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T E C H N I C A L M E M O R A N D U M

TO: Tena Seeds, P.E. – Washington State Department of Ecology

cc: Jim Broadlick and Sean Biehl – City Investors IX L.L.C.

FROM: Suzy Stumpf, P.E., Senior Engineer
Clifford T. Schmitt L.G., L.H.G., Principal Hydrogeologist

DATE: June 15, 2020

RE: **SUPPLEMENTAL SUBSURFACE INVESTIGATION AND FOUNDATION ELEMENTS**
BLOCK 38 WEST PROPERTY
500 THROUGH 536 WESTLAKE AVENUE NORTH
SEATTLE, WASHINGTON
FARALLON PN: 397-019
AGREED ORDER NO. DE 17963

Farallon Consulting, L.L.C. (Farallon) has prepared this Technical Memorandum for City Investors IX L.L.C. (City Investors IX) to present a scope of work and rationale to conduct a supplemental subsurface investigation in the alley between the Block 38 West and Block 38 East Properties (alley) and provide information regarding the design of the foundation for the building being constructed at the Block 38 West Property. The proposed supplemental subsurface investigation and foundation design elements are associated with the redevelopment of the Block 38 West Property and current independent remedial action being performed under the auspices of Agreed Order No. DE 17963 (AO) between the Washington State Department of Ecology (Ecology) and City Investors IX. The Block 38 West Site as defined under the AO is where a hazardous substance, other than a consumer product in consumer use, has been deposited, stored, disposed of, or placed, or otherwise come to be located. The Block 38 West Site is generally located at 500 through 536 Westlake Avenue North in Seattle, Washington (Block 38 West Property) (Figure 1).

This Technical Memorandum summarizes the scope of work and rationale for conducting a supplemental subsurface investigation to evaluate soil conditions in the alley after independent remedial action activities detected constituents of concern (COCs) at concentrations exceeding

Washington State Model Toxics Control Act Cleanup Regulation (MTCA) screening levels in soil samples collected from the east-central sidewall of the excavation for the planned building at the Block 38 West Property. The independent remedial action activities include sampling and off-Site disposal of contaminated soil and construction dewatering and treatment of contaminated groundwater. The scope of work presented in this Technical Memorandum only pertains to a portion of the Block 38 West Site and is focused to evaluate the extent of impacted soil in the alley to support characterization of soil conditions prior to the construction of improvements in the alley as part of the redevelopment. The proposed borings will be part of a remedial investigation (RI) scope of work presented in the Draft RI Work Plan for the Block 38 West Site.

This Technical Memorandum also presents the foundation design elements for the planned building, including the waterproof concrete and the vapor barrier that will prevent future migration of and potential exposure to contaminated groundwater and associated soil vapor, if present, from properties adjacent to or in the vicinity of the Block 38 West Property or remaining soil impacts at the Block 38 West Property boundary. The foundation design elements and engineering controls for the building will be discussed in the Draft RI Work Plan and incorporated into the draft Feasibility Study and Cleanup Action Plan for the Block 38 West Site.

The request for approval of the proposed boring locations, soil sample analyses, and future building foundation elements are being submitted at this time in order to allow for these work elements to occur during building construction. The proposed boring locations could not be selected until performance sampling at the Block 38 West Property was substantially complete, and City Investors IX has kept Ecology apprised of the independent interim action progress and general results.

BLOCK 38 WEST PROPERTY DESCRIPTION

The Block 38 West Property is in a commercial and light industrial area zoned as mixed residential and commercial in the South Lake Union area approximately 1 mile north of downtown Seattle. The Block 38 West Property totals approximately 1.06 acres of land and comprises King County Parcel No. 1983200196 on the northern portion of the Block 38 West Property (534 and 536 Westlake Avenue North), King County Parcel No. 1983200180 on the central portion of the Block 38 West Property (520 Westlake Avenue North), and King County Parcel No. 1983200170 on the southern portion of the Block 38 West Property (500 and 510 Westlake Avenue North). The Block 38 West Property most recently was developed with structures formerly used for retail, temporary office space, storage, and parking.

The vertical structures have been demolished as part of the ongoing redevelopment of the Block 38 West Property. The planned finished floor elevation of the lowest level of parking is -3.25 feet North American Vertical Datum of 1988 (NAVD88), with the bottom of footing elevation for the majority of the foundation at approximately -6.5 feet NAVD88 and the excavation extending deeper in areas for footings and elevator pits. The completion of the mass excavation is scheduled for the week of June 19, 2020, with additional structural foundation features being installed through June 2020.

BACKGROUND

Subsurface investigations have been conducted on the Block 38 West Property since 1999. This section summarizes the activities and results from previous subsurface investigations conducted by Farallon and others at the Block 38 West Property. Figure 2 shows boring locations associated with previous investigations. The data summarized below were provided in the *Interim Action Work Plan, Block 38 West Property, 500 through 536 Westlake Avenue North, Seattle, Washington* dated November 8, 2019 prepared by Farallon (IAWP) and the letter regarding Subsurface Investigation Results, Block 38 West Property, 500 through 536 Westlake Avenue North, Seattle, Washington dated January 22, 2020 from Ms. Suzy Stumpf and Mr. Clifford Schmitt of Farallon to Ms. Tena Seeds of Ecology (SI Summary Letter). Based on the previous investigations conducted at the Block 38 West Property, COCs detected at concentrations exceeding MTCA screening levels in one or more samples include total petroleum hydrocarbons as gasoline-range organics (GRO), as diesel-range organics (DRO), and as oil-range organics (ORO); benzene; total naphthalenes; and carcinogenic polycyclic aromatic hydrocarbons (cPAHs) in soil, and DRO, ORO, benzene, and total naphthalenes in groundwater.

The soil laboratory analytical results for borings and mass excavation soil samples on the Block 38 West Property, the alley, and western sidewall samples from the Block 38 East Property are presented in the attached tables and figures.

Figures 3 through 9 depict soil sample results for COCs and soil sample analytical results are provided in Tables 1 and 2. Groundwater measurements and sampling analytical results are not included in this Technical Memorandum. The soil analytical results are compared to screening levels that correspond to the MTCA Method A cleanup levels for most constituents. If no MTCA Method A cleanup level is reported for a constituent, then the MTCA Method B cleanup level is used for the screening level. The complete laboratory analytical reports for soil and groundwater samples will be provided in the Draft RI Work Plan, but will be made available to Ecology upon request once compiled by Farallon and are being compiled to be uploaded to Ecology's electronic information management database.

SOIL

Soil data discussed in this Technical Memorandum is focused on data collected along the eastern sidewall of the Block 38 West Property mass excavation, the alley, and the western sidewall of the excavation at the Block 38 East Property (Figures 4 through 9). According to existing soil laboratory analytical data from the Block 38 West Property, the alley, and the Block 38 East Property, a 5- to 10-foot-thick zone of impacted soil extends across the alley.

Based on the results of eastern sidewall samples collected from the mass excavation on the Block 38 West Property, impacted soil was confirmed from approximate elevations of 25 to 15 feet NAVD88. ORO and cPAHs were detected at concentrations exceeding MTCA screening levels in soil samples collected from eastern sidewall samples collected at approximate elevation 20 feet NAVD88 from the mass excavation on the Block 38 West Property. Based on subsurface investigation activities conducted in the alley, DRO, ORO, and cPAHs were detected at

concentrations exceeding MTCA screening levels at elevations ranging from 22 to 20 feet NAVD88. The western sidewall samples from the Block 38 East Property were analyzed for select COCs, and naphthalenes, cPAHs, and lead detected at concentrations that exceeded MTCA screening levels were documented at some of the sampled locations. Based on the results of subsurface investigation and mass excavation activities at the Block 38 East Property, impacted soil was confirmed from approximate elevations 30 to 15 feet NAVD 88. The data for the Block 38 East Property remedial action is summarized in the *Cleanup Action Report, Interurban Exchange 2, 535 Terry Avenue North, Seattle, Washington,* dated October 28, 2008 prepared by GeoEngineers, Inc. (Block 38 East CAR). The COCs identified for the Block 38 East Property include petroleum hydrocarbons, cPAHs, lead, and cadmium in soil and petroleum hydrocarbons in groundwater. The northern two-thirds of the Block 38 East Property was redeveloped between 2008 and 2009, which resulted in the removal of soil with COCs detected at concentrations exceeding the MTCA screening levels within the Block 38 East Property boundary. The northern two-thirds of the Block 38 East Property was issued a property-specific No Further Action determination by Ecology[1] based upon the results of the 2008 remedial action conducted and summarized in the Block 38 East CAR.

Additional details regarding the extent and characterization of COCs in soil, cleanup of contaminated soil, and further soil characterization outside of the Block 38 West Property boundary will be provided in the Draft RI Work Plan. All additional soil removed as part of the construction process will continue to be documented and properly disposed of in accordance with the IAWP, the AO, and applicable laws and regulations.

GROUNDWATER

The nomenclature for groundwater occurrence was described in the IAWP and is not reiterated here.

Based on documented soil impacts from elevations 25 to 15 feet NAVD88, there is the potential for COCs in shallow soil to impact groundwater quality in the Shallow Water-Bearing Zone. Groundwater conditions in the Shallow Water-Bearing Zone will not be evaluated under the proposed subsurface investigation work elements. Due to the construction dewatering system associated with soil excavation, no water currently is present in the Shallow Water-Bearing Zone adjacent to the Block 38 West Property. The work elements associated with evaluating groundwater quality in both the Shallow and Intermediate Water-Bearing Zones after the independent remedial action activities and construction of the building on the Block 38 West Property are complete will be presented in the Draft RI Work Plan for the Block 38 West Site.

CONCEPTUAL SITE MODEL SUMMARY

COCs were detected at concentrations exceeding MTCA screening levels in soil on the east-central sidewall of the Block 38 West Property, alley, and west-central sidewall of the Block 38 East

[1] Letter regarding No Further Action at a Property associated with a Site, 960 Republican St. (recently changed to 535 Terry Ave.) dated May 28, 2009, from Mr. Joseph Hickey of Ecology to Ms. Janet Donelson of Schnitzer West, LLC.

Property, indicating that a 5- to 10-foot-thick zone of impacted soil extends across the alley. Contaminated soil formerly present within the Block 38 West and Block 38 East Property boundaries has been removed.

Additional characterization of contaminated soil outside of the Block 38 West Property boundary will be conducted during the RI, and potential cleanup alternatives will be identified and evaluated in the feasibility study for the Block 38 West Site.

City Investors IX will continue to collect additional data to update the existing conceptual site model to support remedial actions at the Block 38 West Site and will continue to advise and consult with Ecology regarding that data.

Based on the results of previous investigations conducted for the Block 38 West Site, the COCs include GRO, DRO, ORO, benzene, total naphthalenes, and cPAHs in soil. The conceptual site model and COCs will be discussed in detail in the Draft RI Work Plan.

DATA GAP SPECIFIC TO PROPOSED SUBSURFACE INVESTIGATION

ORO and/or cPAHs were detected at concentrations exceeding MTCA screening levels in soil samples collected from the eastern sidewall of mass excavation soil sampling grids H4, I4, J4, and K4 at the Block 38 West Property at an approximate elevation of 20 feet NAVD88 (Figures 7 and 9). The lateral extent of ORO and/or cPAHs is defined by soil samples collected from the eastern sidewall of mass excavation soil sampling grid G4 to the south and L4 to the north, and vertically at an elevation of 15 feet NAVD88 from eastern sidewall samples collected in mass excavation soil sampling grids H4, I4, J4, and K4. According to the Block 38 East CAR, the extent of ORO and cPAHs extending into the alley are defined by the western sidewall of the remedial excavation conducted on the Block 38 East Property.

DRO, ORO, and/or cPAHs were detected at concentrations exceeding MTCA screening levels in soil samples collected from locations PH-4, PH-11A, PH-12, PH-13, and TP-10 in the alley at elevations ranging from 21 to 20 feet NAVD88. The vertical extent of impacted soil in the alley has not been defined and the lateral extent of impacted soil in the alley needs to be defined to the north and south.

Analysis of soil samples collected from the western sidewall of the mass excavation on the Block 38 East Property detected cPAHs or naphthalenes at concentrations exceeding MTCA screening levels in soil samples collected from locations EX-19, EX-20, EX-38, EX-39, EX-40, and EX-41 at elevations ranging from 23 to 19 feet NAVD88 (Figure 9). The extent of naphthalenes in the western sidewall of the Block 38 East Property is bounded laterally to the north by location EX-41 and to the south by location EX-39. The extent of cPAHs in the western sidewall are not defined to the north and south. Based on the conceptual site model presented in the Block 38 East CAR, the vertical limit of impacted soil was defined as 1 foot into to the top of the wood waste layer and impacted soil was excavated to approximate elevations 21 to 17.5 feet NAVD88 across Lots 3 through 5.

SUPPLEMENTAL SUBSURFACE INVESTIGATION

The proposed boring locations will be used to evaluate the extent of documented concentrations of DRO, ORO, naphthalenes, and/or cPAHs in soil exceeding MTCA screening levels beneath the alley (Figure 10). According to existing soil laboratory analytical data from the alley, Block 38 West Property, and Block 38 East Property, a 5- to 10-foot-thick zone of impacted soil extends across the alley.

The vertical limits of cPAHs-, petroleum-, and/or metals-impacted soil needs to be defined in the alley, and soil samples will be collected and retained at approximate elevations 20, 15, and 10 feet NAVD88 to evaluate the vertical extent of impacted soil. The lateral limits of cPAHs-impacted soil needs to be defined south of location PH-4 and north of location K4-ESW and boring FB-01. The lateral limits of petroleum-impacted soil needs to be defined south of location PH-12 and north of location J4-ESW. The lateral limits of metals-impacted soil needs to be defined south of location EX-40 and north of location EX-41 and P-4 in the alley.

Farallon field staff will observe and log subsurface conditions during boring advancement. Standard operating procedures are provided in the attached Sampling and Analysis Plan (Attachment A). The information recorded for each boring log includes soil types encountered, visual and olfactory observations (e.g., staining, odor, etc.), and volatile organic vapor concentrations as measured using a photoionization detector.

Work will be conducted within the public right-of-way under the existing master use development permit for the Block 38 West Property and during times to minimize limiting access to adjacent buildings on the Block 38 East Property. Soil samples will be collected and retained every 5 feet to an elevation of 15 to 10 feet NAVD88 (10 to 15 feet below ground surface) for potential laboratory analysis for one or more of the following analytes:

- GRO by Northwest Method NWTPH-Gx;
- DRO and ORO by Northwest Method NWTPH-Dx;
- Benzene, toluene, ethylbenzene and xylenes by U.S. Environmental Protection Agency (EPA) Method 8021 or 8260;
- PAHs and other semivolatile organic compounds by EPA Method 8270D; and
- Metals (i.e., arsenic, cadmium, chromium, mercury, and lead) by EPA Series Methods 200/6000.

The analytical results of the soil samples will be used to support the remedial investigation and conceptual site model for the Block 38 West Site and confirm the soil waste profile for the remedial excavation activities in the alley to be conducted in connection with redevelopment of the Block 38 West Property and under the ongoing independent remedial action work.

BUILDING FOUNDATION ELEMENTS

Current construction plans specify that the exterior walls of the underground portion of the Site building will be constructed along the boundaries of the Block 38 West Property and the floor slab will be constructed with a top of slab elevation of -3.25 feet NAVD88. The exterior walls and floor slab of the underground portion of the building will be constructed of waterproof concrete below the water table, and a vapor barrier will be installed above the water table. The exterior walls and floor slab of the underground portion of the building and the additional protective measures of the waterproof concrete and vapor barrier will prevent future migration of and potential exposure to contaminated groundwater and associated soil vapor, if present, from properties adjacent to or in the vicinity of the Block 38 West Property.

The Site building mat slab foundation thickness is shown for the northern, central, and southern portions of the foundation in Attachment B. In general, the mat slab is a minimum of 48 inches thick with the top 12 inches being comprised of high-performance waterproof concrete (Hycrete) across the entire Block 38 West Property. The mat slab may increase in thickness for various foundation elements up to 63 to 75 inches as shown in the central and northern portions of the foundation (Attachment B). Vertical foundation walls have a 16-inch-thick foundation wall comprised of Hycrete that extends to an elevation of 20 feet NAVD88 approximately 2 feet above the water table elevation at approximately 18 feet NAVD88 (Attachment B). Above the water table, the foundation materials transition from waterproof concrete to concrete with drainage board and 20 millimeter Drago Wrap Vapor Barrier (Drago Wrap), and bentonite waterproof panels in certain below-grade garage walls where occupied space occurs such as mechanical, electrical, and storage rooms. The drainage board and vapor barrier extend 4 feet below the water table to an elevation of 14 feet NAVD88.

The waterproofing product specified for the Block 38 West Property building foundation is the Hycrete W1000 System from Hycrete of Seattle, Washington (Attachment C). Hycrete is an admixture that is combined with cement to create a hydrophobic concrete by combining the metallic ions in the cement with the hycrete admixture, forming water-insoluble polymers blocking water from concrete pore space. The Hycrete W1000 System has less than 1 percent capillary absorption in concrete, which is the main water transport mechanism in concrete and it also bonds to steel reinforcement within concrete, providing a protective covering to prevent corrosion.

The vertical vapor barrier specified for the Block 38 West Property building construction is Drago Wrap from Stego Industries, LLC of San Clemente, California (Attachment D). Drago Wrap is specifically engineered to mitigate environmental contaminants and is rated for the identified COCs for the Block 38 West Property and Site and chlorinated volatile organic compounds that are present near the Block 38 West Property in deeper groundwater emanating from an off-site source, as described in the IAWP. Drago Wrap is a multi-layered plastic extrusion that is 20 millimeters thick and meets the standards of ASTME1745 for water vapor retarders in contact with soil or granular fill under concrete slabs, meets standard methane and radon gas specifications, and is rated for petroleum hydrocarbons and chlorinated solvents environmental contaminants (Attachment D). Drago Wrap will be installed per the manufacturer's specifications.

CLOSING

City Investors IX is committed to the investigation and cleanup of the Block 38 West Property and associated Site and will continue to collect the necessary information to support the RI for the Block 38 West Site in compliance with the AO. The supplemental subsurface investigation will be scheduled within 30 days following Ecology approval of these additional work elements.

Attachments: Figure 1, *Vicinity Map*
Figure 2, *Property Map with Historical Features*
Figure 3, *Site Plan and Soil Sample Locations*
Figure 4, *Soil Analytical Results for GRO*
Figure 5, *Soil Analytical Results for Benzene*
Figure 6, *Soil Analytical Results for DRO*
Figure 7, *Soil Analytical Results for ORO*
Figure 8, *Soil Analytical Results for Total Naphthalenes*
Figure 9, *Soil Analytical Results for cPAH TEC*
Figure 10, *Proposed Boring Locations*
Table 1, *Soil Analytical Results for TPH and BTEX*
Table 2, *Soil Analytical Results for PAHs*
Table 3, *Soil Analytical Results for Metals*

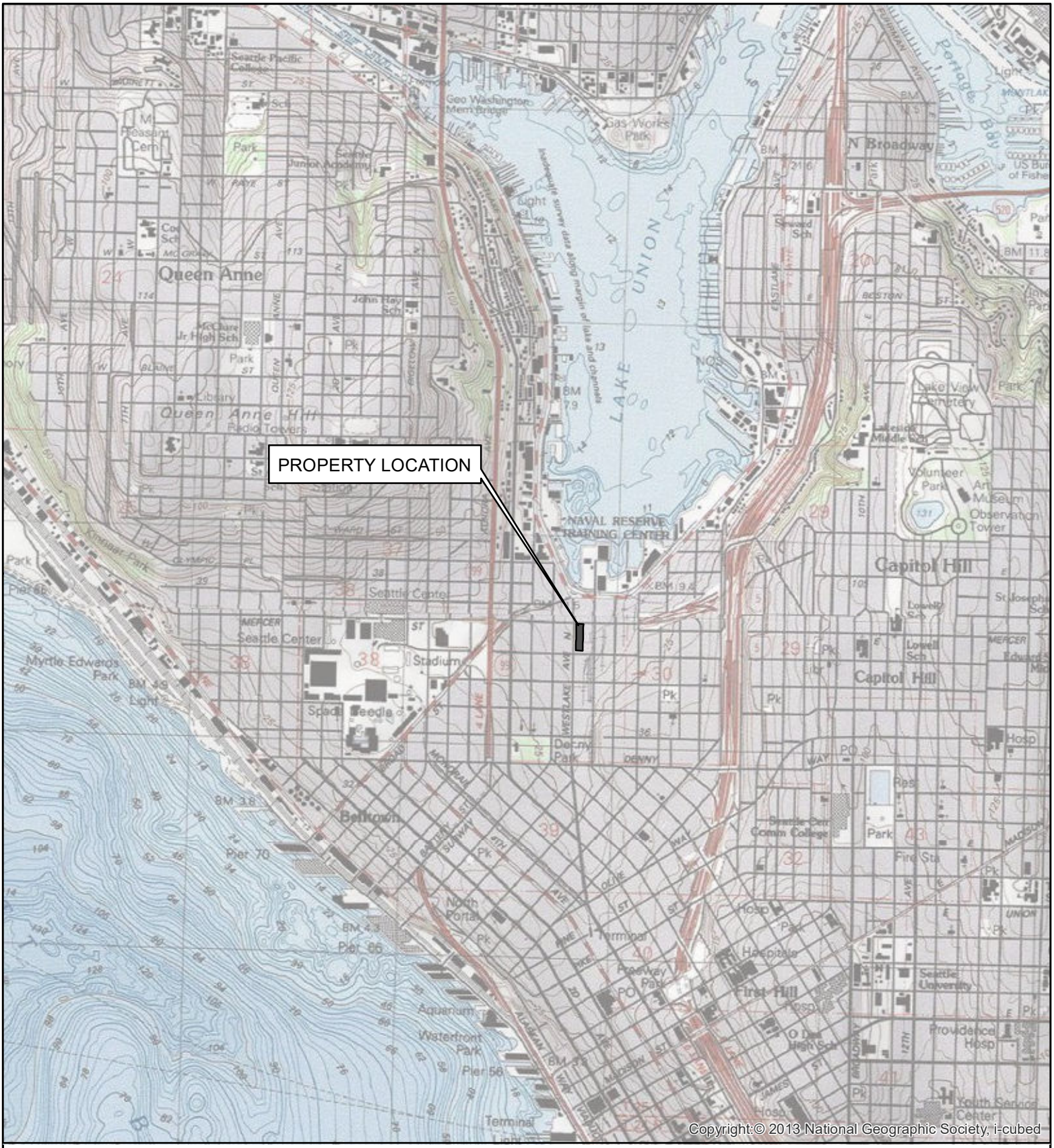
Attachment A, Sampling and Analysis Plan
Attachment B, Construction Drawings Excerpt for Mat Slab Foundation
Attachment C, Hycrete Material Specifications
Attachment D, Drago Wrap Material Specifications

SES/CTS:cm

FIGURES

SUPPLEMENTAL SUBSURFACE INVESTIGATION
AND FOUNDATION ELEMENTS
Block 38 West Property
500 through 536 Westlake Avenue North
Seattle Washington

Farallon PN: 397-019



REFERENCE: 7.5 MINUTE USGS QUADRANGLE SEATTLE NORTH, WASHINGTON, DATED 1983

N

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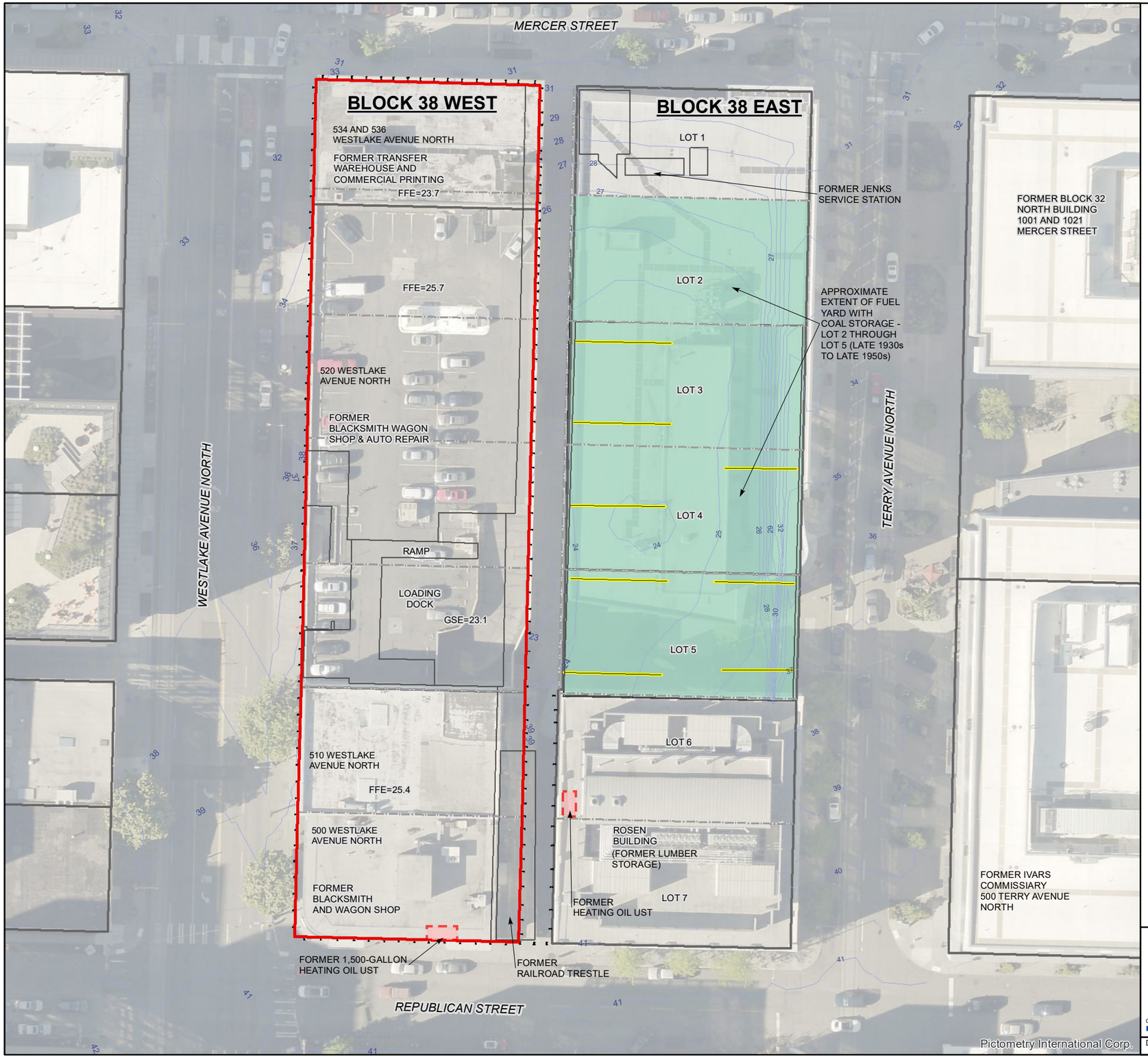
FIGURE 1

VICINITY MAP
BLOCK 38 WEST PROPERTY
SEATTLE, WASHINGTON

FARALLON PN: 397-019

Drawn By: tperrin | Checked By: CS | Date: 4/17/2020 | Disc Reference:

Document Path: Q:\Projects\397 VULCAN\019_Block38\Mapfiles\RI WP_20200420\Figure-01_SiteVicinity.mxd



LEGEND

- FORMER COAL STORAGE BINS (BASED ON 1953 AERIAL)
- BUILDING FEATURES
- 30 GROUND SURFACE ELEVATION CONTOUR
- LOT LINE
- APPROXIMATE LOCATION OF FORMER HEATING OIL USTs
- PROPERTY BOUNDARY
- KING COUNTY PARCEL BOUNDARY
- FUEL YARD

NOTES:
LOADING DOCK HIGHER THAN GSE
ELEVATION SOURCE: BUSH, ROED, & HITCHINGS, INC. (2014)
ELEVATION DATA PRESENTED IN FEET ABOVE MEAN SEA LEVEL IN
THE NORTH AMERICAN VERTICAL DATUM OF 1988

FFE = APPROXIMATE FINISH FLOOR ELEVATIONS
OF GROUND FLOOR OF EXISTING BUILDING
GSE = APPROXIMATE GROUND SURFACE ELEVATION
OF EXISTING LOADING DOCK AREA
UST = UNDERGROUND STORAGE TANK

N

0 60
SCALE IN FEET

ALL LOCATIONS ARE APPROXIMATE.
FIGURES WERE PRODUCED IN COLOR. GRAYSCALE COPIES
MAY NOT REPRODUCE ALL ORIGINAL INFORMATION.

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FIGURE 2
PROPERTY MAP WITH
HISTORICAL FEATURES
BLOCK 38 WEST PROPERTY AND
EAST-ADJACENT ALLEY
SEATTLE, WASHINGTON
FARALLON PN: 397-019

Drawn By: tperrin
Checked By: CS
Date: 6/8/2020
Disc Reference:
Q:\Projects\397_VULCAN\019_Block38\Mapfiles\017D_AlleySITMIA_Soil\Figure-02_Historical_AlleyTM.mxd

WESTLAKE AVENUE NORTH

REPUBLICAN STREET

MERCER STREET

ALLEYWAY

FMW-134
TP-14
FMW-149
A2-B
TP-15
B2-B
FORMER 1,500-GALLON HEATING OIL UST
B3-B
A3-SUBSLAB
FMW-136
TP-16
FMW-148
TP-7
C2-B
C3-B-20
C3-B
FB-06
FB-07
D2-B
D3-B
FB-05
E2-B
F1-B
F2-B
TP-18
FMW-130
FMW-147
G1-WSW
TP-12
G1-B
H1-SSW
H1-WSW
FMW-144
H1-B
FB-03
H1-ESW
G2-B
G3-B
FB-04
TP-13
H3-B
I2-B
I3-B
I3-B-Dup
TP-1
J2-B
FB-08
K1-WSW
K2-B
K3-B
FMW-135
TP-11
L1-B
TP-10
L2-B
L3-B
M2-B
N2-SSW
FMW-132
K4-B
L4-SSW
FB-09
FB-01
FMW-133
K4-ESW
L4-ESW
M4-B
M4-ESW
FMW-145
L1-WSW2
M1-WSW2
UST02-W1
UST-01
UST01-LINE1
M1-WSW
UST02-S
M1-B-0
UST02-E
UST02-E1
UST01-W1
UST01-S1
UST01-B
M1-ESW
UST01-E1
UST02-N1
UST02-N
UST02-B2
UST02-B1
M1-B
UST01-N1
M1-TANK
N1-WSW
N1-WSW3
N2-WSW2
N1-NSW
TP-2
N1-B
N1-ESW
N2-NSW
N2-B
N2-B-Dup
N2-ESW
TP-3
N3-NSW
N3-NSW2
N4-NSW
N4-ESW
C4-ESW
TP-17
D4-ESW
E4-ESW
F4-ESW
G4-ESW
H4-SSW
H4-B
H4-22.7
H4-ESW
H4-ESW2
I4-ESW
FMW-146
FB-02
J4-ESW
PH-4
PH-11A
B-6
PH-12
PH-13
EX-38-EL23
EX-39-EL23
EX-40-EL22
EX-41-EL22
EX-20-W1.5
EX-19-W5
P-4
EX-18-W9
EX-17-W13
EX-12-W16.5
EX-11-W21
W8
N8
B-2
B-3
E-7
B-1
FORMER HEATING OIL UST

LEGEND

- DECOMMISSIONED SHALLOW WATER-BEARING ZONE MONITORING WELL
- DECOMMISSIONED INTERMEDIATE WATER-BEARING ZONE MONITORING WELL
- BORING (FARALLON)
- BORING
- EXCAVATION BORING
- POTHOLE
- UST SAMPLE LOCATION (FARALLON)
- EXCAVATION SAMPLE LOCATION (FARALLON)
- TEST PIT (FARALLON)
- PIPING DISCOVERED IN SIDEWALL WITH SIGNS OF LEAKING PRODUCT AND IMPACTED SOIL BELIEVED TO BE ASSOCIATED WITH DISCOVERED USTS.
- FORMER UNDERGROUND STORAGE TANKS (USTs)
- MECHANICAL EQUIPMENT AREA DECOMMISSIONED AND FILLED WITH CDF
- KING COUNTY PARCELS
- LOT LINE
- PILE
- TIEBACK

N

0 30

SCALE IN FEET

CDF = CONTROLLED DENSITY FILL
ELEVATION DATA PRESENTED IN FEET ABOVE MSL
IN THE NORTH AMERICAN VERTICAL DATUM OF 1988
ELEVATION SOURCE: BUSH, ROED, & HITCHINGS, INC. (2014)

NOTES:
1. ALL LOCATIONS ARE APPROXIMATE.
2. FIGURES WERE PRODUCED IN COLOR. GRAYSCALE COPIES MAY NOT REPRODUCE ALL ORIGINAL INFORMATION.

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FIGURE 3

SITE PLAN AND SOIL SAMPLE LOCATIONS
THROUGH MAY 20, 2020
BLOCK 38 WEST PROPERTY AND
EAST-ADJACENT PROPERTY
SEATTLE, WASHINGTON

FARALLON PN: 397-019

Drawn By: tperrin | Checked By: SS | Date: 6/15/2020 | Disc Reference: Q:\Projects\397 VULCAN\019_Block38\Mapfiles\017D_AlleySITMIA_Soil\Figure-03_BL38WSite_AlleyTM.mxd

WESTLAKE AVENUE NORTH

REPUBLICAN STREET

MERCER STREET

ALLEYWAY

FMW-134 10.4'

FMW-149 15.2'

FB-05 20.5'

FORMER 1,500-GALLON HEATING OIL UST

FMW-136 15.1'

FMW-148 10.4'

TP-7 19.5'

FB-06 22.9'

FB-07 -0.5'

FMW-130 2.2'

FMW-147 14.3'

FB-04 17.0'

FMW-144 20.4'

FB-03 10.8'

H3-B 15.0'

I2-B 10.0'

I3-B 15.0'

FB-08 15.7'

H4-B 15.0'

H4-SSW 15.0'

H4-ESW2 20.0'|<5.5

H4-ESW 20.0'|<11 15.0'|<17

FMW-146 10.2'

FB-02 15.1'

FMW-135 10.6'

FB-09 12.7'

FMW-133 15.3'

FB-01 11.3'

UST02-B2 14.0'

TP-2 10.0'

UST01-B 17.0'

FMW-145 4.9'

N2-NSW 15.0'|<32

N2-B 10.0'

N2-SSW 10.0'

N2-ESW 10.0'

BLOCK 38 WEST

TP-3 15.0'

N3-NSW 20.0'|<5.7

B-6 23.6'|<5.0 13.6'|<5.0

PH-11A 20.0'|<20

PH-12 21.0'|**2,100**

PH-13 20.0'|<6.4

EX-18-W9 19.5'|<10

EX-17-W13 23.0'|<10

EX-12-W16.5 22.0'|<10

EX-11-W21 21.0'|11

W-4 9.5'|**44**

W-3 10.5'|**470**

FORMER HEATING OIL UST

BLOCK 38 EAST

LEGEND

- DECOMMISSIONED SHALLOW WATER-BEARING ZONE MONITORING WELL
- DECOMMISSIONED INTERMEDIATE WATER-BEARING ZONE MONITORING WELL
- BORING (FARALLON)
- BORING
- EXCAVATION BORING
- POTHOLE
- UST SAMPLE LOCATION (FARALLON)
- EXCAVATION SAMPLE LOCATION (FARALLON)
- TEST PIT (FARALLON)
- DENOTES SAMPLE LOCATION AND ELEVATION IN FEET NAVD88 WHERE GRO RESULTS ARE LESS THAN THE MTCA SCREENING LEVEL
- ESTIMATED EXTENT OF SOIL EXCEEDING THE MTCA SCREENING LEVEL PRIOR TO EXCAVATION
- MECHANICAL EQUIPMENT AREA DECOMMISSIONED AND FILLED WITH CDF
- PROPERTY BOUNDARY
- FORMER UNDERGROUND STORAGE TANKS (USTs)
- KING COUNTY PARCEL BOUNDARY
- LOT LINE

NOTES:
FOR BLOCK 38 WEST SOIL SIDEWALL SAMPLES AND SOIL SAMPLES:
ELEVATION IN FEET NAVD88 | GRO
ANALYTICAL RESULTS IN MILLIGRAMS PER KILOGRAM (mg/kg)

FOR BLOCK 38 WEST INTERIOR SAMPLES:
15' = DENOTES SAMPLE ELEVATION IN FEET NAVD88

< = DENOTES ANALYTE NOT DETECTED AT OR EXCEEDING THE REPORTING LIMIT LISTED FOR TOTAL TOXIC EQUIVALENT
CDF = CONTROLLED DENSITY FILL
GRO = TOTAL PETROLEUM HYDROCARBONS (TPH) AS GASOLINE-RANGE ORGANICS
MTCA = WASHINGTON STATE MODEL TOXICS CONTROL ACT CLEANUP REGULATION
NAVD88 = NORTH AMERICAN VERTICAL DATUM OF 1988

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FIGURE 4

SOIL ANALYTICAL RESULTS FOR GRO
BLOCK 38 WEST PROPERTY AND
EAST-ADJACENT ALLEY
SEATTLE, WASHINGTON

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WESTLAKE AVENUE NORTH

REPUBLICAN STREET

MERCER STREET

ALLEYWAY

FMW-134
10.4'

FMW-149
15.2'

FB-05
20.5'

FORMER 1,500-GALLON
HEATING OIL UST

FMW-136
15.1'

FMW-148
10.4'

TP-7
19.5'

FB-06
22.9'

FB-07
-0.5'

FMW-130
2.2'

FMW-147
14.3'

FB-04
17.0'

B-6
23.6'|<50
13.6'|<50

FMW-144
20.4'

FB-03
10.8'

H4-22.7
22.7'

FMW-146
10.2'

FB-02
15.1'

J2-B
20.0'

FB-08
15.7'

I3-B
20.0'

K2-B
20.0'

FMW-135
10.6'

FMW-133
15.3'

FB-09
12.7'

FB-01
11.3'

UST02-B2
14.0'

TP-2
15.0'

UST01-B
17.0'

FMW-145
4.9'

BLOCK 38 WEST

TP-3
15.0'

N3-NSW
20.0'|<0.020

EX-18-W9
19.5'|<0.02

EX-17-W13
23.0'|<0.02

EX-12-W16.5
22.0'|<0.02

EX-11-W21
24.0'|<0.02

W-4
9.5'|<0.030

W-3
10.5'|<0.16

FORMER
HEATING OIL UST

BLOCK 38 EAST

LEGEND

- DECOMMISSIONED SHALLOW WATER-BEARING ZONE MONITORING WELL
- DECOMMISSIONED INTERMEDIATE WATER-BEARING ZONE MONITORING WELL
- BORING (FARALLON)
- BORING
- EXCAVATION BORING
- UST SAMPLE LOCATION (FARALLON)
- EXCAVATION SAMPLE LOCATION (FARALLON)
- TEST PIT (FARALLON)
- DENOTES SAMPLE LOCATION AND ELEVATION IN FEET NAVD88 WHERE BENZENE RESULTS ARE LESS THAN THE MTCA SCREENING LEVEL
- ESTIMATED EXTENT OF SOIL EXCEEDING THE MTCA SCREENING LEVEL PRIOR TO EXCAVATION
- MECHANICAL EQUIPMENT AREA DECOMMISSIONED AND FILLED WITH CDF
- PROPERTY BOUNDARY
- FORMER UNDERGROUND STORAGE TANKS (USTs)
- KING COUNTY PARCEL BOUNDARY
- LOT LINE

NOTES:
FOR BLOCK 38 WEST SOIL SIDEWALL SAMPLES :
ELEVATION IN FEET NAVD88 | BENZENE
ANALYTICAL RESULTS IN MILLIGRAMS PER KILOGRAM (mg/kg)

FOR BLOCK 38 WEST INTERIOR SAMPLES:
15' = DENOTES SAMPLE ELEVATION IN FEET NAVD88

< = DENOTES ANALYTE NOT DETECTED AT OR EXCEEDING THE REPORTING LIMIT LISTED
CDF = CONTROLLED DENSITY FILL
MTCA = WASHINGTON STATE MODEL TOXICS CONTROL ACT CLEANUP REGULATION
NAVD88 = NORTH AMERICAN VERTICAL DATUM OF 1988

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FIGURE 5

SOIL ANALYTICAL RESULTS FOR BENZENE
BLOCK 38 WEST PROPERTY AND
EAST-ADJACENT ALLEY
SEATTLE, WASHINGTON

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WESTLAKE AVENUE NORTH

REPUBLICAN STREET

MERCER STREET

ALLEYWAY

FORMER 1,500-GALLON HEATING OIL UST

FORMER HEATING OIL UST

BLOCK 38 WEST

BLOCK 38 EAST

FMW-134 10.4'
TP-14 15.0'
FB-05 20.5'
FMW-149 15.2'
A2-B 5.0'
TP-15 15.0'
FMW-136 15.1'
TP-16 15.0'
FMW-148 10.4'
TP-7 19.5'
FB-06 22.9'
FB-07 -0.5'
TP-17 15.0'
TP-18 10.0'
FMW-130 2.2'
FMW-147 14.3'
FB-04 17.0'
TP-13 15.0'
H3-B 15.0'
H4-B 15.0'
H4-SSW 15.0'
B-6 23.6'|<20 13.6'|<20
PH-12 21.0'|**9,400**
PH-13 20.0'|<29
PH-11A 20.0'|520
H4-ESW2 20.0'|99
H4-ESW 20.0'|730 15.0'|<55
FMW-144 20.4'
FB-03 10.8'
I2-B 10.0'
J2-B 20.0'
FB-08 15.7'
I3-B 15.0'
FMW-146 10.2'
FB-02 15.1'
I4-ESW 20.0'|500 15.0'|<76
J4-ESW 20.0'|1,800 15.0'|<77
P-4 21.2'|<37 19.2'|<74
K1-WSW 20.0'|58
L1-WSW 20.0'|<31 17.0'|250 15.0'|<83
L1-WSW2 17.0'|86
FMW-135 10.6'
TP-11 15.0'
L1-B 15.0'
TP-10 15.0'
K2-B 20.0'
K3-B 15.0'
L2-B 10.0'
L3-B 15.0'
K4-B 15.0'
FB-09 12.7'
FB-01 11.3'
FMW-133 15.3'
K4-ESW 20.0'|290 15.0'|<120
L4-ESW 15.0'|<130
M1-WSW 20.0'|200 17.0'|<29 15.0'|160 10.0'|<36
M1-WSW2 20.0'|<30
UST02-B2 14.0'
M1-B 15.0'
N1-B 15.0'
UST01-B 17.0'
N1-WSW 20.0'|280 17.0'|**4,800** 15.0'|<79
N1-WSW3 17.0'|<36
N1-NSW 22.0'|<30 15.0'|<150
N1-ESW 15.0'|<150
FMW-145 4.9'
N2-B 10.0'
N2-NSW 22.0'|<29
TP-3 15.0'
N3-NSW 22.0'|<30 20.0'|<30
N3-NSW2 22.0'|<30
M4-B 12.0'
M4-ESW 20'|<30
N4-NSW 20.0'|<30
N4-ESW 20.0'|<29
EX-18-W9 19.5'|<20
EX-17-W13 23.0'|<20
EX-12-W16.5 22.0'|<20
EX-11-W21 21.0'|<20
W-4 9.5'|210
W-3 10.5'|**7,800**

LEGEND

- DECOMMISSIONED SHALLOW WATER-BEARING ZONE MONITORING WELL
- DECOMMISSIONED INTERMEDIATE WATER-BEARING ZONE MONITORING WELL
- BORING (FARALLON)
- BORING
- EXCAVATION BORING
- POTHOLE
- UST SAMPLE LOCATION
- EXCAVATION SAMPLE LOCATION
- TEST PIT (FARALLON)
- DENOTES SAMPLE LOCATION AND ELEVATION IN FEET NAVD88 WHERE DRO RESULTS ARE LESS THAN THE MTCA SCREENING LEVEL
- ESTIMATED EXTENT OF SOIL EXCEEDING THE MTCA SCREENING LEVEL PRIOR TO EXCAVATION
- MECHANICAL EQUIPMENT AREA DECOMMISSIONED AND FILLED WITH CDF
- PROPERTY BOUNDARY
- FORMER UNDERGROUND STORAGE TANKS (USTs)
- KING COUNTY PARCEL BOUNDARY
- LOT LINE

NOTES:
FOR BLOCK 38 WEST SOIL SIDEWALL SAMPLES AND SOIL SAMPLES :
ELEVATION IN FEET NAVD88 | DRO
ANALYTICAL RESULTS IN MILLIGRAMS PER KILOGRAM (mg/kg)

FOR BLOCK 38 WEST INTERIOR SAMPLES:
15' = DENOTES SAMPLE ELEVATION IN FEET NAVD88

BOLD = DENOTES CONCENTRATIONS THAT EXCEED THE SCREENING LEVEL (MTCA METHOD A CLEANUP LEVEL)
< = DENOTES ANALYTE NOT DETECTED AT OR EXCEEDING THE REPORTING LIMIT LISTED
CDF = CONTROLLED DENSITY FILL
DRO = TOTAL PETROLEUM HYDROCARBONS (TPH) AS DIESEL-RANGE ORGANICS
MTCA = WASHINGTON STATE MODEL TOXICS CONTROL ACT CLEANUP REGULATION
NAVD88 = NORTH AMERICAN VERTICAL DATUM OF 1988

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FIGURE 6

SOIL ANALYTICAL RESULTS FOR DRO
BLOCK 38 WEST PROPERTY AND
EAST-ADJACENT PROPERTY
SEATTLE, WASHINGTON

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Checked By: CS
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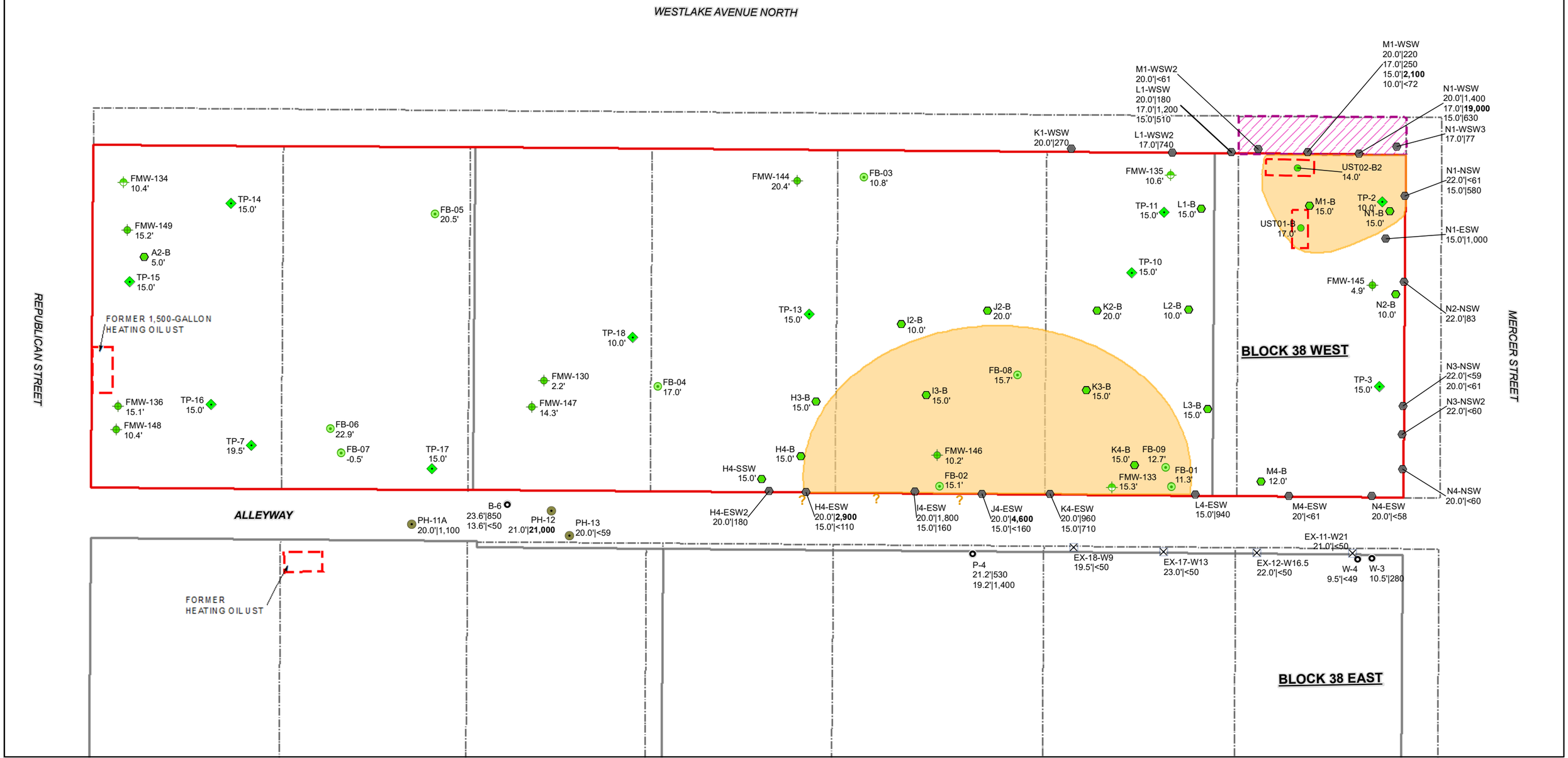

