer installation instruction and specifications. Seal liner seams, edges, and all pipe penetrations through the liner" (SSD-G3, 35.A). The text of Appendix E has been updated to specify a 6-inch minimum overlap, in agreement with the SSD Drawings and the manufacturer's specification.

9.21 Comment 33

Appendix E-3, Sheet SSD M-3. *Please ensure that the stack outlet meets all mechanical codes and is at least three feet away from the parapet wall and 10 feet from any opening.*

Response: The stack outlet is at least three feet away from the parapet walls. The specific locations of other openings in the roof, such as roof vents, are not known at this time but will be considered in the final design. As discussed in Section 5.6 above, the final VIMS design will be provided to DTSC for review and approval prior to construction. The stack final construction will meet all applicable codes.

9.22 Comment 34

Appendix E-3, Sheet SSD-M5. *Please include all layers of the VIMS in all details on this sheet.*

Response: These are manufacturer details and cannot be changed. They show the general installation of the liner, not project-specific details like the gravel layer. EKI updated the explanatory note to the sheet (SSD-M5), stating that these are manufacturer standard details and that they do not show the gravel layer, which is shown on sheets SSD-M2 and SSD-M3.

9.23 Comment 35

Appendix I, Section 4 Waste Characterization and Disposal. *The last sentence in the Section states that "if feasible based on water quality and other considerations, waste water may be treated onsite and used for dust control or discharged under the appropriate permit to either the East Bay Municipal District sanitary sewer or the City of Oaklands's storm drain system." Please clarify how the water will be treated.*

Response: It is unlikely that treated waste water will be used for dust control. Appendix I has been updated to remove that option.

Waste water designated for treatment will be stored in above-ground tanks, tested, and treated if needed prior to permitted discharge to the sanitary sewer system or storm drain system. If needed, and based on the test results, water may be treated on-site using mobile treatment equipment or the existing GETS to meet permit requirements. If mobile treatment equipment is used, equipment will depend on the tested water quality, but will likely include bag filters to remove particulates, including potentially PCB-containing particulates, and granular activated carbon for VOC removal. If mobile treatment equipment is employed, a summary of the work and testing results to show compliance with permit requirements will be provided in the Completion Report.

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