LEGEND

- DECOMMISSIONED SHALLOW WATER-BEARING ZONE MONITORING WELL
- DECOMMISSIONED INTERMEDIATE WATER-BEARING ZONE MONITORING WELL
- BORING (FARALLON)
- BORING
- EXCAVATION BORING
- POTHOLE
- UST SAMPLE LOCATION (FARALLON)
- EXCAVATION SAMPLE LOCATION (FARALLON)
- TEST PIT (FARALLON)
- DENOTES SAMPLE LOCATION AND ELEVATION IN FEET NAVD88 WHERE ORO RESULTS ARE LESS THAN THE MTCA SCREENING LEVEL
- ESTIMATED EXTENT OF SOIL EXCEEDING THE MTCA SCREENING LEVEL PRIOR TO EXCAVATION
- MECHANICAL EQUIPMENT AREA DECOMMISSIONED AND FILLED WITH CDF
- PROPERTY BOUNDARY
- FORMER UNDERGROUND STORAGE TANKS (USTs)
- KING COUNTY PARCEL BOUNDARY
- LOT LINE

NOTES:
FOR BLOCK 38 WEST SOIL SIDEWALL SAMPLES AND SOIL SAMPLES :
ELEVATION IN FEET NAVD88 | ORO
ANALYTICAL RESULTS IN MILLIGRAMS PER KILOGRAM (mg/kg)

FOR BLOCK 38 WEST INTERIOR SAMPLES:
15' = DENOTES SAMPLE ELEVATION IN FEET NAVD88

BOLD = DENOTES CONCENTRATIONS THAT EXCEED THE SCREENING LEVEL (MTCA METHOD A CLEANUP LEVEL)
< = DENOTES ANALYTE NOT DETECTED AT OR EXCEEDING THE REPORTING LIMIT LISTED
CDF = CONTROLLED DENSITY FILL
ORO = TOTAL PETROLEUM HYDROCARBONS (TPH) AS OIL-RANGE ORGANICS
MTCA = WASHINGTON STATE MODEL TOXICS CONTROL ACT CLEANUP REGULATION
NAVD88 = NORTH AMERICAN VERTICAL DATUM OF 1988

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FIGURE 7

SOIL ANALYTICAL RESULTS FOR ORO
BLOCK 38 WEST PROPERTY AND
EAST-ADJACENT PROPERTY
SEATTLE, WASHINGTON

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WESTLAKE AVENUE NORTH

REPUBLICAN STREET

MERCER STREET

ALLEYWAY

FMW-134 10.4'
FMW-149 15.2'
FB-05 10.5'
FORMER 1,500-GALLON HEATING OIL UST
C3-B-20 20.0'
FMW-136 5.1'
FMW-148 10.4'
FB-06 5.4'
FB-07 -0.5'
FMW-130 2.2'
FMW-147 14.3'
FB-04 12'
G3-B 15.0'
H3-B 15.0'
H4-B 15.0'
FMW-144 20.4'
FB-03 15.8'
I2-B 10.0'
J2-B 10.0'
FB-08 5.7'
I3-B 15.0'
FMW-146 10.2'
FB-02 0.1'
D4-ESW 19.0'|0.69
FMW-135 10.6'
TP-11 15.0'
TP-10 15.0'
K2-B 0.0'
K3-B 10.0'
K4-B 15.0'
FB-09 12.7'
FB-01 11.3'
FMW-133 15.3'
L4-SSW 10.0'
K4-ESW 20.0'|1.4
L1-WSW 20.0'|0.237
M1-WSW2 20.0'|0.055
M1-WSW 20.0'|2.85
N1-WSW 20.0'
UST02-B2 14.0'
UST01-B 17.0'
N1-NSW 22.0'|0.013
FMW-145 9.9'
L2-B 10.0'
N2-NSW 22.0'|0.0231
L3-B 10.0'
N3-NSW 22.0'|<0.0237
N3-NSW2 22.0'|0.0352
BLOCK 38 WEST

EX-38-EL23 23.0'|<0.05
EX-39-EL23 23.0'|<0.05
EX-40-EL22 22.0'|6
EX-41-EL22 22.0'|0.56
EX-20-W1.5 19.0'|0.13
TP-10-4 20.5'|<0.03
EX-19-W5 20.0'|0.07
P-4 21.2'|1.09 19.2'|0.055

FORMER HEATING OIL UST

BLOCK 38 EAST

LEGEND

- DECOMMISSIONED SHALLOW WATER-BEARING ZONE MONITORING WELL
- DECOMMISSIONED INTERMEDIATE WATER-BEARING ZONE MONITORING WELL
- BORING (FARALLON)
- BORING
- EXCAVATION BORING
- TEST PIT GEOENGINEERS
- UST SAMPLE LOCATION (FARALLON)
- EXCAVATION SAMPLE LOCATION (FARALLON)
- TEST PIT (FARALLON)
- DENOTES SAMPLE LOCATION AND ELEVATION IN FEET NAVD88 WHERE TOTAL NAPHTHALENES RESULTS ARE LESS THAN THE MTCA SCREENING LEVEL
- ESTIMATED EXTENT OF SOIL EXCEEDING THE MTCA SCREENING LEVEL PRIOR TO EXCAVATION
- MECHANICAL EQUIPMENT AREA DECOMMISSIONED AND FILLED WITH CDF
- PROPERTY BOUNDARY
- FORMER UNDERGROUND STORAGE TANKS (USTs)
- KING COUNTY PARCEL BOUNDARY
- LOT LINE

NOTES:
FOR BLOCK 38 WEST SOIL SIDEWALL SAMPLES AND SOIL SAMPLES :
ELEVATION IN FEET NAVD88 | TOTAL NAPHTHALENES
ANALYTICAL RESULTS IN MILLIGRAMS PER KILOGRAM (mg/kg)

FOR BLOCK 38 WEST INTERIOR SAMPLES:
15' = DENOTES SAMPLE ELEVATION IN FEET NAVD88

< = DENOTES ANALYTE NOT DETECTED AT OR EXCEEDING THE REPORTING LIMIT LISTED FOR TOTAL TOXIC EQUIVALENT
CDF = CONTROLLED DENSITY FILL
MTCA = WASHINGTON STATE MODEL TOXICS CONTROL ACT CLEANUP REGULATION
NAVD88 = NORTH AMERICAN VERTICAL DATUM OF 1988

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FIGURE 8
SOIL ANALYTICAL RESULTS FOR TOTAL NAPHTHALENES
BLOCK 38 WEST PROPERTY AND EAST-ADJACENT ALLEY
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WESTLAKE AVENUE NORTH

REPUBLICAN STREET

MERCER STREET

ALLEYWAY

BLOCK 38 WEST

BLOCK 38 EAST

FORMER 1,500-GALLON HEATING OIL UST

FORMER HEATING OIL UST

FMW-134 10.4'
FMW-149 15.2'
FMW-136 5.1'
FMW-148 10.4'
FMW-130 2.2'
FMW-147 14.3'
FMW-135 10.6'
FMW-145 9.9'
FMW-146 10.2'
FMW-133 15.3'

B2-B 15.0'
B3-B 15.0'
C2-B 15.0'
C3-B 15.0'
D2-B 15.0'
D3-B 15.0'
F1-B 10.0'
F2-B 10.0'
G1-B 0.0'
G2-B 15.0'
G3-B 10.0'
H1-SSW 15.0'
H1-ESW 15.0'
H3-B 10.0'
H4-B 15.0'
H4-SSW 15.0'
I3-B 15.0'
J2-B 15.0'
K2-B 15.0'
K3-B 15.0'
K4-B 15.0'
L2-B 0.0'
L3-B 10.0'
M2-B 0.0'
N2-B 15.0'
TP-16 20.0'
TP-7 19.5'
TP-11 10.0'
TP-10 15.0'
TP-13 15.0'
TP-3 15.0'
TP-2 10.0'
M1-B-0 10.0'
M1-ESW 10.0'
UST02-B2 14.0'
UST01-B 17.0'
FB-03 15.8'
FB-04 7.0'
FB-05 10.5'
FB-06 15.4'
FB-07 -0.5'
FB-08 15.7'
FB-09 12.7'
FB-01 11.3'
FB-02 0.1'

H1-WSW 20.0'|0.026
L1-WSW 20'|0.10
M1-WSW2 20.0'|0.038
M1-WSW 20.0'|**0.51**
N1-WSW 20.0'|<0.060
N1-NSW 22.0'|0.091
N2-NSW 22.0'|0.069
N3-NSW 22.0'|<0.0060
N3-NSW2 22.0'|0.024
N4-NSW 20.0'|0.046
C4-ESW 19.0'|<0.016 15.0'|<0.016
D4-ESW 19.0'|0.019 15.0'|<0.019
E4-ESW 15.0'|<0.015
F4-ESW 15.0'|0.027
G4-ESW 15.0'|<0.011
H4-ESW2 20.0'|**2.5**
H4-ESW 20.0'|2.5 15.0'|<0.011
I4-ESW 20.0'|**35.5** 15.0'|<0.015
J4-ESW 20.0'|**17.2** 15.0'|0.051
K4-ESW 20.0'|**3.1** 15.0'|<0.025
L4-ESW 15.0'|<0.026
M4-ESW 20.0'|0.016
N4-ESW 20.0'|<0.0058
PH-4 22.0'|**0.14**
PH-11A 20.0'|**0.39**
PH-12 21.0'|**152**
PH-13 20.0'|<0.0059
EX-38-EL23 23.0'|**3.7**
EX-39-EL23 23.0'|**0.47**
EX-40-EL22 22.0'|**25**
EX-41-EL22 22.0'|**2.98**
EX-20-W1.5 19.0'|**1.4**
TP-10-4 20.5'|**0.24**
P-4 21.2'|**2.1** 19.2'|**0.34**
EX-19-W5 20.0'|**2.1**

LEGEND

- DECOMMISSIONED SHALLOW WATER-BEARING ZONE MONITORING WELL
- DECOMMISSIONED INTERMEDIATE WATER-BEARING ZONE MONITORING WELL
- BORING (FARALLON)
- BORING
- EXCAVATION BORING
- TEST PIT GEOENGINEERS
- POTHOLE
- UST SAMPLE LOCATION (FARALLON)
- EXCAVATION SAMPLE LOCATION (FARALLON)
- TEST PIT (FARALLON)
- DENOTES SAMPLE LOCATION AND ELEVATION IN FEET NAVD88 WHERE cPAH TEC RESULTS ARE LESS THAN THE MTCA SCREENING LEVEL
- ESTIMATED EXTENT OF SOIL EXCEEDING THE MTCA SCREENING LEVEL PRIOR TO EXCAVATION (? WHERE INFERRED)
- MECHANICAL EQUIPMENT AREA DECOMMISSIONED AND FILLED WITH CDF
- PROPERTY BOUNDARY
- FORMER UNDERGROUND STORAGE TANKS (USTs)
- KING COUNTY PARCEL BOUNDARY
- LOT LINE

NOTES:
FOR BLOCK 38 WEST SOIL SIDEWALL SAMPLES AND SOIL SAMPLES :
DEPTH AND CONCENTRATIONS REPORTED AS:
ELEVATION IN FEET NAVD88 | cPAH TEC
ANALYTICAL RESULTS IN MILLIGRAMS PER KILOGRAM (mg/kg)

FOR BLOCK 38 WEST INTERIOR SAMPLES:
15' = DENOTES SAMPLE ELEVATION IN FEET NAVD88

BOLD = DENOTES ELEVATION AND CONCENTRATIONS THAT EXCEED THE SCREENING LEVEL (MTCA METHOD A CLEANUP LEVEL)
< = DENOTES ANALYTE NOT DETECTED AT OR EXCEEDING THE REPORTING LIMIT LISTED FOR TOTAL TOXIC EQUIVALENT CONCENTRATION OF BENZO(A)PYRENE (mg/kg)
CDF = CONTROLLED DENSITY FILL
cPAHs = CARCINOGENIC POLYCYCLIC AROMATIC HYDROCARBONS
TEC = TOXIC EQUIVALENT CONCENTRATION OF BENZO(A)PYRENE FOR cPAH MIXTURE
MTCA = WASHINGTON STATE MODEL TOXICS CONTROL ACT CLEANUP REGULATION
NAVD88 = NORTH AMERICAN VERTICAL DATUM OF 1988

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FIGURE 9

SOIL ANALYTICAL RESULTS FOR cPAH TEC
BLOCK 38 WEST PROPERTY AND
EAST-ADJACENT PROPERTY
SEATTLE, WASHINGTON

FARALLON PN: 397-019

Drawn By: tperrin | Checked By: CS | Date: 6/4/2020 | Disc Reference:
Document Path: \\edgefs02\GIS\Projects\397 VULCAN\019_Block38\Mapfiles\017D_AlleySITMIA_Soil\Figure-09_Soil-cPAHs__AlleyTM.mxd

WESTLAKE AVENUE NORTH

REPUBLICAN STREET

MERCER STREET

ALLEYWAY

FORMER 1,500-GALLON HEATING OIL UST

FORMER HEATING OIL UST

FMW-134 TP-14 FMW-149 A2-B TP-15 B2-B B3-B A3-SUBSLAB FMW-136 TP-16 FMW-148 TP-7 C2-B C3-B-20 C3-B D2-B D3-B FB-05 FB-06 FB-07 C4-ESW TP-17 D4-ESW E4-ESW F4-ESW G4-ESW H4-SSW H4-B H4-22.7 H4-ESW H4-ESW2 I4-ESW J4-ESW K4-ESW L4-ESW M4-B M4-ESW N4-ESW N4-NSW N3-NSW2 N3-NSW FMW-132 K4-B L4-SSW FB-09 FB-01 FMW-133 FMW-146 FB-02 PH-4 PH-11A B-6 PH-12 PH-13 EX-38-EL23 EX-39-EL23 EX-40-EL22 EX-41-EL22 EX-20-W1.5 EX-19-W5 EX-18-W9 EX-17-W13 EX-12-W16.5 EX-11-W21 P-4 W8 N8 B-2 B-3 E-7 B-1 E2-B F1-B F2-B G2-B TP-18 FMW-130 FMW-147 FB-04 G3-B H3-B TP-12 G1-B G1-WSW H1-WSW FMW-144 FB-03 H1-SSW H1-B H1-ESW TP-13 I2-B I3-B I3-B-Dup FB-08 J2-B TP-1 K1-WSW K2-B K3-B L3-B TP-10 TP-11 L1-B L2-B FMW-135 L1-WSW2 M1-WSW2 UST02-W1 UST-01 UST01-LINE1 M1-WSW UST02-S M1-B-0 UST02-E UST02-E1 UST01-W1 UST01-S1 UST01-B M1-ESW UST01-E1 M1-B UST01-N1 M1-TANK FMW-145 M2-B N2-SSW L1-WSW UST02-N1 UST02-N UST02-B2 UST02-B1 N1-WSW N1-WSW3 N2-WSW2 N1-NSW TP-2 N1-B N1-ESW N2-NSW N2-B N2-B-Dup N2-ESW TP-3 N3-NSW N3-NSW2 N4-NSW N4-ESW

LEGEND

- PROPOSED BORING LOCATION
- DECOMMISSIONED SHALLOW WATER-BEARING ZONE MONITORING WELL
- DECOMMISSIONED INTERMEDIATE WATER-BEARING ZONE MONITORING WELL
- BORING (FARALLON)
- BORING
- EXCAVATION BORING
- POTHOLE
- UST SAMPLE LOCATION (FARALLON)
- EXCAVATION SAMPLE LOCATION (FARALLON)
- TEST PIT (FARALLON)
- PIPING DISCOVERED IN SIDEWALL WITH SIGNS OF LEAKING PRODUCT AND IMPACTED SOIL BELIEVED TO BE ASSOCIATED WITH DISCOVERED USTS.
- FORMER UNDERGROUND STORAGE TANKS (USTs)
- MECHANICAL EQUIPMENT AREA DECOMMISSIONED AND FILLED WITH CDF
- KING COUNTY PARCELS
- LOT LINE
- PILE
- TIEBACK

N

0 30

SCALE IN FEET

CDF = CONTROLLED DENSITY FILL
ELEVATION DATA PRESENTED IN FEET ABOVE MSL
IN THE NORTH AMERICAN VERTICAL DATUM OF 1988
ELEVATION SOURCE: BUSH, ROED, & HITCHINGS, INC. (2014)

NOTES:
1. ALL LOCATIONS ARE APPROXIMATE.
2. FIGURES WERE PRODUCED IN COLOR. GRAYSCALE COPIES MAY NOT REPRODUCE ALL ORIGINAL INFORMATION.

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FIGURE 10

PROPOSED BORING LOCATIONS BLOCK 38 WEST PROPERTY AND EAST-ADJACENT PROPERTY SEATTLE, WASHINGTON

FARALLON PN: 397-019

Drawn By: tperrin
Checked By: SS
Date: 6/15/2020
Disc Reference: Q:\Projects\397 VULCAN\019_Block38\Mapfiles\017D_AlleySITMIA_Soil\Figure-10_ProposedBL38WSite_AlleyTM.mxd

TABLES

SUPPLEMENTAL SUBSURFACE INVESTIGATION
AND FOUNDATION ELEMENTS
Block 38 West Property
500 through 536 Westlake Avenue North
Seattle Washington

Farallon PN: 397-019

Table 1
Soil Analytical Results for TPH and BTEX
Block 38 West Property
Seattle, Washington
Farallon PN: 397-019

Sample Location	Sample Identification	General Location	Sample Type	Sample Location Disposition	Sample Depth (feet)[1]	Sample Elevation (feet NAVD88)[1]	Sample Date	Analytical Results (milligrams per kilogram)								
								NWTPH-Dx[2]		NWTPH-Dx with Silica Gel[2]		NWTPH-Gx[3]	EPA Method 8021B/8260[4]			
								DRO	ORO	DRO	ORO	GRO	Benzene	Toluene	Ethylbenzene	Xylenes
Block 38 West Property																
FB-01	FB-01-5.0-082118	Interior	Performance	Removed	5.0	21.3	8/21/2018	520	**3,700**	510 N	1,100	< 6.2	< 0.020	< 0.062	< 0.062	< 0.124
	FB-01-15.0-082118	Interior	Confirmation	Removed	15.0	11.3	8/21/2018	< 40	250	< 40	< 81	< 9.1	< 0.020	< 0.091	< 0.091	< 0.182
	FB-01-30.0-082118	Interior	Confirmation	Removed	30.0	-3.7	8/21/2018	< 29	< 58	---	---	< 5.1	< 0.020	< 0.051	< 0.051	< 0.102
FB-02	FB-02-5.0-082018	Interior	Performance	Removed	5.0	20.1	8/20/2018	280 N	670	---	---	< 5.4	< 0.020	< 0.054	< 0.054	< 0.108
	FB-02-10.0-082018	Interior	Confirmation	Removed	10.0	15.1	8/20/2018	< 61	270	---	---	< 19	< 0.037	< 0.19	< 0.19	< 0.38
	FB-02-25.0-082018	Interior	Confirmation	Removed	25.0	0.1	8/20/2018	< 30	< 60	---	---	< 5.2	< 0.020	< 0.052	< 0.052	< 0.104
	FB-02-35.0-082018	Interior	Confirmation	In Place	35.0	-9.9	8/20/2018	< 31	< 62	---	---	< 5.8	< 0.020	< 0.058	< 0.058	< 0.116
FB-03	FB-03-10.0-082318	Interior	Confirmation	Removed	10.0	15.8	8/23/2018	< 32	< 65	---	---	< 6.5	< 0.020	< 0.065	< 0.065	< 0.130
	FB-03-15.0-082318	Interior	Confirmation	Removed	15.0	10.8	8/23/2018	< 32	< 65	---	---	< 6.5	< 0.020	< 0.065	< 0.065	< 0.130
	FB-03-25.0-082318	Interior	Confirmation	Removed	25.0	0.8	8/23/2018	< 29	< 59	---	---	< 5.5	< 0.020	< 0.055	< 0.055	< 0.110
FB-04	FB-04-5.0-082118	Interior	Confirmation	Removed	5.0	17.0	8/21/2018	97 N	540	---	---	< 16	< 0.033	< 0.16	< 0.16	< 0.32
	FB-04-20.0-082118	Interior	Confirmation	Removed	20.0	2.0	8/21/2018	< 29	< 58	---	---	< 5.3	< 0.020	< 0.053	< 0.053	< 0.106
	FB-04-30.0-082118	Interior	Confirmation	In Place	30.0	-8.0	8/21/2018	< 30	< 59	---	---	< 5.5	< 0.020	< 0.055	< 0.055	< 0.110
FB-05	FB-05-5.0-082218	Interior	Confirmation	Removed	5.0	20.5	8/22/2018	< 31	< 61	---	---	< 5.4	< 0.020	< 0.054	< 0.054	< 0.108
	FB-05-20.0-082218	Interior	Confirmation	Removed	20.0	5.5	8/22/2018	< 31	< 61	---	---	< 5.5	< 0.020	< 0.055	< 0.055	< 0.110
	FB-05-35.0-082218	Interior	Confirmation	In Place	35.0	-9.5	8/22/2018	< 31	< 62	---	---	< 5.8	< 0.020	< 0.058	< 0.058	< 0.116
FB-06	FB-06-2.5-082218	Interior	Confirmation	Removed	2.5	22.9	8/22/2018	180	310	---	---	17 T	< 0.024	< 0.12	< 0.12	< 0.24
	FB-06-20.0-082218	Interior	Confirmation	Removed	20.0	5.4	8/22/2018	< 30	< 61	---	---	< 5.3	< 0.020	< 0.053	< 0.053	< 0.106
FB-07	FB-07-24	Interior	Confirmation	Removed	24.0	-0.5	12/21/2019	< 30	< 60	---	---	< 6.0	< 0.020	< 0.060	< 0.060	< 0.12
	FB-07-29	Interior	Confirmation	In Place	29.0	-5.5	12/21/2019	< 30	< 60	---	---	< 5.4	< 0.020	< 0.054	< 0.054	< 0.108
	FB-07-31.5	Interior	Confirmation	In Place	31.5	-8.0	12/21/2019	< 30	< 60	---	---	< 5.6	< 0.020	< 0.056	< 0.056	< 0.112
FB-08	FB-08-2.5	Interior	Performance	Removed	2.5	21.2	12/21/2019	1,700 N	**4,500**	---	---	23 O	**0.12**	0.49	0.13	0.94
	FB-08-8	Interior	Confirmation	Removed	8.0	15.7	12/21/2019	< 29	< 58	---	---	< 5.2	< 0.020	< 0.052	< 0.052	< 0.104
	FB-08-13	Interior	Confirmation	Removed	13.0	10.7	12/21/2019	< 31	< 61	---	---	15 T	< 0.020	< 0.064	< 0.064	< 0.128
	FB-08-18	Interior	Confirmation	Removed	18.0	5.7	12/21/2019	< 29	< 58	---	---	< 6.1	< 0.020	< 0.061	< 0.061	< 0.122
	FB-08-30.5	Interior	Confirmation	In Place	30.5	-6.9	12/21/2019	< 31	< 61	---	---	< 6.0	< 0.020	< 0.060	< 0.060	< 0.12
FB-09	FB-09-11	Interior	Confirmation	Removed	11.0	12.7	12/21/2019	< 58	220	---	---	< 20	< 0.039	< 0.20	< 0.20	< 0.4
	FB-09-33	Interior	Confirmation	In Place	33.0	-9.4	12/21/2019	< 31	< 62	---	---	< 5.8	< 0.020	< 0.058	< 0.058	< 0.116
FMW-130	F-MW-130-20.0-072114	Interior	Confirmation	Removed	20.0	2.2	7/21/2014	< 30	< 60	---	---	< 8.8	< 0.020	< 0.088	< 0.088	< 0.176
FMW-132	FMW-132-5.0-082418	Interior	Performance	Removed	5.0	20.7	8/24/2018	730	**2,600**	---	---	< 8.4	< 0.020	< 0.084	< 0.084	< 0.168
FMW-133	FMW-133-10.0-082418	Interior	Confirmation	Removed	10.0	15.3	8/24/2018	< 83	470	---	---	< 28	< 0.057	< 0.28	< 0.28	< 0.56
FMW-134	FMW-134-5.0-082318	Interior	Performance	Removed	5.0	20.4	8/23/2018	260	1,900	---	---	< 30	< 0.059	< 0.30	< 0.30	< 0.60
	FMW-134-15.0-082318	Interior	Confirmation	Removed	15.0	10.4	8/23/2018	< 31	< 61	---	---	< 12	< 0.023	< 0.12	< 0.12	< 0.24
FMW-135	FMW-135-15.0-082418	Interior	Confirmation	Removed	15.0	10.6	8/24/2018	130	680	---	---	< 28	< 0.055	< 0.28	< 0.28	< 0.56
	FMW-135-35.0-082418	Interior	Confirmation	In Place	35.0	-9.4	8/24/2018	< 31	< 62	---	---	< 5.8	< 0.020	< 0.058	< 0.058	< 0.116
FMW-136	FMW-136-10.0-082218	Interior	Confirmation	Removed	10.0	15.1	8/22/2018	< 38	< 76	---	---	< 9.0	< 0.020	< 0.090	< 0.090	< 0.18
	FMW-136-20.0-082218	Interior	Confirmation	Removed	20.0	5.1	8/22/2018	< 32	< 63	---	---	< 6.4	< 0.020	< 0.064	< 0.064	< 0.128
	FMW-136-30.0-082218	Interior	Confirmation	Removed	30.0	-4.9	8/22/2018	< 30	< 59	---	---	< 5.2	< 0.020	< 0.052	< 0.052	< 0.104
FMW-144	FWM-144-9.0	Interior	Confirmation	Removed	9.0	20.4	12/20/2019	< 52	110	---	---	< 18	< 0.036	< 0.18	< 0.18	< 0.36
Screening Levels[5]								**2,000**	**2,000**	**2,000**	**2,000**	**30/100[6]**	**0.03**	**7**	**6**	**9**

Table 1
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Block 38 West Property
Seattle, Washington
Farallon PN: 397-019

Sample Location	Sample Identification	General Location	Sample Type	Sample Location Disposition	Sample Depth (feet)[1]	Sample Elevation (feet NAVD88)[1]	Sample Date	Analytical Results (milligrams per kilogram)								
								NWTPH-Dx[2]		NWTPH-Dx with Silica Gel[2]		NWTPH-Gx[3]	EPA Method 8021B/8260[4]			
								DRO	ORO	DRO	ORO	GRO	Benzene	Toluene	Ethylbenzene	Xylenes
FMW-145	FMW-145-13.0	Interior	Performance	Removed	13.0	9.9	12/20/2019	650	1,400	---	---	**83** O	< 0.020	< 0.075	< 0.075	< 0.15
	FMW-145-18.0	Interior	Confirmation	Removed	18.0	4.9	12/20/2019	58 N	210	---	---	< 28 U1	< 0.020	< 0.080	< 0.080	< 0.16
	FMW-145-23.0	Interior	Confirmation	Removed	23.0	-0.1	12/20/2019	< 30	< 60	---	---	< 5.3	< 0.020	< 0.053	< 0.053	< 0.106
	FMW-145-28.0	Interior	Confirmation	Removed	28.0	-5.1	12/20/2019	< 31	< 61	---	---	< 6.5	< 0.020	< 0.065	< 0.065	< 0.13
	FMW-145-30.5	Interior	Confirmation	In Place	30.5	-7.6	12/20/2019	< 29	< 57	---	---	< 4.8	< 0.020	< 0.048	< 0.048	< 0.096
	FMW-145-33.0	Interior	Confirmation	In Place	33.0	-10.1	12/20/2019	< 31	< 61	---	---	< 5.5	< 0.020	< 0.055	< 0.055	< 0.11
FMW-146	FMW-146-13.0	Interior	Confirmation	Removed	13.0	10.2	12/21/2019	< 34	< 69	---	---	< 7.0	< 0.020	< 0.070	< 0.070	< 0.14
	FMW-146-18.0	Interior	Confirmation	Removed	18.0	5.2	12/21/2019	< 31	< 62	---	---	< 5.4	< 0.020	< 0.054	< 0.054	< 0.108
FMW-147	FMW-147-8.5	Interior	Confirmation	Removed	8.5	14.3	12/21/2019	< 120	1,100	---	---	< 51	< 0.10	< 0.51	< 0.51	< 1.02
	FMW-147-13.5	Interior	Confirmation	Removed	13.5	9.3	12/21/2019	< 31	< 61	---	---	< 5.5	< 0.020	< 0.055	< 0.055	< 0.11
	FMW-147-23.5	Interior	Confirmation	Removed	23.5	-0.7	12/21/2019	< 30	< 61	---	---	< 5.1	< 0.020	< 0.051	< 0.051	< 0.102
	FMW-147-30.5	Interior	Confirmation	In Place	30.5	-7.7	12/21/2019	< 30	< 61	---	---	< 6.4	< 0.020	< 0.064	< 0.064	< 0.128
FMW-148	FMW-148-27.0	Interior	Confirmation	Removed	27.0	10.4	12/22/2019	< 31	< 63	---	---	< 5.7	< 0.020	< 0.057	< 0.057	< 0.114
FMW-149	FMW-149-21.0	Interior	Confirmation	Removed	21.0	15.2	12/22/2019	< 33	< 66	---	---	< 7.0	< 0.020	< 0.070	< 0.070	< 0.14
	FMW-149-31.0	Interior	Confirmation	Removed	31.0	5.2	12/22/2019	< 31	< 63	---	---	< 6.3	< 0.020	< 0.063	< 0.063	< 0.126
	FMW-149-41.0	Interior	Confirmation	Removed	41.0	-4.8	12/22/2019	< 26	< 53	---	---	< 4.4	< 0.020	< 0.044	< 0.044	< 0.088
	FMW-149-43.5	Interior	Confirmation	In Place	43.5	-7.3	12/22/2019	< 28	< 56	---	---	< 4.3	< 0.020	< 0.043	< 0.043	< 0.086
A2-B	A2-B-(-5.0)	Interior	Confirmation	Removed	---	-5.0	4/29/2020	< 27	< 53	---	---	---	---	---	---	---
A3-Subslab	A3-SUBSLAB-22-010920	Interior	Performance	Removed	22.0	---	1/9/2020	< 76	< 150	---	---	---	---	---	---	---
	A3-SUBSLAB-25-010920	Interior	Performance	Removed	25.0	---	1/9/2020	82	660	---	---	---	---	---	---	---
H3-B	H3-B-20	Interior	Confirmation	Removed	---	20.0	2/20/2020	---	---	---	---	< 6.7	---	---	---	---
	H3-B-15.0	Interior	Confirmation	Removed	---	15.0	2/24/2020	< 67	250	---	---	< 21	---	---	---	---
H4-22.7	H4-1.0-121319	Interior	Performance	Removed	1.0	22.7	12/13/2019	600 N	**5,000**	---	---	**31**	< 0.022	< 0.11	< 0.11	< 0.22
H4-B	H4-B-20.0	Interior	Confirmation	Removed	---	20.0	2/19/2020	140 N	970	---	---	< 51	---	---	---	---
	H4-B-15.0	Interior	Confirmation	Removed	---	15.0	2/19/2020	< 90	500	---	---	< 31	---	---	---	---
H4-ESW	H4-ESW-20.0	E Sidewall	Confirmation	In Place	---	20.0	2/4/2020	730 N	**2,900**	---	---	< 11 H	---	---	---	---
	H4-ESW-15.0	E Sidewall	Confirmation	In Place	---	15.0	2/26/2020	< 55	< 110	---	---	< 17	---	---	---	---
H4-ESW2	H4-ESW2-20.0	E Sidewall	Confirmation	In Place	---	20.0	2/4/2020	99 N	180	---	---	< 5.5 H	---	---	---	---
H4-SSW	H4-SSW-15.0	Interior	Confirmation	Removed	---	15.0	2/27/2020	< 65	170	---	---	< 21	---	---	---	---
I2-B	I2-B-10.0	Interior	Confirmation	Removed	---	10.0	2/28/2020	< 28	< 55	---	---	---	---	---	---	---
I3-B	I3-B-20.0	Interior	Performance	Removed	---	20.0	2/23/2020	< 680	**6,200**	---	---	< 15 H	< 0.030 H	< 0.15 H	< 0.15 H	< 0.30 H
	I3-B-15.0	Interior	Confirmation	Removed	---	15.0	2/23/2020	< 76	690	---	---	< 26 H	---	---	---	---
	I3-B-DUP-15.0	Interior	Confirmation	Removed	---	15.0	2/24/2020	---	---	---	---	23 T	---	---	---	---
I4-ESW	I4-ESW-20.0	E Sidewall	Confirmation	In Place	---	20.0	2/4/2020	500 N	1,800	---	---	---	---	---	---	---
	I4-ESW-15.0	E Sidewall	Confirmation	In Place	---	15.0	2/22/2020	< 76	160	---	---	---	---	---	---	---
J2-B	J2-B-20.0	Interior	Confirmation	Removed	---	20.0	2/14/2020	< 29	< 58	---	---	---	< 0.00076	< 0.0038	< 0.00076	< 0.00226
J4-ESW	J4-ESW-20.0	E Sidewall	Confirmation	In Place	---	20.0	2/4/2020	1,800 N	**4,600**	---	---	---	---	---	---	---
	J4-ESW-15.0	E Sidewall	Confirmation	In Place	---	15.0	2/22/2020	< 77	< 160	---	---	---	---	---	---	---
K1-WSW	K1-WSW-20.0	Sidewall	Confirmation	In Place	---	20.0	2/4/2020	58 N	270	---	---	---	---	---	---	---
K2-B	K2-B-20.0	Interior	Confirmation	Removed	---	20.0	2/6/2020	< 56	280	---	---	---	< 0.037	< 0.19	< 0.19	< 0.38
K3-B	K3-B-20.0	Interior	Performance	Removed	---	20.0	2/13/2020	**2,500** N	**9,700**	---	---	---	---	---	---	---
	K3-B-15.0	Interior	Confirmation	Removed	---	15.0	2/24/2020	68 N	830	---	---	---	---	---	---	---
	K3-B-10.0	Interior	Confirmation	Removed	---	10.0	2/28/2020	< 32	< 64	---	---	---	---	---	---	---
Screening Levels[5]								**2,000**	**2,000**	**2,000**	**2,000**	**30/100[6]**	**0.03**	**7**	**6**	**9**

Table 1
Soil Analytical Results for TPH and BTEX
Block 38 West Property
Seattle, Washington
Farallon PN: 397-019

Sample Location	Sample Identification	General Location	Sample Type	Sample Location Disposition	Sample Depth (feet)[1]	Sample Elevation (feet NAVD88)[1]	Sample Date	Analytical Results (milligrams per kilogram)								
								NWTPH-Dx[2]		NWTPH-Dx with Silica Gel[2]		NWTPH-Gx[3]	EPA Method 8021B/8260[4]			
								DRO	ORO	DRO	ORO	GRO	Benzene	Toluene	Ethylbenzene	Xylenes
K4-B	K4-B-15.0	Interior	Confirmation	Removed	---	15.0	2/26/2020	< 33	< 67	---	---	---	---	---	---	---
	K4-B-10.0	Interior	Confirmation	Removed	---	10.0	2/26/2020	110	290	---	---	---	---	---	---	---
K4-ESW	K4-ESW-20.0	E Sidewall	Confirmation	In Place	---	20.0	2/4/2020	290 N	960	---	---	---	---	---	---	---
	K4-ESW-15.0	E Sidewall	Confirmation	In Place	---	15.0	2/22/2020	< 120	710	---	---	---	---	---	---	---
L1-B	L1-B-15.0	Interior	Confirmation	Removed	---	15.0	2/24/2020	< 170	560	---	---	---	---	---	---	---
L1-WSW	L1-WSW-20.0	Sidewall	Confirmation	In Place	---	20.0	2/3/2020	< 31	180	---	---	---	---	---	---	---
	L1-WSW-17.0	Sidewall	Confirmation	In Place	---	17.0	2/10/2020	250 N	1,200	---	---	---	---	---	---	---
	L1-WSW-15.0	Sidewall	Confirmation	In Place	---	15.0	2/24/2020	< 83	510	---	---	---	---	---	---	---
L1-WSW2	L1-WSW2-17.0	Sidewall	Confirmation	In Place	---	17.0	2/10/2020	86 N	740	---	---	---	---	---	---	---
L2-B	L2-B-10.0	Interior	Confirmation	Removed	---	10.0	2/28/2020	< 33	< 67	---	---	---	---	---	---	---
L3-B	L3-B-15.0	Interior	Confirmation	Removed	---	15.0	2/24/2020	< 140	1,300	---	---	---	---	---	---	---
L4-ESW	L4-ESW-15.0	E Sidewall	Confirmation	In Place	---	15.0	2/22/2020	< 130	940	---	---	---	---	---	---	---
M1-B	M1-B-15.0	Interior	Confirmation	Removed	---	15.0	2/24/2020	< 160	470	---	---	---	---	---	---	---
	M1-B-10	Interior	Confirmation	Removed	---	10.0	2/25/2020	< 31	< 62	---	---	---	---	---	---	---
M1-WSW	M1-WSW-20.0	Sidewall	Confirmation	In Place	---	20.0	2/3/2020	200	220	---	---	---	---	---	---	---
	M1-WSW-17.0	Sidewall	Confirmation	In Place	---	17.0	2/10/2020	< 29	250	---	---	---	---	---	---	---
	M1-WSW-15.0	Sidewall	Confirmation	In Place	---	15.0	2/24/2020	160 N	**2,100**	---	---	---	---	---	---	---
	M1-WSW-10	Sidewall	Confirmation	In Place	---	10.0	2/25/2020	< 36	< 72	---	---	---	---	---	---	---
M1-WSW2	M1-WSW2-20.0	Sidewall	Confirmation	In Place	---	20.0	2/3/2020	< 30	< 61	---	---	---	---	---	---	---
M4-B	M4-B-12.0	Interior	Confirmation	Removed	---	12.0	2/22/2020	< 76	400	---	---	---	---	---	---	---
M4-ESW	M4-ESW-20.0	E Sidewall	Confirmation	In Place	---	20.0	2/6/2020	< 30	< 61	---	---	---	---	---	---	---
N1-B	N1-B-15.0	Interior	Confirmation	Removed	---	15.0	2/22/2020	< 110	1,900	---	---	---	---	---	---	---
N1-NSW	N1-NSW-22.0	Sidewall	Confirmation	In Place	---	22.0	1/31/2020	< 30	< 61	---	---	---	---	---	---	---
	N1-NSW-15.0	Sidewall	Confirmation	In Place	---	15.0	2/24/2020	< 150	580	---	---	---	---	---	---	---
N1-ESW	N1-ESW-15.0	Sidewall	Confirmation	In Place	---	15.0	2/22/2020	< 150	1,000	---	---	---	---	---	---	---
N1-WSW	N1-WSW-20.0	Sidewall	Confirmation	In Place	---	20.0	2/3/2020	280 N	1,400	---	---	---	---	---	---	---
	N1-WSW-17.0	Sidewall	Confirmation	In Place	---	17.0	2/10/2020	**4,800** N	**19,000**	---	---	---	---	---	---	---
	N1-WSW-15.0	Sidewall	Confirmation	In Place	---	15.0	2/24/2020	< 79	630	---	---	---	---	---	---	---
N1-WSW3	N1-WSW3-170	Sidewall	Confirmation	In Place	---	17.0	2/21/2020	< 36	77	---	---	---	---	---	---	---
N2-B	N2-B-20.0	Interior	Confirmation	Removed	---	20.0	2/6/2020	< 31	< 61	---	---	---	---	---	---	---
	N2-B-15.0	Interior	Confirmation	Removed	---	15.0	2/23/2020	---	---	---	---	< 22 H	---	---	---	---
	N2-B-DUP-15.0	Interior	Confirmation	Removed	---	15.0	2/24/2020	---	---	---	---	< 64	---	---	---	---
	N2-B-10.0	Interior	Confirmation	Removed	---	10.0	2/23/2020	< 31	< 62	---	---	< 12 H	---	---	---	---
	N2-B-DUP-10.0	Interior	Confirmation	Removed	---	10.0	2/24/2020	---	---	---	---	< 6.4	---	---	---	---
N2-NSW	N2-NSW-22.0	Sidewall	Confirmation	In Place	---	22.0	1/31/2020	< 29	83	---	---	---	---	---	---	---
	N2-NSW-15.0	Sidewall	Confirmation	In Place	---	15.0	2/24/2020	---	---	---	---	< 32	---	---	---	---
N2-ESW	N2-ESW-10	Interior	Confirmation	Removed	---	10.0	2/25/2020	---	---	---	---	< 6.5	---	---	---	---
N2-SSW	N2-SSW-10	Interior	Confirmation	Removed	---	10.0	2/25/2020	---	---	---	---	< 6.9	---	---	---	---
N3-NSW	N3-NSW-20.0-121019	Sidewall	Confirmation	In Place	---	20.0	12/10/2019	< 30 H	< 61 H	---	---	< 5.7 H	< 0.020 H	< 0.057 H	< 0.057 H	< 0.114 H
	N3-NSW-22.0	Sidewall	Confirmation	In Place	---	22.0	1/31/2020	< 30	< 59	---	---	---	---	---	---	---
N3-NSW2	N3-NSW2-22.0	Sidewall	Confirmation	In Place	---	22.0	1/31/2020	< 30	< 60	---	---	---	---	---	---	---
N4-NSW	N4-NSW-20.0	Sidewall	Confirmation	In Place	---	20.0	2/6/2020	< 30	< 60	---	---	---	---	---	---	---
N4-ESW	N4-ESW-20.0	E Sidewall	Confirmation	In Place	---	20.0	2/6/2020	< 29	< 58	---	---	---	---	---	---	---
Screening Levels[5]								**2,000**	**2,000**	**2,000**	**2,000**	**30/100[6]**	**0.03**	**7**	**6**	**9**

Table 1
Soil Analytical Results for TPH and BTEX
Block 38 West Property
Seattle, Washington
Farallon PN: 397-019

Sample Location	Sample Identification	General Location	Sample Type	Sample Location Disposition	Sample Depth (feet)[1]	Sample Elevation (feet NAVD88)[1]	Sample Date	Analytical Results (milligrams per kilogram)								
								NWTPH-Dx[2]		NWTPH-Dx with Silica Gel[2]		NWTPH-Gx[3]	EPA Method 8021B/8260[4]			
								DRO	ORO	DRO	ORO	GRO	Benzene	Toluene	Ethylbenzene	Xylenes
TP-2	TP-2-20.0-121919	Interior	Confirmation	Removed	5.0	20.0	12/19/2019	< 27	210	---	---	< 4.2	< 0.020	< 0.042	< 0.042	< 0.084
	TP-2-15.0-121919	Interior	Confirmation	Removed	10.0	15.0	12/19/2019	**6,600**	**9,000**	---	---	< 420 U1	< 0.026	< 0.13	< 0.13	< 0.26
	TP-2-10.0	Interior	Confirmation	Removed	---	10.0	2/13/2020	< 33	< 66	---	---	< 6.8	---	---	---	---
	TP-2-5.0	Interior	Confirmation	Removed	---	5.0	2/13/2020	< 28	< 57	---	---	< 4.9	---	---	---	---
TP-3	TP-3-20.0-121919	Interior	Confirmation	Removed	5.0	20.0	12/19/2019	< 29	< 59	---	---	< 5.2	< 0.020	< 0.052	< 0.052	< 0.104
	TP-3-15.0-121919	Interior	Confirmation	Removed	10.0	15.0	12/19/2019	< 160	1,700	---	---	< 59	< 0.12	< 0.59	< 0.59	< 1.18
TP-7	TP-7-4.0	Interior	Confirmation	Removed	4.0	19.5	12/23/2019	< 74	230	---	---	< 25	< 0.0044	< 0.022	< 0.0044	< 0.0132
TP-10	TP-10-15.0	Interior	Confirmation	Removed	---	15.0	2/4/2020	< 130	370	---	---	---	---	---	---	---
TP-11	TP-11-20.0	Interior	Confirmation	Removed	---	20.0	2/4/2020	< 30	190	---	---	---	---	---	---	---
	TP-11-15.0	Interior	Confirmation	Removed	---	15.0	2/4/2020	230	680	---	---	---	---	---	---	---
	TP-11-10.0	Interior	Confirmation	Removed	---	10.0	2/4/2020	< 36	< 71	---	---	---	---	---	---	---
TP-13	TP-13-20.0	Interior	Confirmation	Removed	---	20.0	2/7/2020	< 28	< 57	---	---	---	---	---	---	---
	TP-13-15.0	Interior	Confirmation	Removed	---	15.0	2/7/2020	< 35	< 70	---	---	---	---	---	---	---
TP-14	TP-14-20.0	Interior	Confirmation	Removed	---	20.0	2/14/2020	< 95	410	---	---	---	---	---	---	---
	TP-14-15.0	Interior	Confirmation	Removed	---	15.0	2/14/2020	120 N	640	---	---	---	---	---	---	---
	TP-14-10.0	Interior	Confirmation	Removed	---	10.0	2/14/2020	< 33	< 67	---	---	---	---	---	---	---
TP-15	TP-15-20.0	Interior	Confirmation	Removed	---	20.0	2/14/2020	< 97	700	---	---	---	---	---	---	---
	TP-15-15.0	Interior	Confirmation	Removed	---	15.0	2/14/2020	95 N	490	---	---	---	---	---	---	---
	TP-15-10.0	Interior	Confirmation	Removed	---	10.0	2/14/2020	< 32	< 65	---	---	---	---	---	---	---
TP-16	TP-16-20.0	Interior	Confirmation	Removed	---	20.0	2/14/2020	< 65	250	---	---	---	---	---	---	---
	TP-16-15.0	Interior	Confirmation	Removed	---	15.0	2/14/2020	88 N	400	---	---	---	---	---	---	---
	TP-16-10.0	Interior	Confirmation	Removed	---	10.0	2/14/2020	< 32	< 64	---	---	---	---	---	---	---
TP-17	TP-17-20.0	Interior	Confirmation	Removed	---	20.0	2/18/2020	300 N	1,700	---	---	---	---	---	---	---
	TP-17-15	Interior	Confirmation	Removed	---	15.0	2/25/2020	< 59	< 120	---	---	---	---	---	---	---
	TP-17-10	Interior	Confirmation	Removed	---	10.0	2/25/2020	< 29	< 58	---	---	---	---	---	---	---
TP-18	TP-18-10.0	Interior	Confirmation	Removed	---	10.0	2/19/2020	< 28	< 56	---	---	---	---	---	---	---
Screening Levels[5]								**2,000**	**2,000**	**2,000**	**2,000**	**30/100[6]**	**0.03**	**7**	**6**	**9**

Table 1
Soil Analytical Results for TPH and BTEX
Block 38 West Property
Seattle, Washington
Farallon PN: 397-019

Sample Location	Sample Identification	General Location	Sample Type	Sample Location Disposition	Sample Depth (feet)[1]	Sample Elevation (feet NAVD88)[1]	Sample Date	Analytical Results (milligrams per kilogram)								
								NWTPH-Dx[2]		NWTPH-Dx with Silica Gel[2]		NWTPH-Gx[3]	EPA Method 8021B/8260[4]			
								DRO	ORO	DRO	ORO	GRO	Benzene	Toluene	Ethylbenzene	Xylenes
Alley																
B-6	B-6-3	Alley	Confirmation	In Place	3.0	23.6	12/29/1998	< 20	850	---	---	< 5.0	< 50	< 50	< 50	< 50
	B-6-13	Alley	Confirmation	In Place	13.0	13.6	12/29/1998	< 20	< 50	---	---	< 5.0	< 50	< 50	< 50	< 50
PH-11A	PH-11A-4.0-011919	Alley	Confirmation	In Place	4.0	20.0	1/19/2019	520 N	1,100	---	---	< 20	---	---	---	---
PH-12	PH-12-4.0-011919	Alley	Confirmation	In Place	4.0	21.0	1/19/2019	**9,400** N,M	**21,000**	---	---	**2,100**	---	---	---	---
PH-13	PH-13-3.0-011219	Alley	Confirmation	In Place	3.0	20.0	1/12/2019	< 29	< 59	---	---	< 6.4	---	---	---	---
Block 38 East Property																
EX-11-W21	EX-11-W21 (EL21)	W Sidewall	Confirmation	In Place	9.5	21.0	7/2/2008	< 20	< 50	---	---	11	< 0.02	< 0.05	< 0.05	< 0.15
EX-12-W16.5	EX-12-W16.5 (EL22)	W Sidewall	Confirmation	In Place	7.0	22.0	7/2/2008	< 20	< 50	---	---	< 10	< 0.02	< 0.05	< 0.05	< 0.15
EX-17-W13	EX-17-W13 (EL23)	W Sidewall	Confirmation	In Place	6.5	23.0	7/3/2008	< 20	< 50	---	---	< 10	< 0.02	< 0.05	< 0.05	< 0.15
EX-18-W9	EX-18-W9 (EL19.5)	W Sidewall	Confirmation	In Place	6.0	19.5	7/3/2008	< 20	< 50	---	---	< 10	< 0.02	< 0.05	< 0.05	< 0.15
P-4	P-4-3.5	W Sidewall	Confirmation	In Place	3.5	21.2	6/12/2002	< 37	530	---	---	---	---	---	---	---
	P-4-5.5	W Sidewall	Confirmation	In Place	5.5	19.2	6/12/2002	< 74	1,400	---	---	---	---	---	---	---
W-3	W-3	W Sidewall	Confirmation	In Place	10.0	10.5	10/11/1993	**7,800**	280	---	---	**470**	< 0.16	< 0.16	0.19	0.87
W-4	W-4	W Sidewall	Confirmation	In Place	11.0	9.5	10/11/1993	210	< 49	---	---	**44**	< 0.030	< 0.030	< 0.030	0.063
Screening Levels[5]								**2,000**	**2,000**	**2,000**	**2,000**	**30/100[6]**	**0.03**	**7**	**6**	**9**

NOTES:

Results in **bold** denote concentrations exceeding applicable cleanup levels.

Samples highlighted in green denote samples in alley or alley perimeter.

< denotes analyte not detected at or exceeding the laboratory reporting limit listed.

— denotes sample not analyzed.

[1]Depth in feet below ground surface. Elevation in feet referenced to North American Vertical Datum of 1988 (NAVD88).

[2]Analyzed by Northwest Method NWTPH-Dx, unless otherwise noted. Results denoted as analyzed by NWTPH-Dx with silica gel were analyzed using a sample extract treated with sulfuric acid/silica gel cleanup procedure.

[3]Analyzed by Northwest Method NWTPH-Gx, unless otherwise noted.

[4]Analyzed by U.S. Environmental Protection Agency Method 8021B, 8260C, or 8260D.

[5]Washington State Model Toxics Control Act Cleanup Regulation (MTCA) Method A Soil Cleanup Levels for Unrestricted Land Uses, Table 740-1 of Section 900 of Chapter 173-340 of the Washington Administrative Code, as revised 2013.

[6]Cleanup level is 30 milligrams per kilogram if benzene is detected and 100 milligrams per kilogram if benzene is not detected.

[7]Analyzed by Northwest Method NWTPH-HCID (hydrocarbon identification).

BTEX = benzene, toluene, ethylbenzene, and xylenes

DRO = total petroleum hydrocarbons (TPH) as diesel-range organics

GRO = TPH as gasoline-range organics

H = sample analyzed outside of holding time

M = hydrocarbons in the gasoline range are impacting the diesel-range result

N = hydrocarbons in the oil-range are impacting the diesel-range result

N1 = hydrocarbons in the diesel-range are impacting the oil-range result

ORO = TPH as oil-range organics

O = Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

T = the sample chromatogram is not similar to a typical gasoline standard

Table 2
Soil Analytical Results for PAHs
Block 38 West Property
Seattle, Washington
Farallon PN: 397-019

Sample Location	Sample Identification	General Location	Sample Type	Sample Location Disposition	Sample Composition	Sample Depth (feet)[1]	Sample Elevation (feet NAVD88)[1]	Sample Date	Analytical Results (milligrams per kilogram)[2]															
									Non-Carcinogenic PAHs												Carcinogenic PAHs							
									Naphthalene	1-Methylnaphthalene	2-Methylnaphthalene	Total Naphthalenes[4,5]	Acenaphthene	Acenaphthylene	Anthracene	Benzo(g,h,i)Perylene	Fluoranthene	Fluorene	Phenanthrene	Pyrene	Benzo(a)Pyrene	Benzo(a)Anthracene	Benzo(b)Fluoranthene	Benzo(j,k)Fluoranthene	Chrysene	Dibenzo(a,h)Anthracene	Indeno(1,2,3-cd)Pyrene	Total cPAHs TEC[4,5]
Block 38 West Property																												
FB-01	FB-01-5.0-082118	Interior	Performance	Removed	Soil	5.0	21.3	8/21/2018	0.99	1.1	1.2	3.29	0.46	0.32	1.0	1.9	4.8	0.46	5.4	6.8	2.5	2.6	2.9	0.76	3.1	0.45	1.6	**3.4**
	FB-01-15.0-082118	Interior	Confirmation	Removed	Soil	15.0	11.3	8/21/2018	< 0.011	< 0.011	< 0.011	< 0.033	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.008
FB-02	FB-02-5.0-082018	Interior	Performance	Removed	Soil	5.0	20.1	8/20/2018	1.1	0.86	1.3	3.3	1.4	0.45	3.3	8.5	18	1.3	12	25	11	9.8	12	3.5	9.7	1.6	8.0	**15**
	FB-02-25.0-082018	Interior	Confirmation	Removed	Soil	25.0	0.1	8/20/2018	0.083	0.020	0.024	0.127	0.027	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0060
FB-03	FB-03-10.0-082318	Interior	Confirmation	Removed	Soil	10.0	15.8	8/23/2018	< 0.0086	< 0.0086	< 0.0086	< 0.0258	< 0.0086	< 0.0086	< 0.0086	< 0.0086	0.011	< 0.0086	0.015	0.012	< 0.0086	< 0.0086	< 0.0086	< 0.0086	< 0.0086	< 0.0086	< 0.0086	< 0.0065
	FB-03-35.0-082318	Interior	Confirmation	In Place	Soil	35.0	-9.2	8/23/2018	< 0.0080	< 0.0080	< 0.0080	< 0.024	< 0.0080	< 0.0080	< 0.0080	< 0.0080	0.015	< 0.0080	0.017	0.017	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0060
FB-04	FB-04-10.0-082118	Interior	Performance	Removed	Soil	10.0	12.0	8/21/2018	0.12	0.057	0.099	0.276	0.21	0.045	0.29	0.21	0.97	0.22	1.0	1.1	0.36	0.67	0.47	0.18	0.95	0.041	0.19	**0.52**
	FB-04-15.0-082118	Interior	Confirmation	Removed	Soil	15.0	7.0	8/21/2018	0.052	0.048	0.092	0.192	0.049	< 0.0082	0.029	0.018	0.078	0.043	0.16	0.1	0.027	0.027	0.025	0.0099	0.028	< 0.0082	0.017	0.036
FB-05	FB-05-15.0-082218	Interior	Confirmation	Removed	Soil	15.0	10.5	8/22/2018	< 0.0089	< 0.0089	< 0.0089	< 0.0267	< 0.0089	< 0.0089	< 0.0089	< 0.0089	< 0.0089	< 0.0089	< 0.0089	< 0.0089	< 0.0089	< 0.0089	< 0.0089	< 0.0089	< 0.0089	< 0.0089	< 0.0089	< 0.0067
FB-06	FB-06-2.5-082218	Interior	Performance	Removed	Soil	2.5	22.9	8/22/2018	0.087	0.044	0.045	0.176	0.13	0.042	0.20	0.35	0.81	0.094	0.89	1.1	0.49	0.47	0.52	0.17	0.50	0.054	0.34	**0.65**
	FB-06-10.0-082218	Interior	Confirmation	Removed	Soil	10.0	15.4	8/22/2018	< 0.016 H	< 0.016 H	< 0.016 H	< 0.048	< 0.016 H	< 0.016 H	< 0.016 H	< 0.016 H	< 0.016 H	< 0.016 H	< 0.016 H	0.020 H	< 0.016 H	< 0.016 H	< 0.016 H	< 0.016 H	< 0.016 H	< 0.016 H	< 0.016 H	< 0.012
	FB-06-20.0-082218	Interior	Confirmation	Removed	Soil	20.0	5.4	8/22/2018	0.070	< 0.0081	< 0.0081	0.070	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0061
FB-07	FB-07-24	Interior	Confirmation	Removed	Soil	24.0	-0.5	12/21/2019	0.028	< 0.0081	< 0.0081	0.028	---	---	---	---	---	---	---	---	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0061
	FB-07-29	Interior	Confirmation	Removed	Soil	29.0	-5.5	12/21/2019	< 0.0080	< 0.0080	< 0.0080	< 0.024	---	---	---	---	---	---	---	---	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0060
	FB-07-31.5	Interior	Confirmation	In Place	Soil	31.5	-8.0	12/21/2019	< 0.0080	< 0.0080	< 0.0080	< 0.024	---	---	---	---	---	---	---	---	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0060
FB-08	FB-08-2.5	Interior	Performance	Removed	Soil	2.5	21.2	12/21/2019	3.8	5.0	5.5	**14.3**	---	---	---	---	---	---	---	---	4.8	4.6	6.4	2.0	4.7	0.70	3.1	**6.5**
	FB-08-8	Interior	Performance	Removed	Soil	8.0	15.7	12/21/2019	0.013	< 0.0078	0.0089	0.022	---	---	---	---	---	---	---	---	0.015	0.013	0.017	< 0.0078	0.015	< 0.0078	0.011	0.020
	FB-08-13	Interior	Performance	Removed	Soil	13.0	10.7	12/21/2019	4.6	1.9	2.3	**8.8**	---	---	---	---	---	---	---	---	< 0.0082	< 0.0082	< 0.0082	< 0.0082	< 0.0082	< 0.0082	< 0.0082	< 0.0062
	FB-08-18	Interior	Confirmation	Removed	Soil	18.0	5.7	12/21/2019	0.12	0.040	0.040	0.20	---	---	---	---	---	---	---	---	< 0.0077	< 0.0077	< 0.0077	< 0.0077	< 0.0077	< 0.0077	< 0.0077	< 0.0058
	FB-08-30.5	Interior	Confirmation	In Place	Soil	30.5	-6.9	12/21/2019	< 0.0081	< 0.0081	< 0.0081	< 0.024	---	---	---	---	---	---	---	---	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0061
FB-09	FB-09-11	Interior	Confirmation	Removed	Soil	11.0	12.7	12/21/2019	< 0.015	< 0.015	< 0.015	< 0.045	---	---	---	---	---	---	---	---	0.018	< 0.015	0.021	< 0.015	< 0.015	< 0.015	< 0.015	0.023
	FB-09-33	Interior	Confirmation	In Place	Soil	33.0	-9.4	12/21/2019	< 0.0083	< 0.0083	< 0.0083	< 0.025	---	---	---	---	---	---	---	---	< 0.0083	< 0.0083	< 0.0083	< 0.0083	< 0.0083	< 0.0083	< 0.0083	< 0.0063
FMW-130	F-MW-130-20.0-072114	Interior	Confirmation	Removed	Soil	20.0	2.2	7/21/2014	0.38	0.016	0.028	0.424	0.014	< 0.0079	< 0.0079	< 0.0079	< 0.0079	< 0.0079	< 0.0079	< 0.0079	< 0.0079	< 0.0079	< 0.0079	< 0.0079	< 0.0079	< 0.0079	< 0.0079	< 0.0060
FMW-132	FMW-132-5.0-082418	Interior	Performance	Removed	Soil	5.0	20.7	8/24/2018	2.0	2.0	2.6	**6.6**	1.5	0.10	3.3	4.4	15	0.84	18	27	9.4	11	10	2.9	13	1.4	4.1	**12.5**
FMW-133	FMW-133-10.0-082418	Interior	Confirmation	Removed	Soil	10.0	15.3	8/24/2018	< 0.055	< 0.055	< 0.055	< 0.165	< 0.055	< 0.055	< 0.055	< 0.055	< 0.055	< 0.055	< 0.055	< 0.055	< 0.055	< 0.055	< 0.055	< 0.055	< 0.055	< 0.055	< 0.055	< 0.042
	FMW-133-20.0-082418	Interior	Confirmation	Removed	Soil	20.0	5.3	8/24/2018	0.25	0.035	0.042	0.33	0.021	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0060
FMW-134	FMW-134-15.0-082318	Interior	Confirmation	Removed	Soil	15.0	10.4	8/23/2018	0.14	0.012	0.028	0.18	0.014	< 0.0081	< 0.0081	< 0.0081	< 0.0081	0.016	0.021	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0061
FMW-135	FMW-135-15.0-082418	Interior	Confirmation	Removed	Soil	15.0	10.6	8/24/2018	0.029	< 0.022	< 0.022	0.029	0.039	< 0.022	< 0.022	< 0.022	0.042	< 0.022	0.068	0.073	< 0.022	< 0.022	< 0.022	< 0.022	< 0.022	< 0.022	< 0.022	< 0.017
	FMW-135-30.0-082418	Interior	Confirmation	Removed	Soil	30.0	-4.4	8/24/2018	0.12	0.012	< 0.0082	0.132	< 0.0082	< 0.0082	< 0.0082	< 0.0082	< 0.0082	< 0.0082	< 0.0082	< 0.0082	< 0.0082	< 0.0082	< 0.0082	< 0.0082	< 0.0082	< 0.0082	< 0.0082	< 0.0062
FMW-136	FMW-136-20.0-082218	Interior	Confirmation	Removed	Soil	20.0	5.1	8/22/2018	0.030	< 0.0084	< 0.0084	0.030	< 0.0084	< 0.0084	< 0.0084	< 0.0084	< 0.0084	< 0.0084	< 0.0084	< 0.0084	< 0.0084	< 0.0084	< 0.0084	< 0.0084	< 0.0084	< 0.0084	< 0.0084	< 0.0063
FMW-144	FWM-144-9.0	Interior	Performance	Removed	Soil	9.0	20.4	12/20/2019	< 0.014	< 0.014	< 0.014	< 0.042	---	---	---	---	---	---	---	---	0.085	0.033	0.088	0.025	0.032	< 0.014	0.081	**0.11**
FMW-145	FMW-145-13.0	Interior	Confirmation	Removed	Soil	13.0	9.9	12/20/2019	0.075	0.17	0.056	0.301	---	---	---	---	---	---	---	---	0.063	0.062	0.060	0.018	0.11	0.011	0.037	0.083
	FMW-145-18.0	Interior	Confirmation	Removed	Soil	18.0	4.9	12/20/2019	0.018	0.054	0.044	0.116	---	---	---	---	---	---	---	---	0.055	0.051	0.051	0.016	0.066	< 0.0096	0.035	0.071
	FMW-145-23.0	Interior	Confirmation	Removed	Soil	23.0	-0.1	12/20/2019	< 0.0079	< 0.0079	< 0.0079	< 0.0237	---	---	---	---	---	---	---	---	< 0.0079	< 0.0079	< 0.0079	< 0.0079	< 0.0079	< 0.0079	< 0.0079	< 0.0060
	FMW-145-28.0	Interior	Confirmation	Removed	Soil	28.0	-5.1	12/20/2019	< 0.0081	< 0.0081	< 0.0081	< 0.0243	---	---	---	---	---	---	---	---	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0061
	FMW-145-30.5	Interior	Confirmation	In Place	Soil	30.5	-7.6	12/20/2019	< 0.0076	< 0.0076	< 0.0076	< 0.0228	---	---	---	---	---	---	---	---	< 0.0076	< 0.0076	< 0.0076	< 0.0076	< 0.0076	< 0.0076	< 0.0076	< 0.0057
	FMW-145-33.0	Interior	Confirmation	In Place	Soil	33.0	-10.1	12/20/2019	< 0.0081	< 0.0081	< 0.0081	< 0.0243	---	---	---	---	---	---	---	---	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0061
FMW-146	FMW-146-13.0	Interior	Confirmation	Removed	Soil	13.0	10.2	12/21/2019	0.25	0.33	0.18	0.76	---	---	---	---	---	---	---	---	0.050	0.060	0.054	0.015	0.059	< 0.0091	0.031	0.067
	FMW-146-18.0	Interior	Confirmation	Removed	Soil	18.0	5.2	12/21/2019	0.20	0.13	0.12	0.45	---	---	---	---	---	---	---	---	0.031	0.034	0.031	0.0084	0.035	< 0.0082	0.018	0.041
FMW-147	FMW-147-8.5	Interior	Confirmation	Removed	Soil	8.5	14.3	12/21/2019	0.095	< 0.031	0.035	0.13	---	---	---	---	---	---	---	---	< 0.079 U1	0.054	0.042	< 0.031	0.048	< 0.031	< 0.031	0.054
	FMW-147-13.5	Interior	Confirmation	Removed	Soil	13.5	9.3	12/21/2019	0.10	< 0.0081	< 0.0081	0.10	---	---	---	---	---	---	---	---	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0061
	FMW-147-23.5	Interior	Confirmation	Removed	Soil	23.5	-0.7	12/21/2019	< 0.0081	< 0.0081	< 0.0081	< 0.0243	---	---	---	---	---	---	---	---	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0061
	FMW-147-30.5	Interior	Confirmation	In Place	Soil	30.5	-7.7	12/21/2019	< 0.0081	< 0.0081	< 0.0081	< 0.0243	---	---	---	---	---	---	---	---	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0061
FMW-148	FMW-148-27.0	Interior	Confirmation	Removed	Soil	27.0	10.4	12/22/2019	0.38	0.056	0.11	0.546	---	---	---	---	---	---	---	---	< 0.0084	< 0.0084	< 0.0084	< 0.0084	< 0.0084	< 0.0084	< 0.0084	< 0.0063
FMW-149	FMW-149-21.0	Interior	Confirmation	Removed	Soil	21.0	15.2	12/22/2019	< 0.0088	< 0.0088	< 0.0088	< 0.0264	---	---	---	---	---	---	---	---	< 0.0088	< 0.0088	< 0.0088	< 0.0088	< 0.0088	< 0.0088	< 0.0088	< 0.0066
	FMW-149-31.0	Interior	Confirmation	Removed	Soil	31.0	5.2	12/22/2019	0.044	0.010	0.013	0.067	---	---	---	---	---	---	---	---	< 0.0084	< 0.0084	< 0.0084	< 0.0084	< 0.0084	< 0.0084	< 0.0084	< 0.0063
	FMW-149-41.0	Interior	Confirmation	Removed	Soil	41.0	-4.8	12/22/2019	< 0.0070	< 0.0070	< 0.0070	< 0.021	---	---	---	---	---	---	---	---	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0053
	FMW-149-43.5	Interior	Confirmation	In Place	Soil	43.5	-7.3	12/22/2019	< 0.0075	< 0.0075	< 0.0075	< 0.0225	---	---	---	---	---	---	---	---	< 0.0075	< 0.0075	< 0.0075	< 0.0075	< 0.0075	< 0.0075	< 0.0075	< 0.0057
Screening Levels[6]												**5**	**4,800[7]**	**NE**	**24,000[7]**	**NE**	**3,200[7]**	**3,200[7]**	**NE**	**2,400[7]**								**0.1**

Table 2
Soil Analytical Results for PAHs
Block 38 West Property
Seattle, Washington
Farallon PN: 397-019

Sample Location	Sample Identification	General Location	Sample Type	Sample Location Disposition	Sample Composition	Sample Depth (feet)[1]	Sample Elevation (feet NAVD88)[1]	Sample Date	Analytical Results (milligrams per kilogram)[2]																
									Non-Carcinogenic PAHs													Carcinogenic PAHs				
									Naphthalene	1-Methylnaphthalene	2-Methylnaphthalene	Total Naphthalenes[4,5]	Acenaphthene	Acenaphthylene	Anthracene	Benzo(g,h,i)Perylene	Fluoranthene	Fluorene	Phenanthrene	Pyrene	Benzo(a)Pyrene	Benzo(a)Anthracene	Benzo(b)Fluoranthene	Benzo(j,k)Fluoranthene	Chrysene	Dibenzo(a,h)Anthracene	Indeno(1,2,3-cd)Pyrene	Total cPAHs TEC[4,5]
B2-B	B2-B-15.0	Interior	Confirmation	Removed	Soil	---	15.0	2/26/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.011
B3-B	B3-B-15	Interior	Confirmation	Removed	Soil	---	15.0	2/27/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.0096	< 0.0096	< 0.0096	< 0.0096	< 0.0096	< 0.0096	< 0.0096	< 0.0072
C2-B	C2-B-15.0	Interior	Confirmation	Removed	Soil	---	15.0	2/26/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.021	< 0.021	< 0.021	< 0.021	< 0.021	< 0.021	< 0.021	< 0.016
C3-B-20	C3-B-20	Interior	Performance	Removed	Soil	---	20.0	2/20/2020	0.46	0.12	0.16	0.74	---	---	---	---	---	---	---	---	0.25	0.32	0.29	0.090	0.27	0.029	0.14	**0.34**
C3-B	C3-B-15	Interior	Confirmation	Removed	Soil	---	15.0	2/27/2020	---	---	---	---	---	---	---	---	---	---	---	---	0.059	0.11	0.075	0.021	0.087	< 0.014	0.028	0.08
C4-ESW	C4-ESW-19.0	Sidewall	Confirmation	In Place	Soil	---	19.0	2/28/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.021	< 0.021	< 0.021	< 0.021	< 0.021	< 0.021	< 0.021	< 0.016
	C4-ESW-15	Sidewall	Confirmation	In Place	Soil	---	15.0	2/27/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.021	< 0.021	< 0.021	< 0.021	< 0.021	< 0.021	< 0.021	< 0.016
D2-B	D2-B-15.0	Interior	Confirmation	Removed	Soil	---	15.0	2/26/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.019	< 0.019	< 0.019	< 0.019	< 0.019	< 0.019	< 0.019	< 0.014
D3-B	D3-B-15	Interior	Confirmation	Removed	Soil	---	15.0	2/27/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.015
D4-ESW	D4-ESW-19.0	Sidewall	Confirmation	In Place	Soil	---	19.0	2/28/2020	0.30	0.17	0.22	0.69	---	---	---	---	---	---	---	---	< 0.022	0.032	< 0.022	< 0.022	0.028	< 0.022	< 0.022	0.019
	D4-ESW-15	Sidewall	Confirmation	In Place	Soil	---	15.0	2/27/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.019
E4-ESW	E4-ESW-15.0	Sidewall	Confirmation	In Place	Soil	---	15.0	2/26/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.015
F1-B	F1-B-10.0	Interior	Confirmation	Removed	Soil	---	10.0	2/29/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.0090	< 0.0090	< 0.0090	< 0.0090	< 0.0090	< 0.0090	< 0.0090	< 0.0068
F2-B	F2-B-15.0	Interior	Performance	Removed	Soil	---	15.0	2/26/2020	---	---	---	---	---	---	---	---	---	---	---	---	0.73	0.54	0.63	0.25	0.48	0.081	0.51	**0.94**
	F2-B-10.0	Interior	Confirmation	Removed	Soil	---	10.0	2/29/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0081	< 0.0061
F4-ESW	F4-ESW-15.0	Sidewall	Confirmation	In Place	Soil	---	15.0	2/26/2020	---	---	---	---	---	---	---	---	---	---	---	---	0.021	0.020	0.020	< 0.015	0.020	< 0.015	< 0.015	0.027
G1-B	G1-B-0.0	Interior	Confirmation	Removed	Soil	---	0.0	5/4/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.0076	< 0.0076	< 0.0076	< 0.0076	< 0.0076	< 0.0076	< 0.0076	< 0.0057
G2-B	G2-B-15.0	Interior	Confirmation	Removed	Soil	---	15.0	2/26/2020	---	---	---	---	---	---	---	---	---	---	---	---	0.060	0.092	0.061	0.023	0.074	< 0.016	0.030	0.082
G3-B	G3-B-15.0	Interior	Confirmation	Removed	Soil	---	15.0	2/26/2020	< 0.038	< 0.038	< 0.038	< 0.114	---	---	---	---	---	---	---	---	< 0.038	< 0.038	< 0.038	< 0.038	< 0.038	< 0.038	< 0.038	< 0.029
	G3-B-10.0	Interior	Confirmation	Removed	Soil	---	10.0	2/28/2020	0.058	0.051	0.13	0.239	---	---	---	---	---	---	---	---	< 0.0073	< 0.0073	< 0.0073	< 0.0073	< 0.0073	< 0.0073	< 0.0073	< 0.0055
G4-ESW	G4-ESW-15.0	Sidewall	Confirmation	In Place	Soil	---	15.0	2/26/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.011
H1-B	H1-B-20.0	Interior	Performance	Removed	Soil	---	20.0	2/4/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.010
	H1-B-15.0	Interior	Performance	Removed	Soil	---	15.0	2/27/2020	---	---	---	---	---	---	---	---	---	---	---	---	2.3	3.0	2.3	0.78	2.5	0.22	1.2	**3.1**
	H1-B-5.0	Interior	Confirmation	Removed	Soil	---	5.0	5/4/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.0079	0.019	< 0.0079	< 0.0079	0.022	< 0.0079	< 0.0079	0.008
H1-ESW	H1-ESW-20.0	Interior	Confirmation	Removed	Soil	---	20.0	2/22/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.019	< 0.019	< 0.019	< 0.019	< 0.019	< 0.019	< 0.019	< 0.014
	H1-ESW-15.0	Interior	Confirmation	Removed	Soil	---	15.0	2/27/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.008
H1-SSW	H1-SSW-20.0	Interior	Performance	Removed	Soil	---	20.0	2/22/2020	---	---	---	---	---	---	---	---	---	---	---	---	0.13	0.080	0.13	0.052	0.074	0.015	0.11	**0.17**
	H1-SSW-15.0	Interior	Confirmation	Removed	Soil	---	15.0	2/27/2020	---	---	---	---	---	---	---	---	---	---	---	---	0.011	0.054	0.020	< 0.0091	0.042	< 0.0091	< 0.0091	0.020
H1-WSW	H1-WSW-20.0	Sidewall	Confirmation	In Place	Soil	---	20.0	2/4/2020	---	---	---	---	---	---	---	---	---	---	---	---	0.020	0.017	0.018	< 0.0086	0.016	< 0.0086	0.011	0.026
H3-B	H3-B-20	Interior	Performance	Removed	Soil	---	20.0	2/20/2020	< 0.0079	< 0.0079	< 0.0079	< 0.0237	---	---	---	---	---	---	---	---	< 0.0079	< 0.0079	< 0.0079	< 0.0079	< 0.0079	< 0.0079	< 0.0079	< 0.0060
	H3-B-15.0	Interior	Performance	Removed	Soil	---	15.0	2/24/2020	0.29	0.22	0.34	0.85	---	---	---	---	---	---	---	---	0.11	0.15	0.11	0.036	0.13	< 0.018	0.056	**0.15**
	H3-B-10.0	Interior	Confirmation	Removed	Soil	---	10.0	2/28/2020	< 0.0077	< 0.0077	< 0.0077	< 0.0231	---	---	---	---	---	---	---	---	< 0.0077	< 0.0077	< 0.0077	< 0.0077	< 0.0077	< 0.0077	< 0.0077	< 0.0058
H4-B	H4-B-20.0	Interior	Performance	Removed	Soil	---	20.0	2/19/2020	0.26	0.041	0.070	0.371	---	---	---	---	---	---	---	---	1.1	1.3	1.1	0.46	1.1	0.11	0.60	**1.5**
	H4-B-15.0	Interior	Confirmation	Removed	Soil	---	15.0	2/19/2020	< 0.024	< 0.024	< 0.024	< 0.072	---	---	---	---	---	---	---	---	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.018
H4-ESW	H4-ESW-20.0	E Sidewall	Confirmation	In Place	Soil	---	20.0	2/4/2020	---	---	---	---	---	---	---	---	---	---	---	---	1.9	2.0	2.2	0.54	2.2	0.22	1.2	**2.5**
	H4-ESW-15.0	E Sidewall	Confirmation	In Place	Soil	---	15.0	2/26/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.011
H4-ESW2	H4-ESW2-20.0	E Sidewall	Confirmation	In Place	Soil	---	20.0	2/4/2020	---	---	---	---	---	---	---	---	---	---	---	---	1.9	1.9	1.9	0.58	2.0	0.16	1.1	**2.5**
H4-SSW	H4-SSW-15.0	Interior	Confirmation	Removed	Soil	---	15.0	2/27/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.013
I2-B	I2-B-10.0	Interior	Confirmation	Removed	Soil	---	10.0	2/28/2020	< 0.0074	< 0.0074	< 0.0074	< 0.0222	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
I3-B	I3-B-20.0	Interior	Performance	Removed	Soil	---	20.0	2/23/2020	7.8	1.9	3.8	**13.5**	---	---	---	---	---	---	---	---	8.3	8.9	8.1	2.4	8.3	0.84	4.4	**10.8**
	I3-B-15.0	Interior	Confirmation	Removed	Soil	---	15.0	2/23/2020	0.024	< 0.020	< 0.020	0.024	---	---	---	---	---	---	---	---	0.021	0.022	0.023	< 0.020	0.027	< 0.020	< 0.020	0.029
	I3-B-10.0	Interior	Confirmation	Removed	Soil	---	10.0	2/22/2020	< 0.0083	< 0.0083	< 0.0083	< 0.0249	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
I4-ESW	I4-ESW-20.0	E Sidewall	Confirmation	In Place	Soil	---	20.0	2/4/2020	---	---	---	---	---	---	---	---	---	---	---	---	27	27	28	8.3	28	2.6	16	**35.5**
	I4-ESW-15.0	E Sidewall	Confirmation	In Place	Soil	---	15.0	2/22/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.015
J2-B	J2-B-20.0	Interior	Confirmation	Removed	Soil	---	20.0	2/14/2020	< 0.0077	< 0.0077	0.0087	0.0087	---	---	---	---	---	---	---	---	< 0.0077	< 0.0077	< 0.0077	< 0.0077	< 0.0077	< 0.0077	< 0.0077	< 0.0058
	J2-B-15.0	Interior	Confirmation	Removed	Soil	---	15.0	2/26/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018	< 0.014
	J2-B-10.0	Interior	Confirmation	Removed	Soil	---	10.0	2/28/2020	0.15	0.076	0.15	0.376	---	---	---	---	---	---	---	---	0.0085	0.034	0.015	< 0.0081	0.023	< 0.0081	< 0.0081	0.015
J4-ESW	J4-ESW-20.0	E Sidewall	Confirmation	In Place	Soil	---	20.0	2/4/2020	---	---	---	---	---	---	---	---	---	---	---	---	13	14	14	4.4	15	1.3	7.1	**17.2**
	J4-ESW-15.0	E Sidewall	Confirmation	In Place	Soil	---	15.0	2/22/2020	---	---	---	---	---	---	---	---	---	---	---	---	0.039	0.033	0.035	< 0.021	0.036	< 0.021	0.023	0.051
Screening Levels[6]												**5**	**4,800[7]**	**NE**	**24,000[7]**	**NE**	**3,200[7]**	**3,200[7]**	**NE**	**2,400[7]**								**0.1**

Table 2
Soil Analytical Results for PAHs
Block 38 West Property
Seattle, Washington
Farallon PN: 397-019

Sample Location	Sample Identification	General Location	Sample Type	Sample Location Disposition	Sample Composition	Sample Depth (feet)[1]	Sample Elevation (feet NAVD88)[1]	Sample Date	Analytical Results (milligrams per kilogram)[2]																			
									Non-Carcinogenic PAHs														Carcinogenic PAHs							
									Naphthalene	1-Methylnaphthalene	2-Methylnaphthalene	Total Naphthalenes[4,5]	Acenaphthene	Acenaphthylene	Anthracene	Benzo(g,h,i)Perylene	Fluoranthene	Fluorene	Phenanthrene	Pyrene	Benzo(a)Pyrene	Benzo(a)Anthracene	Benzo(b)Fluoranthene	Benzo(j,k)Fluoranthene	Chrysene	Dibenzo(a,h)Anthracene	Indeno(1,2,3-cd)Pyrene	Total cPAHs TEC[4,5]
K2-B	K2-B-20.0	Interior	Performance	Removed	Soil	---	20.0	2/6/2020	4.0	4.6	5.6	**14.2**	---	---	---	---	---	---	---	---	12	11	12	3.4	10	0.96	6.7	**15.5**
	K2-B-15.0	Interior	Confirmation	Removed	Soil	---	15.0	2/24/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.015
	K2-B-0.0	Interior	Confirmation	Removed	Soil	---	0.0	5/4/2020	< 0.0082	< 0.0082	< 0.0082	< 0.0246	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
K3-B	K3-B-20.0	Interior	Performance	Removed	Soil		20.0	2/13/2020	22	14	15	**51**	---	---	---	---	---	---	---	---	78	86	74	23	72	7.8	43	**102**
	K3-B-15.0	Interior	Confirmation	Removed	Soil	---	15.0	2/24/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.014	< 0.011
	K3-B-10.0	Interior	Confirmation	Removed	Soil	---	10.0	2/28/2020	< 0.0086	< 0.0086	< 0.0086	< 0.0258	---	---	---	---	---	---	---	---	< 0.0086	< 0.0086	< 0.0086	< 0.0086	< 0.0086	< 0.0086	< 0.0086	< 0.0065
K4-B	K4-B-15.0	Interior	Confirmation	Removed	Soil	---	15.0	2/26/2020	1.2	0.33	0.59	2.12	---	---	---	---	---	---	---	---	< 0.0089	< 0.0089	< 0.0089	< 0.0089	< 0.0089	< 0.0089	< 0.0089	< 0.0067
	K4-B-10.0	Interior	Confirmation	Removed	Soil	---	10.0	2/26/2020	0.72	0.30	0.55	1.57	---	---	---	---	---	---	---	---	0.035	0.055	0.037	< 0.018	0.052	< 0.018	0.018	0.048
K4-ESW	K4-ESW-20.0	E Sidewall	Confirmation	In Place	Soil	---	20.0	2/4/2020	0.46	0.45	0.49	1.4	---	---	---	---	---	---	---	---	2.4	1.9	2.3	0.68	1.9	0.23	1.4	**3.1**
	K4-ESW-15.0	E Sidewall	Confirmation	In Place	Soil	---	15.0	2/22/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.033	< 0.033	< 0.033	< 0.033	< 0.033	< 0.033	< 0.033	< 0.025
L1-WSW	L1-WSW-20.0	Sidewall	Confirmation	In Place	Soil	---	20.0	2/3/2020	0.087	0.071	0.079	0.237	---	---	---	---	---	---	---	---	0.076	0.073	0.10	0.030	0.077	0.011	0.054	0.10
L2-B	L2-B-20.0	Interior	Performance	Removed	Soil	---	20.0	2/6/2020	0.41	< 0.21	< 0.21	0.41	---	---	---	---	---	---	---	---	3.0	2.9	3.3	1.1	2.4	0.42	1.8	**4.0**
	L2-B-10.0	Interior	Confirmation	Removed	Soil	---	10.0	2/28/2020	< 0.0089	< 0.0089	< 0.0089	< 0.0267	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	L2-B-0.0	Interior	Confirmation	Removed	Soil	---	0.0	5/4/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.0071	< 0.0071	< 0.0071	< 0.0071	< 0.0071	< 0.0071	< 0.0071	< 0.0054
L3-B	L3-B-10.0	Interior	Confirmation	Removed	Soil	---	10.0	2/26/2020	< 0.018	< 0.018	< 0.018	< 0.054	---	---	---	---	---	---	---	---	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018	< 0.014
L4-ESW	L4-ESW-15.0	E Sidewall	Confirmation	In Place	Soil	---	15.0	2/22/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.034	< 0.034	< 0.034	< 0.034	< 0.034	< 0.034	< 0.034	< 0.026
L4-SSW	L4-SSW-10.0	Interior	Confirmation	Removed	Soil	---	10.0	2/28/2020	0.028	< 0.0081	0.010	0.038	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
M1-B	M1-B-0.0	Interior	Confirmation	Removed	Soil	---	0.0	5/4/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.0086	< 0.0086	< 0.0086	< 0.0086	< 0.0086	< 0.0086	< 0.0086	< 0.0065
M1-ESW	M1-ESW-10.0	Interior	Confirmation	Removed	Soil	---	10.0	2/26/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.008
M1-WSW	M1-WSW-20.0	Sidewall	Confirmation	In Place	Soil	---	20.0	2/3/2020	0.25	1.2	1.4	2.85	---	---	---	---	---	---	---	---	0.40	0.30	0.38	0.11	0.34	0.041	0.27	**0.51**
M1-WSW2	M1-WSW2-20.0	Sidewall	Confirmation	In Place	Soil	---	20.0	2/3/2020	0.015	0.022	0.018	0.055	---	---	---	---	---	---	---	---	0.028	0.022	0.039	0.012	0.031	< 0.0081	0.023	0.038
M2-B	M2-B-20.0	Interior	Performance	Removed	Soil	---	20.0	2/6/2020	---	---	---	---	---	---	---	---	---	---	---	---	0.14	0.14	0.11	< 0.077	0.13	< 0.077	< 0.077	**0.18**
	M2-B-0.0	Interior	Confirmation	Removed	Soil	---	0.0	4/30/2020	---	---	---	---	---	---	---	---	---	---	---	---	0.015	0.074	0.029	0.0085	0.046	< 0.0078	< 0.0078	0.027
M4-ESW	M4-ESW-20.0	E Sidewall	Confirmation	In Place	Soil	---	20.0	2/6/2020	---	---	---	---	---	---	---	---	---	---	---	---	0.012	0.010	0.016	< 0.0081	0.015	< 0.0081	0.0089	0.016
N1-NSW	N1-NSW-22.0	Sidewall	Confirmation	In Place	Soil	---	22.0	1/31/2020	0.013	< 0.0081	< 0.0081	0.013	---	---	---	---	---	---	---	---	0.070	0.062	0.075	0.022	0.066	< 0.0081	0.043	0.091
N1-WSW	N1-WSW-20.0	Interior	Confirmation	Removed	Soil	---	20.0	2/3/2020	0.094	0.20	0.38	0.674	---	---	---	---	---	---	---	---	< 0.079	< 0.079	< 0.079	< 0.079	< 0.079	< 0.079	< 0.079	< 0.060
N2-B	N2-B-20.0	Interior	Performance	Removed	Soil	---	20.0	2/6/2020	---	---	---	---	---	---	---	---	---	---	---	---	0.15 H	0.13 H	0.13 H	0.052 H	0.13 H	0.013 H	0.084 H	**0.19**
	N2-B-15.0	Interior	Confirmation	Removed	Soil	---	15.0	2/23/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.019	< 0.019	< 0.019	< 0.019	< 0.019	< 0.019	< 0.019	< 0.014
	N2-B-10.0	Interior	Confirmation	Removed	Soil	---	10.0	2/23/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.0083	< 0.0083	< 0.0083	< 0.0083	< 0.0083	< 0.0083	< 0.0083	< 0.0063
N2-NSW	N2-NSW-22.0	Sidewall	Confirmation	In Place	Soil	---	22.0	1/31/2020	0.014	< 0.0078	0.0091	0.0231	---	---	---	---	---	---	---	---	0.053	0.025	0.040	0.012	0.025	0.0090	0.074	0.069
N3-NSW	N3-NSW-22.0	Sidewall	Confirmation	In Place	Soil	---	22.0	1/31/2020	< 0.0079	< 0.0079	< 0.0079	< 0.0237	---	---	---	---	---	---	---	---	< 0.0079	< 0.0079	< 0.0079	< 0.0079	< 0.0079	< 0.0079	< 0.0079	< 0.0060
N3-NSW2	N3-NSW2-22.0	Sidewall	Confirmation	In Place	Soil	---	22.0	1/31/2020	0.0088	0.0094	0.017	0.0352	---	---	---	---	---	---	---	---	0.019	0.011	0.018	< 0.0080	0.012	< 0.0080	0.015	0.024
N4-NSW	N4-NSW-20.0	Sidewall	Confirmation	In Place	Soil	---	20.0	2/6/2020	---	---	---	---	---	---	---	---	---	---	---	---	0.034	0.024	0.039	0.011	0.027	< 0.0080	0.038	0.046
N4-ESW	N4-ESW-20.0	E Sidewall	Confirmation	In Place	Soil	---	20.0	2/6/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.0077	< 0.0077	< 0.0077	< 0.0077	< 0.0077	< 0.0077	< 0.0077	< 0.0058
TP-2	TP-2-10.0	Interior	Confirmation	Removed	Soil	---	10.0	2/13/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.0089	< 0.0089	< 0.0089	< 0.0089	< 0.0089	< 0.0089	< 0.0089	< 0.0067
TP-3	TP-3-20.0-121919	Interior	Confirmation	Removed	Soil	5.0	20.0	12/19/2019	< 0.0078	< 0.0078	< 0.0078	< 0.0234	< 0.0078	< 0.0078	< 0.0078	0.0087	0.026	< 0.0078	0.016	0.028	0.015	0.012	0.014	< 0.0078	0.012	< 0.0078	0.0089	0.019
	TP-3-15.0-121919	Interior	Confirmation	Removed	Soil	10.0	15.0	12/19/2019	< 0.041	< 0.041	< 0.041	< 0.123	< 0.041	< 0.041	< 0.041	< 0.041	< 0.041	< 0.041	< 0.041	< 0.041	< 0.041	< 0.041	< 0.041	< 0.041	< 0.041	< 0.041	< 0.041	< 0.031
TP-7	TP-7-4.0	Interior	Confirmation	Removed	Soil	4.0	19.5	12/23/2019	0.061	< 0.020	< 0.020	0.061	---	---	---	---	---	---	---	---	0.031	0.033	0.044	< 0.020	0.067	< 0.020	0.025	0.044
TP-10	TP-10-15.0	Interior	Confirmation	Removed	Soil	---	15.0	2/4/2020	< 0.035	< 0.035	< 0.035	< 0.105	---	---	---	---	---	---	---	---	< 0.035	< 0.035	< 0.035	< 0.035	< 0.035	< 0.035	< 0.035	< 0.026
	TP-10-10.0	Interior	Confirmation	Removed	Soil	---	10.0	2/4/2020	0.027	< 0.0081	< 0.0081	0.027	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP-11	TP-11-15.0	Interior	Performance	Removed	Soil	---	15.0	2/4/2020	0.35	0.32	0.32	0.99	---	---	---	---	---	---	---	---	1.5	1.5	1.3	0.51	1.4	0.15	0.79	**1.9**
	TP-11-10.0	Interior	Confirmation	Removed	Soil	---	10.0	2/4/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.0095	< 0.0095	< 0.0095	< 0.0095	< 0.0095	< 0.0095	< 0.0095	< 0.0072
TP-12	TP-12-20.0	Interior	Performance	Removed	Soil	---	20.0	2/7/2020	---	---	---	---	---	---	---	---	---	---	---	---	16	19	14	5.7	17	1.6	8.4	**21**
	TP-12-15.0	Interior	Performance	Removed	Soil	---	15.0	2/7/2020	---	---	---	---	---	---	---	---	---	---	---	---	0.083	0.084	0.075	0.023	0.078	< 0.014	0.043	**0.107**
TP-13	TP-13-20.0	Interior	Confirmation	Removed	Soil	---	20.0	2/7/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.0076	< 0.0076	< 0.0076	< 0.0076	< 0.0076	< 0.0076	< 0.0076	< 0.0057
	TP-13-15.0	Interior	Confirmation	Removed	Soil	---	15.0	2/7/2020	---	---	---	---	---	---	---	---	---	---	---	---	< 0.0093	< 0.0093	< 0.0093	< 0.0093	< 0.0093	< 0.0093	< 0.0093	< 0.0070
TP-16	TP-16-20.0	Interior	Confirmation	Removed	Soil	---	20.0	2/14/2020	---	---	---	---	---	---	---	---	---	---	---	---	0.023	0.029	0.029	< 0.017	0.029	< 0.017	< 0.017	0.032
Screening Levels[6]												**5**	**4,800[7]**	**NE**	**24,000[7]**	**NE**	**3,200[7]**	**3,200[7]**	**NE**	**2,400[7]**								**0.1**

Table 2
Soil Analytical Results for PAHs
Block 38 West Property
Seattle, Washington
Farallon PN: 397-019

Sample Location	Sample Identification	General Location	Sample Type	Sample Location Disposition	Sample Composition	Sample Depth (feet)[1]	Sample Elevation (feet NAVD88)[1]	Sample Date	Analytical Results (milligrams per kilogram)[2]															
									Non-Carcinogenic PAHs												Carcinogenic PAHs							
									Naphthalene	1-Methylnaphthalene	2-Methylnaphthalene	Total Naphthalenes[3,5]	Acenaphthene	Acenaphthylene	Anthracene	Benzo(g,h,i)Perylene	Fluoranthene	Fluorene	Phenanthrene	Pyrene	Benzo(a)Pyrene	Benzo(a)Anthracene	Benzo(b)Fluoranthene	Benzo(j,k)Fluoranthene	Chrysene	Dibenzo(a,h)Anthracene	Indeno(1,2,3-cd)Pyrene	Total cPAHs TEC[4,5]
Alley																												
PH-4	PH-4-4.5-012619	Alley	Confirmation	In Place	Soil	4.5	22.0	1/26/2019	---	---	---	---	---	---	---	---	---	---	---	0.11	0.079	0.10	0.035	0.086	0.013	0.078	**0.14**
PH-11A	PH-11A-4.0-011919	Alley	Confirmation	In Place	Soil	4.0	20.0	1/19/2019	---	---	---	---	---	---	---	---	---	---	---	0.30	0.25	0.31	0.081	0.26	0.031	0.20	**0.39**
PH-12	PH-12-4.0-011919	Alley	Confirmation	In Place	Soil	4.0	21.0	1/19/2019	---	---	---	---	---	---	---	---	---	---	---	120	110	100	31	110	9.9	63	**152**
PH-13	PH-13-3.0-011219	Alley	Confirmation	In Place	Soil	3.0	20.0	1/12/2019	---	---	---	---	---	---	---	---	---	---	---	< 0.0078	< 0.0078	< 0.0078	< 0.0078	< 0.0078	< 0.0078	< 0.0078	< 0.0059
TP-10-4	TP-10-4	Alley	Confirmation	In Place	Soil	4.0	20.5	5/5/2008	< 0.03	---	---	< 0.03	< 0.03	< 0.03	< 0.03	0.1	0.21	0.04	< 0.03	0.33	0.16	0.17	0.25	0.36	0.29	< 0.03	< 0.03	**0.24**
Block 38 East Property																												
EX-19-W5	EX-19-W5 (EL20)	W Sidewall	Confirmation	In Place	Soil	5.0	20.0	7/3/2008	0.07	---	---	0.07	0.42	0.11	0.98	2.0	2.9	0.30	2.3	3.6	1.7	0.97	1.3	0.55	0.88	0.50	0.78	**2.1**
EX-20-W1.5	EX-20-W1.5 (EL19.5)	W Sidewall	Confirmation	In Place	Soil	5.5	19.0	7/3/2008	0.13	---	---	0.13	0.63	0.12	1.5	3.0	4.4	0.42	4.2	5.5	0.75	1.2	2.1	0.75	1.2	0.76	1.2	**1.4**
EX-38	EX-38-EL23	W Sidewall	Confirmation	In Place	Soil	1.0	23.0	7/18/2008	< 0.05	---	---	< 0.05	< 0.05	0.14	1.7	2.9	6.3	0.43	1.7	7.8	2.9	2.7	1.6	1.7	1.4	1.0	1.1	**3.7**
EX-39	EX-39-EL23	W Sidewall	Confirmation	In Place	Soil	1.0	23.0	7/18/2008	< 0.05	---	---	< 0.05	0.13	< 0.05	0.27	0.39	0.51	0.13	0.27	0.0	0.32	0.73	0.23	0.31	0.21	< 0.01	0.18	**0.47**
EX-40	EX-40-EL22	W Sidewall	Confirmation	In Place	Soil	2.0	22.0	7/18/2008	6	---	---	**6**	0.61	7.2	40	12	43	4.9	53	53	19	17	17	20	9.4	1.4	5.7	**25**
EX-41	EX-41-EL22	W Sidewall	Confirmation	In Place	Soil	3.0	22.0	7/18/2008	0.56	---	---	0.56	0.16	0.49	1.4	1.7	4.1	0.31	3.3	4.7	2.3	2.9	1.3	1.1	2.1	0.62	0.69	**2.98**
P-4	P-4-3.5	W Sidewall	Confirmation	In Place	Soil/Wood	3.5	21.2	6/12/2002	0.52	0.21	0.36	1.09	0.39	0.39	0.60	1.1	2.4	0.39	3.4	3.5	1.6	1.1	1.1	1.0	1.4	0.34	0.95	**2.1**
	P-4-5.5	W Sidewall	Confirmation	In Place	Soil/Wood	5.5	19.2	6/12/2002	0.055	< 0.025	< 0.025	0.055	0.047	< 0.025	0.067	0.17	0.36	0.042	0.33	0.24	0.21	0.090	0.56	0.48	0.18	0.026	0.12	**0.34**
Screening Levels[6]												**5**	**4,800[7]**	**NE**	**24,000[7]**	**NE**	**3,200[7]**	**3,200[7]**	**NE**	**2,400[7]**								**0.1**

NOTES:

Results in **bold** denote concentrations exceeding applicable cleanup levels.
Samples highlighted in green denote samples in alley or alley perimeter.
— denotes sample not analyzed.
< denotes analyte not detected at or exceeding the reporting limit listed.

[1]Depth in feet below ground surface. Elevation in feet referenced to North American Vertical Datum of 1988 (NAVD88).
[2]Analyzed by U.S. Environmental Protection Agency Method 8270D/SIM or 8270E/SIM.
[3]Sum of naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene.
[4]Total cPAHs derived using the total toxicity equivalency method in Section 708(8) of Chapter 173-340 of the Washington Administrative Code.
[5]For concentrations reported at less than the laboratory reporting limit, half the reporting limit was used to calculate total. If all constituent concentrations are non-detect, calculated total is indicated non-detect.
[6]Washington State Model Toxics Control Act Cleanup Regulation (MTCA) Method A Soil Cleanup Levels for Unrestricted Land Uses, Table 740-1 of Section 900 of Chapter 173-340 of the Washington Administrative Code, as revised 2013, unless otherwise noted.
[7]Washington State Department of Ecology Cleanup Levels and Risk Calculations, under MTCA Standard Method B Formula Values for Soil (Unrestricted Land Use) - Direct Contact (Ingestion Only) and Leaching Pathway, https://fortress.wa.gov/ecy/clarc/Reporting/ChemicalQuery.aspx

Adapt Engineering = Adapt Engineering, Inc.
cPAHs = carcinogenic polycyclic aromatic hydrocarbons
Enviros = Enviros Group, Ltd.
Farallon = Farallon Consulting, L.L.C.
GeoEngineers = GeoEngineers, Inc.
H = sample analyzed outside of holding time
J = result is an estimate
ND = not detected and reporting limit is not available.
NE = not established
PAHs = polycyclic aromatic hydrocarbons
TEC = toxic equivalent concentration

Table 3
Soil Analytical Results for Metals
Block 38 West Property
Seattle, Washington
Farallon PN: 397-019

Sample Location	Sample Identification	General Location	Sample Type	Sample Location Disposition	Sample Depth (feet) [1]	Sample Elevation (feet NAVD88) [1]	Sample Date	Analytical Results (milligrams per kilogram)[2]							
								Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
Block 38 West Property															
FB-01	FB-01-15.0-082118	Interior	Confirmation	Removed	15.0	11.3	8/21/2018	< 16	110	< 0.81	60	< 8.1	< 0.40	< 16	< 1.6
FB-02	FB-02-10.0-082018	Interior	Confirmation	Removed	10.0	15.1	8/20/2018	< 12	190	< 1.2	36	24	1.2	< 12	< 2.5
FB-03	FB-03-10.0-082318	Interior	Confirmation	Removed	10.0	15.8	8/23/2018	< 13	230	< 0.65	100	8.9	< 0.32	< 13	< 1.3
	FB-03-35.0-082318	Interior	Confirmation	In Place	35.0	-9.2	8/23/2018	< 12	44	< 0.60	42	< 6.0	< 0.30	< 12	< 1.2
FB-04	FB-04-5.0-082118	Interior	Confirmation	Removed	5.0	17.0	8/21/2018	< 11	290	< 1.1	53	56	< 0.55	< 11	< 2.2
FB-05	FB-05-35.0-082218	Interior	Confirmation	In Place	35.0	-9.5	8/22/2018	< 12	58	< 0.62	38	< 6.2	< 0.31	< 12	< 1.2
FMW-133	FMW-133-10.0-082418	Interior	Confirmation	Removed	10.0	15.3	8/24/2018	< 17	200	< 1.7	29	18	< 0.83	< 17	< 3.3
	FMW-133-20.0-082418	Interior	Confirmation	Removed	20.0	5.3	8/24/2018	< 12	50	< 0.60	27	< 6.0	< 0.30	< 12	< 1.2
FMW-134	FMW-134-5.0-082318	Interior	Confirmation	Removed	5.0	20.4	8/23/2018	< 17	110	< 1.7	19	< 17	< 0.83	< 17	< 3.3
	FMW-134-15.0-082318	Interior	Confirmation	Removed	15.0	10.4	8/23/2018	< 12	48	< 0.61	42	< 6.1	< 0.30	< 12	< 1.2
FMW-135	FMW-135-5.0-082418	Interior	Confirmation	Removed	5.0	20.6	8/24/2018	< 12	120	< 0.61	48	16	< 0.31	< 12	< 1.2
	FMW-135-25.0-082418	Interior	Confirmation	Removed	25.0	0.6	8/24/2018	< 14	120	< 0.69	60	< 6.9	< 0.35	< 14	< 1.4
	FMW-135-30.0-082418	Interior	Confirmation	Removed	30.0	-4.4	8/24/2018	< 12	66	< 0.62	44	< 6.2	< 0.31	< 12	< 1.2
FMW-136	FMW-136-20.0-082218	Interior	Confirmation	Removed	20.0	5.1	8/22/2018	< 13	46	< 0.63	42	< 6.3	< 0.32	< 13	< 1.3
	FMW-136-30.0-082218	Interior	Confirmation	Removed	30.0	-4.9	8/22/2018	< 12	45	< 0.59	41	< 5.9	< 0.30	< 12	< 1.2
M1-WSW	M1-WSW-17.0	Sidewall	Confirmation	In Place	---	17.0	2/10/2020	---	---	---	---	18	---	---	---
N1-WSW	N1-WSW-17.0	Interior	Confirmation	Removed	---	17.0	2/10/2020	---	---	---	---	80	---	---	---
TP-7	TP-7-4.0	Interior	Confirmation	Removed	4.0	19.5	12/23/2019	---	---	---	---	33	---	---	---
Alley															
TP-10-4	TP-10-4	Alley	Confirmation	In Place	4.0	20.5	5/5/2008	---	---	**2.4**	---	**1,900**	---	---	---
Screening Levels[3]								**20**	**16,000[4]**	**2**	**2,000**	**250**	**2**	**400[4]**	**400[4]**
Block 38 East Property															
EX-19-W5	EX-19-W5 (EL20)	W Sidewall	Confirmation	In Place	5.0	20.0	7/3/2008	---	---	< 2.0	---	64	---	---	---
EX-20-W1.5	EX-20-W1.5 (EL19.5)	W Sidewall	Confirmation	In Place	5.5	19.5	7/3/2008	---	---	< 2.0	---	120	---	---	---
EX-39	EX-39-EL23	W Sidewall	Confirmation	In Place	1.0	23.0	7/18/2008	---	---	< 2.0	---	86	---	---	---
EX-40	EX-40-EL22	W Sidewall	Confirmation	In Place	2.0	22.0	7/18/2008	---	---	< 2.0	---	**1,800**	---	---	---
EX-41	EX-41-EL22	W Sidewall	Confirmation	In Place	3.0	22.0	7/18/2008	---	---	< 2.0	---	**1,200**	---	---	---
P-4	P-4-3.5	W Sidewall	Confirmation	In Place	3.5	21.2	6/12/2002	---	---	**2.1**	---	**1,500**	---	---	---
	P-4-5.5	W Sidewall	Confirmation	In Place	5.5	19.2	6/12/2002	---	---	< 1.5	---	200	---	---	---
W-3	W-3	W Sidewall	Confirmation	In Place	10.0	10.5	10/11/1993	---	---	---	---	18	---	---	---
W-4	W-4	W Sidewall	Confirmation	In Place	11.0	9.5	10/11/1993	---	---	---	---	2.4	---	---	---
Screening Levels[3]								**20**	**16,000[4]**	**2**	**2,000**	**250**	**2**	**400[4]**	**400[4]**

NOTES:

Results in **bold** denote concentrations exceeding applicable cleanup levels.

Samples highlighted in green denote samples in alley or alley perimeter.

< denotes analyte not detected at or exceeding the laboratory reporting limit listed.

— denotes sample not analyzed.

[1]Depth in feet below ground surface. Elevation in feet referenced to North American Vertical Datum of 1988 (NAVD88).

[2]Analyzed by U.S. Environmental Protection Agency Methods 6010D/6020B/7471B.

[3]Washington State Model Toxics Control Act Cleanup Regulation (MTCA) Method A Soil Cleanup Levels for Unrestricted Land Uses, Table 740-1 of Section 900 of Chapter 173-340 of the Washington Administrative Code, as amended 2013, unless otherwise noted.

[4]Washington State Department of Ecology Cleanup Levels and Risk Calculations, under MTCA Standard Method B Formula Values for Soil (Unrestricted Land Use) - Direct Contact (Ingestion Only) and Leaching Pathway, https://fortress.wa.gov/ecy/clarc/Reporting/ChemicalQuery.aspx

ATTACHMENT A
SAMPLING AND ANALYSIS PLAN

SUPPLEMENTAL SUBSURFACE INVESTIGATION
AND FOUNDATION ELEMENTS
Block 38 West Property
500 through 536 Westlake Avenue North
Seattle Washington

Farallon PN: 397-019

FARALLON CONSULTING

Washington
Issaquah | Bellingham | Seattle
Oregon
Portland | Baker City
California
Oakland | Folsom | Irvine

SAMPLING AND ANALYSIS PLAN
ALLEY SUPPLEMENTAL SUBSURFACE INVESTIGATION

BLOCK 38 WEST PROPERTY
500 THROUGH 536 WESTLAKE AVENUE NORTH
SEATTLE, WASHINGTON

Submitted by:
Farallon Consulting, L.L.C.
975 5th Avenue Northwest
Issaquah, Washington 98027

Farallon PN: 397-019
AGREED ORDER NO. DE 17963

For:
City Investors IX LLC
505 5th Avenue South
Seattle, Washington 98104

June 15, 2020

Prepared by:

Yusuf Pehlivan, L.G.
Project Geologist

Reviewed by:

Clifford T. Schmitt, L.G., L.H.G.
Principal Hydrogeologist

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APPENDICES

1.0 INTRODUCTION

Farallon Consulting, L.L.C. (Farallon) has prepared this Sampling and Analysis Plan (SAP) for City Investors IX L.L.C. (City Investors IX) to present specific methodologies for the collection, handling, and analysis of samples that will be conducted during the supplemental subsurface investigation in the east-adjacent alley at the Block 38 West Site. The Block 38 West Site is generally located at 500 through 536 Westlake Avenue North in Seattle, Washington (Block 38 West Property) (Figure 1). This SAP has been prepared in accordance with the Washington State Model Toxics Control Act Cleanup Regulation (MTCA) as established in Section 820 of Chapter 173-340 of the Washington Administrative Code (WAC 173-340-820) and *Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies* revised December 2016, prepared by the Washington State Department of Ecology (Ecology) (2004).

The purpose of the SAP is to define the specific requirements for sample collection and analytical activities to ensure that activities are conducted in accordance with technically acceptable protocols and that the results meet the data quality objectives. The SAP presents the protocols pertaining to sampling equipment and procedures and sample handling and analysis that will be used for the supplemental subsurface investigation in the alley. Sampling objectives, sample locations, and measurement frequencies also are described. The SAP provides a basis for conducting field activities and a mechanism for complying with quality assurance requirements.

1.1 PURPOSES

The specific purposes of this SAP are to:

- Describe the scope of work for the alley supplemental subsurface investigation associated with the independent remedial action being performed under the auspices of Agreed Order No. DE 17963 (AO) between Ecology and City Investors IX;

- Identify sample locations and media, sample quantities, analytical methods, and documentation protocols for the sampling program;

- Describe standard operating procedures (SOPs) for installation of monitoring wells, well development, and field sampling of soil; and

- Provide quality assurance (QA) and quality control (QC) protocols for field activities and laboratory analysis to ensure collection of representative and useable data.

2.0 PROJECT DESCRIPTION

This section provides a summary of the scope of work and Farallon's project organization and schedule.

2.1 SCOPE OF WORK

The rationale for the advancement of borings in the alley is to evaluate the vertical and lateral extent of petroleum hydrocarbons-, carcinogenic polycyclic aromatic hydrocarbons (cPAHs)- and/or metals-impacted soil in the alley and the scope of work was discussed during communications between City Investors IX, Farallon, and Ecology, which included a site meeting conducted on March 12, 2020; email correspondence dated March 31, May 5, and May 15, 2019; and a conference call on May 20, 2020. The planned locations for the installation of up to seven borings are shown on Figure 1. Table 1 lists the sampling locations and provides the scope of work and rationale for each sampling location.

The scope of work for the alley supplemental subsurface investigation includes:

- Conducting public and private utility locates to clear proposed boring locations and provide additional information pertaining to the location of subsurface utilities in work areas;
- Using an air knife to confirm drilling locations are clear of underground utilities to a depth of approximately 5 feet below ground surface (bgs);
- Advancement of up to seven borings to depths of 15 feet bgs, corresponding to an elevation of approximately 10 feet North American Vertical Datum of 1988 (NAVD88) using a limited-access direct-push drill rig;
- Collection and retention of soil samples from elevations of 20, 15, and 10 feet NAVD88 for laboratory analysis; and
- Abandonment of completed borings using bentonite chips and concrete to match the surrounding grade.

Table 2 shows the constituents of potential concern identified for the Block 38 West Property and Block 38 East Property based on historical data compared to the most stringent MTCA screening levels. Analytical results from the independent remedial action will be compiled with historical data from the Block 38 West Site. These data will be used to evaluate for the presence of constituents of concern and potential concern and transport pathways for the Block 38 West Site following completion of redevelopment activities.

2.2 PROJECT ORGANIZATION AND RESPONSIBILITIES

The project organization for conducting the scope of work described in the SAP, including identification of key personnel and their responsibilities, is presented below.

Regulatory Agency. Ecology is the lead regulatory agency for the Site. Ecology's Site manager for the Block 38 West Site is:

Ms. Tena Seeds, P.E.
Washington State Department of Ecology
Northwest Regional Office
3190 160th Avenue Southeast
Bellevue, Washington 98008
Telephone: (425) 649-7008
tena.seeds@ecy.wa.gov

Project Contact. Farallon has been contracted by City Investors IX to plan and implement the SAP. The Project Contact for City Investors IX is:

Mr. Jim Broadlick
City Investors IX L.L.C.
505 5th Avenue South
Seattle, Washington 98104
Telephone: (206) 342-2000
JimBr@vulcan.com

Project Principal. The Project Principal provides support for all project activities and reviews data and deliverables prior to their submittal to the Project Contact or Regulatory Agency. The Project Principal is:

Clifford T. Schmitt, L.G., L.H.G.
Farallon Consulting, L.L.C.
975 5th Avenue Northwest
Issaquah, Washington 98027
Telephone: (425) 295-0800
cschmitt@farallonconsulting.com

Project Manager. The Project Manager has day-to-day responsibility for project implementation. The Project Manager will be responsible monitoring the quality of the technical and managerial aspects of the project, and implementing the SAP and corresponding corrective actions, if necessary. The Project Manager for Farallon is:

Ms. Suzy Stumpf, P.E.
Farallon Consulting, L.L.C.
1809 7th Avenue
Seattle, Washington 98101
Telephone: (425) 295-0800
sstumpf@farallonconsulting.com

Project Data Manager. The Project Data Manager manages data as it is received from the laboratory and is responsible for data validation. Data validation responsibilities include reviewing laboratory reports, advising on data corrective action procedures, and performing QA/QC on analytical data reports. In addition, the Project Data Manager will directly transfer laboratory data into an EQuIS environmental data management system database (EQuIS database) and the Ecology Environmental Information Management System. The Data Manager for Farallon is:

Ms. Jeanette Mullin
Farallon Consulting, L.L.C.
975 5th Avenue Northwest
Issaquah, Washington 98027
Telephone: (425) 295-0800
jmullin@farallonconsulting.com

Field Staff. Members of the field staff supervise contractor procedures, manage collection of samples, coordinate sample deliveries to the laboratory, and document field-sampling activities. Field staff also will communicate progress updates to the Project Manager, including deviations from the SAP.

Laboratory – OnSite Environmental, Inc. OnSite Environmental Inc. (On-Site) in Redmond, Washington will perform analytical services in support of the supplemental subsurface investigation and will be responsible for implementing specific QA/QC requirements.

2.3 PROJECT SCHEDULE

The alley supplemental subsurface investigation component of the independent remedial action is currently planned for July or August 2020 following Ecology's approval of the scope of work.

3.0 FIELD PROCEDURES

This section summarizes the protocols and procedures that will be followed for field data collection. Farallon SOPs for fieldwork, including detailed step-by-step protocols, are provided in Appendix A.

3.1 SOIL SAMPLING

Soil samples will be collected from discrete depth intervals during drilling of borings. Boring locations are shown on Figure 1. Locations may be adjusted as necessary based on access and utilities. Farallon will use the one-call and private utility location services to confirm the location of subsurface utilities in accordance with Farallon SOP GN-02 (Appendix A).

The borings will be drilled to depths of approximately 15 feet below ground surface, corresponding to an elevation of approximately 10 feet NAVD88 using a limited-access direct-push drill rig. Soil samples will be collected continuously using a polyvinyl chloride or acetate liner for lithologic description and potential laboratory analysis, depending on the sampling location and available soil data from proximate locations. Soil samples will be retained for laboratory analysis at elevations of 20, 15, and 10 feet NAVD88.

Soil samples will be collected from borings and handled in accordance with the requirements of Farallon SOP SL-01 (Appendix A); Section 4, Sample Handling; and Section 7, Field Documentation. Borings will be abandoned upon completion using bentonite chips and concrete to match the surrounding grade.

3.2 DECONTAMINATION PROCEDURES

Reusable equipment will be decontaminated in accordance with Farallon SOP EQ-01 (Appendix A).

4.0 SAMPLE HANDLING

This section discusses the sample designation, labeling, and sample-handling methods to be used during the supplemental subsurface investigation. The protocols discussed include sample containers, preservation and holding times, sample documentation, collection of QA/QC samples, and sample packaging and shipment.

4.1 SAMPLE DOCUMENTATION

Sample documentation includes sample labels, Field Report forms, Soil Sample Data Log forms, and Chain of Custody forms. Other sample documentation to be maintained by field personnel are provided in Appendix B.

Each sample container will be marked with a durable adhesive label and labeled with a unique identifier. The sample identifier for each sample will be constructed according to Section 4.2, Sample Designation, and recorded in the Field Report forms and on the sample Chain of Custody form (Appendix B). Sample labels will include the client name, project name and number, date and time sampled, sample identifier, sampler's initials, requested sample analysis, and analyte preservative(s), if any. The Chain of Custody form will include the sample identifier, date and time of sample collection, sampler's initials, number of containers, and requested sample analysis. Entries for all samples will be made on the Chain of Custody form prior to the transfer of the samples off the area of interest.

4.2 SAMPLE DESIGNATION

Sample designation and labeling procedures for soil and groundwater samples are presented below.

4.2.1 Soil Sample Identifiers

Soil samples will be assigned a unique sample identifier that will include the sample location (e.g., boring identification) and the depth of the sample stated in feet below ground surface. For example, a soil sample collected from boring FMW-147 at a depth of 5 feet bgs would be assigned the identifier FMW-147-5.0. The sample identifier will be recorded on the sample label, Field Report form, Soil Sample Data Log, and Chain of Custody form.

4.3 SAMPLE CONTAINERS, PRESERVATION PROCEDURES, AND HOLDING TIMES

Sample container requirements for soil sampling are based on the medium to be sampled and the type(s) of analysis to be performed. The containers, preservation procedures, and hold times for soil are shown in Table 3 and follow standard laboratory protocols.

4.4 FIELD QUALITY ASSURANCE/QUALITY CONTROL SAMPLES

Field duplicate samples will not be collected during the alley supplemental subsurface investigation scope of work because only soil samples will be collected. Soil sampling is subject to potentially wide ranges of variability due to the heterogeneity of the sample and the limited mass of soil sampled. Conversely, media such as groundwater are not as susceptible to the effects of heterogeneity and are more-reliable media for establishing measures of precision and/or accuracy.

4.5 SAMPLE PACKAGING AND SHIPMENT

The samples shipped for laboratory analysis will be packaged according to applicable regulations and the recommendations of the laboratory performing the analysis. Samples will be expeditiously transported to the analytical laboratory after being sealed in coolers.

The following procedures (representing the minimum shipping and handling requirements) will be used for sample packaging:

- A sample label will be affixed to the corresponding sample container at the time of sample collection.
- Bubble-wrap bags or an equivalent will be used to protect sample containers.
- Sample containers will be placed into a cooler and checked against the Chain of Custody form to ensure that all samples are listed and are placed into the correct cooler.
- One copy of the Chain of Custody form will be detached and retained by the Farallon Field Scientist.
- Remaining paperwork will be sealed in a resealable plastic bag and taped to the inside of the cooler lid.
- One to three resealable bags will be filled with ice and/or a chemical equivalent and included in the cooler. Ice will be double-bagged in heavy-duty bags.
- The cooler will be sealed with a chain-of-custody seal and taped shut using strapping tape.
- The laboratory address will be affixed to the cooler.
- Extraneous stickers will be removed from the cooler.
- The cooler will be examined to ensure that Farallon's return address is affixed.

Upon transfer of the samples to laboratory personnel or arrival of the samples at the laboratory facility, the laboratory will assume responsibility for custody of the samples. Laboratory personnel will document the status of shipping and handling containers and will adhere to standard chain-of-custody procedures to track each sample through all of the stages of laboratory processing.

5.0 LABORATORY ANALYSIS

This section describes the details of the laboratory analysis associated with soil and groundwater samples that will be collected during this independent remedial action. Laboratory analyses will be conducted by OnSite. OnSite is accredited by Ecology and meets the QA/QC requirements of Ecology and the U.S. Environmental Protection Agency (EPA).

5.1 LABORATORY ANALYSES

Soil samples may be analyzed for one or more of the following analytes, depending on the sample location:

- Benzene, toluene, ethylbenzene, and xylenes by EPA Methods 8021D and/or 8260D;
- Total petroleum hydrocarbons as gasoline-range organics by Northwest Method NWTPH-Gx;
- Total petroleum hydrocarbons as diesel-range and as oil-range organics by Northwest Method NWPTH-Dx;
- Carcinogenic polycyclic aromatic hydrocarbons and total naphthalenes (1-methyl-naphthalene, 2-methyl-naphthalene, and naphthalene) by EPA Method 8270D SIM, and
- MTCA metals by EPA Method 200.8.

Table 1 lists the analytes that will analyzed at each sampling location.

5.2 REPORTING LIMITS

The analytical methods identified above result in the reporting limits (or practical quantitation limits) that are shown on Table 4. The laboratory reporting limits are based on current laboratory data and may be modified during the investigation as methodology is refined. Instances may arise where high sample concentration, nonhomogeneity of samples, or matrix interferences preclude achieving the laboratory reporting limits.

6.0 MANAGEMENT OF INVESTIGATION-DERIVED WASTE

Investigation-derived waste soil, wastewater, and other products generated during the supplemental subsurface investigation will be managed with the existing waste profiles. Soil laboratory analysis is anticipated for investigation-derived waste to confirm it meets the current waste profiles, and soil generated will be managed under the existing soil waste profiles for the Block 38 West Property. Wastewater generated during the alley supplemental subsurface investigation will be processed by the existing construction dewatering treatment system and permitted discharge.

6.1 WASTE SOIL

Waste soil generated by the advancement of borings will be temporarily staged in drums or small roll-off bins and then loaded into trucks for transportation and off-site disposal. Waste soil generated will be managed under the existing soil waste profiles for the ongoing independent remedial action. Waste soil temporarily stored at the Block 38 West Site will be tracked using a Waste Inventory Tracking Sheet (Appendix B).

6.2 WASTEWATER

Wastewater generated by equipment decontamination (if applicable) will be processed through the construction dewatering system and treated and discharged under the existing construction general stormwater permit issued for the independent remedial action for the Block 38 West Property.

If unable to process wastewater through the construction dewatering system, wastewater will be placed into Department of Transportation–approved 55-gallon drums for storage at the Block 38 West Site. Wastewater generated will be tracked using a Waste Inventory Tracking Sheet. Wastewater generated may be disposed of under existing waste profiles at a selected facility for treatment and disposal.

6.3 DISPOSABLES

Disposable personal protective clothing (e.g., Tyvek suits, rubber gloves, boot covers) and disposable sampling devices (e.g., plastic soil sample plungers) will be cleaned, placed into plastic garbage bags, and disposed of as nonhazardous waste.

7.0 FIELD DOCUMENTATION

Documentation of field activities will be provided on Field Report forms, boring logs, Soil Sample Data Logs, sample and waste material labels, Waste Inventory forms, and Chain of Custody forms. Documentation generated during the field program will be retained in the project files and included in the reports generated, as appropriate. Filled forms and records will be maintained in the Farallon project files. Example forms and labels are provided in Appendix B.

7.1 FIELD REPORT FORM

Field personnel will be required to keep a daily field log on a Field Report form. Field notes will be as descriptive and inclusive as possible, enabling independent parties to reconstruct the sampling situation from the recorded information. Language will be objective, factual, and free of inappropriate or ambiguous terms and/or opinions.

A summary of each day's events will be provided on the Field Report form. At a minimum, field documentation will include the date, job number, project identification and location, weather conditions, sample collection data, personnel present and responsibilities, field equipment used, and any activities performed in a manner other than as specified in this SAP. In addition, if other forms or documents such as boring location surveys or maps are completed or used, they will be cited in and attached to the Field Report form. Field personnel will sign the completed Field Report form.

7.2 BORING LOGS

Boring logs will be prepared by a Farallon Scientist for each boring drilled. The log includes hydrologic conditions, lithologic descriptions using the Unified Soil Classification System, and information on the potential presence of contamination.

7.3 SOIL SAMPLE DATA LOG

A Soil Sample Data Log will be used to record information pertaining to soil samples collected. This log includes entries for the sample location, identification, and depth; the time sampled; field-screening results; the types and number of containers collected; and a brief lithologic description.

7.4 SAMPLE LABELS

Sample labels will be filled out and affixed to appropriate sample containers immediately prior to sample collection. The label will be filled out with indelible ink and includes the medium, date, time sampled, sample identifier (see Section 4.2, Sample Designation), project name, project number, sampler’s initials, and analyte preservative(s) if any.

7.5 WASTE MATERIAL LABELS

A waste material label is filled out and affixed to the appropriate waste container immediately upon filling. The label is filled out in indelible ink and includes the job number and name, address where the waste was generated, container contents, date, consultant's name and phone number, and sampler's initials.

7.6 WASTE INVENTORY FORM

A Waste Inventory form will be used to document and track the wastes generated during the characterization field work. The form will include information on the waste container, origin of the waste, type of waste, date generated, date removed from the Site, transporter, and disposal location. A copy of the Waste Inventory form is included in Appendix B.

7.7 CHAIN OF CUSTODY FORM

The Chain of Custody form provides an accurate written record that can be used to trace the possession and handling of the sample from the moment of its collection through analysis and reporting of analytical values. The Chain of Custody form should be updated whenever samples are collected, transferred, stored, analyzed, or destroyed. The Chain of Custody form includes the client name, project name and number, date and time sampled, sample identifier, sampler's initials, and requested sample analysis.

8.0 QUALITY ASSURANCE PROJECT PLAN

This section describes the analytical program to be conducted for each sample selected for chemical analysis, as well as the laboratory QA objectives and QC protocols required to be met to ensure collection of representative and useable data.

8.1 DATA QUALITY OBJECTIVES

Data quality objectives (DQOs) for this project will be used to develop and implement procedures to ensure that the data collected are of sufficient quality to adequately address the supplemental subsurface investigation objectives. Observations and measurements will be made and recorded in a manner so as to yield results representative of the media and conditions observed and/or measured. Goals for representativeness will be met by ensuring that sampling locations are selected properly, a sufficient number of samples are collected, and field screening and laboratory analyses are conducted properly.

DQOs for this project include:

- Collect and retain soil samples from up to seven borings for potential analysis to evaluate the vertical extent of impacted soil in the east-adjacent alley;
- Achieve a practical quantitation limit sufficient for direct comparison against MTCA screening levels; and;
- Implement QA/QC protocols described in this SAP so that data collected are scientifically defensible.

The quality of the field sampling methods and laboratory data will be assessed using the parameters of precision, accuracy, representativeness, comparability, completeness, and sensitivity (PARCCS). QC procedures for PARCCS are described in the following sections. Quantitative DQOs for applicable parameters (i.e., precision, accuracy, and completeness) are provided following their definition. Laboratory DQOs have been established by the analytical laboratories and are specified in the individual analytical laboratory Quality Assurance Manuals. The applicable analytical laboratory Quality Assurance Manual will be kept on file at the Farallon corporate office in Issaquah, Washington.

8.1.1 PRECISION

Precision is defined as the degree of agreement between or among independent, similar, or repeated measures, and is expressed in terms of analytical variability. For this project, analytical variability will be measured as the relative percent difference (RPD) or coefficient of variation between analytical laboratory duplicates, and between the matrix spike (MS) and matrix spike duplicate (MSD) analyses. Monitoring and sampling variability will be measured by analysis of blind field-replicate samples.

The tolerance limit for percent differences between laboratory duplicates will be ±20 percent; deviations from these criteria will be reported. If the criteria are not met, the laboratory will provide an explanation of why the limits were exceeded, and will implement appropriate corrective actions for laboratory control samples (LCSs)/LCS duplicates only. RPDs will be evaluated during data review and validation. If precision limit exceedances are linked to field sampling, those field sampling procedures will be reviewed, and any problems will be identified. Re-sampling and analysis may be required.

8.1.2 ACCURACY

Accuracy (bias) is a statistical measurement of correctness and includes components of random error (i.e., variability due to imprecision) and systematic error. It therefore reflects the total error associated with a measurement. A measurement is accurate when the value reported does not differ excessively from the known concentration of the spike or standard.

Accuracy measures the bias in a measurement system and is difficult to measure for the entire data collection activity. Sources of error include the sampling process, field contamination, preservative handling, sample matrix effects, and sample preparation and analysis techniques. To confirm that the samples collected are not contaminated, laboratory method blank samples will be analyzed.

Laboratory MSs and surrogates will be carried out at the analytical laboratory in accordance with EPA SW-846 requirements for organic chemical analyses. The frequency for both MSs and MSDs analysis will be one per batch of 20 or fewer samples. Quantitative percent recovery criteria for organic analyses will be based on laboratory-derived control limits for surrogate recovery and MS results.

The resultant percent recovery will be compared to the acceptance criteria defined in the SAP, and deviations from specified limits will be reported. If the objective criteria are not met, the laboratory will provide an explanation of why acceptability limits were exceeded, and will implement appropriate corrective actions. Percent recoveries will be reviewed during data validation, and deviations from the specified limits will be noted. The data reviewer will comment on the effect of the deviations on reported data.

8.1.3 REPRESENTATIVENESS

Representativeness is a qualitative assessment of how closely the measured results reflect the actual concentration or distribution of the constituent concentrations in the matrix sampled. The sampling plan design, sample collection techniques, sample handling protocols, sample analysis methods, and data review procedures have been developed to ensure that the results obtained are representative of site conditions. Representativeness also will be determined by evaluating holding times, sample preservation, and blank contamination. Samples with expired holding times, improper preservation, or blank contamination may not be representative.

8.1.4 COMPLETENESS

Completeness, defined as the number of acceptable data points relative to the total number of data points, will be assessed for all samples within a given media (i.e., soil). The QA/QC objective for completeness for all components of this project is 95 percent. Data that were qualified as estimated because the QA/QC criteria were not met will be considered valid for the purpose of assessing completeness. Data that have been qualified as estimated will be further reviewed for usability. For this investigation, the primary use of the data is to evaluate the vertical and lateral extent of petroleum-, cPAHs-, and/or metals-impacted soil in the alley. Data that were qualified as rejected will not be considered valid for the purpose of assessing completeness. If a sample medium has an unacceptable completeness percentage after comparison to the individual data quality objectives described above, original samples will be re-analyzed if sufficient sample volume is available, archived samples will be analyzed if appropriate, or additional samples will be collected during the remedial investigation.

8.1.5 COMPARABILITY

Comparability is a qualitative parameter expressing the confidence with which one dataset can be compared to another. In order to ensure results are comparable, samples will be analyzed using standard EPA or Ecology methods and protocols. Calibration and reference standards will be traceable to certified standards, and standard data reporting formats will be employed. Data will also be reviewed to verify that precision and accuracy criteria were achieved and, if not, that data were appropriately qualified.

8.2 DATA QUALITY CONTROL

Data will undergo two levels of QA/QC evaluation: one by the laboratory and one by Farallon. Initial data reduction, evaluation, and reporting will be performed by the laboratory, as specified in the laboratory Quality Assurance Manual. The analytical data will then be validated by Farallon under the supervision of the Project Data Manager. The following types of QC information will be reviewed, as appropriate:

- Method deviations;
- Sample extraction and hold times;
- Method reporting limits;
- Blank samples (e.g., equipment rinsate, trip, and laboratory method);
- Field duplicate samples;
- RPD (for precision);
- MS/MSD samples (for accuracy);
- Surrogate recoveries; and
- Percent completeness.

Farallon will review field records and the results of field observations and measurements to ensure that procedures were properly performed and documented. Field procedures will be reviewed for the following elements:

- Completeness and legibility of field logs;
- Preparation and frequency of field QC samples;
- Field equipment calibration and maintenance; and
- Chain of Custody forms.

8.3 LABORATORY DATA PACKAGE REQUIREMENTS

Laboratory data packages will consist of a laboratory report and electronic data deliverable. Laboratory reports will include the following elements:

- Case narrative;
- Analytical notes;
- QC narrative;
- Sample inventory report;
- Analytical results; and
- Data qualifiers and abbreviations.

The electronic data deliverable will include at a minimum:

- Sample identification information;
- Sample media;
- Sampling, laboratory receiving, extraction, and analysis dates;
- Analyte and Chemical Abstracts Service Reference No.;
- Reported concentrations and reporting units;
- Analytical method detection limits;
- Machine reporting limits and reporting units; and
- QA/QC results, including identification of MS/MSD and surrogate samples.

8.4 CORRECTIVE ACTION

Corrective action will be the joint responsibility of the Project Manager and the Project Data Manager. Corrective procedures may include:

- Identifying the source of deviation from the quality standards set forth in the SAP and its supporting documents;

- Re-analyzing soil and/or groundwater samples if hold-time criteria permit;
- Re-sampling and analyzing soil and/or groundwater if necessary to meet the quality standards set forth in this SAP;
- Evaluating and amending sampling, analytical, and/or data transfer procedures; and/or
- Qualifying data to indicate the level of uncertainty.

During field operations and sampling procedures, field team members will be responsible for identifying and correcting equipment malfunctions and documenting sampling procedures in a manner that will enable the Project Manager or the Project Data Manager to evaluate whether corrective action is warranted.

Equipment malfunctions, variances in sampling protocols, and corrective actions taken by field team members will be documented in the field notes. The Project Manager or the Project Data Manager will evaluate the field notes upon submittal to determine whether the corrective action taken was adequate to meet project quality standards or whether additional corrective action is required.

8.5 DATA MANAGEMENT

The final repository for sample analytical information will be an EQuIS database. The electronic data deliverables received from the laboratories will be directly transferred into the EQuIS database, reducing the likelihood of data entry errors. The Project Data Manager will manage and maintain the EQuIS database.

Farallon will directly transfer the analytical data provided by the laboratory into the Ecology Environmental Information Management System, thus eliminating the likelihood of data entry errors inherent with manual data entry.

Field measurements and other data requiring manual entry will be reviewed by Farallon personnel other than the data entry staff prior to submission to the Environmental Information Management System. Ecology's confirmation of receipt of the data will be maintained in Farallon project files.

8.6 DATA VALIDATION

Farallon will conduct a Level I Compliance Screening on all the analytical data.

All chemical data will be reviewed with regard to the following:

- Chain-of-custody/documentation;
- Sample preservation and holding times;
- Method blanks;
- Reporting limits;

- Surrogate recoveries;
- MS/MSD recoveries;
- LCS recoveries; and
- Laboratory and field duplicate RPDs.

Data validation will be based on the QA/QC criteria as recommended in the methods identified in this SAP and in the *National Functional Guidelines for Organic and/or Inorganic Methods Data Review* (EPA 2017a, 2017b).

Data usability, conformance with the QA/QC objectives, and any deviations that may have affected the quality of the data, as well as the basis of application of qualifiers, will be included in the final reporting of the data. Any required corrective actions based on the evaluation of the analytical data will be determined by the laboratory in consultation with the Farallon Project Manager and may include qualification or rejection of the data.

9.0 REFERENCES

U.S. Environmental Protection Agency (EPA). 2017a. *National Functional Guidelines for Organic Superfund Methods Data Review.* EPA Administrative Record EPA-540-R-2017-002. January.

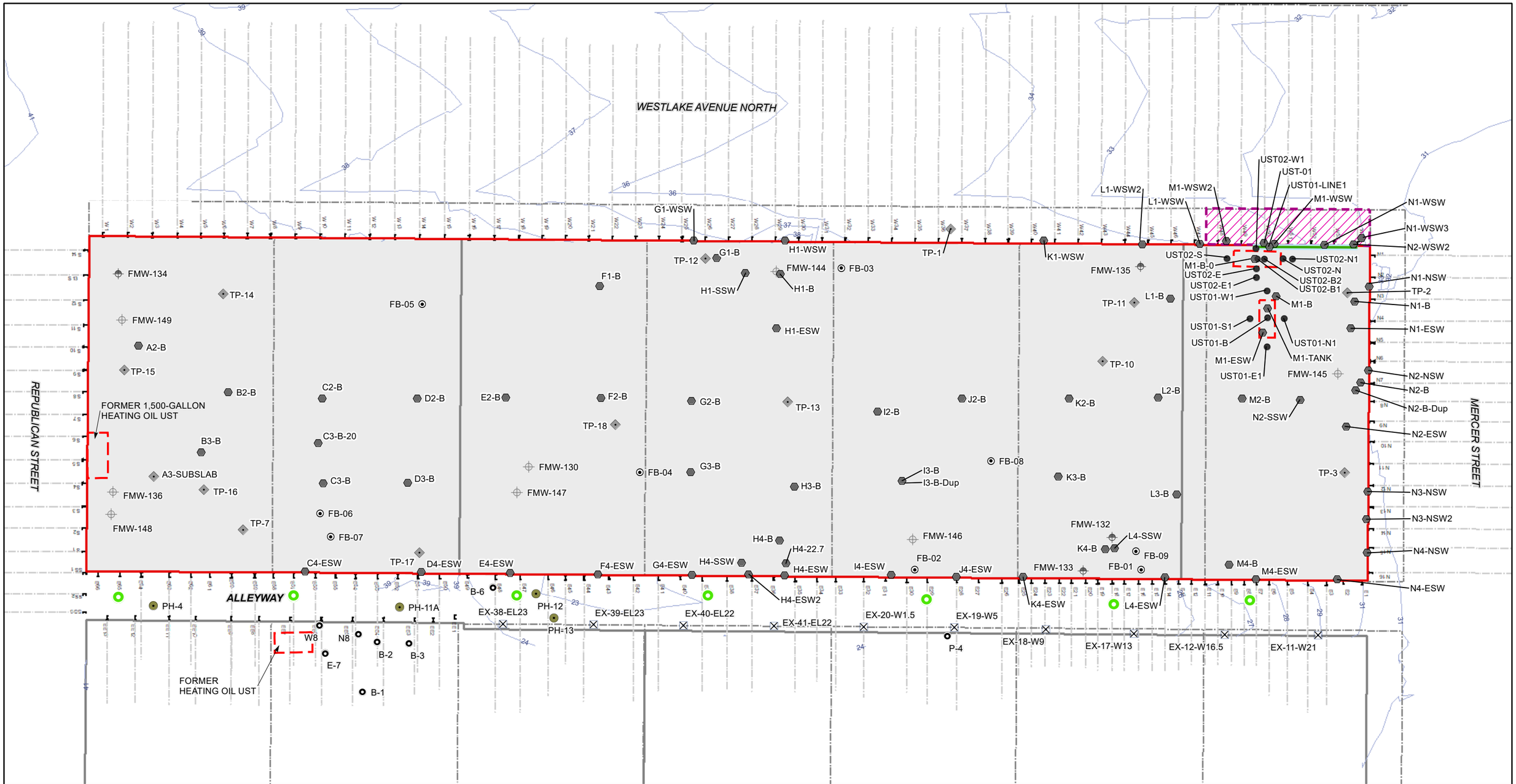
———. 2017b. *National Functional Guidelines for Organic Superfund Methods Data Review.* EPA Administrative Record EPA-540-R-2017-001. January.

Washington Department of Ecology (Ecology). 2004. *Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies*. Publication No. 04-03-030. Revised December 2016. July.

FIGURE

SAMPLING AND ANALYSIS PLAN
Alley Supplemental Subsurface Investigation
Block 38 West Property
500 through 536 Westlake Avenue North
Seattle, Washington

Farallon PN: 397-019



LEGEND

- PROPOSED BORING LOCATION
- DECOMMISSIONED SHALLOW WATER-BEARING ZONE MONITORING WELL
- DECOMMISSIONED INTERMEDIATE WATER-BEARING ZONE MONITORING WELL
- BORING (FARALLON)
- BORING
- EXCAVATION BORING
- POTHOLE
- UST SAMPLE LOCATION (FARALLON)
- EXCAVATION SAMPLE LOCATION (FARALLON)
- TEST PIT (FARALLON)
- PIPING DISCOVERED IN SIDEWALL WITH SIGNS OF LEAKING PRODUCT AND IMPACTED SOIL BELIEVED TO BE ASSOCIATED WITH DISCOVERED USTS.
- FORMER UNDERGROUND STORAGE TANKS (USTs)
- MECHANICAL EQUIPMENT AREA DECOMMISSIONED AND FILLED WITH CDF
- KING COUNTY PARCELS
- LOT LINE
- PILE
- TIEBACK

0 30
SCALE IN FEET

CDF = CONTROLLED DENSITY FILL
ELEVATION DATA PRESENTED IN FEET ABOVE MSL
IN THE NORTH AMERICAN VERTICAL DATUM OF 1988
ELEVATION SOURCE: BUSH, ROED, & HITCHINGS, INC. (2014)

NOTES:
1. ALL LOCATIONS ARE APPROXIMATE.
2. FIGURES WERE PRODUCED IN COLOR. GRAYSCALE COPIES MAY NOT REPRODUCE ALL ORIGINAL INFORMATION.

FARALLON CONSULTING
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Washington
Issaquah | Bellingham | Seattle

Oregon
Portland | Baker City

California
Oakland | Folsom | Irvine

FIGURE 1

PROPOSED BORING LOCATIONS BLOCK 38 WEST PROPERTY AND EAST-ADJACENT PROPERTY SEATTLE, WASHINGTON

FARALLON PN: 397-019

Drawn By: tperrin | Checked By: SS | Date: 6/15/2020 | Disc Reference: Q:\Projects\397 VULCAN\019_Block38\Mapfiles\017D_AlleySITMIA_Soil\Figure-10_ProposedBL38WSite_AlleyTM.mxd

TABLES

SAMPLING AND ANALYSIS PLAN
Alley Supplemental Subsurface Investigation
Block 38 West Property
500 through 536 Westlake Avenue North
Seattle, Washington

Farallon PN: 397-019

Table 1
Scope of Work and Rationale
Block 38 West Property
Seattle, Washington
Farallon PN: 397-019

Location	Rationale	Scope	Analytes and Methods
Seven Locations in the Alley	Evaluation of the vertical extent of impated soil in the east-adjacent alley to the Block 38 West Property.	1) Advance seven borings to a depth of 15 feet bgs, corresponding to an elevation of 10 feet NAVD88. 2) Collect soil samples at elevations of 20, 15, and 10 feet NAVD88. 3) Abandon borings with bentonite chips and concrete to match surrounding grade.	1) GRO by NWTPH-Dx; 2) Benzene, toluene, ethylbenzene, and xylenes by EPA 8260D; 3) DRO and ORO by NWTPH-Dx; 4) cPAHs and total naphthalenes (1-methylnaphthalene, 2-methylnaphthalene, and naphthalene) by EPA 8270D SIM; and 5) MTCA metals by EPA Method 200.8.

NOTES:
bgs = below ground surface
cPAHs = carcinogenic polycyclic aromatic hydrcarbons
DRO = total petroleum hydrocarbons (TPH) as diesel-range organics
EPA = U.S. Environmental Protection Agency
GRO =TPH as gasoline-range organics
NAVD88 = North American Vertical Datum of 1988
MTCA = Washington State Model Toxics Control Act Cleanup Regulation
ORO = TPH as oil-range organics
RCRA = Resource Conservation and Recovery Act
SIM = Selective Ion Mode

Table 2
Summary of MTCA Screening Levels
Block 38 West Property
Seattle, Washington
Farallon PN: 397-019

Parameter	Soil Screening Levels[1] (milligrams per kilogram)	Groundwater Screening Level[2] (micrograms per liter)
Total Petroleum Hydrocarbons		
Gasoline-range organics	30/100[3]	800/1,000[4]
Diesel-range organics	2,000[5]	500[5]
Oil-range organics		
Volatile Organic Compounds		
Benzene	0.03	5.0
Polycyclic Aromatic Hydrocarbons		
Naphthalene	5.0[6]	160[6]
1-Methylnaphthalene		
2-Methylnaphthalene		
Benzo(a)Pyrene	0.1[7]	0.1[7]
Benzo(a)Anthracene		
Benzo(b)Fluoranthene		
Benzo(j,k)Fluoranthene		
Chrysene		
Dibenzo(a,h)Anthracene		
Indeno(1,2,3-cd)Pyrene		

Table 2
Summary of MTCA Screening Levels
Block 38 West Property
Seattle, Washington
Farallon PN: 397-019

Parameter	Soil Screening Levels[1] (milligrams per kilogram)	Groundwater Screening Level[2] (micrograms per liter)
Metals		
Arsenic	20	5.0
Cadmium	2.0	5.0
Chromium	2,000	50
Lead	250	15
Mercury	2.0	2.0

NOTES:

[1]Washington State Model Toxics Control Act Cleanup Regulation (MTCA) Method A Soil Cleanup Levels for Unrestricted Land Uses, Table 740-1 of Section 900 of Chapter 173-340 of the Washington Administrative Code, as revised 2013.

[2]Washington State Model Toxics Control Act Cleanup Regulation Method A Cleanup Levels for Groundwater, Table 720-1 of Section 900 of Chapter 173-340 of the Washington Administrative Code, as amended 2013.

[3]Screening level is 30 milligrams per kilogram if benzene is detected and 100 milligrams per kilogram if benzene is not detected.

[4]Screening level is 800 micrograms per liter if benzene is detected and 1,000 micrograms per liter if benzene is not detected.

[5]Screening level based on the sum of diesel-range organics and oil-range organics.

[6]Screening level based on sum of naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene.

[7]Screening level based on total carcinogenic polycyclic aromatic hydrocarbons derived using the total toxicity equivalency method in Section 708(8) of Chapter 173-340 of the Washington Administrative Code.

Table 3
Sample Containers, Preservatives, and Hold Times
Block 38 West Property
Seattle, Washington
Farallon PN: 397-019

Parameter	Analytical Method	Container Size and Type	Holding Time	Sample Preservation Technique
Soil				
Gasoline-range organics	NWTPH-Gx	(1) 40-ml glass pre-weighed VOA vial without a stir bar (5 gram soil sample)	48 hours to freeze; 14 days to analyze	Cool to 4°C ±2°C in field; freeze ≤ 0°C in laboratory
Diesel-range organics	NWTPH-Dx	(1) 4-oz CWM Jar	14 days to extract, 40 days to analyze after extraction	Cool to 4°C ±2°C
Oil-range organics				
Benzene	EPA 8260D	(2) 40-ml glass pre-weighed VOA vial with stir bar (5 gram soil sample), and (1) 40-ml glass pre-weighed VOA vial without a stir bar (5 gram soil sample)	48 hours to freeze; 14 days to analyze	Cool to 4°C ±2°C in field; freeze ≤ 0°C in laboratory
Naphthalene	EPA 8270E-SIM	(1) 4-oz CWM Jar	14 days to extract, 40 days to analyze after extraction	Cool to 4°C ±2°C
1-Methylnaphthalene				
2-Methylnaphthalene				
Benzo(a)Pyrene				
Benzo(a)Anthracene				
Benzo(b)Fluoranthene				
Benzo(j,k)Fluoranthene				
Chrysene				
Dibenzo(a,h)Anthracene				
Indeno(1,2,3-cd)Pyrene				
Arsenic	EPA 6010D	(1) 4-oz CWM Jar	6 months to analyze	Cool to 4°C ±2°C
Cadmium				
Chromium				
Lead				
Mercury	EPA 7471B	(1) 4-oz CWM Jar	28 days to analyze	Cool to 4°C ±2°C

Table 3
Sample Containers, Preservatives, and Hold Times
Block 38 West Property
Seattle, Washington
Farallon PN: 397-019

Parameter	Analytical Method	Container Size and Type	Holding Time	Sample Preservation Technique
Groundwater				
Gasoline-range Organics	NWTPH-Gx	(3) 40-ml glass VOA vials with Teflon septum	14 days to analyze	Preserve with HCl to pH <2; Cool to 4°C ±2°C
Diesel-range Organics	NWTPH-Dx	(2) 500-ml amber	14 days to extract, 40 days to analyze after extraction	Preserve with HCl to pH <2; Cool to 4°C ±2°C
Oil-range Organics				
Benzene	EPA 8260D	(3) 40-ml glass VOA vials with Teflon septum	14 days to analyze	Preserve with HCl to pH <2; Cool to 4°C ±2°C
Naphthalene	EPA 8270E-SIM	(2) 1-liter amber	7 days to extract, 40 days to analyze after extraction	Cool to 4°C ±2°C
1-Methylnaphthalene				
2-Methylnaphthalene				
Benzo(a)Pyrene				
Benzo(a)Anthracene				
Benzo(b)Fluoranthene				
Benzo(j,k)Fluoranthene				
Chrysene				
Dibenzo(a,h)Anthracene				
Indeno(1,2,3-cd)Pyrene				
Arsenic	EPA200.8	(1) 500-ml high density polyethylene container	6 months to analyze	Preserve with HNO_3 to pH <2; Cool to 4°C ±2°C
Cadmium				
Chromium				
Lead				
Mercury	EPA 7470A	(1) 500-ml high density polyethylene container	28 days to analyze	Preserve with HNO3 to pH <2; Cool to 4°C ±2°C

NOTES:
°C = degrees Celsius
CWM = clear wide-mouth
EPA = U.S. Environmental Protection Agency
HCl = hydrochloric acid
HNO_3 = nitric acid
ml = milliliter
oz = ounce

Table 4
Soil and Groundwater Laboratory Reporting Limits
Block 38 West Property
Seattle, Washington
Farallon PN: 397-019

Parameter	Analytical Method	Soil PQL[1] (mg/kg)	Groundwater PQL (µg/l)
Total Petroleum Hydrocarbons			
Gasoline-range Organics	NWTPH-Gx	5.0	100
Diesel-range Organics	NWTPH-Dx	25	250
Oil-range Organics	NWTPH-Dx	50	400
Volatile Organic Compounds			
Benzene	EPA 8260D	0.001	0.20
Polycyclic Aromatic Hydrocarbons			
Naphthalene	EPA 8270E-SIM	0.0067	0.10
1-Methylnaphthalene	EPA 8270E-SIM	0.0067	0.10
2-Methylnaphthalene	EPA 8270E-SIM	0.0067	0.10
Benzo(a)Pyrene	EPA 8270E-SIM	0.0067	0.010
Benzo(a)Anthracene	EPA 8270E-SIM	0.0067	0.010
Benzo(b)Fluoranthene	EPA 8270E-SIM	0.0067	0.010
Benzo(j,k)Fluoranthene	EPA 8270E-SIM	0.0067	0.010
Chrysene	EPA 8270E-SIM	0.0067	0.010
Dibenzo(a,h)Anthracene	EPA 8270E-SIM	0.0067	0.010
Indeno(1,2,3-cd)Pyrene	EPA 8270E-SIM	0.0067	0.010
Metals			
Arsenic	EPA 6010D/200.8	10	5.0
Cadmium	EPA 6010D/200.8	0.50	4.4
Chromium	EPA 6010D/200.8	0.50	11
Lead	EPA 6010D/200.8	5.0	1.1
Mercury	EPA 7471B/7470A	0.25	0.50

NOTES:

[1] The MRL for project samples will vary with moisture content of the samples.

EPA = U.S. Environmental Protection Agency
mg/kg = milligrams per kilogram
µg/l = micrograms per liter
PQL = practical quantitation limit

APPENDIX A
FARALLON STANDARD OPERATING PROCEDURES

SAMPLING AND ANALYSIS PLAN
Supplemental Subsurface Investigation
Block 38 West Property
500 through 536 Westlake Avenue North
Seattle, Washington

Farallon PN: 397-019

STANDARD OPERATING PROCEDURE EQ-01
EQUIPMENT DECONTAMINATION PROCEDURES

PURPOSE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to provide field personnel with the methodology for decontaminating sampling equipment during various field activities. The step-by-step guidelines provided in this SOP are to be followed by the field crew during all site visits, as applicable.

EQUIPMENT AND SUPPLIES/REAGENTS

The following equipment is necessary to properly decontaminate field equipment during various field tasks:

- Rinse water or distilled water.
- Deionized water.
- Liquinox or other phosphate-free detergent.
- Paper towels.
- Labeled squirt bottles.
- Long-handled hard-bristle brushes (for sediment and soil).
- Cotton swabs.
- Plastic sheeting, garbage bags, and aluminum foil (for sediment and soil).
- Core liner caps or plastic wrap and rubber bands (for sediment and soil).
- Extension arm for cleaning core liners (for sediment and soil).
- Plastic 5-gallon bucket.
- U.S. Department of Transportation-approved drum(s) for decontamination water unless other water-handling arrangements have been made. Separate drums are needed for liquid and solid wastes (see Farallon SOP WM-01, Field-Handling of Investigation-Derived Waste). Liquid wastes should not be added to drums containing solid wastes.

Dilute Liquinox with distilled water in a squirt bottle in accordance with the instructions on the Liquinox package, and label the bottle. Fill another squirt bottle with distilled water, and label the bottle.

FIELD EQUIPMENT TO BE DECONTAMINATED AFTER USE

Decontaminate the following field equipment at the conclusion of field work each day, in accordance with the procedures outlined in this SOP:

- Water-level meter.
- Horiba/YSI multiparameter probe.
- Bladder pump.
- Submersible pump.
- Sediment and soil collection and processing equipment.

WATER-LEVEL METER DECONTAMINATION

Decontaminate the water-level meter after measuring the water level at a monitoring well before moving to a new monitoring well, using the following procedures:

- Spray the bottom half of a paper towel with the diluted Liquinox solution, and the upper half with deionized water.
- Grip the measuring tape of the water-level meter with the paper towel in one hand with the Liquinox side down toward the monitoring well casing.
- Begin slowly reeling up the water-level meter while maintaining firm contact between the measuring tape and the paper towel.
- Ensure that no debris or contamination remains on the measuring tape of the water-level meter once it has been reeled up.
- Use a clean new paper towel for each successive decontamination of the measuring tape of the water-level meter.

HORIBA/YSI MULTIPARAMETER PROBE DECONTAMINATION

Decontaminate the Horiba/YSI multiparameter probe at the end of each workday or after sampling a monitoring well with high concentrations of contamination, using the following procedures:

- Remove the multiparameter probe from the flow-through cell, and thoroughly spray each component with deionized water.
- Use a cotton swab to gently clean around each sensor probe, ensuring that all contaminated water and material has been washed away.
- Refill the protective dissolved oxygen and pH probe caps with deionized water, and replace prior to storage.
- Once the multiparameter probe has been adequately cleaned, replace the protective shield, and return the probe to the case. If the device appears to be overly wet, allow it to air-dry with the case open.

- Do not use Liquinox to clean any probes on the Horiba multiparameter probe, as it may damage the device.

BLADDER PUMP DECONTAMINATION

Decontaminate the bladder pump after sampling a well and at the end of each workday, using the following procedures:

- After extracting the bladder pump from the well, break down the pump, remove and dispose of the used bladder, and spray each component with the diluted Liquinox solution, followed by deionized water.
- Wipe away any visible contamination or debris with a paper towel.
- Capture cleaning water in a liquid waste drum for proper disposal in accordance with Farallon SOP WM-01, Field-Handling of Investigation-Derived Waste.
- Ensure that all contamination and Liquinox solution is washed off all components before reassembling the device, installing a new bladder, and moving to sample a new well.

SUBMERSIBLE PUMP DECONTAMINATION

Decontaminate the submersible pump after purging water from any well, using the following procedures:

- After extracting the submersible pump from the well, thoroughly spray down the pump with the diluted Liquinox solution, followed by deionized water.
- Wipe away any visible contamination or debris with a paper towel.
- Purge clean water through the pump and tubing to ensure that contaminated water has been cleared from all lines.
- Capture cleaning water in a liquid waste drum for proper disposal in accordance with Farallon SOP WM-01, Field-Handling of Investigation-Derived Waste.

SEDIMENT AND SOIL SAMPLING AND PROCESSING EQUIPMENT DECONTAMINATION

Decontaminate sampling equipment used to collect and process sediment and soil samples, using the following procedures:

- Place contaminated equipment and decontamination tools on plastic sheeting.
- Thoroughly rinse all used equipment with distilled water in a 5-gallon bucket to remove excess sediment or soil.
- Pour one capful of Liquinox solution into a 5-gallon bucket filled with tap water or distilled water.
- Using a long-handled hard-bristle brush, thoroughly scrub the equipment with the Liquinox solution until no sediment or soil particles remain.

- Holding the equipment over a 5-gallon bucket, double-rinse the equipment with distilled water until no Liquinox solution remains. Do not allow clean equipment to come into contact with a contaminated surface.
- Drain the equipment and place it in a clean, dry place to prevent recontamination.
- If decontaminated equipment will not be re-used immediately, wrap stainless steel equipment (e.g., bowls, spoons) in aluminum foil with the dull side facing the equipment. Seal polycarbonate core liners with core caps or cellophane plastic. Rubber-band ends to ensure a proper seal.
- After decontamination has been completed, place disposable items into a garbage bag, and store decontamination water in a drum in accordance with Farallon SOP WM-01, Field-Handling of Investigation-Derived Waste.

STANDARD OPERATING PROCEDURE (SOP) GN-02

UTILITY LOCATE

PURPOSE

The purpose of this SOP is to provide Farallon Consulting, L.L.C. (Farallon) personnel with the specific information needed to identify and locate utilities on sites where drilling or excavation activities will occur. Excavation is defined by Section 20 of Chapter 19.122 of the Revised Code of Washington (RCW 19.122.020) as "any operation, including the installation of signs, in which earth, rock, or other material on or below the ground is moved or otherwise displaced by any means." For the purposes of this SOP, the excavation area refers to the area of an excavation or a perimeter around all proposed borings, test pits, soil gas sampling locations, and subslab soil gas sampling locations. Identifying utilities within the boundaries of a proposed excavation area prior to any digging is required by law and is necessary for the safety of Farallon personnel and contractors.

The guidelines provided in this SOP are to be followed by Farallon personnel who coordinate utility locating, mark locate boundaries, and/or observe field work that involves any type of excavation.

EQUIPMENT AND SUPPLIES

The following equipment and supplies are necessary to arrange and conduct utility locating:

- A map of the site with the proposed excavation area(s);
- Readable side sewer card figures, if applicable;
- Geographic information system (GIS) utility figures, if applicable;
- Readable American Land Title Association (ALTA) survey figures, if applicable;
- Any previous utility figures associated with the site;
- White marking products (e.g., paint, flags, stakes, grease marking pen, tape, chalk);
- Materials necessary to provide required documentation (e.g., Field Report form, camera, measuring wheel, global positioning system); and
- Personal protective equipment (PPE) as described in the site-specific Health and Safety Plan, or Level D PPE at a minimum.

PROCEDURES

The following utility locating procedures have been developed for use before excavation occurs on a site. The procedures are divided into the following five parts:

- Call Before You Dig System;
- Private Utility Locating Services;
- Hand-Clearing Proposed Excavation Areas;
- Maintaining Public Utility Locate Marks; and
- Utility Line Damage.

The Project Manager should discuss the scope of work, details of the project location, and any essential information with the project field team before any of the procedures described below commence. When practicable, an on-site kickoff meeting involving a member of the field team and the Project Manager should be conducted to discuss the work to be performed, mark the boundaries of the excavation area, and mark potential boring locations, if applicable.

Call Before You Dig System

According to RCW 19.122.030, excavators are required to mark the boundary of a proposed excavation area using white marking products. Marking products include paint, flags, and stakes. Boundary marks should conform to the following guidelines:

- A continuous line, hashed line, dots, or corner marks with arrows are acceptable ways to mark the boundary.
- Flags and stakes can be used if paint is not adequate.

The location(s) of the proposed excavation area(s) must be reviewed to verify that no visible utilities that would interfere with the proposed excavation area(s) are present. If utilities are present, the Project Manager and field personnel should communicate the changes to the excavation that are area necessary before the boundaries are marked with white paint.

After marking the boundaries of the proposed excavation area, Farallon personnel must provide notice of the scheduled excavation to the owner/operators of buried utilities at least 2 but no more than 10 business days in advance by calling 811 or 1-800-424-5555, or using the online tool at www.callbeforeyoudig.org. Use of the online tool is preferred.

A map with the excavation area boundaries depicted and/or photos of the white paint marks is helpful in conveying the scope of work to the Call Before You Dig service.

The following information should be available to provide the Call Before You Dig service at the time of initial contact:

- Scope of work, including the start date and time.
- Contact information for the Project Manager and a field person able to answer questions from public utility locators regarding project details.

- Site address, township/range/section quarter, and name of property owner.

Once the Call Before You Dig system has been notified of the upcoming work, the system provides a ticket number, which

- Should be referenced whenever the Call Before You Dig service is contacted about the job.
- Provides proof that the Call Before You Dig system was notified prior to excavation. Public utility locators, inspectors, and law enforcement personnel may ask for the ticket number.
- Should be supplied to any subcontractors doing work on the site for reference when contacting the system for their own ticket number.

Call Before You Dig personnel will provide a list of public utilities present on the site, and will notify public utility operators of the planned work.

Public utility operators have 2 full business days after the day notification was received to locate and mark their lines, or to provide reasonable information on lines that they are not able to locate. The day notice is given is not included as 1 of these 2 days. Therefore, if excavation work is planned to start on a Monday, for example, the Call Before You Dig system must be notified by Wednesday the week before.

Two full business days must elapse between Call Before You Dig notification and the start of excavation. No excavation is to take place until all known utilities are marked or otherwise accounted for with information provided by the facility operator.

Locators mark their lines with colored hash marks. The American Public Works Association determines the colors to be used to denote different kinds of lines:

Red: Power Lines and Cable	Yellow: Gas, Oil, Petroleum
Orange: Telephone and Cable	Blue: Drinking Water
Green: Sewer (Storm and Sanitary)	Purple: Non-Potable Water
Pink: Survey Marks	White: Excavator Marks

Public utility operators are required to mark their lines only to the meter. Utility lines located beyond the meter are the responsibility of the property owner. Public utility operators should indicate by marking if no public utilities are present.

Public utility locators are required to mark their lines with reasonable accuracy. According to RCW 19.122.020, “reasonable accuracy means location within twenty-four inches of the outside dimensions of both sides of an underground facility.”

At this time, public utility companies are not required to mark abandoned or deactivated lines in Washington.

An individual not following the protocols established by the Call Before You Dig system can be held liable for up to three times the cost to repair a utility line damaged during excavation.

Records of ticket numbers and communications with the Call Before You Dig service should be stored in the project folder and supplied to on-site project personnel.

Before any excavation work is started, Farallon personnel should verify that all public utility marks are present on the site. The public utility company/ies listed on the Call Before You Dig system ticket should be contacted if marks for that utility/ies are not present.

Private Utility Locating Services

After the public utility companies have marked their lines and before excavation begins, it is standard practice to have a private utility locating service clear areas that will be excavated.

Private locates generally are scheduled for the day before or the morning of the start of excavation.

Areas where excavation will occur must be cleared for conductible utilities by a private locator. Depending on the nature of the site and the proximity of utility lines, the private locator may also mark non-conductible utilities.

If possible, the excavation contractor should be on the site during the private utility locating to verify with the private locator that all proposed excavation areas are accessible.

When working with private utility locators, Farallon personnel should:

- Study existing figures of the site, noting the locations of known utilities.
- Use available side sewer cards or geographic information system utility figures to verify utility locations at the site.
- Verify that all public utilities have been marked by physically verifying that colored paint marks are present for all of the public utility companies listed on the One Call Before You Dig ticket. If any public utilities have not been marked, the utility company must be contacted and requested to mark the area, or to provide confirmation that the area is clear of their utility.
- Discuss the scope of work/excavation areas with the private locator.
- Document the name of the locating company and the name of the locator.
- Observe the locator clear the excavation area(s).
- Document the locate marks with photos, and note any uncertainties in the Field Report form.
- Identify the locations of shut-off valves for utilities such as water and natural gas.
- Contact the Project Manager or Principal to discuss relocating the excavation area if a proposed excavation area is in conflict with a utility identified by the private locator.
- Sign the locator's paperwork, if necessary, and depart the site if no additional field work is to be performed that day.

Private location of conductible utilities should sweep the excavation area in two perpendicular directions.

Private location of non-conductible utilities (typically storm and sanitary sewer) can use either a probe or a camera for accessible lines. Appropriately colored paint marks are applied by the private locator based on a signal sent from the probe or camera. For inaccessible lines, a ground-penetrating radar or magnetometer can be used to approximate the line locations. Marks based on this method should be considered approximate.

Hand-Clearing Excavation Areas

Prior to conducting certain excavation activities, excavators will clear the proposed excavation area to verify that no utilities are present. This can be accomplished through use of an air knife/vacuum truck, post-hole digging, hand-augering, or use of other hand tools that allow the excavation location be explored sufficiently to verify that no utilities are present. Farallon Project Managers will confirm the method of clearing and depths with the field team before the excavation work is performed. Farallon Project Managers also need to discuss shallow soil sampling needs with the field team if clearing activities are being performed. Clearing activities should be conducted according to the following guidelines:

- Hollow-Stem Auger Drilling: Hand-clear to a minimum depth of 5 feet below ground surface (bgs) using an air knife/vacuum truck whenever possible. Alternative methods such as post-hole digging or hand-augering also may be used.
- Sonic Drilling: Hand-clear to a minimum depth of 5 feet bgs using an air knife/vacuum truck whenever possible. Alternative methods such as post-hole digging or hand-augering also may be used.
- Geoprobe Drilling: Clearing activity requirements are dependent on known utilities and results of the public and private utility location procedures completed above. Hand-clear using a post-hole digger or hand-auger to a maximum depth of 5 feet bgs is necessary. An air knife/vacuum truck may be used to hand clear each boring location to a maximum depth of 5 feet bgs, if available.
- Test Pit Excavation: No hand-clearing is necessary. Excavation contractors should be directed to dig cautiously in the upper 5 feet bgs in the event an unknown utility is present. A test pit excavation or regular excavation using machinery (e.g., track hoe, backhoe) should include using a spotter to watch for unidentified utility lines. Ideally, the spotter should be provided by the excavation contractor.
- Rotary Hammer for Soil Gas Sampling: No hand-clearing is necessary.
- Rotary Hammer for Subslab Soil Gas Sampling: No-hand clearing is necessary.

Some drilling contractors require that a utility line be exposed prior to drilling if the proposed drilling location is within a certain distance of the utility line. Farallon personnel should confirm drilling contractor requirements prior to conducting drilling activities.

If a utility line is encountered during clearing, excavators should verify that the utility has not been damaged, and Farallon personnel should document the encounter on the Field Report form with photos and details. RCW 19.122.020 states that “damage” includes the substantial weakening of

structural or lateral support of an underground facility, penetration, impairment, or destruction of any underground protective coating, housing, or other protective device, or the severance, partial or complete, of any underground facility to the extent that the project owner of the affected facility operator determines that repairs are required. The Project Manager or Principal should be notified immediately if a utility line is encountered during hand-clearing, and an alternate location will be proposed. A hand-cleared area having an exposed utility line should be backfilled with a bentonite seal and finished to match existing grade.

Maintaining Public Utility Locate Marks

According to RCW 19.122.030, "public utility locate marks expire 45 days from the date the excavator provides notice," and "it is the responsibility of the excavator to maintain the public utility marks for 45 days, or for the length of the project–whichever is shortest. In any case, the public utility locate marks expire after 45 days."

Locate marks can be maintained digitally through both photos and figures drawn to scale.

Locate marks can be maintained in the field using white paint. White paint can be applied between original hash marks, on either side of the hash marks, or on both ends. Offset paint or staking can be used if placed a uniform distance from the original marks with a clear indication of the direction and distance from the original marks. The original marks should not be painted over, and white paint should never be applied over colored paint. White marks should include a letter identifying the type of buried line.

Utility Line Damage

A utility line does not need to be ruptured or severed to be considered damaged. Scratching or denting a utility line or its protective tape also is considered damage, as the integrity of the line may have damaged even if the damage does not appear to be significant. Before excavation work begins, shut-off valve locations for applicable utilities should be documented. If a utility is believed to be damaged, the utility should be shut down if practicable and safe to do so. According to RCW 19.122.053, "all facility operators and excavators who observe or cause damage to an underground facility must report the damage event to the Washington State Utilities and Transportation Commission."

If a utility line is hit and public safety is a concern, 911 should be the first call made after the immediate area has been evacuated. If a utility line is hit and the public is not at risk, the field team should notify the Project Manager, who will notify the Principal and the corporate Health and Safety Coordinator immediately. The Project Manager should then contact the utility that owns the damaged line, and report to the field team any instructions issued by the utility owner, and an expected timeframe for arrival of a utility owner representative at the site. Repairs to a utility line will not be attempted by Farallon personnel or contractors.

Damage must be reported through the Common Ground Alliance Damage Information Reporting Tool website, hosted by the Washington State Utilities and Transportation Commission: http://www.utc.wa.gov/publicSafety/pipelineSafety/Pages/Damagereportingrequirements.aspx

Access to damaged utility lines should be maintained to allow inspection by the utility company. An exposed utility should not be backfilled or patched until instruction to do so has been provided by the Project Manager or Principal.

DOCUMENTATION

Farallon personnel should document in the Field Report form the work performed and methods used by private utility locators, and photos from multiple angles with good reference points for each utility line in the excavation area(s).

REFERENCES

Washington Utilities Coordinating Council. 2014. *Guide to Safe Digging, Washington State Law and Industry Best Practices.*

STANDARD OPERATING PROCEDURE SL-01
SOIL CORE SAMPLING

PURPOSE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to provide field personnel with the methodology for collecting and documenting soil core samples using a hollow-stem-auger drill rig, a direct-push drill rig, and a sonic drill rig. All drilling operations will be conducted by a licensed drilling subcontractor in accordance with subcontractor SOPs. This SOP presents the procedures that will be performed by Farallon field staff once the soil core has been collected by the drilling subcontractor. The step-by-step guidelines provided in this SOP are to be followed by the field crew conducting subsurface soil sampling.

EQUIPMENT AND SUPPLIES/REAGENTS

The following equipment is necessary to properly collect soil samples from borings:

- Personal protective equipment (PPE) as described in the site-specific Health and Safety Plan.
- Differential global positioning system, if required in project-specific plans. Discuss the methodology for recording the location of the sample point with the Project Manager before conducting the field work.
- Photoionization detector (PID) to monitor and record soil headspace readings.
- Applicable soil sampling equipment, including:
    - Stainless steel hand-auger.
    - Wooden or steel stakes to stabilize cores on table while sampling.
    - Folding table.
    - Utility knife.
    - Stainless steel spoons or scoops.
    - Six-mil plastic sheeting.
    - Resealable plastic bags.
    - Duct tape.
    - Aluminum foil.
    - Tape measure.
    - Five-gallon buckets, and scrub brushes.
    - Alconox phosphate-free cleanser.
    - Laboratory-provided certified pre-cleaned sample containers.

  - Soil sample plunger and syringes for sampling volatile organic compounds (VOCs) using U.S. Environmental Protection Agency (EPA) Method 5035A.

- Materials necessary to provide required documentation, including:
  - Camera.
  - White board and dry-erase markers, if specified in project-specific plan.
  - Sample labels.
  - Field Report forms.
  - Boring Log forms.
  - Chain of Custody forms.
  - Chain-of-custody seals for the sample cooler(s).
- U.S. Department of Transportation-approved drum(s) for decontamination wastewater and excess soil cuttings. Separate drums are needed for liquid and solid wastes (refer to Farallon SOP WM-01, Field Handling of Investigation-Derived Waste). Liquid wastes should not be added to drums containing solid wastes.
- Decontamination equipment as specified in Farallon SOP EQ-01, Equipment Decontamination Procedures.
- Sampling support equipment (e.g., sample coolers, ice, bubble wrap, clear packing tape, heavy resealable plastic bags, razor knives, garbage bags, paper towels, distilled water, nitrile gloves).

DECONTAMINATION

Reusable equipment that will come into contact with soil boring samples or will be used to acquire soil samples is to be decontaminated before arrival at the site, between soil samples collected, upon relocation at the site, and upon demobilization from the site, in accordance with Farallon SOP EQ-01, Equipment Decontamination Procedures.

PROCEDURES

Prior to drilling, all underground utilities must be located, and cleared with an air-knife or other method approved by the Farallon Health and Safety Coordinator.

Collect soil samples from areas known or suspected to have the lowest concentrations of constituents of concern first, with areas of higher concentrations of constituents of concern sampled last, unless the Project Manager indicates a different project-specific sampling protocol. The procedures listed below may be modified, with approval from the field team lead and the Project Manager. Any modifications must be identified in the project-specific sampling plans or, at a minimum, details must be noted on the Field Report form.

Soil core collection methods differ for hollow-stem-auger, direct-push, and sonic drilling techniques, each summarized below:

- Hollow-stem-auger: Collect soil core samples using a standard 18-inch-length (6-inch waste barrel) Dames & Moore split-spoon sampler with a 2.5-inch inner diameter that can be used with or without brass or stainless steel liners.
- Direct-push: Collect soil core samples using 5-foot macrocore samplers with acetate sample liners.
- Sonic: Collect soil core samples using a standard 6-inch-diameter stainless steel sampling rod. Use a 2.5-, 5.0-, or 10-foot polyethylene liner inside the sampling rod for soil sample collection.

Record the specific drilling and soil sampling equipment used on the Boring Log form and on the Field Report form.

Setup

The instructions below are to be followed at each boring site:

- Don appropriate PPE as described in the site-specific Health and Safety Plan.
- Ensure that each borehole has been cleared to a minimum depth of 5 feet below ground surface using an air knife, per the Farallon health and safety policy.
- Set up a temporary sampling table adjacent to the drill rig to log and collect soil samples from the soil cores as they are recovered during drilling. During sunny conditions, consider using a portable canopy for protection from the sun. Lay plastic sheeting over the table to keep the surface clean and to prevent potential cross-contamination between borings and soil samples. Designate clean areas for decontaminated sampling equipment and laboratory-provided certified pre-cleaned soil sample containers.
- Set up 5-gallon buckets for decontaminating soil sampling equipment between samples. These decontamination buckets are separate from the buckets provided by the drillers for their split spoons and core barrels. (Refer to Farallon SOP EQ-01, Equipment Decontamination Procedures.)
- Calibrate the PID to monitor headspace for selected soil core samples in accordance with the equipment manual.

Sample Collection and Processing

The instructions listed below are to be followed for collecting samples using lined and unlined split-spoon and tube samplers:

- Don a new pair of nitrile sampling gloves for each individual soil sample collected, and prior to decontaminating sampling equipment to avoid potential cross-contamination.

- Ensure that the drillers have properly decontaminated all drill shoes and caps prior to initiating drilling operations. Drill shoes and caps must be decontaminated between sampling intervals and stations in accordance with Farallon SOP EQ-01, Equipment Decontamination Procedures. Replace dirty or ineffective decontamination water as needed throughout the workday.
- Ensure that the drillers position the sampling rig over the sample station and remove any surface material or debris that would interfere with sampling. Note on the Field Report form any surface material removed.
- Note on the Field Report form and the Boring Log forms any difficulties encountered during drilling operations. Include the number of blow counts (if applicable) or any resistance encountered during drilling operations.
- Place the core tube, core liner, or split spoon on a new piece of aluminum foil on the sample logging/processing table. If necessary, use wood or metal stakes as shims to stabilize the tube, liner, or split spoon on the sample logging/processing table.
- If a core liner is used, split the liner open with a decontaminated utility knife, taking care not to penetrate the soil in the liner with the blade or knife.
- Briefly examine the soil sample visually for obvious signs of contamination, and take PID readings.
- Take care to:
    - **Not** collect soil in contact with the sidewalls of the sampler or liner.
    - **Always** use decontaminated stainless-steel spoons or scoops to handle the soil within a given sample interval.
    - **Always** don a new pair of nitrile gloves before processing each sample interval in each soil core to prevent cross-contamination in the soil core.
- When sampling for VOCs, collect them as soon as possible after opening the core tube, split spoon, or core liner. Use a decontaminated stainless steel spoon to collect the VOC samples with minimal disturbance to soil by placing a representative amount of soil from the length and depth of the desired sample interval directly into the laboratory-provided VOC sample container with no headspace, and seal it tightly. Follow the sample collection guidelines provided by the manufacturer or the analytical laboratory when using a plunger-type sampling device in accordance with EPA Method 5035A.
- Retain approximately 100 grams of the soil sample in a heavy resealable plastic bag or glass sample container, shake the sealed bag to volatilize the contaminants in the soil, and wait approximately 5 minutes before measuring for headspace analysis using the PID (Washington State Department of Ecology 2011). Insert the PID probe tip into a small opening in the top of the bag, and record the PID units on the Boring Log form. Reseal the bag after taking the headspace reading in case further assessment of the sample is needed. Do not puncture the resealable plastic bag to obtain headspace readings.

- If specified in the project-specific plans, photograph each section of the boring, including in the photograph notations on a white board documenting sample location identifier, date, orientation, depth, and site markers.
- Describe the soil samples in accordance with ASTM International Standard D-2488-00, *Standard Practice for Description and Identification of Soils*.
- Record on the Field Report form any deviations from the project-specified sampling procedures or from this SOP, or any obstacle encountered.
- Examine the remaining soil core sample for lithology using the Unified Soil Classification System, and record the lithology on the Boring Log form.
- Discard excess soil cuttings in a labeled waste drum or a soil bin in accordance with Farallon SOP WM-01, Field Handling of Investigation-Derived Waste. Do not add soil to a liquid waste drum.
- Backfill the borehole, as appropriate.
- Upon completion of sampling at a boring, measure the boring's location to an on-site permanent datum, collect the location using the differential global positioning system, or have the sample location surveyed by a licensed surveyor.
- Decontaminate the soil sampling equipment, and don a new pair of sampling gloves before collecting each new soil sample.

DOCUMENTATION

Document the soil sampling activities on the Boring Log form, the Chain of Custody form, and the Field Report form.

REFERENCE

American Society for Testing Materials. 1989. *Standard Method for Penetration Test and Split-Barrel Sampling of Soils.* Method D-1586-11.

U.S. Environmental Protection Agency. 1987. *A Compendium of Superfund Field Operation Methods.* EPA Document No. 540-P-87-001. December 1.

Washington State Department of Ecology. 2011. *Guidance for Remediation of Petroleum Contaminated Sites.* Ecology Publication No. 10-09-057. Toxics Cleanup Program. September.

APPENDIX B
FARALLON FIELD FORMS AND RECORDS

SAMPLING AND ANALYSIS PLAN
Alley Supplemental Subsurface Investigation
Block 38 West Property
500 through 536 Westlake Avenue North
Seattle, Washington

Farallon PN: 397-019

FARALLON CONSULTING

Washington
Issaquah | Bellingham | Seattle
Oregon
Portland | Bend | Baker City
California
Oakland | Folsom | Irvine

FIELD REPORT

Page ___ of ___

Date: _____ **Project #:** _____ **Task #:**_____

Project: _____ **Site Address:** _____

Client: _____ **Contractor:** _____

Weather: _____ **Temp:** _____

Equipment Used: _____

Hours: _____ _____ **Mileage:** _____ **Project Manager:** _____

Contractor *Staff*

Prepared By: _____ **Reviewed By:** _____

Comments:

FIELD REPORT (continued)

Page ___ of ___

Project: _____ **Date:** _____ **Project #:** _____ **Task #:**_____

FARALLON CONSULTING

Log of Boring:

Page __ of __

Client:	**Date/Time Started:**	**Sampler Type:**
Project:	**Date/Time Completed:**	**Drive Hammer (lbs.):**
Location:	**Equipment:**	**Depth of Water ATD (feet bgs):**
Farallon PN:	**Drilling Company:**	**Total Boring Depth (feet bgs):**
Logged By:	**Drilling Foreman:**	**Total Well Depth (feet bgs):**
	Drilling Method:	

Depth (feet bgs)	Sample Interval	Lithologic Description	USCS	USGS Graphic	% Recovery	Blow Counts 8/8/8	PID (ppm*)	Sample ID	Sample Analyzed	Boring/Well Construction Details	
0											
5											
10											
15											
20											

Well Construction Information

Monument Type:	Filter Pack:	Ground Surface Elevation (ft):
Casing Diameter (inches):	Surface Seal:	Top of Casing Elevation (ft):
Screen Slot Size (inches):		Boring Abandonment:
Screened Interval (ft bgs):	Annular Seal:	Surveyed Location: X: Y:

MONITORING WELL CONSTRUCTION DATA

WELL/BORING NO:

PROJECT NO: | PROJECT NAME: | PERMIT NO:

DATE: | SITE ADDRESS:

WELL SITE LOCATION PLAN:

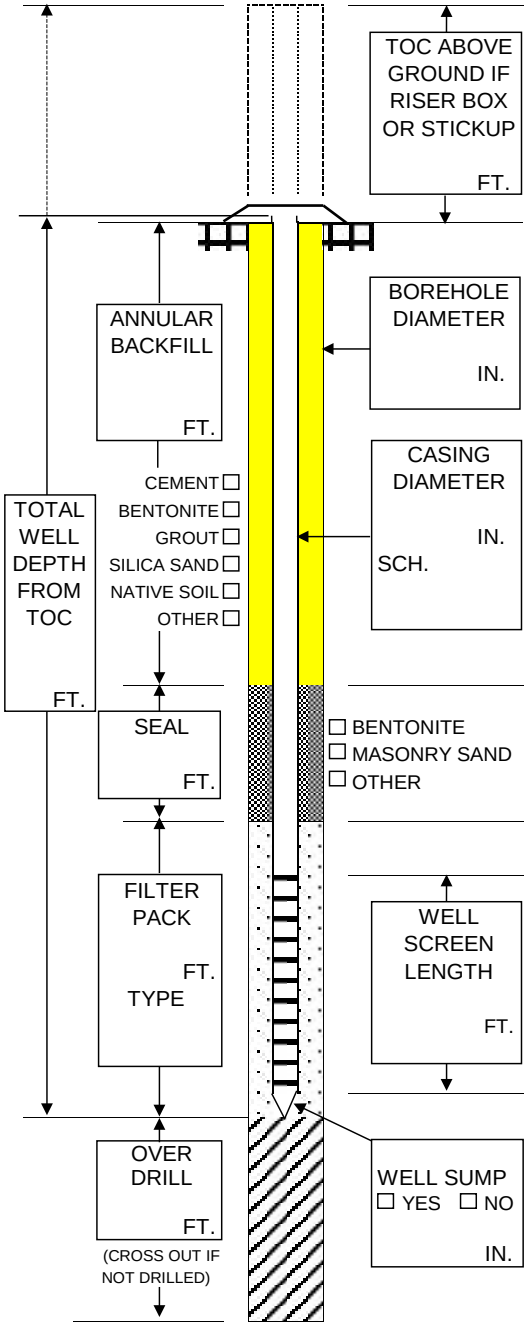
SEC: TWN: RGE: LAT: LONG:

DRILLING CO:

DRILL CREW:

WELL TYPE: ☐ SHALLOW ☐ SINGLE CASED ☐ MONITORING
☐ PERMANENT ☐ INTERMEDIATE ☐ DOUBLE CASED ☐ RECOVERY
☐ TEMPORARY ☐ DEEP ☐ OTHER ☐ OTHER

WELL SCHEMATIC



INSTALLATION DATA

DECON. ☐ STEAM CLEAN ☐ HIGH PRESSURE WASH ☐ SOAP WASH ☐ OTHER _____

CASING TYPE: ☐ PVC ☐ STAINLESS ☐ TEFLON ☐ OTHER
JOINTS: ☐ THREADED ☐ WELDED ☐ COUPLED ☐ SCREWED ☐ OTHER _____
PIT CASING: ☐ YES ☐ NO ☐ DESCRIBE _____

WELL SCREEN: ☐ PVC ☐ STAINLESS ☐ TEFLON ☐ OTHER
DIAMETER: ☐ 2" ☐ 4" ☐ 6" ☐ OTHER _____ IN
SLOT: ☐ 0.010 ☐ 0.020 ☐ OTHER _____ IN

DRILLING METHOD: ☐ SOLID STEM ☐ HOLLOW STEM ☐ MUD ROTARY ☐ AIR ROTARY ☐ DIRECT PUSH ☐ HAND AUGER ☐ OTHER _____
BIT SIZE: ☐ 2" ☐ 4" ☐ 6" ☐ 8" ☐ 12" ☐ OTHER ____ IN
DRILLING MUD: ☐ NONE ☐ WATER ☐ BENTONITE ☐ OTHER _____
CENTRALIZER: ☐ YES ☐ NO

COMPLETION: ☐ FLUSH MOUNT ☐ STICKUP ☐ RISER BOX
LOCK TYPE: ☐ DOLPHIN ☐ MASTER KEY NO. _____ ☐ OTHER
PAD: ☐ 2'X2' ☐ 4'X4' ☐ OTHER _____

CUTTINGS: ☐ DRUMMED NUMBER OF DRUMS _____ ☐ SPREAD ☐ OTHER _____

DEVELOPMENT METHOD: ☐ NONE ☐ BAILING ☐ PUMPING ☐ AIR LIFT ☐ SURGE & BLOCK ☐ OTHER _____
TIME: ☐ 10 MIN ☐ 20 MIN ☐ OTHER _____ MIN
AMOUNT ☐ 5 GAL ☐ 10 GAL ☐ OTHER _____ GAL
WATER BEFORE: ☐ SILTY ☐ TURBID ☐ OPAQUE ☐ CLEAR
WATER AFTER: ☐ SILTY ☐ TURBID ☐ OPAQUE ☐ CLEAR
EVIDENT ODOR: ☐ YES ☐ NO TYPE _____

DEVELOPMENT WATER: ☐ DRUMMED NUMBER OF DRUMS _____ ☐ SPREAD ☐ TREATED ☐ POTW ☐ OTHER

WATER LEVEL: INITIAL _____ FT ☐ BTOC ☐ BLS

DATE: _____ _____ FT BELOW TOC

DATE: _____ _____ FT BELOW TOC

NOTES: (DESCRIBE ALL NON-STANDARD METHODS & MATERIALS)

PREPARED BY:

FARALLON CONSULTING

Groundwater Level Measurement Summary Form

Date: **Project Name:**

Project Number: **Task:** **Project Location:**

Equipment Used: **Project Manager:**

Well Number	Time	Depth to NAPL (feet)	Depth to Water (feet)	NAPL Thickness (feet)	Total Well Depth (feet)	Comments

Prepared By:

LOW-FLOW WELL PURGING AND SAMPLING DATA

		WELL NO:
DATE:	PROJECT NAME:	PROJECT NO:
WEATHER CONDITIONS:		
WELL DIAMETER (IN.) ☐ 1 ☐ 2 ☐ 4 ☐ 6 ☐ OTHER _____		
SAMPLE TYPE: ☐ GROUNDWATER ☐ WASTEWATER ☐ SURFACE WATER ☐ OTHER		
WELL DEPTH (TOC) FT.	DEPTH TO WATER BEFORE PURGING (TOC) FT.	
LENGTH OF WATER FT.	CALCULATED ONE WELL VOLUME[1]: GAL.	
DEPTH OF SAMPLE POINT FT.	ESTIMATED VOLUME PURGED GAL.	
EQUIP. DECON. ☐ ALCONOX WASH ☐ LIQUINOX WASH ☐ DIST/DEION 1 RINSE ☐ DIST/DEION 2 RINSE ☐ OTHER		
CONTAINER PRESERVATION: ☐ LAB PRESERVED ☐ FIELD PRESERVED		
WATER ANALYZER:	PUMP TYPE:	TUBING:

ACTUAL TIME (min)	FLOW RATE (ml/min)	DEPTH TO WATER (feet)	TEMP ☐ °F ☐ °C	SPECIFIC CONDUCT. (mS/cm)	pH	DISS. OXYGEN (mg/l)	TURBIDITY (NTU)	ORP (mV)	REMARKS
			(3%)	(3%)	(+/- 0.1)	(<0.5 mg/L or 10% for > 0.5 mg/L)	(<5 NTU or 10% for > 5 NTU)	(+/- 10 mV)	(EVIDENT ODOR, COLOR, PID)
	INITIAL		--	--	--	--	--	--	

DEPTH TO WATER AFTER PURGING (TOC) FT.	SAMPLE FILTERED ☐ YES ☐ NO SIZE _____
NOTES:	SAMPLE TIME: ID#
	DUPLICATE ☐ TIME: ID#:
	EQUIP. BLANK: ☐ TIME: ID#:
	PREPARED BY:

[1] A 1 FOOT LENGTH OF WATER = 0.05 GAL IN 1" DIA. PIPE 0.17 GAL IN 2" DIA PIPE 0.65 GAL IN 4" DIA PIPE 1.5 GAL IN 6" DIA PIPE

FARALLON CONSULTING

Sheet____of____

Soil Sample Data Log

Date: _____ **Project Name:** _____ **Farallon P/N:** _____

PID Model & Serial No: _____ **Calibration Date/Standard:** _____

Headspace Container: ☐ 16 oz glass ☐ 8 oz glass ☐ Zip-loc ☐ Other

Sample Method: ☐ Hand auger ☐ Direct push ☐ Split spoon ☐ Corer ☐ Other

Equip Decon: ☐ Tap water wash ☐ DIST/DEION 1 Rinse ☐ Isopropanol ☐ Analyte-free final rinse ☐ Tap water final rinse

☐ Alconox wash ☐ Liquinox Wash ☐ DIST/DEION 2 rinse ☐ Other solvent ☐ DIST/DEION final rinse ☐Air Dry

Test Pit/Boring Location	Sample ID	Time	Depth	PID	Odor	Sheen Tare Weight	Staining Field Weight	Containers	Lithological Description Remarks

2 oz = two-ounce jars

4 oz = four-ounce jars

WASTE INVENTORY TRACKING SHEET

Project Number: _____ **Page:** _____ **of**

Project Name: _____ **Generation Date:** _____

Project Address: _____ **Prepared By:** _____

Field Work Description: _____ **Date Waste Removed:** _____

Project Manager: _____ **Waste Transporter:** _____

Waste Disposal Location: _____

Unique Container ID	Container Size	% Capacity Used	Contents (Soil/GW/Decon Water)/ Origin (Boring or Well ID)	Date(s) Accumulated	Labeling (Contents Under Test/ Haz/Non-Haz/Other-Specify)	Sampled (Y/N)	Comments

NOTES: Contents should be specified and include identification of well/boring, media, source, depth of soil (if applicable), and any other helpful information.

Container ID should be unique when compared against other nearby containers. Special waste labels may include flammable, corrosive, dangerous when wet, and/or oxidizer.

Location of Drums (sketch or describe):

FARALLON CONSULTING

Chain of Custody

Page _____ of _____

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Company:

Project Number:

Project Name:

Project Manager:

Sampled by:

Turnaround Request (in working days)

(Check One)

☐ Same Day ☐ 1 Day

☐ 2 Days ☐ 3 Days

☐ Standard (7 Days)

☐ _____ (other)

Laboratory Number:

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx (☐ Acid / SG Clean-up)	Volatiles 8260C	Halogenated Volatiles 8260C	EDB EPA 8011 (Waters Only)	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664A					% Moisture

	Signature	Company	Date	Time
Relinquished				
Received				
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions

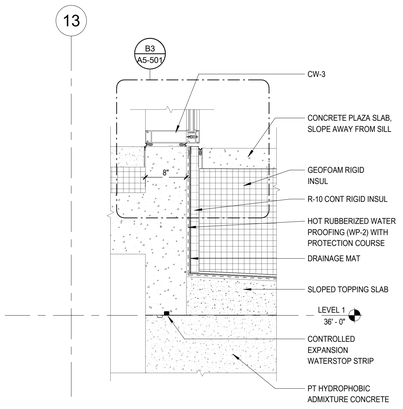
Data Package: Standard ☐ Level III ☐ Level IV ☐

Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☐

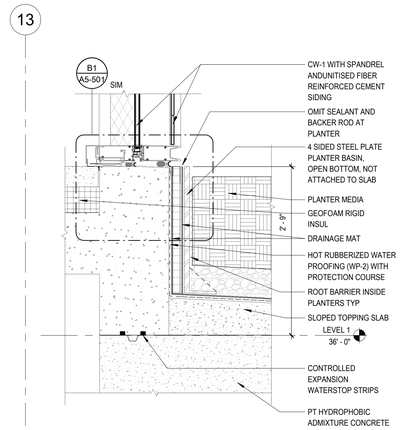
ATTACHMENT B
CONSTRUCTION DRAWINGS EXCERPT
FOR MAT SLAB FOUNDATION

SUPPLEMENTAL SUBSURFACE INVESTIGATION
AND FOUNDATION ELEMENTS
Block 38 West Property
500 through 536 Westlake Avenue North
Seattle Washington

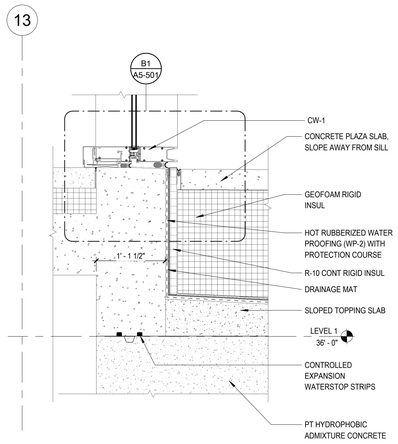
Farallon PN: 397-019



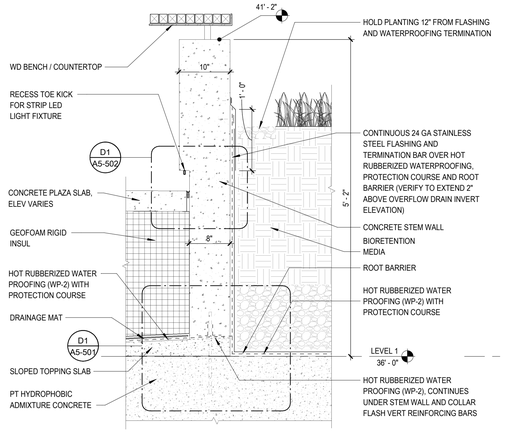
D1 L1 CW-3 SILL AT PLAZA PAVING
SCALE: 1" = 1'-0"



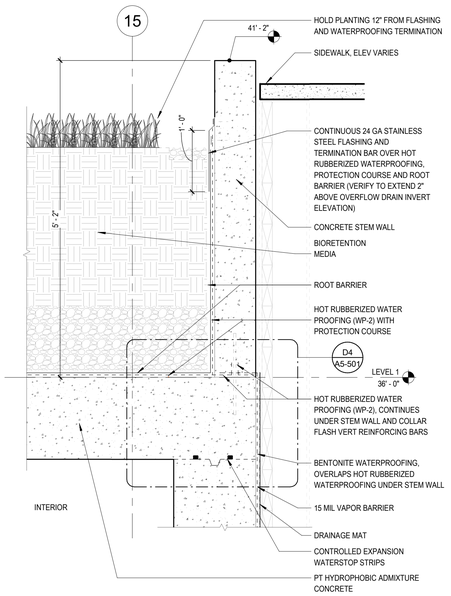
D2 L1 CW-1 SILL AT PLAZA PLANTER -TRELLIS
SCALE: 1" = 1'-0"



D3 L1 CURTAIN WALL CW-1 SILL AT PLAZA PAVING
SCALE: 1" = 1'-0"



D4 BIORETENTION STEM WALL AT PLAZA PAVING
SCALE: 1" = 1'-0"



D5 L1 EXTERIOR WALL AT BIORETENTION CELL
SCALE: 1" = 1'-0"

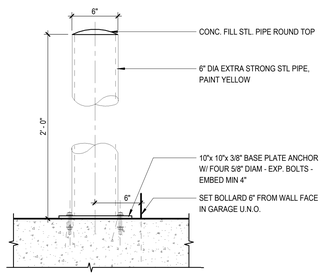
B1 P1 GARAGE ENTRY DOOR THRESHOLD
SCALE: 1" = 1'-0"

B2 L1- CW-3- SILL ON GRID A AT TENANT ENTRY
SCALE: 1" = 1'-0"

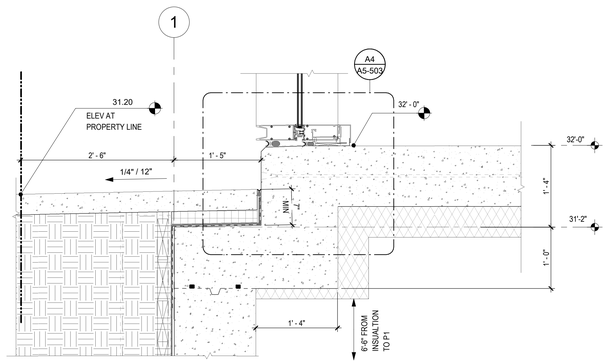
B4 L1 CURTAIN WALL CW-1- SILL AT LOBBY
SCALE: 1" = 1'-0"

B5 P1 EXTERIOR WALL AT CONCRETE TRANSITION
SCALE: 1" = 1'-0"

FARALLON COMMENT: 15 MIL VAPOR BARRIER NOTED HERE WAS UPGRADED TO 20 MIL DRAGO WRAP MANUFACTURED BY STEGO INDUSTRIES

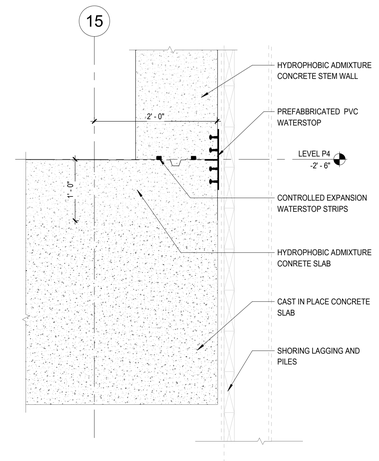


A1 BOLLARD AT SLAB ON GRADE
SCALE: 1 1/2" = 1'-0"



A2 L1 NORTH CW-1 SILL AT GRADE
SCALE: 1" = 1'-0"

A3 L1 NORTWEST ENTRY AT GRID 1- SECTION DETAIL
SCALE: 1" = 1'-0"



A5 TYPICAL P4 EXTERIOR WALL AT MAT SLAB
SCALE: 1" = 1'-0"

nbbj
223 YALE AVENUE NORTH
SEATTLE, WASHINGTON 98109
PHONE 206 223 5555
www.nbbj.com

CONSTRUCTION MANAGER:
GLY

CIVIL ENGINEER:
CPL

LANDSCAPE ARCHITECT:
SITE WORKSHOP

STRUCTURAL ENGINEER:
DCI

MEP:
STANTEC

8504 REGISTERED ARCHITECT

BLOCK 38

100% CD
082319

REVISIONS

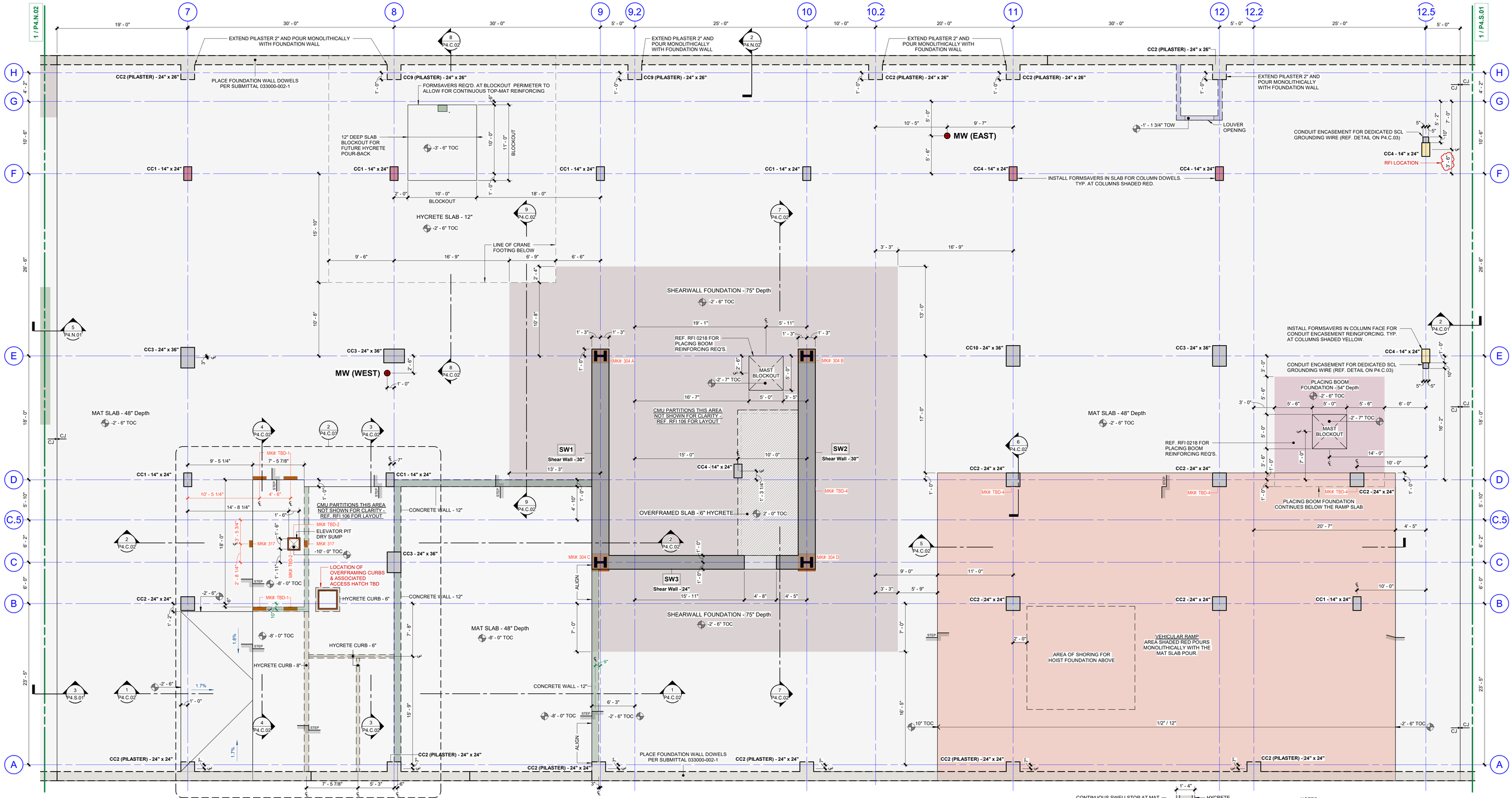
MARK	DATE	DESCRIPTION

SCALE	As indicated
PROJECT ARCHITECT	JC
PROJECT NUMBER	101292.00
DATE	082319

SHEET NAME
EXTERIOR DETAILS - GRADE & BELOW GRADE

SHEET NUMBER
A5-500
SHEET OF 250

8/23/2019 11:25:24 AM
BIM 360://101292.00 - Block 38 R19/ARCH_B38_SHELL AND CORE.rvt



1 LEVEL P4 - CENTER
3/16" = 1'-0"

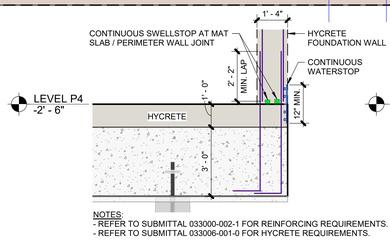
EMBED SCHEDULE - P4 CENTER				
QTY	MARK	DESCRIPTION	MANUFACTURER	NOTES
1	304 A	B.U. 72" x 26" x 26"	METALS FAB	BUILT-UP EMBED: REF. SUBMITTAL 051200-003-0 FOR CONFIGURATION
1	304 B	B.U. 72" x 26" x 26"	METALS FAB	BUILT-UP EMBED: REF. SUBMITTAL 051200-003-0 FOR CONFIGURATION
1	304 C	B.U. 111" x 30" x 30"	METALS FAB	BUILT-UP EMBED: REF. SUBMITTAL 051200-003-0 FOR CONFIGURATION
1	304 D	B.U. 72" x 30" x 30"	METALS FAB	BUILT-UP EMBED: REF. SUBMITTAL 051200-003-0 FOR CONFIGURATION
2	317	PL 1/2" x 8" x 12"	METALS FAB	ELEVATOR DIVIDER BEAM EMBED
4	TBD-1	PL 1/2" x 8" x 24"	METALS FAB	ELEVATOR RAIL BRACKET EMBED
1	TBD-2	B.U. ANGLE 2" x 2" x 1/4"	MFC / HASKELL	CONTINUOUS ANGLE EMBED FRAME FOR SUMP GRATE
1	TBD-3	B.U. ANGLE 2" x 2" x 1/4"	MFC / HASKELL	CONTINUOUS ANGLE EMBED FRAME FOR DRAIN GRATE
4	TBD-4	5/8" x 8" x 48"	HASKELL	

LEVEL P4 SLAB LEGEND

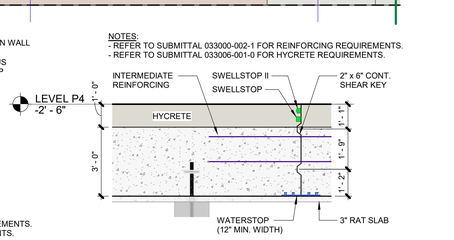
- 48" MAT SLAB
- 60" FOOTING
- 63" FOOTING
- 75" FOOTING / SW FOUNDATION
- RAMP (THICKNESS VARIES)

PLAN & SOFFIT LEGEND

- COLUMN / PILASTER
- ENCASED COLUMN / PILASTER
- COLUMN / PILASTER AT UNDERSIDE OF SLAB
- SHEAR WALL
- MONITORING WELL MW
- HYCRETE FOUNDATION WALL (P4 - P1)
- CONCRETE CURB / WALL
- CMU PARTITION WITH FURRING WALL (CMU PARTITION DIM.)
- EMBED PLATE (T.O. SLAB) (EMBED DIM.)
- EMBED PLATE (E.O. SLAB / F.O. WALL)
- HYCRETE OVERFRAMED SLAB



3 TYP. FOUNDATION WALL SECTION AT MAT SLAB
3/8" = 1'-0"



2 TYPICAL SECTION AT MAT SLAB CONSTRUCTION JOINT
3/8" = 1'-0"

G·L·Y CONSTRUCTION
200 - 112th Ave. NE, SUITE 300 BELLEVUE, WA 98004
p: (425) 451-8877 f: (425) 453-5680

REVIEWED BY:

- ☐ Fletcher Beall
- ☐ Ralph Myrick
- ☐ Matt Wentz
- ☐ Jesse Schweitzberger
- ☐ John Gabica
- ☐ Jamie McIver
- ☐ Brent Bowers
- ☐ Isaiah Brent
- ☐ Ethan Cochran
- ☐ Jason Gill
- ☐ Nic Willman
- ☐ Ryan Weeger
- ☐ Kenny McBride
- ☐ Dennis Lee
- ☐ Myron Ramirez
- ☐ Joe Worley
- ☐ Jon deVita

DIVISION	PE | Cell #
03, 05 | Structure	Kenny McBride | 206.747.6462
04 | CMU	Joe Worley | 425.449.6611
05 | Metal Stairs	Kenny McBride | 206.747.6462
07-08 | Envelope	Myron Ramirez | 425.429.1685
09 | Partitions	Joe Worley | 425.449.6611
14 | Elevators	Dennis Lee | 425.495.5109
21-28 | MEP	Dennis Lee | 425.495.5109
31-32 | Site	Jon deVita | 425.625.6006
Work Packages	Andrew Ellis | 425.229.3520

BLOCK 38
520 Westlake Ave North
Seattle, WA 98109

LEVEL P4 KEY PLAN

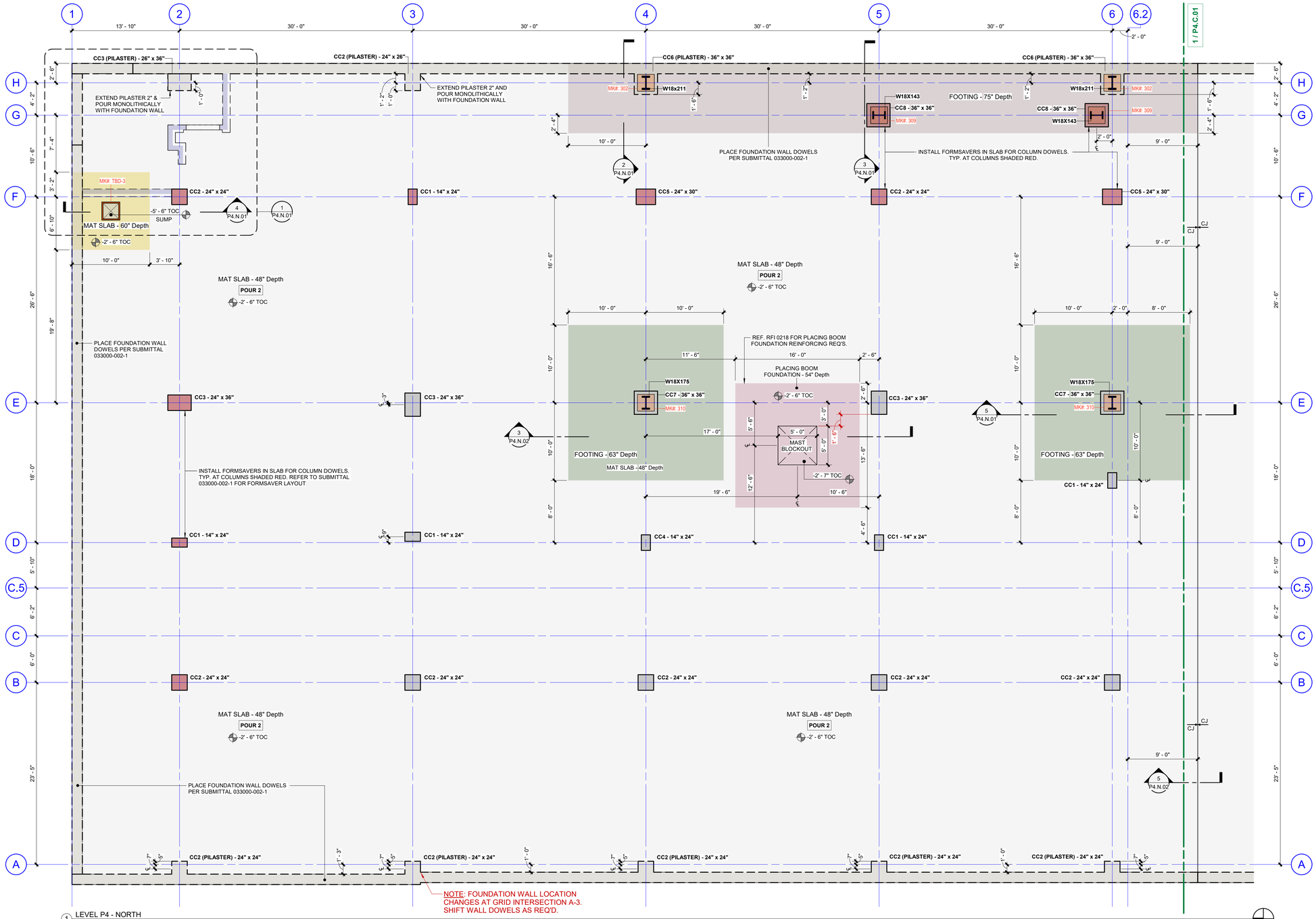
REV	DATE	BY	DESCRIPTION
00	04/03/20	AE	FOR REVIEW

GLY Job No. 1671
Date: 5/27/2020 8:06:00 PM

FOR REVIEW

LEVEL P4 CENTER

P4.C.01



1 LEVEL P4 - NORTH
3/16" = 1'-0"

EMBED SCHEDULE - P4 NORTH				
QUANTITY	MARK	CONFIGURATION	MANUFACTURER	NOTES
2	302	B.U. 72" x 26" x 26"	METALS FAB	BUILT-UP EMBED: REF. SUBMITTAL 051200-003-0 FOR CONFIGURATION
2	309	B.U. 72" x 26" x 26"	METALS FAB	BUILT-UP EMBED: REF. SUBMITTAL 051200-003-0 FOR CONFIGURATION
2	310	B.U. 60 x 26 x 2-2"	METALS FAB	BUILT-UP EMBED: REF. SUBMITTAL 051200-003-0 FOR CONFIGURATION
1	TBD-3	B.U. ANGLE 2" x 2" x 1/4"	MFC / HASKELL	CONTINUOUS ANGLE EMBED FRAME FOR SUMP GRATE

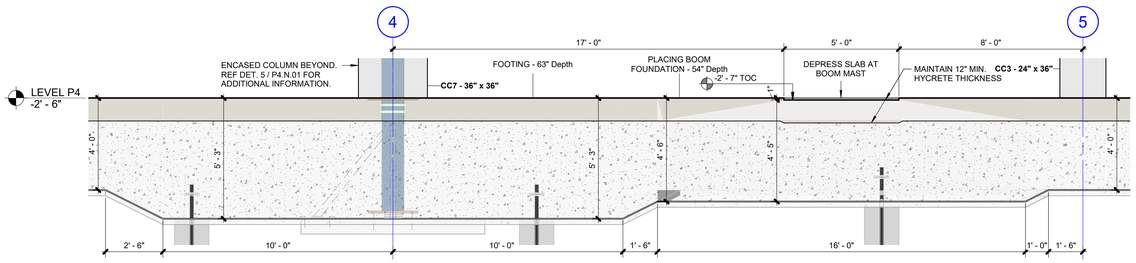
CONCRETE QUANTITIES - P4 NORTH (SLAB + COLUMNS)			
STRENGTH	MIX DESIGN	AREA	VOLUME
6000 PSI	(P)5MFT438	17705 SF	1819 CY
8000 PSI	(P)6C33877 / S6C36828	1700 SF	31 CY
6000 PSI	(P)REPELEX7	15160 SF	562 CY
		34565 SF	2412 CY

LEVEL P4 SLAB LEGEND

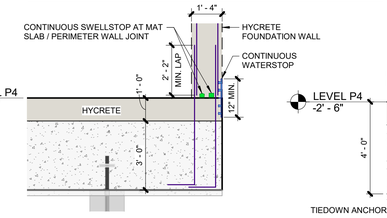
- 48" MAT SLAB
- 60" FOOTING
- 63" FOOTING
- 75" FOOTING / SW FOUNDATION
- RAMP (THICKNESS VARIES)

PLAN & SOFFIT LEGEND

- COLUMN / PILASTER
- STEEL ENCASED COLUMN / PILASTER
- COLUMN / PILASTER AT UNDERSIDE OF SLAB
- SHEAR WALL
- HYCRETE FOUNDATION WALL (P4 - P1)
- CONCRETE CURB / WALL
- CMU PARTITION WITH FURRING WALL (CMU PARTITION DIM.)
- EMBED PLATE (T.O. SLAB) (EMBED DIM.)
- EMBED PLATE (E.O. SLAB / F.O. WALL)
- HYCRETE OVERFRAMED SLAB
- MONITORING WELL (MW)

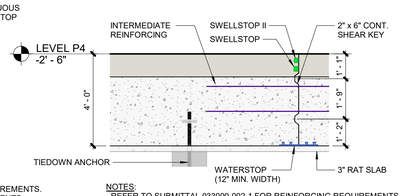


3 N-S SECTION AT ENCASED COLUMN (CC7) FOOTING - LOOKING EAST1
3/8" = 1'-0"



NOTES:
- REFER TO SUBMITTAL 033000-002-1 FOR REINFORCING REQUIREMENTS.
- REFER TO SUBMITTAL 033006-001-0 FOR HYCRETE REQUIREMENTS.

2 TYP. FOUNDATION WALL SECTION AT MAT SLAB
3/8" = 1'-0"



NOTES:
- REFER TO SUBMITTAL 033000-002-1 FOR REINFORCING REQUIREMENTS.
- REFER TO SUBMITTAL 033006-001-0 FOR HYCRETE REQUIREMENTS.

5 N-S SECTION AT MAT SLAB CONSTRUCTION JOINT
3/8" = 1'-0"

GLY CONSTRUCTION
200 - 112th Ave. NE, SUITE 300 BELLEVUE, WA 98004
p: (425) 451-8877 f: (425) 453-5680

REVIEWED BY:

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- ☐ Kenny McBride
- ☐ Dennis Lee
- ☐ Myron Ramirez
- ☐ Joe Worley
- ☐ Jon deVita

BLOCK 38

520 Westlake Ave North
Seattle, WA 98109

LEVEL P4 KEY PLAN

NORTH

DIVISION	PE | Cell #
03, 05 | Structure	Kenny McBride | 206.747.6462
04 | CMU	Joe Worley | 425.449.6611
05 | Metal Stairs	Kenny McBride | 206.747.6462
07-08 | Envelope	Myron Ramirez | 425.429.1685
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21-28 | MEP	Dennis Lee | 425.495.5109
31-32 | Site	Jon deVita | 425.625.6006
Work Packages	Andrew Ellis | 425.229.3520

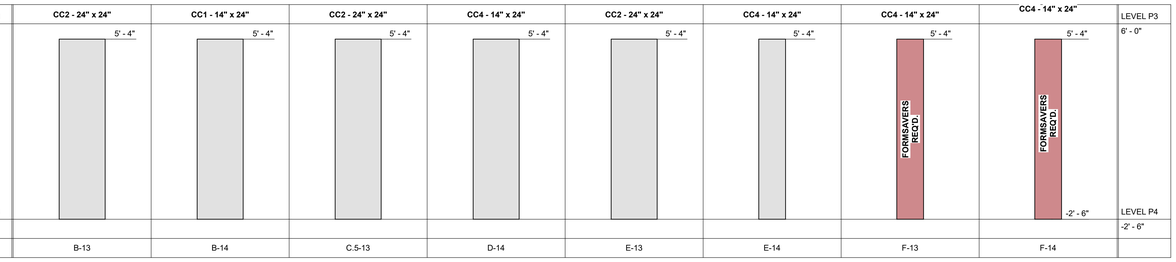
REV	DATE	BY	DESCRIPTION
01	05/19/20	AE	FOR REVIEW
00	03/16/20	AE	FOR REVIEW

GLY Job No. 1671
Date: 5/27/2020 8:03:54 PM

FOR REVIEW

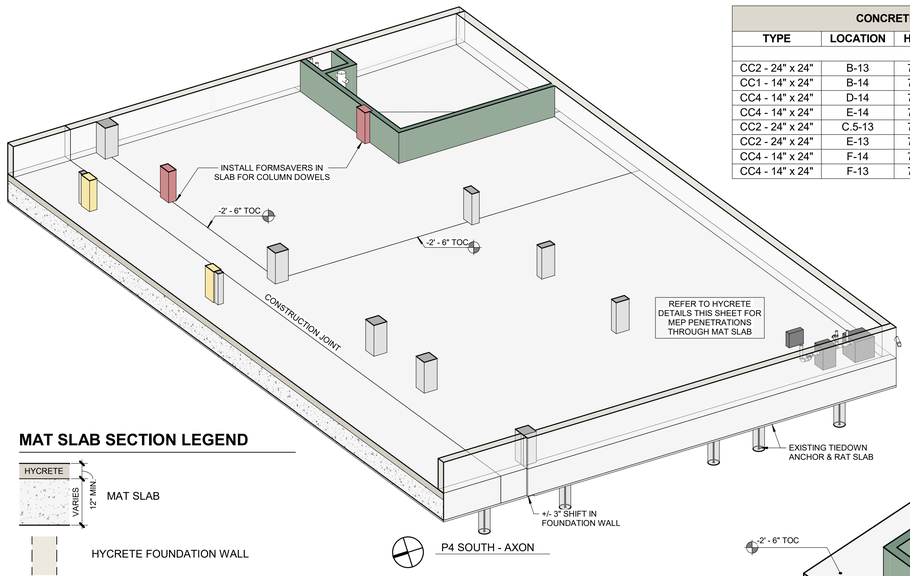
LEVEL P4 NORTH

P4.N.02



COLUMN ELEVATIONS - P4 SOUTH

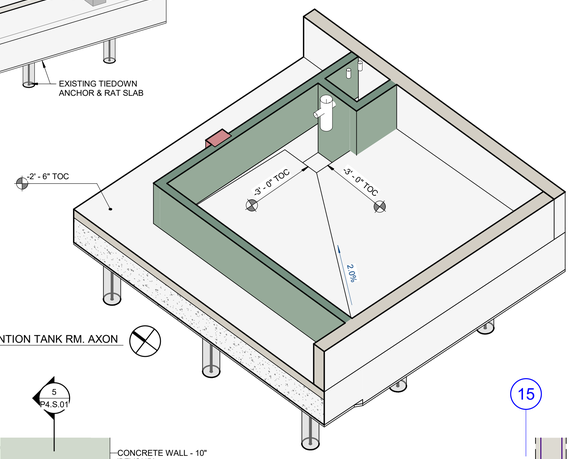
CONCRETE COLUMN SCHEDULE - P4 SOUTH					
TYPE	LOCATION	HEIGHT	VOLUME	STRENGTH	MIX DESIGN
CC2 - 24" x 24"	B-13	7' - 10"	1 CY	8 ksi	(P)6C33877 / S6C36828
CC1 - 14" x 24"	B-14	7' - 10"	1 CY	8 ksi	(P)6C33877 / S6C36828
CC4 - 14" x 24"	D-14	7' - 10"	1 CY	8 ksi	(P)6C33877 / S6C36828
CC4 - 14" x 24"	E-14	7' - 10"	1 CY	8 ksi	(P)6C33877 / S6C36828
CC2 - 24" x 24"	C.5-13	7' - 10"	1 CY	8 ksi	(P)6C33877 / S6C36828
CC2 - 24" x 24"	E-13	7' - 10"	1 CY	8 ksi	(P)6C33877 / S6C36828
CC4 - 14" x 24"	F-14	7' - 10"	1 CY	8 ksi	(P)6C33877 / S6C36828
CC4 - 14" x 24"	F-13	7' - 10"	1 CY	8 ksi	(P)6C33877 / S6C36828



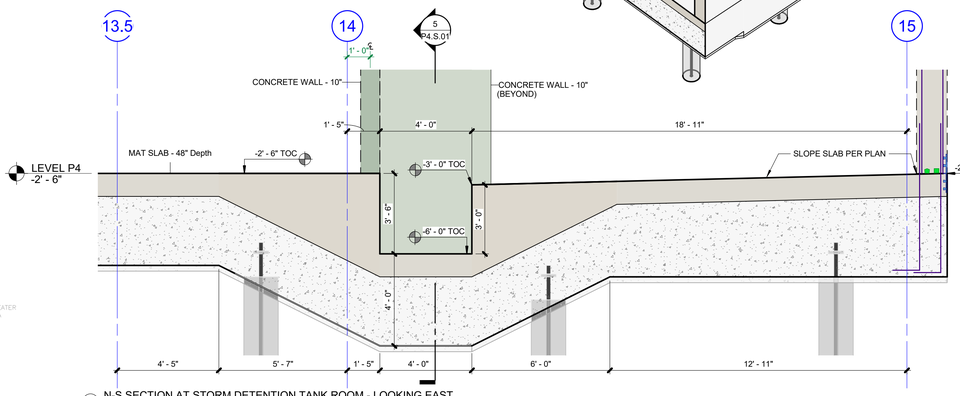
P4 SOUTH - AXON

MAT SLAB SECTION LEGEND

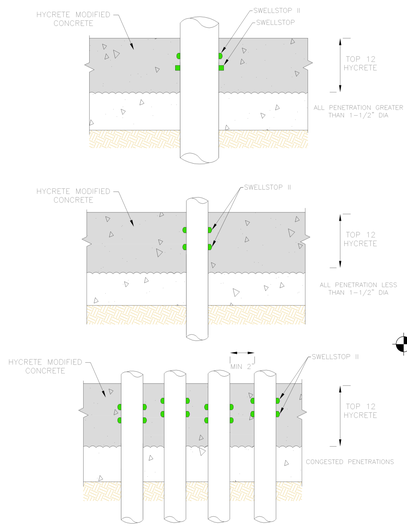
- HYCRETE / MAT SLAB (VARIES, 12" MIN.)
- HYCRETE FOUNDATION WALL
- CONCRETE CURB / WALL (WALL / CURB DIM.)
- CMU PARTITION WITH FURRING WALL (CMU PARTITION DIM.)
- SHEAR WALL
- EMBED PLATE (E.O. SLAB / F.O. WALL) (EMBED DIM.)
- OVERFRAMED SLAB (OVERFRAMING DIM.)
- STRUCTURAL FOAM
- REINFORCING BAR (SHOWN FOR REF. ONLY)



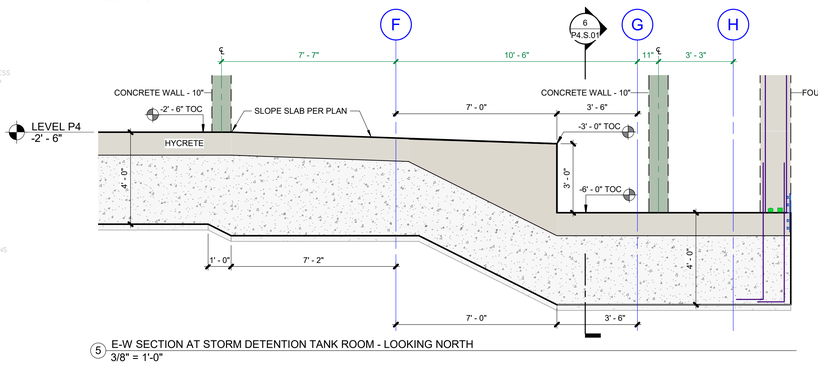
STORM DETENTION TANK RM. AXON



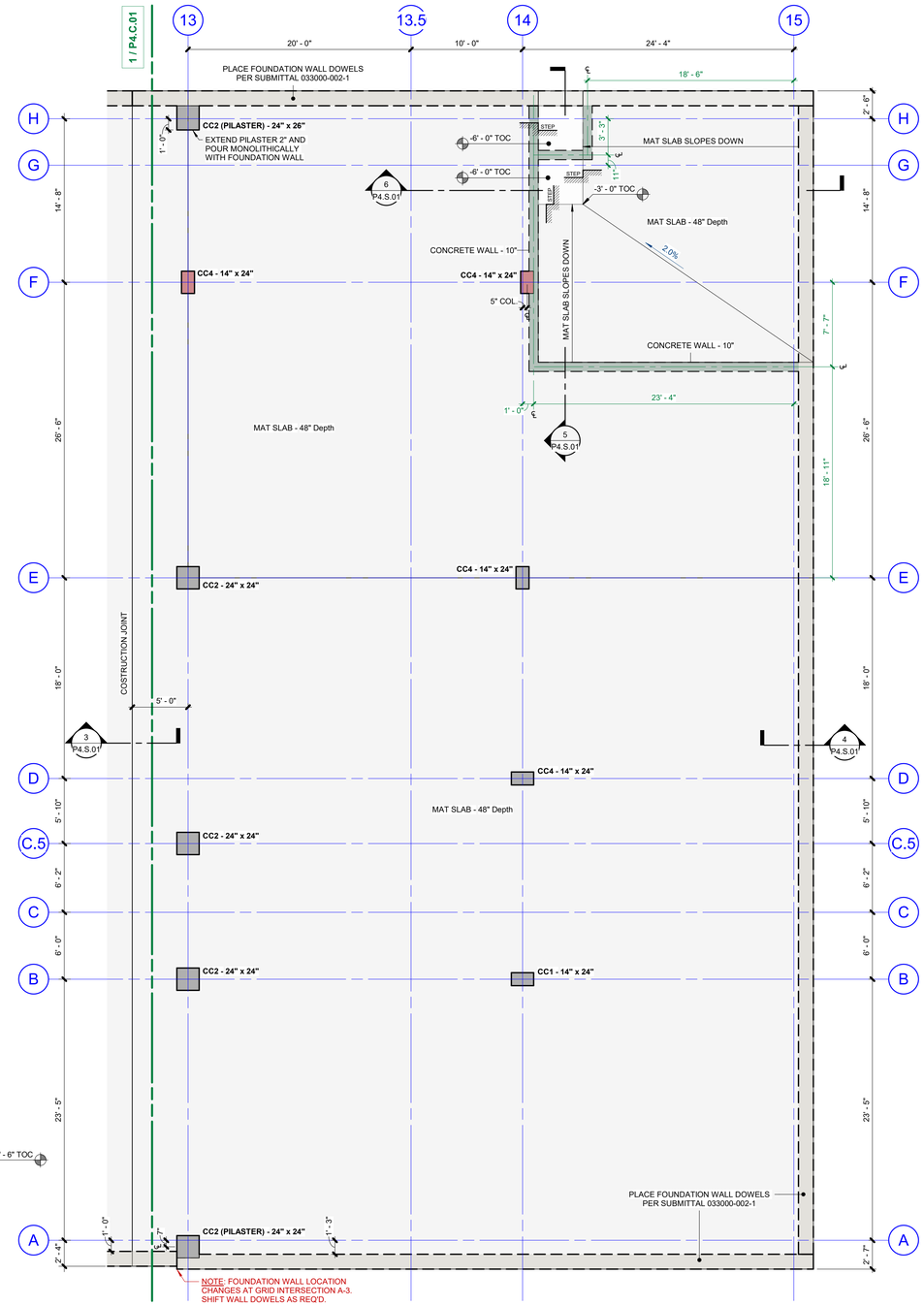
6 N-S SECTION AT STORM DETENTION TANK ROOM - LOOKING EAST
3/8" = 1'-0"



HYCRETE DETAIL - MEP PENETRATIONS AT MAT SLAB



5 E-W SECTION AT STORM DETENTION TANK ROOM - LOOKING NORTH
3/8" = 1'-0"



1 LEVEL P4 FOUNDATION PLAN - NORTH
3/16" = 1'-0"

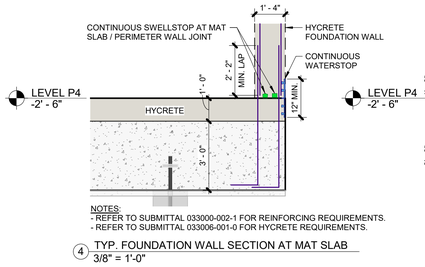
CONCRETE QUANTITIES - P4 SOUTH (SLAB + COLUMNS)			
STRENGTH	MIX DESIGN	AREA	VOLUME
6000 PSI	(P)5MFT438	7570 SF	738 CY
8000 PSI	(P)6C33877 / S6C36828	483 SF	7 CY
6000 PSI	(P)REPELEX7	6454 SF	239 CY
		14507 SF	984 CY

LEVEL P4 SLAB LEGEND

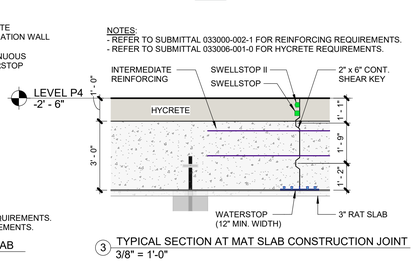
- 48" MAT SLAB
- 60" FOOTING
- 63" FOOTING
- 75" FOOTING / SW FOUNDATION
- RAMP (THICKNESS VARIES)

PLAN & SOFFIT LEGEND

- COLUMN / PILASTER
- STEEL ENCASED COLUMN / PILASTER
- COLUMN / PILASTER AT UNDERSIDE OF SLAB
- SHEAR WALL
- FOUNDATION WALL (P4 - P1)
- CONCRETE CURB / WALL
- CMU PARTITION WITH FURRING WALL
- EMBED PLATE (T.O. SLAB)
- EMBED PLATE (E.O. SLAB / F.O. WALL)
- OVERFRAMED SLAB
- MONITORING WELL MW



4 TYP. FOUNDATION WALL SECTION AT MAT SLAB
3/8" = 1'-0"



3 TYPICAL SECTION AT MAT SLAB CONSTRUCTION JOINT
3/8" = 1'-0"

GLY CONSTRUCTION
200 - 112th Ave. NE, SUITE 300 BELLEVUE, WA 98004
p: (425) 451-8877 f: (425) 453-5680

REVIEWED BY:

- ☐ Fletcher Beall
- ☐ Ralph Myrick
- ☐ Jesse Schweitzberger
- ☐ John Gabica
- ☐ Jamie McIver
- ☐ Brent Bowers
- ☐ Jason Blair
- ☐ Ethan Cochrun
- ☐ Aaron Van Buren
- ☐ Jeremiah Fort
- ☐ Matt Wentz
- ☐ John Malloy
- ☐ Jason Gill
- ☐ Nic Willman
- ☐ Ryan Weeger
- ☐ Kenny McBride
- ☐ Dennis Lee
- ☐ Myron Ramirez
- ☐ Albert Chon
- ☐ Joe Worley

BLOCK 38

520 Westlake Ave North
Seattle, WA 98109

LEVEL P4 KEY PLAN

DIVISION	PE | Cell #
03, 05 | Structure	Kenny McBride | 206.747.6462
04 | CMU	Joe Worley | 425.449.6611
05 | Metal Stairs	Kenny McBride | 206.747.6462
07-08 | Envelope	Myron Ramirez | 425.429.1685
09 | Partitions	Joe Worley | 425.449.6611
14 | Elevators	Dennis Lee | 425.495.5109
21-28 | MEP	Dennis Lee | 425.495.5109
31-32 | Site	Albert Chon | 425.516.5711
Work Packages	Andrew Ellis | 425.229.3520

REV	DATE	BY	DESCRIPTION
00	04/06/20	AE	FOR REVIEW
01	04/24/20	AE	FOR REVIEW

GLY Job No. 1671
Date: 5/1/2020 10:06:00 AM

FOR REVIEW

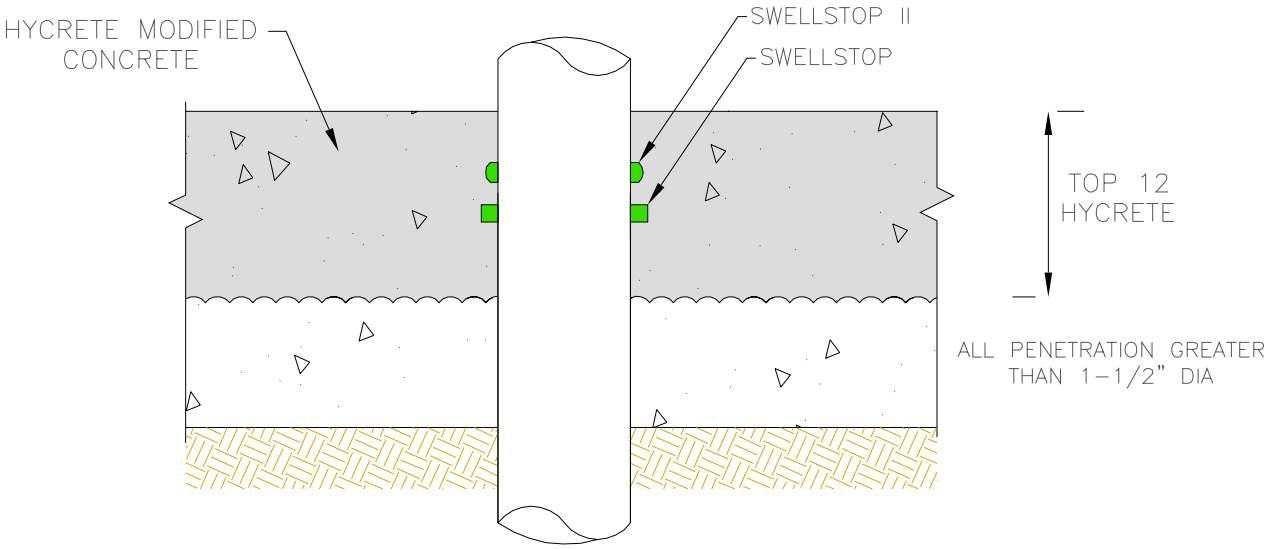
LEVEL P4 SOUTH

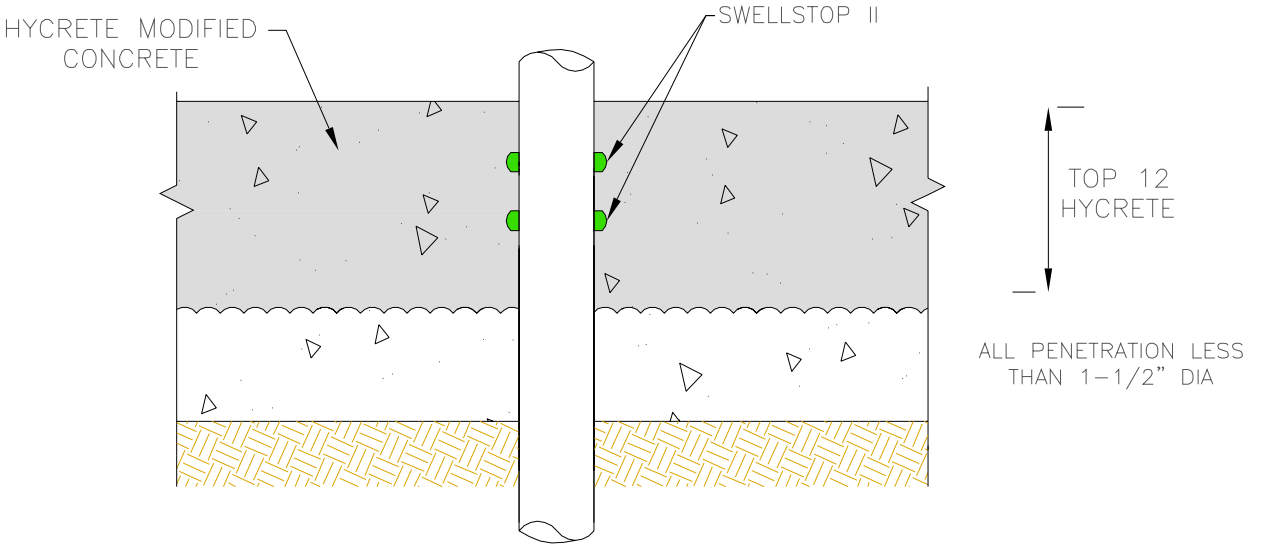
P4.S.01

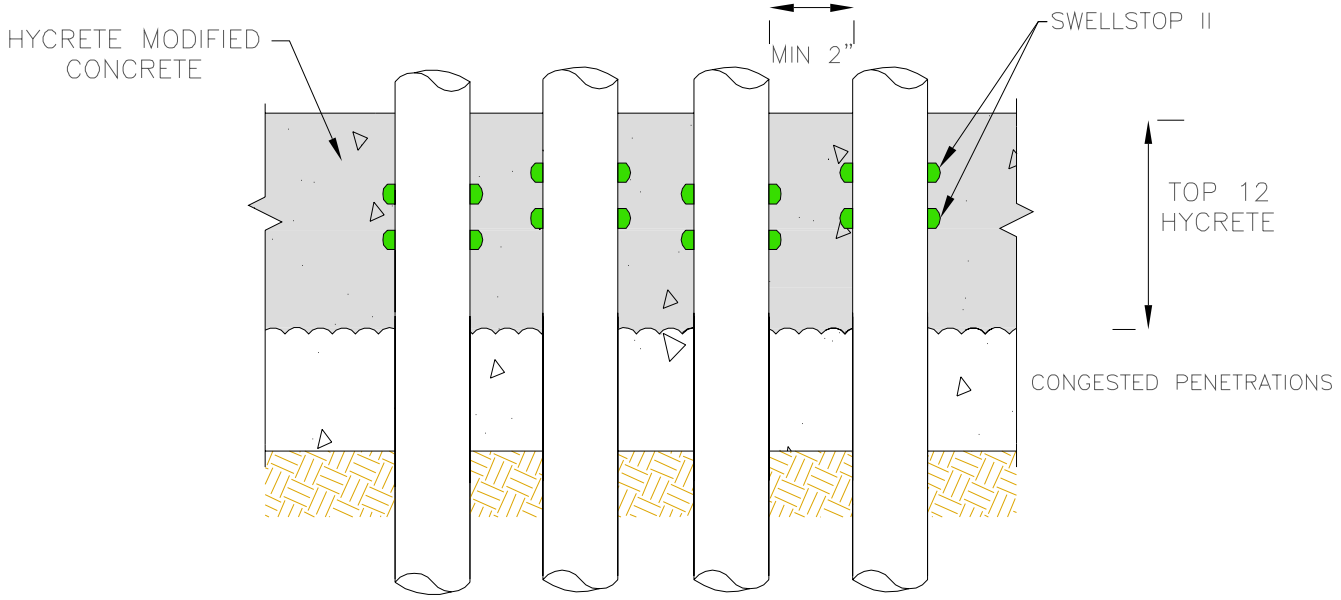
ATTACHMENT C
HYCRETE MATERIAL SPECIFICATIONS

SUPPLEMENTAL SUBSURFACE INVESTIGATION
AND FOUNDATION ELEMENTS
Block 38 West Property
500 through 536 Westlake Avenue North
Seattle Washington

Farallon PN: 397-019







- MIN 2" SPACING BETWEEN WATERSTOPS. MIN 3" CONCRETE COVER FOR SWELLSTOP & MIN 2" COVER FOR SWELLSTOP II.
- SURFACE OF JOINT MUST BE SMOOTH AND FREE FROM DIRT AND LAITANCE BEFORE FIXING WATERSTOP.
- WATERSTOP MUST BE GLUED WITH MANUFACTURERS RECOMMENDED ADHESIVE OR EQUIVALENT LIKE 3M HI-STRENGTH 90 SPRAY ADHESIVE.

Project#----	MAT SLAB PENETRATION DETAIL		Hycrete
9/ 24 / 18			
Drwn By: Fazal	BLOCK 38		201-386-8110 www.hycrete.com
Chkd By: NHM	SHEET#2	NTS	

I. Waterproofing and Hydrophobic Properties

Concrete with Hycrete admixtures achieves the highest waterproofing performance ratings of waterproof concrete mix designs.

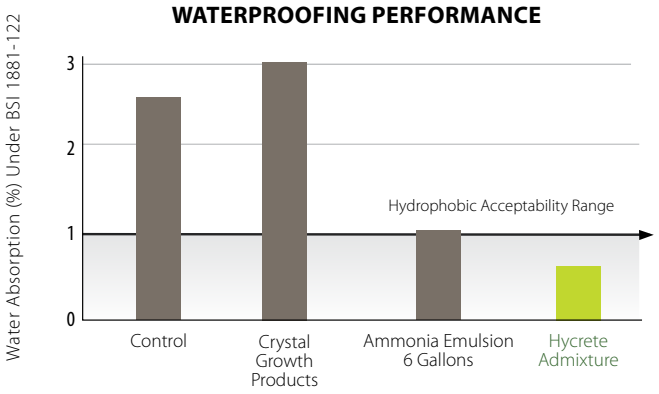
I-a. Absorption (BSI 1881-122)

BSI 1881-122 is a standard method for the measurement of capillary absorption in concrete. Capillary absorption is a powerful water transport mechanism in concrete that can result in water, chloride, and sulfate absorption, concrete surface degradation, and increased interior moisture vapor levels.

Concrete specimens are cast and cured, and then weighed. Specimens are then immersed in water for 30 minutes to simulate a typical wetting event. Finally, samples are re-weighed to measure water absorption.

Part 1 – Low w/c Ratio

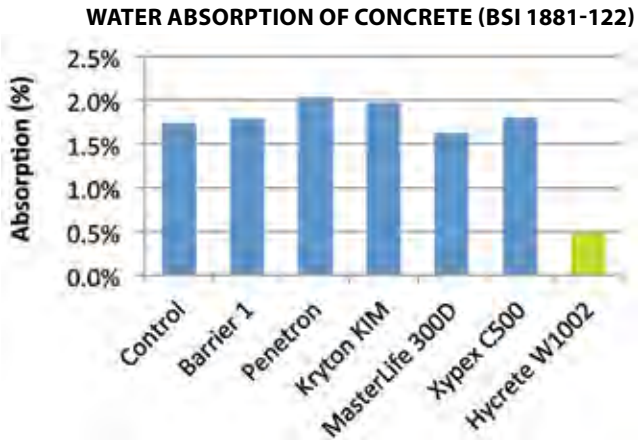
Unparalleled: This test is used as the benchmark for hydrophobic concrete. Low w/c concrete typically tests in the 2%-4% absorption range under BSI 1881-122 testing. Hydrophobic concrete is specified at less than 1% absorption. Hycrete admixtures perform at the 0.3% to 0.9% range.



South Carolina Independent Lab Testing: 40/60 Structural Mix, 0.40 W/C - 611 Type I-II Cement Polycarboxylate Superplasticizer

Part 2 – Hycrete compared to other admixtures

Specimens with Hycrete W1002 outperformed both the control and the other waterproofing admixtures by a factor of 3.3-4.2.



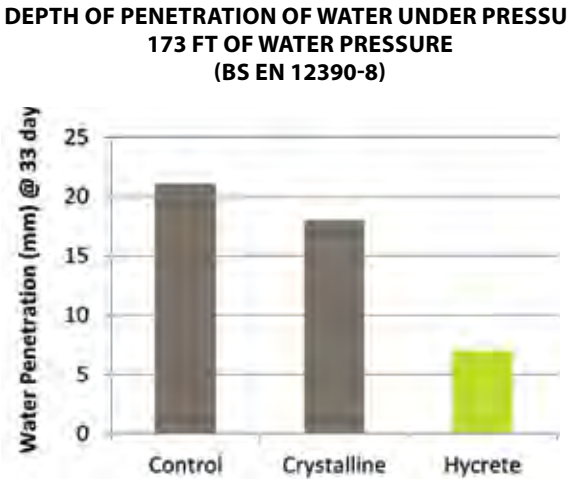
Performed by Tourney Consulting Group (TCG)

1-b. Depth of Penetration of Water Under Pressure (BS EN 12390-8)

BS EN 12390-8 is a widely used performance standard for applications requiring protection for concrete structures under hydrostatic pressure.

BS EN 12390-8 specifies a method for determining the depth of penetration of water under pressure in hardened concrete. Water is applied under pressure to the surface of hardened concrete. The specimen is then split and the depth of penetration of the waterfront is measured.

BS EN 12390-8 is conducted at the equivalent of a depth of 173 feet of water for 72 hours. Hycrete outperformed both the control and crystalline samples by a factor of 2-3.



Advanced Construction Technology Services (ACTS)

I-c. Hydrostatic Pressure Resistance (ASTM D 5385)

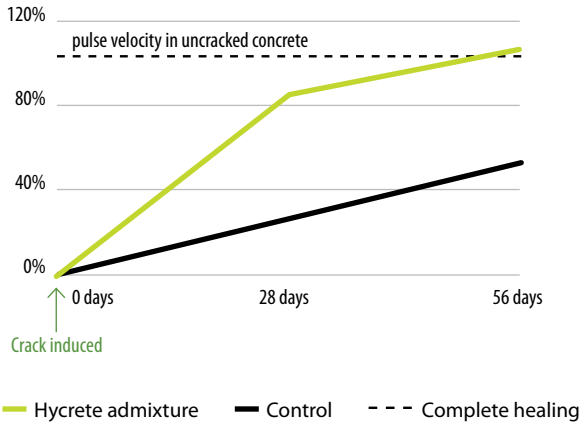
	PSI	Head of Water Pressure	Result
Hycrete admixture	100	231 Feet Resistance	No seepage

Nelson Testing Labs, Chicago, IL

I-d. Self-Healing of Cracks

Excellent: Hycrete admixtures have been tested under numerous scenarios in cracked concrete. In a test conducted by Materials Service Life, LLC, a Portable Ultrasonic Non-Destructive Digital Indicating Tester (PUNDIT device) was used to record pulse velocity through concrete. Sound waves travel faster in uncracked concrete than they do in cracked concrete. The study deliberately cracked the concrete and measured pulse velocity. As cracks heal, velocity of pulses will rise towards the velocity measured in uncracked concrete. As shown in the figure below, concrete with Hycrete admixtures fosters faster and 100% complete healing compared to the untreated control sample.

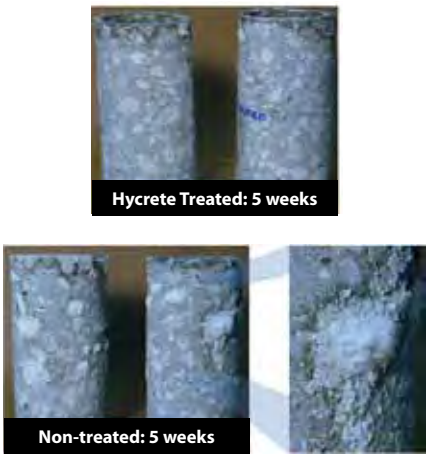
PULSE VELOCITY RECOVERY (%) OF CRACKED CONCRETE WITH TIME



Materials Service Life, LLC

I-e. Chloride Transmission

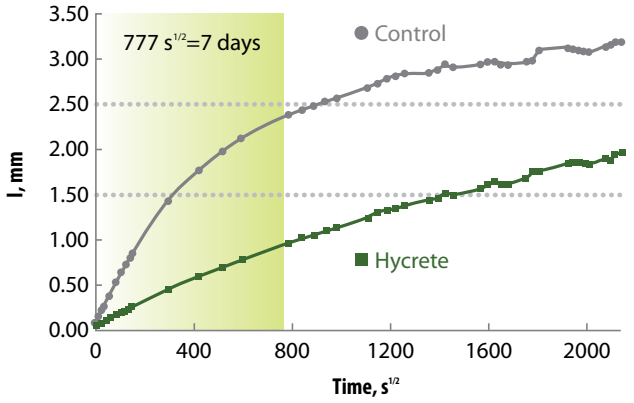
Cups made of concrete with Hycrete admixture and a control. NaCl solution was poured into the cups for a 5 week period. As seen, salt leaching was observed through the control and not through the Hycrete admixed sample.



Kansas Department of Transportation

I-f. Impact of Hycrete on Absorption (ASTM C1585) in High Performance Concrete

DETERMINATION OF CAPILLARY ABSORPTION ASTM C1585



The VTRC of the Virginia DOT conducted extensive testing of Hycrete admixtures. Hycrete performance in the ASTM C1585 absorption test demonstrates up to six times lower absorption. The testing was conducted with the Virginia DOT's standard A4 high performance concrete mixes with variations in Hycrete dosage and the inclusion of fly ash.

Virginia Transportation Research Council (VTRC), Virginia Dept of Transportation, May, 2007

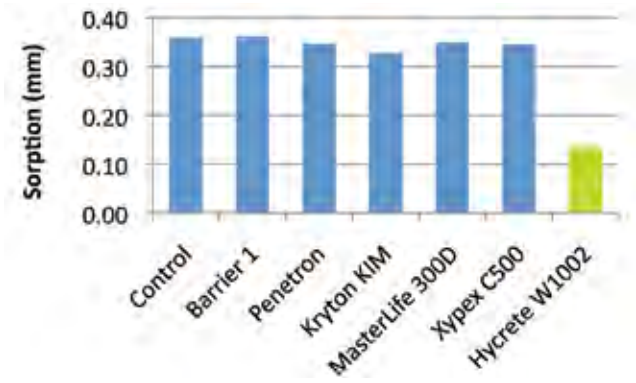
I-g. Water Sorption (ASTM 1757)

ASTM C1757 is a standard method for the measurement of one-point, bulk water sorption of dried concrete, an important measure of concrete durability.

Concrete specimens are cast and cured, and then immersed in water for 30 minutes. The specimen's gain in mass is measured and the depth to which water is absorbed in millimeters is calculated.

Specimens with Hycrete W1002 outperformed both the control and the other waterproofing admixtures by a factor of 2.4-2.7.

WATER SORPTION OF CONCRETE (ASTM C1757)



Performed by Tourney Consulting Group (TCG)

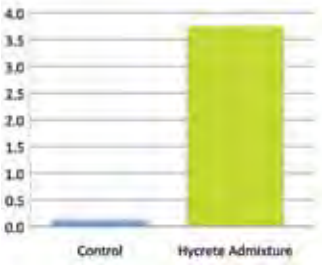
I-h. Water Penetration of Masonry Walls with a Hydrophobic Additive (ASTM E514)

Masonry walls are a common construction material and are often susceptible to moisture intrusion and associated waterborne particles, which can cause corrosion of the reinforcement and promote mold growth in confined spaces. In this test masonry walls are constructed and exposed to a simulated wind-driven rain for a period of four hours.

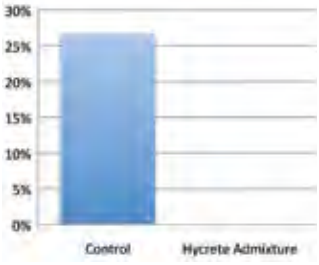
As the constructed walls with and without Hycrete Admixture were subjected to the simulated wind-driven rain, the "time of dampness" (the time it took for the first moisture to be seen on the back side of the wall) was measured. In addition, the area of dampness on the back side of the wall as a percent of the total area of the constructed wall was measured. Hycrete showed significant benefit in both cases.

The average time of dampness for the wall constructed with Hycrete was 3.75 hours compared to 8.5 minutes for the control wall.

TIME OF DAMPNESS (HOURS)



AREA OF DAMPNESS (%)



Hycrete wall
Time of dampness: 3.75 hours
Area of dampness: 0.012%

Control wall
Time of dampness: 0.14 hours (8.5 minutes)
Area of dampness: 26.679%

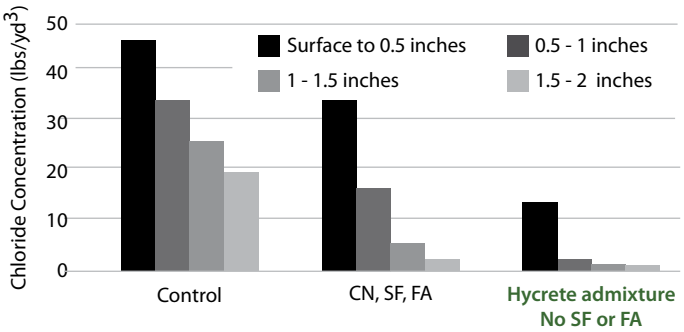
Water Penetration of Masonry Walls with a Hydrophobic Additive, US Army Engineer Research and Development Center

II. Corrosion Protection

II-a. Chloride Diffusion (ASTM G-109)

Excellent (Outperforms calcium nitrite/silica fume/fly ash mixes)

CHLORIDE DIFFUSION COMPARISON BETWEEN CALCIUM NITRITE/ SF/FA COMBINATION AND CONCRETE WITH HYCRETE ADMIXTURE



University of Massachusetts: w/c 0.40, Admixture: Calcium Nitrite (3 gal./yd^3), Silica Fume (6%), Fly Ash (15%), Hycrete admixture (2 gal./yd^3) Double-ASTM G-109 blocks, Salt Ponding Regime 12 weeks of 4 day ponding, then 12 weeks of continuous ponding. Approximately 3 years ponding.

II-b. Corrosion Inhibition

Hycrete admixture and rebar in NaCl solution of pH 13 for 28 days illustrated below.

Rebar in 6% Hycrete admixture & NaCl Solution. No Damage Measured.

NaCl Solution 0.11%. Steel Loss.

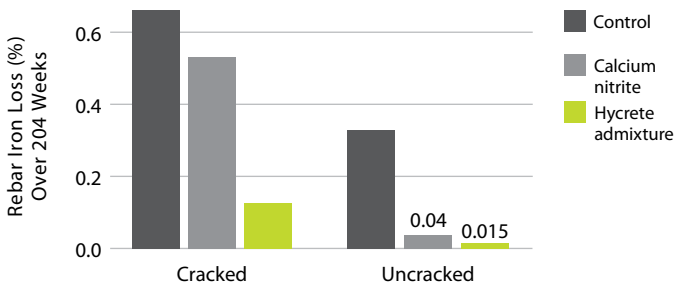
No rust **0.11% Steel Loss**

Materials Service Life, LLC

II-c. Corrosion Protection of Steel in Cracked Concrete

Hycrete admixtures have been the focus of a number of government commissioned corrosion inhibition studies. In one such study, 204 weeks of cycled ponding and drying in sodium chloride solution were evaluated for corrosion by macrocell measurements leading to a calculation of iron lost. Both uncracked and cracked specimens were evaluated, and a number of competitive corrosion inhibitors were studied. The results indicate that corrosion is accelerated by cracking and that Hycrete admixtures are able to inhibit corrosion compared to the controls and to calcium nitrite treated specimens in both uncracked and cracked concretes.

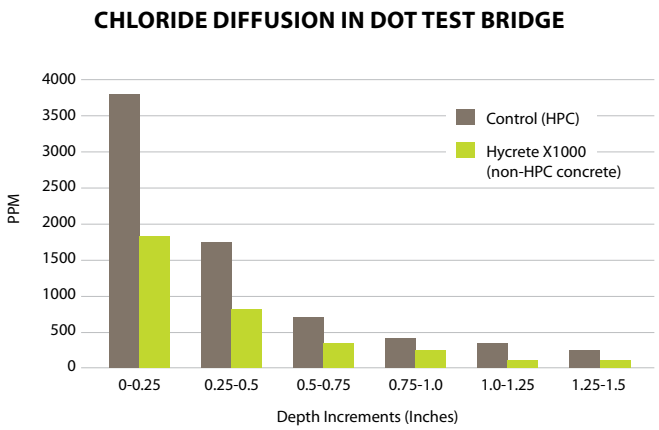
CORROSION PERFORMANCE



Hycrete effectively reduces rust even in cracked concrete.

University of Massachusetts

II-d. Chloride Diffusion in DOT Test Bridge



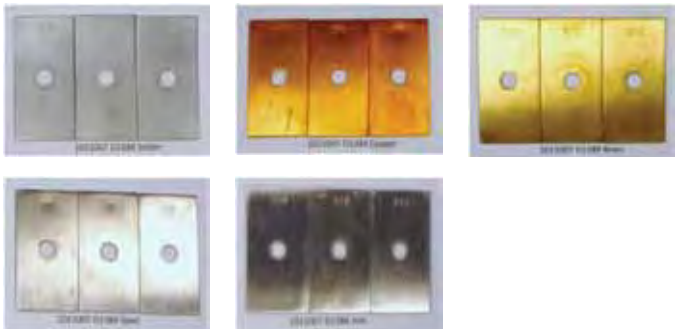
Hycrete reduces chloride penetration at all depths.

The New Jersey DOT installed test bridge decks on Route 130 in 2006. The control deck utilized the standard NJ DOT high performance concrete (HPC) mix; the test deck included Hycrete admixtures. Core samples taken in late 2009 show a dramatic benefit in chloride resistance in the Hycrete deck. Chloride concentrations in the Hycrete deck were up to 3.5 times lower; a Hycrete-treated deck could be expected to be considerably more durable than a deck constructed with the standard DOT HPC mix design.

Tourney Consulting Group (TCG), December, 2009

II-e. Corrosion on Metals (ASTM D1384)

Hycrete has been tested to evaluate its effectiveness in preventing corrosion on metals. Metal specimens are immersed in a solution with corrosive salts and Hycrete for 336 hours at 88ºC. The corrosion inhibition properties of the test solution are evaluated on the basis of the weight changes incurred by the specimens. Hycrete has been shown to protect copper, solder, brass, steel, and iron, among other metals.

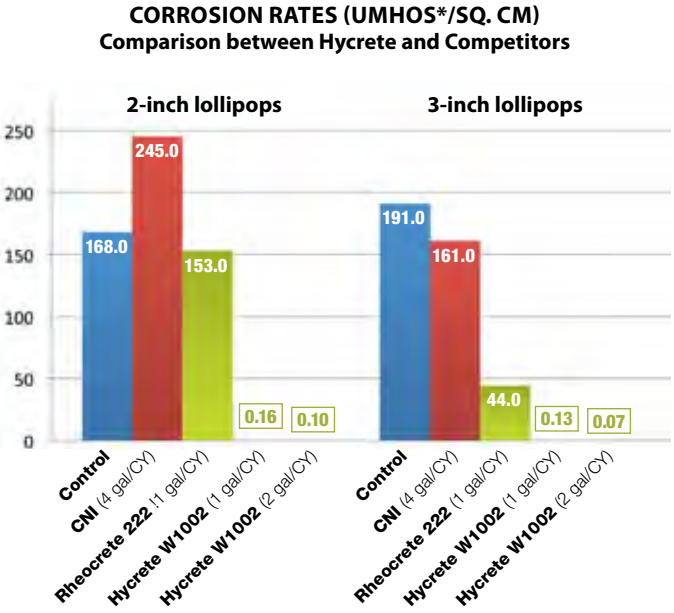


Hycrete stops corrosion in iron, steel, copper, brass and silver.

Source: ASTM D1384; Amalgamated Laboratories, Inc.

II-f. Corrosion Rates After 100 Weeks of Wet/Dry Cycling in 15% Salt Water

Hycrete stops corrosion by 99%+



*µmhos (micromhos) is a measure of the electrical conductivity of a solution.

After 100 weeks of wet/dry cycling in 15% salt water, visual inspection showed no brown staining on the Hycrete lollipop samples and no corrosion of the rebar. The Control, CNI, and Rheocrete 222 lollipops all showed brown staining on the concrete surface and significant corrosion of the rebar.

Control

With Inhibitor (CNI 4gal yd³)

With Hycrete

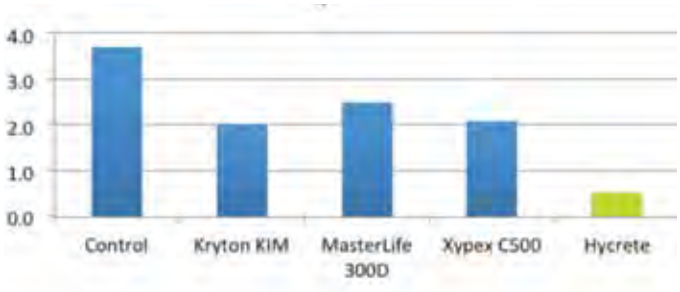
University of Connecticut "Protection of Reinforcement with Corrosion Inhibitors" by Professors Gregory C. Frantz and Jack E. Stephens

II-g. Bulk Chloride Diffusion (ASTM C1556)

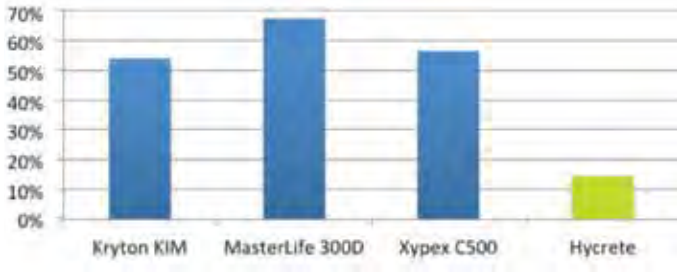
In independent testing performed by Tourney Consulting Group (TCG), the chloride diffusion performance of concrete with four concrete admixtures (including Hycrete admixture) was evaluated alongside a control according to modified ASTM C1556. TCG followed modified-ASTM C1556 Apparent Chloride Diffusion Coefficient to estimate chloride penetration into cementitious mixtures that are in a saturated condition. Concrete samples are moist-cured for 28 days prior to drying for four weeks. Then the samples undergo a cycle of one week of chloride soaking followed by one week of ambient drying for a period of 90 days.

Specimens with Hycrete admixture outperformed both the control and the other waterproofing admixtures by a factor of 3.8-7.0.

MODIFIED ASTM C1556 BULK CHLORIDE DIFFUSION
Mean D_a, m^2/s ($x10^{-11}$)



MODIFIED ASTM C1556 BULK CHLORIDE DIFFUSION
as a % of Control



Tourney Consulting Group (TCG)

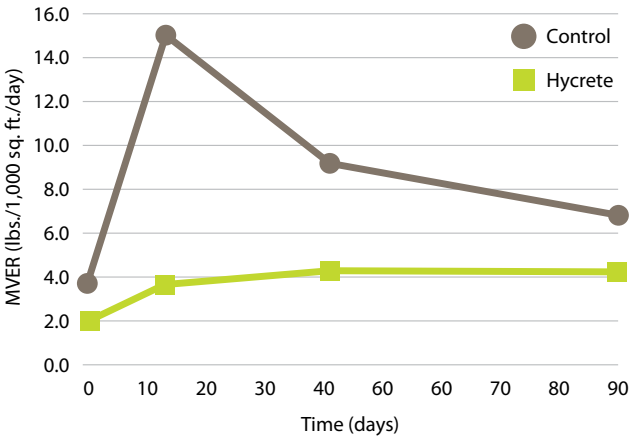
III. Moisture Protection For Flooring, Coatings, And Sealants

III-a. Moisture Vapor Transmission (ASTM F1869)

Modified Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

Specimens are moist cured for seven days followed by 50% RH drying for a period of 94 days to observe drying rates. Specimens are then oven dried for three days followed by one day of cooling. Then the specimens are placed in containers with water such that the bottom one-inch of the slab is constantly immersed in water and a 50% RH atmosphere is maintained on the top surface. Measurements were taken at 1, 13, 41, and 90 days.

SLAB MOISTURE VAPOR EMISSION
WITH SIMULATED GROUNDWATER EXPOSURE
Moisture vapor measurements at dry surface of concrete slab



(Placed in one inch of water)

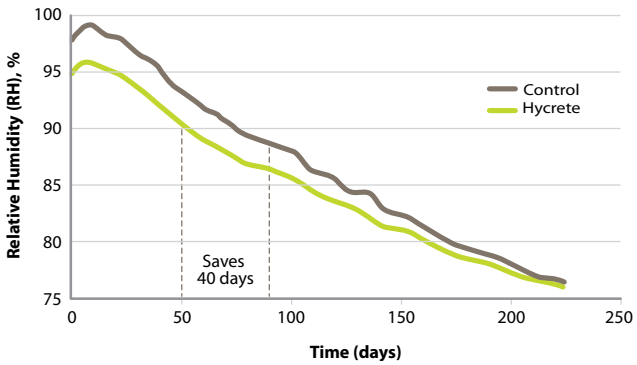
CTL Group, Skokie, IL: w/c 0.39; 700 lbs cementitious; 15% fly ash

III-b. Relative Humidity (RH) (ASTM F2170)

Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes

Concrete slabs are cast and instrumented with relative humidity (RH) probes to measure internal relative humidity over time. A probe is suspended in air close to the slabs to record ambient temperature and relative humidity. The slabs are exposed to ambient temperature and relative humidity, which is meant to mimic typical field construction exposure conditions.

RELATIVE HUMIDITY
0.50 W/C Control, 0.42 W/C Hycrete, 40mm depth

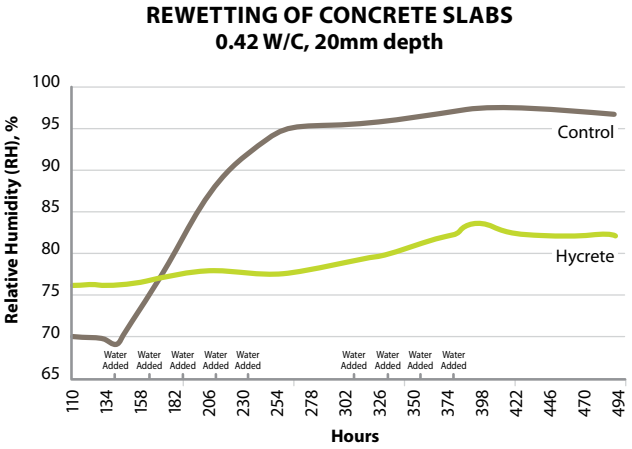


CTLGroup, Skokie, IL

III-c. Concrete Rewetting (ASTM F2170)

Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes

Samples are soaked in ½ inch of water for one hour each day and then dried to simulate real-world conditions. Relative humidity is measured at a depth of 20mm using in situ probes.

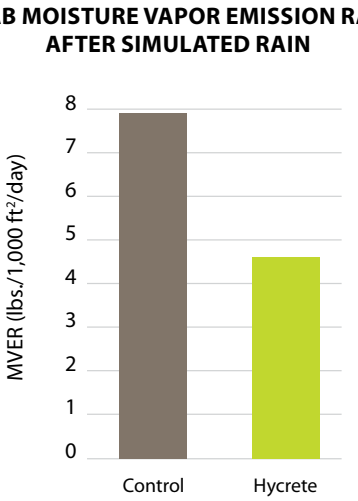


CTLGroup, Skokie, IL

III-d. Absorption Upon Rewetting of Concrete (ASTM F1869)

Modified Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

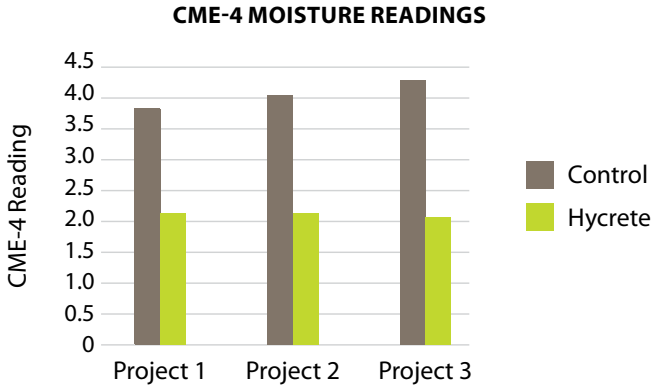
Specimens are moist cured for seven days followed by 50% RH drying for a period of 94 days to observe drying rates. Specimens are then oven dried for three days followed by one day of cooling. Then the specimens are immersed in water for 15 minutes to simulate a rain (or other wetting) event. Finally, the specimens are dried at 50% RH for 15 hours.



CTLGroup, Skokie, IL

III-e. Moisture Content

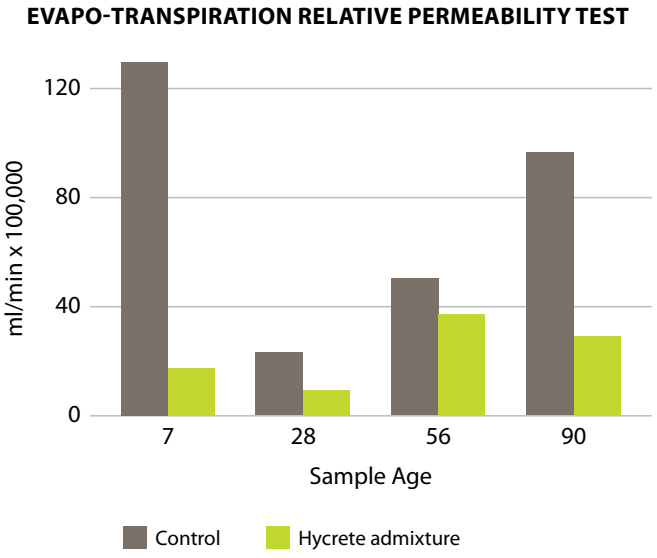
Moisture readings were taken at several completed projects using a CME-4 meter. Results indicate significantly lower moisture content in concrete containing Hycrete admixtures compared to control concrete.



Southwest Inspection and Testing, Inc., La Habra, CA; samples were taken from three projects with different mix designs

III-f. Evapo-Transpiration Relative Permeability

Hycrete admixtures demonstrated a 68% vapor transpiration reduction compared to the control at 90 days. Resistance to capillary flow of water through the concretes was measured using the Kansas evapo-transpiration test, in which a desiccant on one side of a one-inch-thick sample draws water from the other side.

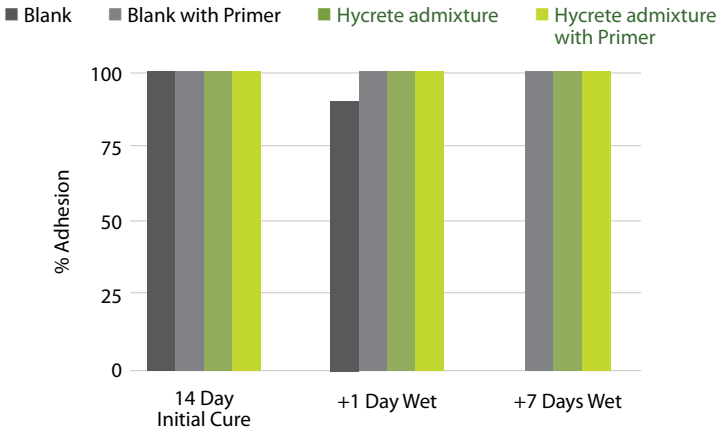


Kansas Department of Transportation: 0.42 w/c 600 lbs cement Hycrete 2 gal./yd^3

III-g. Adhesion

Hycrete admixtures are compatible with most concrete admixtures and coatings and are not known to affect adhesion. For specific questions relating to your project please contact Technical Services.

SILICONE ADHESION TO HYCRETE TREATED CONCRETE

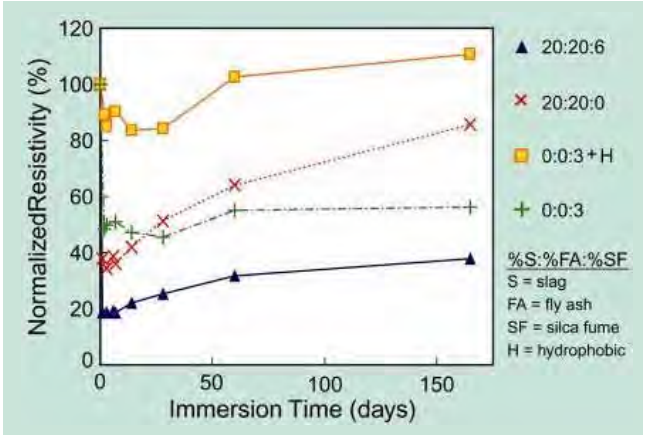


GE Silicones Construction Laboratory, Waterford, NY

IV. Electrical Resistance and Sulfate Protection

IV-a. Electrical Resistivity

Concrete with Hycrete admixture was measured with the intent of maximizing resistivity to prevent the transmission of stray current from an electric trolley line from corroding underground piping. Hycrete admixture (designated "H" here) was shown to resist the decrease in resistivity shown by alternative concretes when exposed to water, which is critical to controlling stray currents in environments where rain occurs.



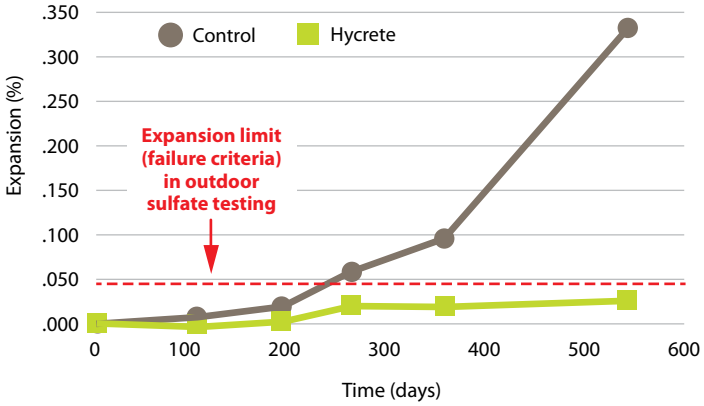
Hycrete maintains concrete's resistivity. Slag, fly ash and silica fume do not when exposed to water.

Figure reproduced with permission and gratitude to John S. Tinnea & Associates and NACE International from Burke, et. al., Materials Performance, September 2007, pp. 2-8. © NACE International 2007.

IV-b. Sulfate Protection

The influence of Hycrete admixtures on the durability of concrete exposed to sulfates was examined at the University of Texas at Austin, Concrete Durability Center, in a study funded by the United States Army Corps of Engineers. Concrete with Hycrete admixture was exposed to sulfates in both outdoor and laboratory sodium sulfate exposure sites. The outdoor study includes exposure to a sodium sulfate pond with a concentration greater than 2% by mass (this condition is consistent with class three sulfate exposure per ACI 318-08). In the outdoor sulfate testing, an expansion limit of 0.04% is the failure criteria. The control mixture at 18 months expanded 0.33% while the Hycrete mixture had only expanded 0.03%.

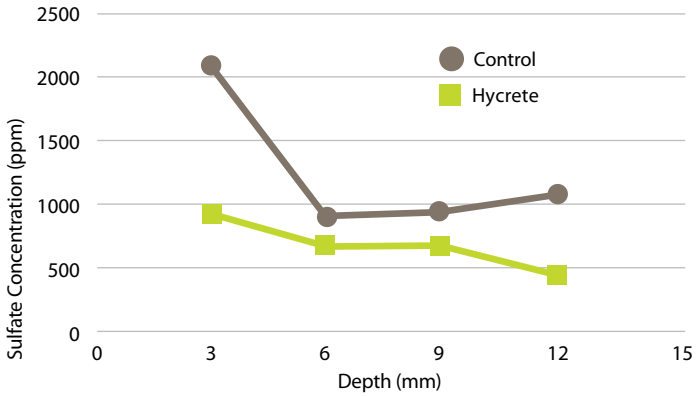
EXPANSION OF 0.7 W/CM MIXTURES IN THE OUTDOOR SULFATE EXPOSURE



Hycrete retards cracking due to soil, seawater and sewage borne sulfates.

Sulfate penetration was also tested in the outdoor sulfate exposure site. In every case tested, the sulfate concentration was lower in the mixtures containing Hycrete. Mixtures containing Hycrete outperformed control mixtures.

SULFATE PENETRATION IN THE OUTDOOR SULFATE EXPOSURE



Hycrete slows the penetration of sulfates

External sulfates are known to cause deterioration to concrete through chemical reactions. X-Ray diffraction (XRD) was used to determine the chemical reaction changes that are occurring in concrete. The XRD is occurring on samples after 18 months of storage in the sulfate outdoor exposure site in Austin, TX.

Figure 1 provides the XRD patterns at different depths for the submerged Control prism. In the outer 0-3mm, the calcium hydroxide has been depleted. Further into the specimen the calcium hydroxide amount has increased. In addition, ettringite formation has formed within each interval along with a small amount of gypsum. Figure 2 shows the XRD pattern for the submerged prism for Hycrete. Calcium hydroxide has not been depleted at any depth within this sample, and ettringite formation has not occurred.

Mixtures with Hycrete did not show the calcium hydroxide depletion and ettringite formation that was seen in the control mixtures. Overall, the mixtures with Hycrete provided a higher tolerance to sulfate attack.

FIGURE 1: X-RAY DIFFRACTION AT DIFFERENT DEPTHS FOR SUBMERGED CONTROL SPECIMEN

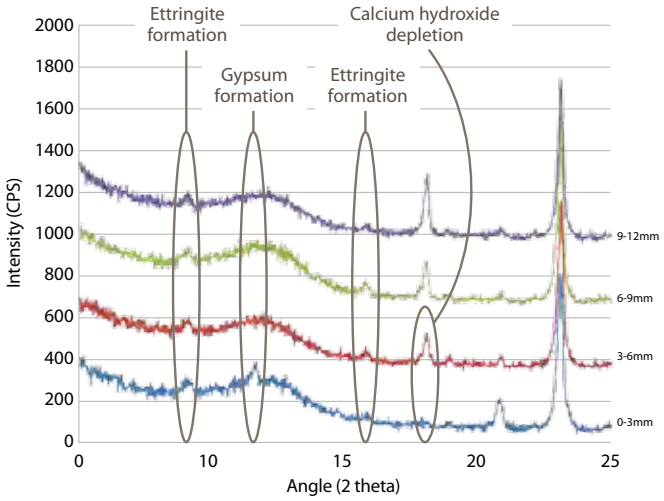
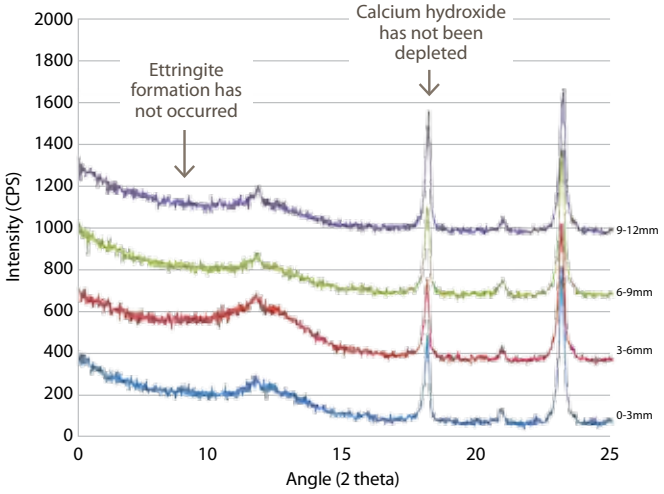


FIGURE 2: X-RAY DIFFRACTION AT DIFFERENT DEPTHS FOR SUBMERGED HYCRETE SPECIMEN



The Calcium Hydroxide that protects concrete from sulfate cracking and pitting is not consumed when Hycrete is incorporated

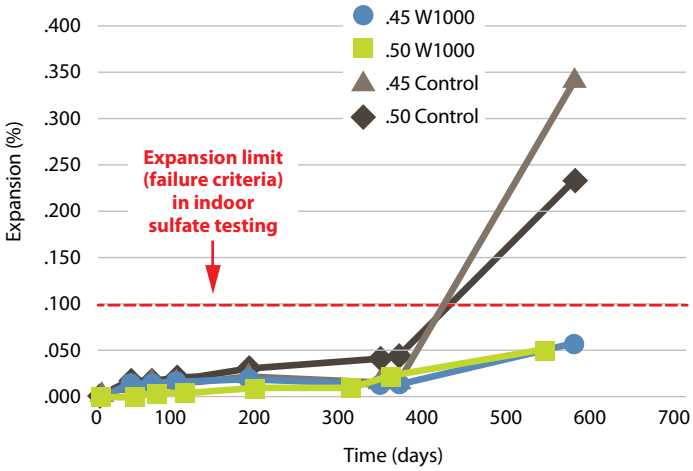
Visual signs of chemical and physical sulfate attack were also documented. Hycrete treated specimens showed less distress versus control specimens.

Control prisms after 18 months of exposure

Hycrete prisms after 18 months of exposure

Hycrete was also tested in a laboratory static immersion test according to ASTM C1012 Modified. A failure criterion of 0.10% expansion is shown in the following graph as it is the failure criterion in most guidelines (e.g., ACI). The modification employs cyclic immersion as a way of accelerating deterioration and for better elucidating the effects of integral water repellents on sulfate resistance. Several specimens with different water-cement ratios were used. Hycrete specimens had lower expansion values than control specimens in all instances.

EXPANSION OF CONCRETES AT .45 AND .50 WATER/CEMENT



Control *Hycrete*

INDOOR SPECIMENS AFTER 18 MONTHS OF EXPOSURE TO SODIUM SULFATE SOLUTION. The visual inspection of all the mixtures showed that Hycrete was performing better than the control.

Durability of Hycrete-Treated Concrete Exposed to External Sulfates – Forensics Investigation. Submitted by Kevin J. Folliard, Thano Drimalas, and Michael D.A. Thomas

IV-c. Surface Protection

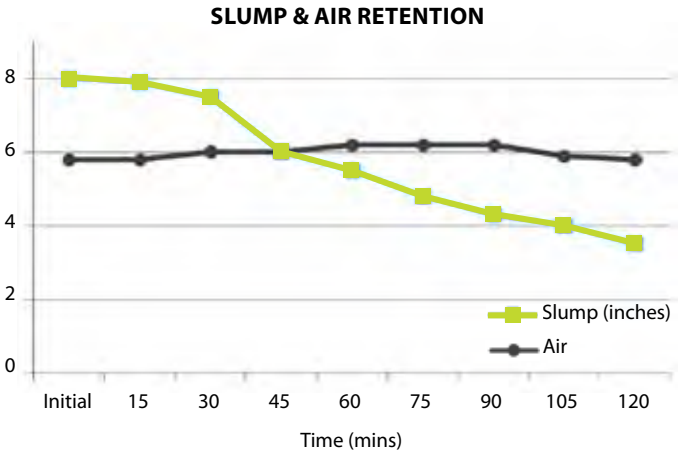
In 2003 Connecticut DOT constructed highway barriers with and without Hycrete admixture along Interstate 84 in Connecticut to test the effectiveness of Hycrete in protecting the concrete from corrosion and exposure to the elements. The same mix design was used in both cases and the Control and Hycrete barriers were alternated to account for potential differences in field conditions. After eight years in service the barriers were tested and photographed. The Control barriers showed signs of spalling and exterior deterioration; the Hycrete barriers are intact.

Hycrete greatly reduces spalling due to freeze thaw cycles.

V. General Concrete Properties

V-a. Plastic Concrete Properties

Workability & Cohesion: Excellent
Slump Retention: Excellent – Neutral
Air Content: Highly Stable – Neutral



Pacific NW Independent Lab Testing: 40/60 Structural Mix .42 W/C- 590 lbs Cementitious 20% Class F Flyash Polycarboxylate Superplasticizer

V-b. Setting Time

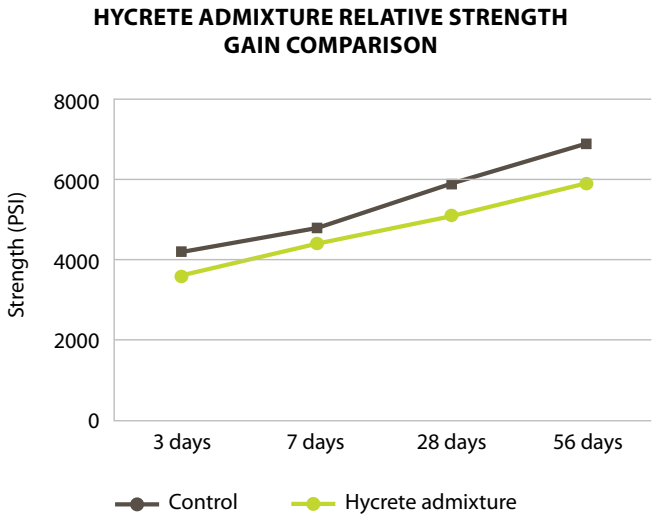
Set Neutral **Typically +/- 30mins of Control**

	Control	Hycrete admixture
Set Time, Initial, hrs	4:59	4:39
Set Time, Final, hrs	6:05	5:47

New Jersey Department of Transportation Data

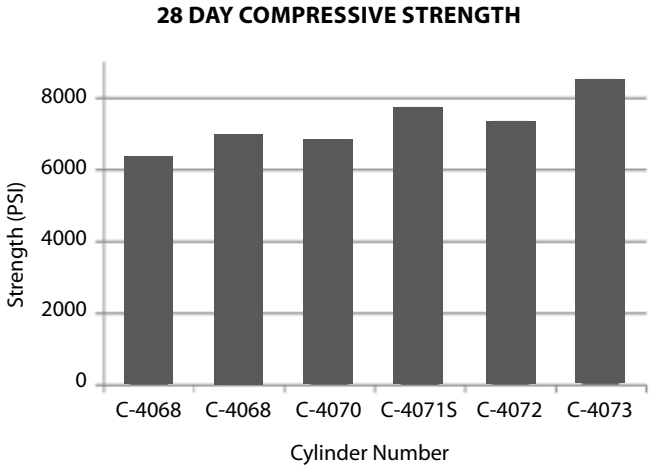
V-c. Hardened Concrete Properties

Compressive Strength: Concrete treated with Hycrete admixture meets ACI strength guidelines for structural concrete.



Kansas Independent Lab Testing: 40/60 Structural Mix 0.40 W/C – 600 lbs Type I - II OPC

V-d. Production Strengths



Meritage Project: Seattle, WA 0.40 wc, 655 cementitious, Hycrete admixture

V-e. Freeze-Thaw (ASTM C666)

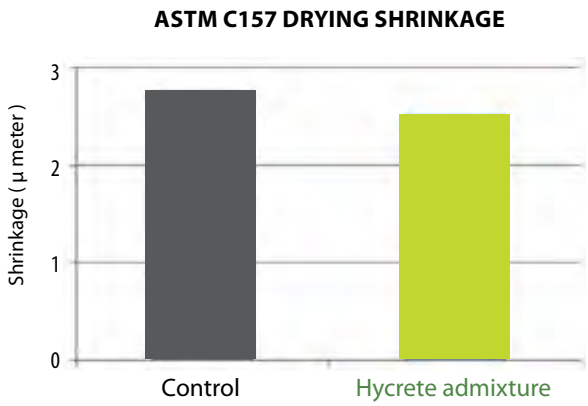
Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing

Concrete with Hycrete admixture is air entrainable and meets the vigorous demands placed on concretes used in severe winter weather conditions. (Result: Pass; 300+ cycles with durability readings of 90+)

New England Transportation Consortium

V-f. Drying Shrinkage (ASTM C157)

Shrinkage of concrete is dependent upon numerous factors. Hycrete admixtures have generally been shrink neutral.



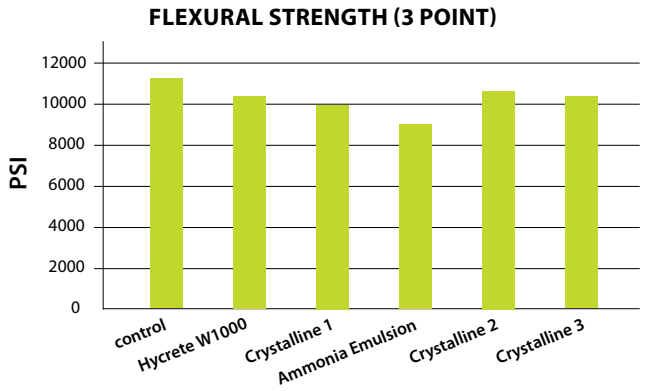
Nelson Testing Labs, Chicago, IL: 40/60 Structural Mix .40 W/C 565 lbs Cementitious 24% Type F Flyash Water Reducer

V-g. Shotcrete Performance

Rebound: Excellent	Stand up: Excellent
Odor: Neutral	Set Time: Neutral
Consolidation: Excellent	Absorption: Superior

Northern California Independent Lab Testing: 70/30 Shotcrete Mix780 lbs Cementitious - 25% Slag 0.38 W/C Polycarboxylate Water Reducer

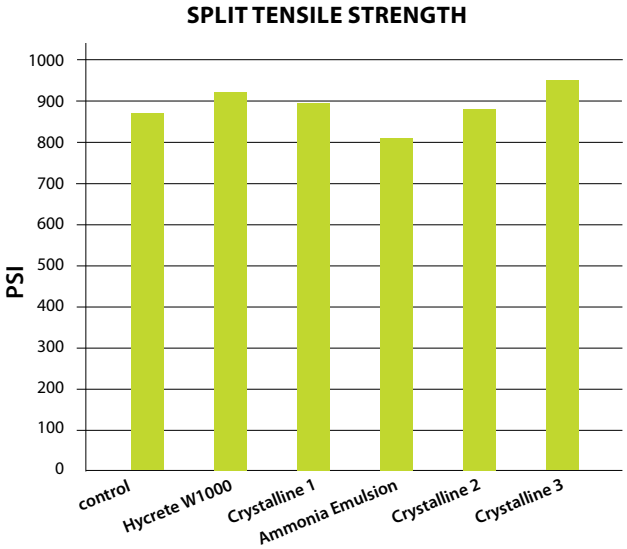
V-h. Flexural Strength Testing (ASTM C78)



Internal testing conducted by Hycrete correlates Hycrete flexural strengths to compressive strengths in accordance with standard engineering relationships. This testing demonstrates that Hycrete admixtures have negligible impact on flexural strength in concrete.

Conducted by Hycrete, 2007

V-i. Split Tensile Strength (ASTM C496)



Testing conducted at the New Jersey Institute of Technology shows negligible impact on tensile strength in concrete incorporating Hycrete admixtures.

NJIT, 2007

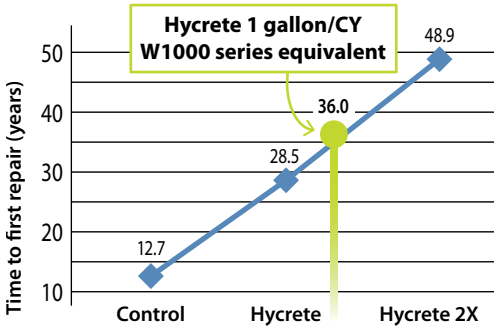
VI. U.S. Army Corps of Engineers Life 365™ Modeling in Various Applications and Climates

Hycrete more than triples the structural and cosmetic life of concrete.

In independent modeling performed by Tourney Consulting Group (TCG) for the U.S. Army Corps of Engineers (USACE), the durability of concrete with Hycrete admixtures was compared to standard control concrete mixes used by USACE. The analysis includes modeling conducted using Life 365™, an open software program. This Life 365™ analysis predicted the time in years until the first repair and the cost effectiveness when using Hycrete. It concluded that in all scenarios Hycrete significantly increased the time until first repairs and provided significant cost savings. Here are summarized results from the study.

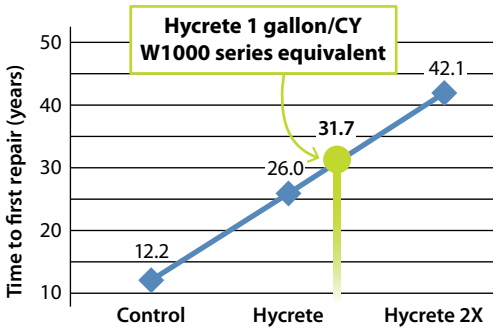
FORECASTED TIME TO INITIAL REPAIR – COMPARISON BETWEEN USACE CONTROL AND HYCRETE

Chicago Bridge Deck – 2.5" cover, W/C 0.35



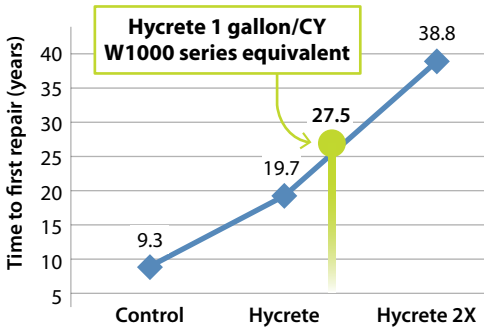
Chicago Bridge Deck *– The model included exposure to deicing salts in Chicago, IL. The Control is a USACE standard cold weather mix.*

Chicago Parking Deck – 2.5" cover, W/C 0.35



Chicago Parking Deck – *The model included exposure to deicing salts in Chicago, IL. The Control is a USACE standard cold weather mix.*

Hawaii Seawall in Tidal Zone – 2.5" cover, W/C 0.35



Hawaii Seawall in Tidal Zone – *The model included exposure to salts in the tidal zone in Honolulu, HI. The Control is a USACE standard warm weather mix.*

VII. Environmental

VI-a. Contributions to LEED

MR 2.1 – Construction Waste Management

Hycrete admixtures have zero construction site waste, eliminating the waste streams from traditional membranes.

MR 4.1/2 – Recycled Materials

Hycrete admixtures contain 80% pre-consumer recycled materials.

MR 5.1/2 – Sourced Locally within 500 Miles

Hycrete admixtures are manufactured in Newark, NJ.

Innovation in Design – "Membrane-Free Construction"

Hycrete materials offer the opportunity to eliminate the use of membranes, providing substantial reduction in jobsite material used, pollutants emitted, non-recyclables consumed, and labor used. Based solely on the use of the Hycrete System, this Innovation In Design credit has been successfully submitted and approved by the USGBC in previous projects.

Innovation in Design – 2.5% of Building Materials Cradle to Cradle^{CM} Certified

An ID point can be achieved for a total of 2.5% of a building's material use Cradle to Cradle^{CM} Certified. Hycrete admixtures are Cradle to Cradle^{CM} Certified Gold.

VI-b. Cradle to Cradle^{CM} Certified Gold

The Cradle to Cradle^{CM} philosophy embraces a fundamental change in our disposable society – from cradle to grave to Cradle to Cradle^{CM}. Hycrete admixtures are Cradle to Cradle^{CM} Certified Gold.

VI-c. NSF/ANSI 61 Certified

Drinking Water System Components – Hycrete admixtures have been tested and approved for use in potable water applications.

Results shown are actual test results. Hycrete, Inc. provides no warranty, expressed or implied, based on the findings in this document.

HYCRETE, INC. | 462 BARELL AVENUE | CARLSTADT, NJ 07072 USA | PHONE: (+1) 201.386.8110 | FAX: (+1) 201.386.8155 | WWW.HYCRETE.COM

5001002-SEP15

Hycrete, Inc.
14 Spielman Road
Fairfield, NJ 07004
Office: (201) 386-8110
Fax: (201) 386-8155
Website: www.hycrete.com

SECTION 03 05 12

WATERPROOF CONCRETE CONSTRUCTION

OUTLINE SPECIFICATION

This outline specification is available for insertion into your concrete specification. You should ensure that the concrete design and construction quality requirements in your concrete specification meet the long-form version of this specification, available as a separate document, in order that Hycrete System W waterproof concrete construction can meet performance requirements.

Hycrete System W consists of: (1) Hycrete W1000 hydrophobic concrete admixture, a green, high-performing admixture which reduces the absorptivity of concrete; (2) Service during design, preconstruction, and construction; and (3) Performance warranty.

Please note that the service and performance warranty are only available when the application is suitable for membrane-free construction and approved by Hycrete. Please contact Hycrete to ensure that the full system can be available for your project.

For information on Hycrete System W, including performance and applications, please contact Hycrete, Inc. or visit www.hycrete.com.

For best results, display hidden notes to specifier – click on ¶.

PART 1 GENERAL

1.01 SUMMARY

A. This section specifies concrete with Hydrophobic Concrete Admixture and System as indicated on the project drawings for the following:
   1. Footings
   2. Foundation walls
   3. Slabs-on-grade
   4. Suspended slabs
   5. Water tanks
   6. Tunnels
   7. (Other-specify)

1.02 SUBMITTALS

A. Shop Drawings: Submit concrete placement procedures and plan drawings showing locations of isolation joints, contraction (control) joints, and construction joints for slab-on-grade concrete. Concrete waterproofing-related drawings will be reviewed and approved by the Hydrophobic Concrete Admixture Manufacturer technical personnel before submittal.

1.03 QUALITY ASSURANCE

A. Hydrophobic Concrete Admixture Manufacturer Qualifications: Hydrophobic Concrete Admixture Manufacturer will have a minimum of 5 years of experience on projects of similar scope.

B. Manufacturer quality assurance during design, preconstruction and construction:
   1. Hydrophobic Concrete Admixture Manufacturer will review and approve the waterproofing details and procedures, including the joint detailing, the waterstop detailing, the reinforcing steel detailing, and all related information.
   2. Hydrophobic Concrete Admixture Manufacturer will review and approve the service penetration details prior to installation.

3. Hydrophobic Concrete Admixture Manufacturer will provide pre-placement and placement inspection of hydrophobic concrete production and installation and document specification compliance.
4. Hydrophobic Concrete Admixture Manufacturer will provide pre-placement and placement inspection of waterstop installation and document specification compliance.

1.04 SLAB OR MEMBER THICKNESS

A. Thickness of slab and other member to provide waterproofing to be as specified and not less than 6 inches. Any slab or other member to provide waterproofing that has a thickness of less than 6 inches to be increased to 6 inches, with design approved by the Engineer.

1.05 PRE-INSTALLATION CONFERENCE

A. Attendance: Contractor, installer, owner, architect, structural engineer, civil engineer, Hydrophobic Concrete Admixture Manufacturer representative, batch plant representative, and those requested to attend.
B. Meeting Time: Minimum of 3 weeks prior to the beginning of the work of this Section and work of related Sections affecting the work of this Section.
C. Location: Project site.
D. Review procedures for conducting work of this Section, including:
   1. Review of mix design and mix test results.
   2. Mixing procedure.
   3. Conditions for acceptance of concrete at project site.
   4. Placement procedures.
   5. Finishing options and procedures.
   6. Curing and crack control procedures.
   7. Testing for acceptable moisture emissions, alkalinity pH levels, and relative humidity of concrete slab prior to installation of finish flooring.
   8. Affect of the above on the project schedule.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Conform to provisions of the Section 01 65 10 and the Hydrophobic Concrete Admixture Manufacturer instructions.
B. Mixing and Delivery: Conform to ASTM C94.
C. Sampling at Delivery: Conform to ASTM C172. Cure 4-inch by 8-inch cylinders to provisions of ASTM C31 and compression test compressive strength of cylinders to ASTM C39.
D. Batch Tickets: Conform to ASTM C94 Option A or C. Accompany each load, fully executed, and signed. Log in with inspector at time of entry. Conform to Source Quality Control requirements specified by this Section.
   1. Include water content and water withheld at batch plant.
   2. Indicate time to nearest minute that batch was dispatched from plant, when it arrived at site, and when unloading began and was finished.
   3. Indicate ambient air temperature and concrete internal temperature at time of arrival.
   4. Make written record of water and other additives added to design mix, and the amount of concrete in the truck at the time of addition, after the mix truck left the batch plant.
E. Reject concrete that has reached internal temperature of 89 degrees Fahrenheit or above and when temperature has risen 5 degrees in 10 minutes, indicating concrete is setting up prior to discharge.
F. Store products in accordance with ACI 301. Do not use admixtures that have been in storage at project site for more than 12 months or which have been subjected to freezing, except as accepted by the Hydrophobic Concrete Admixture Manufacturer and by the structural engineer based on test results.

1.07 WARRANTY

A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.
B. Manufacturer's Warranty: Submit, for owner's acceptance, Hydrophobic Concrete Admixture Manufacturer's standard warranty document executed by an authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights owner may have under the contract documents.

PART 2 PRODUCTS

2.01 HYDROPHOBIC CONCRETE ADMIXTURE

A. Product generic name: Water-Based Hydrophobic Concrete Admixture for Waterproof Construction plus Service and Performance Warranty.

B. Product name: Hycrete System W, as manufactured by Hycrete, Inc., 14 Spielman Road, Fairfield, New Jersey, 07004, telephone (201) 386-8110, website www.hycrete.com.

C. Physical properties
   1. Admixture to meet or exceed British Standards Institute (BSI) 1881-122 testing to performance of <1% water absorption.

D. Warranty
   1. 10 year IntegraTek waterproof warranty, which covers cost of repair of any leak in protected areas through industry-accepted and approved means.

2.02 MIXES

A. The concrete ready mix supplier must contact the Hydrophobic Concrete Admixture Manufacturer before designing and testing any new mix designs, to receive guidance on achieving proper water absorption characteristics. The concrete ready mix supplier must also report the test results to the Hydrophobic Concrete Admixture Manufacturer. All values must be within the specification limits.
   1. All concrete materials used for testing must be same as concrete materials used for construction.
   2. Test result requirements for Hydrophobic Concrete in addition to engineer's performance requirements: Corrected 30 minute water absorption, age at test 7 days (BS 1881-122): Not greater than 1.0%

B. Waterproofing System: All concrete in the locations listed in section 1.01 will be waterproofed by the addition of Hydrophobic Concrete Admixture and additional ingredients including:
   1. Hydrophobic Concrete Admixture at the rate of one U.S. gallon per cubic yard of concrete (5 liters per cubic meter).
   2. Superplasticizer at the manufacturer's recommended rate and appropriate for the placement requirements of the project.

C. Cementitious Content: The cementitious content of concrete containing Hydrophobic Concrete Admixture will not be less than 550 lbs/yd^3 (325 kg/m^3) with up to 15% fly ash or 50% slag replacement.

D. Water-Cement Ratio: 0.42 maximum. Water content of Hydrophobic Concrete Admixture and other admixtures to be included in the water-to-cementitious ratio.

2.03 SOURCE QUALITY CONTROL

A. Verification of Performance: Provide ready-mixed concrete from a concrete supplier approved by the Hydrophobic Concrete Admixture Manufacturer and authorized to dispense the Hydrophobic Concrete Admixture Manufacturer's waterproofing materials.

PART 3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

A. Comply with the Hydrophobic Concrete Admixture Manufacturer's instructions and recommendations.

3.02 EXAMINATION

A. Site verification of conditions:
   1. Verify that site conditions are acceptable for placement of waterproofed concrete.
   2. Utilize Hydrophobic Concrete Admixture Manufacturer's pre-placement inspection services.
   3. Do not proceed with concrete placement until conditions unacceptable to the Hydrophobic Concrete Admixture Manufacturer are corrected.

B. Suitable Condition of Reinforcing Steel:
   1. At the time concrete is placed, reinforcement shall be free from mud, oil, or other nonmetallic coatings that decrease bond. Epoxy-coating of steel reinforcement in accordance with standards shall be permitted.
   2. Except for prestressing steel, steel reinforcement with rust, mill scale, or a combination of both shall be considered satisfactory, provided the minimum dimensions (including

height of deformations) and weight of a hand-wire-brushed test specimen comply with ASTM A 615, ASTM A 706, ASTM A 996.

3.03 INSTALLATION

A. Waterstops and groutable hose waterstop system components: Install in accordance with Hydrophobic Concrete Admixture Manufacturer's recommendations and the drawings.
   1. Bentonite waterstops:
      a. Shall be placed at all cold joints and penetrations
      b. Preparation:
         a. Brush off all dust and debris and apply a coat of primer or spray adhesive to the area where the waterstop is to be placed on the standing structural member.
         b. Using moderate hand pressure press a continuous bead of waterstop firmly into position on the standing structure. Check to be certain that the waterstop has bonded to the primed area.
         c. For proper joining, cut ends with sharp tool at 45 degree angle, and then place ends over one another
         d. Peel the protective backing from the exposed side of the waterstop. Knead the overlapped ends together to form continuous, uninterrupted gasket.
         e. For shotcrete applications, in addition to the instructions above, utilize masonry nails to hold the waterstop in place.on the concrete. Masonry nails should be spaced approximately 12 inches apart. Waterstop must be glued and tied with the use of tie wires to all penetrations.
      c. Bentonite waterstops must not be installed more than 2 days prior to concrete placement. After installation of waterstops, cover the waterstop with a plastic sheet to protect from weather damage.
      d. Bentonite waterstops shall be dry and not activated when concrete is placed. If the waterstops have been water damaged they shall be replaced before the concrete is placed.
   2. Other waterstops and groutable hose waterstop systems:
      a. Shall be placed as on drawings and as per Hydrophobic Concrete Admixture Manufactuer's recommendations

B. Additional Reinforcement at Re-entrant Angles
   1. Where re-entrant angles occur, three #4 or #5 bars spaced at 3 inches OC at least 3 feet long must be placed top and bottom at 90 degrees across all the angles.

C. Concrete: Place, consolidate, and cure concrete in accordance with ACI 301, ACI 306, ACI 308, and ACI 309.

D. Closure: Contractor shall allow Hydrophobic Concrete Admixture Manufacturer access to concrete after concrete placement to allow for closure. Hydrophobic Concrete Admixture Manufacturer shall advise Contractor when each area of waterproof concrete is available for finishing.

3.04 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: A representative of the Hydrophobic Concrete Admixture Manufacturer will be present to observe, inspect, and approve the placement of concrete containing Hydrophobic Concrete Admixture Manufacturer's products.

B. The Contractor shall notify the Hydrophobic Concrete Admixture Manufacturer field representative at least 3 days prior to placement.

3.05 PROTECTION

C. Protect installed work from damage due to subsequent construction activity on the site.
   1. Apply evaporation reducer (ACI 308) on flatwork immediately after finishing, as needed to maintain a film of water on the surface of the finished concrete until the final curing is applied, anytime the evaporation rate exceeds 0.10 lbs/ft2/hr.
   2. Apply curing compound immediately to finished or stripped surfaces. A wax- or resin-based curing compound should be used if there is no subsequent finish on the structure. If there is a subsequent finish, a water-based curing compound should be used.

END OF SECTION

Hycrete, Inc.
14 Spielman Road
Fairfield, NJ 07004
Office: (201) 386-8110
Fax: (201) 386-8155
Website: www.hycrete.com

SECTION 03 05 11

HYDROPHOBIC CONCRETE

OUTLINE SPECIFICATION

This outline specification is available for insertion into your concrete specification. You should ensure that the concrete design and construction quality requirements in your concrete specification meet the long-form version of this specification, available as a separate document, in order that Hycrete W1000 hydrophobic concrete admixture can meet performance requirements.

Please contact Hycrete to ensure that this product is suitable for your project.

For information on Hycrete W1000, including performance and applications, please contact Hycrete, Inc. or visit www.hycrete.com.

For best results, display hidden notes to specifier – click on ¶.

PART 1 GENERAL

1.01 SUMMARY

A. This section specifies concrete with Hydrophobic Concrete Admixture as indicated on the project drawings for the following:
   1. Footings
   2. Foundation walls
   3. Slabs-on-grade
   4. Suspended slabs
   5. Water tanks
   6. Tunnels
   7. (Other-specify)

1.02 QUALITY ASSURANCE

A. Hydrophobic Concrete Admixture Manufacturer Qualifications: Hydrophobic Concrete Admixture Manufacturer will have a minimum of 5 years of experience on projects of similar scope.

1.03 PRE-INSTALLATION CONFERENCE

A. Attendance: Contractor, installer, owner, architect, structural engineer, civil engineer, Hydrophobic Concrete Admixture Manufacturer representative, batch plant representative, and those requested to attend.

B. Meeting Time: Minimum of 3 weeks prior to the beginning of the work of this Section and work of related Sections affecting the work of this Section.

C. Location: Project site.

D. Review procedures for conducting work of this Section, including:
   1. Review of mix design and mix test results.
   2. Mixing procedure.
   3. Conditions for acceptance of concrete at project site.
   4. Placement procedures.
   5. Finishing options and procedures.
   6. Curing and crack control procedures.
   7. Testing for acceptable moisture emissions, alkalinity pH levels, and relative humidity of concrete slab prior to installation of finish flooring.
   8. Affect of the above on the project schedule.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Conform to provisions of the Section 01 65 10 and the Hydrophobic Concrete Admixture Manufacturer instructions.
B. Mixing and Delivery: Conform to ASTM C94.
C. Sampling at Delivery: Conform to ASTM C172. Cure 4-inch by 8-inch cylinders to provisions of ASTM C31 and compression test compressive strength of cylinders to ASTM C39.
D. Batch Tickets: Conform to ASTM C94 Option A or C. Accompany each load, fully executed, and signed. Log in with inspector at time of entry. Conform to Source Quality Control requirements specified by this Section.
   1. Include water content and water withheld at batch plant.
   2. Indicate time to nearest minute that batch was dispatched from plant, when it arrived at site, and when unloading began and was finished.
   3. Indicate ambient air temperature and concrete internal temperature at time of arrival.
   4. Make written record of water and other additives added to design mix, and the amount of concrete in the truck at the time of addition, after the mix truck left the batch plant.
E. Reject concrete that has reached internal temperature of 89 degrees Fahrenheit or above and when temperature has risen 5 degrees in 10 minutes, indicating concrete is setting up prior to discharge.
F. Store products in accordance with ACI 301. Do not use admixtures that have been in storage at project site for more than 12 months or which have been subjected to freezing, except as accepted by the Hydrophobic Concrete Admixture Manufacturer and by the structural engineer based on test results.

PART 2 PRODUCTS

2.01 HYDROPHOBIC CONCRETE ADMIXTURE

A. Product generic name: Water-Based Hydrophobic Concrete Admixture.

B. Product name: Hycrete W1000, as manufactured by Hycrete, Inc., 14 Spielman Road, Fairfield, New Jersey, 07004, telephone (201) 386-8110, website www.hycrete.com.

C. Physical properties
   1. Admixture to meet or exceed British Standards Institute (BSI) 1881-122 testing to performance of <1% water absorption.

2.02 MIXES

A. The concrete ready mix supplier must contact the Hydrophobic Concrete Admixture Manufacturer before designing and testing any new mix designs, to receive guidance on achieving proper water absorption characteristics. The concrete ready mix supplier must also report the test results to the Hydrophobic Concrete Admixture Manufacturer. All values must be within the specification limits.
   1. All concrete materials used for testing must be same as concrete materials used for construction.
   2. Test result requirements for Hydrophobic Concrete in addition to engineer's performance requirements: Corrected 30 minute water absorption, age at test 7 days (BS 1881-122): Not greater than 1.0%

B. Waterproofing System: All concrete in the locations listed in section 1.01 will be waterproofed by the addition of Hydrophobic Concrete Admixture and additional ingredients including:
   1. Hydrophobic Concrete Admixture at the rate of one U.S. gallon per cubic yard of concrete (5 liters per cubic meter).
   2. Superplasticizer at the manufacturer's recommended rate and appropriate for the placement requirements of the project.

C. Water-Cement Ratio: 0.42 maximum. Water content of Hydrophobic Concrete Admixture and other admixtures to be included in the water-to-cementitious ratio.

2.03 SOURCE QUALITY CONTROL

A. Verification of Performance: Provide ready-mixed concrete from a concrete supplier approved by the Hydrophobic Concrete Admixture Manufacturer and authorized to dispense the Hydrophobic Concrete Admixture Manufacturer's waterproofing materials.

PART 3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

A. Comply with the Hydrophobic Concrete Admixture Manufacturer's instructions and recommendations.

3.02 EXAMINATION

A. Site verification of conditions:
   1. Verify that site conditions are acceptable for placement of waterproofed concrete.
   2. Do not proceed with concrete placement until conditions unacceptable to the Hydrophobic Concrete Admixture Manufacturer are corrected.

B. Suitable Condition of Reinforcing Steel:
   1. At the time concrete is placed, reinforcement shall be free from mud, oil, or other nonmetallic coatings that decrease bond. Epoxy-coating of steel reinforcement in accordance with standards shall be permitted.
   2. Except for prestressing steel, steel reinforcement with rust, mill scale, or a combination of both shall be considered satisfactory, provided the minimum dimensions (including height of deformations) and weight of a hand-wire-brushed test specimen comply with ASTM A 615, ASTM A 706, ASTM A 996.

3.03 INSTALLATION

A. Waterstops and groutable hose waterstop system components: Install in accordance with Hydrophobic Concrete Admixture Manufacturer's recommendations.
   1. Bentonite waterstops:
      a. Shall be placed at all cold joints and penetrations
      b. Preparation:
         a. Brush off all dust and debris and apply a coat of primer or spray adhesive to the area where the waterstop is to be placed on the standing structural member.
         b. Using moderate hand pressure press a continuous bead of waterstop firmly into position on the standing structure. Check to be certain that the waterstop has bonded to the primed area.
         c. For proper joining, cut ends with sharp tool at 45 degree angle, and then place ends over one another
         d. Peel the protective backing from the exposed side of the waterstop. Knead the overlapped ends together to form continuous, uninterrupted gasket.
         e. For shotcrete applications, in addition to the instructions above, utilize masonry nails to hold the waterstop in place.on the concrete. Masonry nails should be spaced approximately 12 inches apart. Waterstop must be glued and tied with the use of tie wires to all penetrations.
      c. Bentonite waterstops must not be installed more than 2 days prior to concrete placement. After installation of waterstops, cover the waterstop with a plastic sheet to protect from weather damage.
      d. Bentonite waterstops shall be dry and not activated when concrete is placed. If the waterstops have been water damaged they shall be replaced before the concrete is placed.
   2. Other waterstops and groutable hose waterstop systems:
      a. Shall be placed as on drawings.

B. Additional Reinforcement at Re-entrant Angles
   1. Where re-entrant angles occur, three #4 or #5 bars spaced at 3 inches OC at least 3 feet long must be placed top and bottom at 90 degrees across all the angles.

C. Concrete: Place, consolidate, and cure concrete in accordance with ACI 301, ACI 306, ACI 308, and ACI 309.

3.04 PROTECTION

A. Protect installed work from damage due to subsequent construction activity on the site.
   1. Apply evaporation reducer (ACI 308) on flatwork immediately after finishing, as needed to maintain a film of water on the surface of the finished concrete until the final curing is applied, anytime the evaporation rate exceeds 0.10 lbs/ft2/hr.
   2. Apply curing compound immediately to finished or stripped surfaces. A wax- or resin-based curing compound should be used if there is no subsequent finish on the structure. If there is a subsequent finish, a water-based curing compound should be used.

END OF SECTION

Hycrete

Delivering Concrete Solutions

DATA SHEET

Hycrete System W

For technical assistance contact your local Hycrete Representative or call (201) 386-8110

For Waterproof Construction, Membrane-Free

PRODUCT FEATURES

- Water-Tight Construction
- Performance Warranty
- Accelerated Construction & Reduced Delays
- Reduced Costs
- Enhanced Durability
- Simplified Process & Improved Safety
- Sustainable Construction

RECOMMENDED APPLICATIONS*

- Parking Garages
- Podiums and Plaza Decks
- LEED Projects
- Commercial Sub-Grade Walls & Slabs
- Retaining Walls
- Water Tanks
- Water Treatment Facilities
- Tunnels

** Please contact a Hycrete, Inc. representative for suitability of your application.*

PRODUCT DESCRIPTION

The Hycrete System W is a multi-pronged approach to concrete construction that eliminates the need for membranes. At the core is Hycrete's patented revolutionary admixture technology, a chemistry that transforms the porous, hard sponge of ordinary concrete into hydrophobic concrete. From start to finish, Hycrete's world-class field service team is involved, providing guidance on construction details, mix designs, and Hycrete admixtures. They then ensure that all onsite steps are completed so that a waterproof structure is delivered. Then – when a dry structure is delivered – Hycrete backs it all up with the best-in-class IntegraTek ™ warranty.

THE SYSTEM APPROACH TO WATERPROOF CONSTRUCTION

1. WATERPROOF CONCRETE

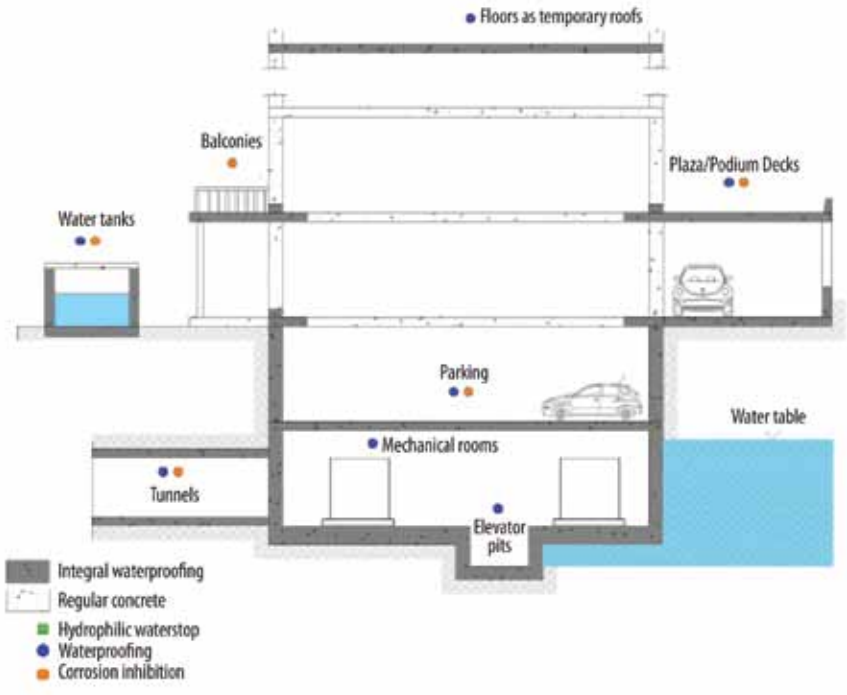
An environmentally friendly, water-soluble Cradle to Cradle™ certified product, **Hycrete W1000** transforms into a water-insoluble polymer when mixed into concrete. That polymer works on the molecular level to block pores that are penetrable by damaging water and corrosive salts. It also bonds to the surface of steel reinforcement within concrete, creating a protective layer that wards off corrosion. The result is hydrophobic, waterproof concrete.

2. WORLD-CLASS TECHNICAL FIELD SERVICE

Hycrete's **field service team** makes the difference between waterproof concrete and waterproof construction. This level of service is unique to Hycrete. No claim to a waterproof structure would be complete without it.

3. BEST-IN-CLASS, 10-YEAR WARRANTY

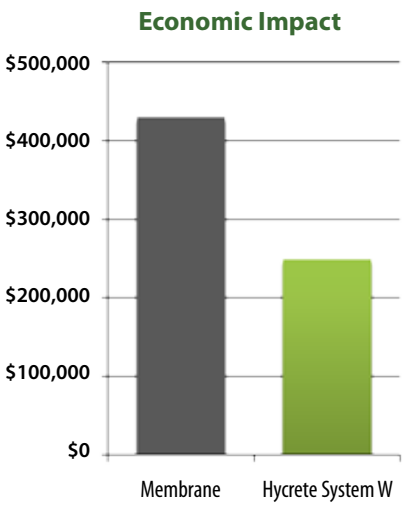
The Hycrete **IntegraTek™ warranty** was written to be the best available. Since the Hycrete System W approach simplifies waterproofing so dramatically, you have only one person to call; the finger-pointing of traditional waterproofing is eliminated.



A GREENER BUILDING

The Cradle to Cradle™ concept is at the core of Hycrete's solutions. This approach models human industry on nature's processes in which materials are viewed as nutrients circulating in healthy, safe metabolisms. Put simply, it is a holistic economic, industrial and social framework that seeks to create systems that are not just efficient but essentially waste free. In Hycrete's case, this means using environmentally safe and healthy materials, designing for material reutilization, using renewable energy and energy efficiency in manufacturing and the efficient use of water in manufacturing.

A LOWER COST AND FASTER APPROACH



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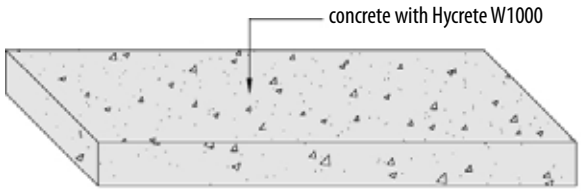
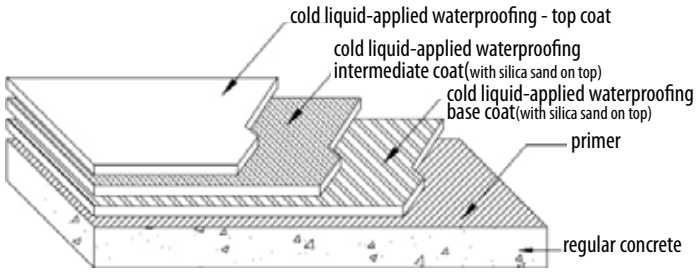
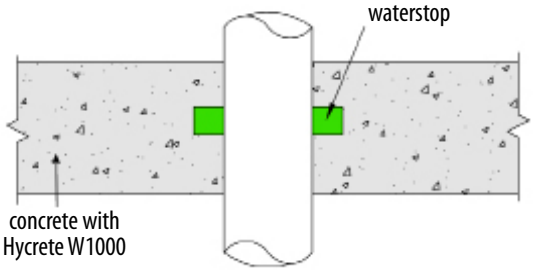
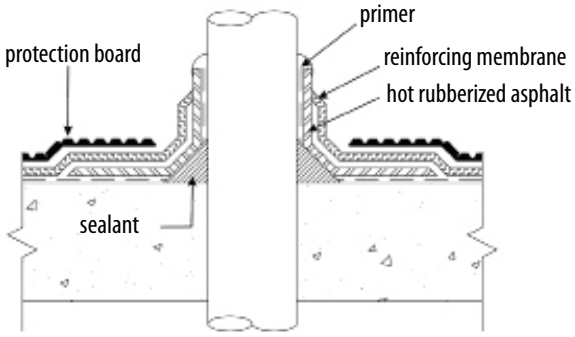
A BETTER SOLUTION

Hycrete System W **VS** **Membrane System**









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1001001-AUG11

Hycrete

Delivering Concrete Solutions

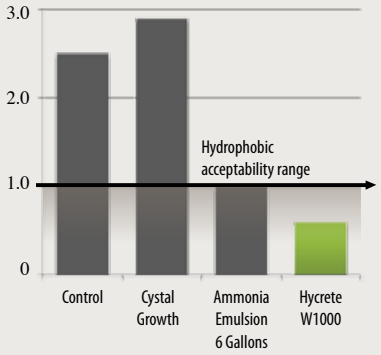
DATA SHEET

Hycrete W1000

For technical assistance contact your local Hycrete Representative or call (201) 386-8110

For Maximum Waterproofing Protection in Non-Air Concrete Mixes

Water Absorption (%) under BSI 1881-122



KEY BENEFITS

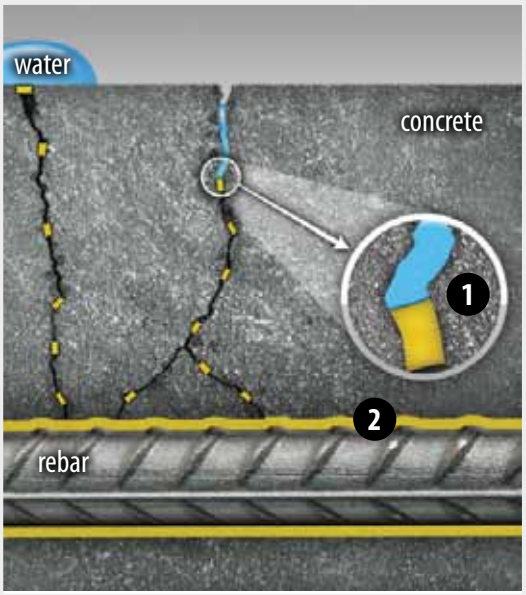
- Maximum waterproofing protection in concrete: less than 1% water absorption
- Corrosion protection; protective coating formed around steel reinforcement
- Neutral concrete set time performance, even in high fly ash and GGBS (slag) mixes
- Resists hydrostatic pressure
- Can heal cracks up to 0.4mm
- Consistent performance and verifiable dosage
- Easy to use; no additional labor required
- Safe to use

** See page 2 for testing methodologies*

PRODUCT DESCRIPTION

Hycrete W1000, Hycrete's patented flagship concrete waterproofing admixture, dramatically reduces water ingress through concrete. Ordinary concrete absorbs water and dissolved salts through its network of pores, leading to water infiltration and corrosion of steel reinforcement. Hycrete W1000 reduces absorption to 1% or lower and forms a protective coating around steel reinforcement. Less water and fewer chlorides are able to penetrate the concrete and the reinforcement has enhanced protection from corrosion.

Hycrete W1000 delivers consistent and reliable performance and is easy to use. Hycrete W1000 is an environmentally-responsible, Cradle to Cradle™ certified product. Using Hycrete W1000 allows owners and builders to have the comfort of knowing their investment/project remains secure against one of nature's most damaging elements …water.



1. Hydrophobic pore blocking
2. Corrosion-inhibiting surface coating

PRODUCT FEATURES

- Cradle to Cradle™ certified by MBDC
- NSF/ANSI 61 - approved for use in potable water tanks
- Compatible with standard admixture metering equipment
- ISO 14021 compliant - recycled content in accordance with Type II environmental labeling; applicable for LEED Materials and Resources Credit 4.1/4.2 - Recycled Content

USES AND APPLICATIONS

- Included in Hycrete System W; see separate data sheet for Hycrete System W
- Extra protection for walls and slabs
- Above and below grade construction
- Water containment reservoirs
- Sewage and water treatment plants
- Secondary containment structures
- Underground vaults
- Tilt-up panel walls
- Pre-cast components
- Architectural water features and fountains
- Bridges, dams and highway infrastructure
- Aquatic centers, marinas and zoos
- Swimming pools

PRODUCT PERFORMANCE*

Water absorption	BSI 1881-122	Less than 1% absorption
Permeability/hydrostatic pressure	DIN 1048 BS EN 12390-8	Passes DIN 1048; up to 70% reduction in permeability
Crack healing	ASTM C597	Concrete with Hycrete fosters faster and 100% complete healing compared to untreated control
Set time	ASTM C403	Set neutral
Drying shrinkage	ASTM C157	Neutral to the control
Slump	ASTM C143	Neutral
Workability	N/A	Excellent
Effect on concrete color	N/A	None
Compressive strength	ASTM C39	Water/cement ratios may need to be lowered to account for possible, minor strength decreases associated with some materials. Perform trial mixes.
Potable water	NSF/ANSI 61	Approved for use in potable water tanks 50,000 gallons or greater and pipes 84" in diameter and greater
Adhesion	ASTM C1583, ASTM C1072, ASTM D3359	Neutral; no adverse effect on bond with concrete

**All benefits and results are based on actual test results. Results may vary according to concrete mix designs, Hycrete W1000 dosage, or other factors.*

GENERAL PROPERTIES AND CHARACTERISTICS

Physical characteristics:

Form	Liquid
Specific gravity	1.05
Chloride content	Nil
pH:	8.5

Compatibility:
- Most concrete admixtures
- Most Portland cements or replacements including fly ash and GGBS (slag)
- Shotcrete mixes and application
- Most surface-applied sealants and external membrane protection systems

Recommended dosage:
1.0 U.S. gallon per cubic yard of concrete (5.0 liters per cubic meter)

Usage guidelines:
- Superplasticizer at the manufacturer's recommended rate and appropriate for the placement requirements of the project.
- Cementitious Content: The cementitious content of concrete containing Hydrophobic Concrete Admixture will not be less than 550 lbs/yd^3 (325 kg/m^3) with up to 15% fly ash or 30% slag replacement.
- Water-Cement Ratio: 0.42 maximum. Water content of Hydrophobic Concrete Admixture and other admixtures to be included in the water-to-cementitious ratio.

Packaging:
1 gallon bottles; 5 gallon pails; 55 gallon drums; 275 gallon totes; bulk tanker delivery

Storage and handling:
Store above 32°F (0°C) and below 120 °F (48 °C). Slight flocculation can occur over time due to pH reductions. Such flocculation does not affect product performance

NOTES
- For air-entrained concrete mixes see Hycrete W1002 data sheet. Hycrete W1002 is specifically designed for air-entrained concrete mixes.
- User should perform trial mixes prior to placement and make necessary adjustments to the mix design as needed.
- If considering dosages other than recommended dosage contact Technical Services before use.

SAFETY
Hycrete W1000 is a water-based material and should not be swallowed or come into contact with skin or eyes. Wear suitable protective gloves and goggles. If material comes in contact with the skin, wash immediately with soap and water. In case of contact with eyes, rinse immediately with sufficient water and seek medical support. If swallowed, seek immediate medical attention. For further information please consult the Material Safety Data Sheet.

RELATED DOCUMENTS
- Hycrete Mixing Instructions
- Hycrete Material Safety Data Sheet – Hycrete W1000
- For air-entrained concrete mixes see Hycrete Data Sheet - Hycrete W1002

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1002002-SEP13

ATTACHMENT D
DRAGO WRAP MATERIAL SPECIFICATIONS

SUPPLEMENTAL SUBSURFACE INVESTIGATION
AND FOUNDATION ELEMENTS
Block 38 West Property
500 through 536 Westlake Avenue North
Seattle Washington

Farallon PN: 397-019

DRAGO® WRAP VAPOR INTRUSION BARRIER
SUMMARY OF PERMEATION AND ATTENUATION TESTING

BACKGROUND

From October 2015 through August 2018, Drago Wrap Vapor Intrusion Barrier was subjected to a series of diffusion and sorption tests to obtain the film's diffusion, partitioning, and permeation characteristics. This testing was designed and overseen by an expert in the permeation of volatile organic compounds (VOCs) at a prominent university. The results of this testing, combined with further modeling and analysis, have been used to empirically determine the attenuation efficacy of Drago Wrap against various hydrocarbons and chlorinated solvents. The purpose of this document is to briefly discuss the theory behind diffusive vapor intrusion (VI); summarize and explain the robust testing protocol utilized; and relay the results of the testing and analysis.

CHEMICALS TESTED

Drago Wrap has been tested with regard to permeation of the following chemicals: Trichloroethylene (TCE); Perchloroethylene (PCE); the BTEX family: Benzene, Toluene, Ethylbenzene, Xylene; Dichloromethane; 1,4 Dichlorobenzene; Methyl tert-butyl ether (MTBE) and Naphthalene. This list was chosen based on a survey of the most often found chemicals on brownfield projects.

THEORY

The practical purpose behind obtaining permeation, diffusion, and partitioning coefficients is to apply them to the equations governing mass flux per Fick's laws during design of VI mitigation systems. The following briefly explains the theory and physics behind Fick's First Law.

The diffusion coefficient, D_g (units expressed in [m^2/s]), is the parameter defining the membrane's resistance to the diffusive mass flux [g/m^2s] transported within the membrane as governed by Fick's First Law:

$$f = -D_g \frac{dc_g}{d_z} \qquad \text{(Eq. 1)}$$

due to a concentration gradient dc_g/d_z [g/m^4] in the membrane layer. If the contaminant source is an aqueous solution adjacent to the membrane, the concentration of the contaminant in the membrane can be related to that in the fluid (at equilibrium) by the partitioning coefficient, S_{gf} (where S_{gf} is analogous to a Henry's coefficient). It is given by Equation 2 and depends on the solubility of the contaminant in the material:

$$S_{gf} = \frac{c_g}{c_f} \qquad \text{(Eq. 2)}$$

where c_f is the concentration of the contaminant in the fluid, adjacent to and in equilibrium with, the concentration, c_g, in the membrane.

Thus, the mass flux (f) from the fluid on one side of the membrane to the fluid on the other side (at steady state) is given by:

$$f = S_{gf} D_g \frac{dc_g}{d_z} = \frac{P_g}{l} \Delta C \qquad \text{(Eq. 3)}$$

where l is the thickness of the film/membrane, and ΔC is the difference in concentration between the two sides of the film/membrane at steady state, and the product of the two parameters (S_{gf} D_g) is called the permeation coefficient, P_g (m^2/s):

$$P_g = S_{gf} D_g \quad \text{(Eq. 4)}$$

It can be gleaned from Equations 1-4 that the diffusion coefficient, D_g, is not enough to characterize the film's mass transfer properties for contaminants moving from below the membrane to above it. Diffusive mass transfer through an intact geomembrane is a 3-step process: partitioning into the geomembrane; diffusion through the geomembrane; and partitioning out of the geomembrane. Both D_g and S_{gf} (or simply P_g) must be known in order to effectively utilize Fick's steady state mass transfer equations. Therefore, to allow for full and complete analysis, Drago Wrap's permeation was fully characterized with all three values (permeation, diffusion, and partitioning coefficients) for each chemical tested. Those values are contained in Table 2. It is also imperative to understand the differences in methodologies between lab and site-specific field-testing setups. If such differences exist, the addition of the phase transition coefficient between water and air, Henry's coefficient (H), may also be required in the analysis. A deeper discussion on accounting for these differences is beyond the scope of this summary. Please contact the Stego Industries' Technical Department for additional assistance.

TESTING METHODOLOGY

Two types of tests and subsequent modeling have been employed in characterizing Drago Wrap's relevant characteristics: diffusion testing, sorption testing, and the finite layer modeling and analysis program, POLLUTE v7 (Rowe and Booker 2004).

The diffusion testing setup used stainless steel double-compartment cells (Figure 1), such that source and receptor volumes were separated by the Drago Wrap membrane. The cell was screwed together, with the membrane secured using two Viton rings (Figure 2) to prevent the loss of contaminant at the connection between each compartment and the membrane. Both the source and receptor were filled with double deionized (DDI) water, and a septum was inserted into the sampling ports to prevent losses. A stock solution of contaminants was added to the source compartment to form a dilute aqueous solution with a known concentration. Before assembly, and after disassembly, the mass of the membrane was recorded.

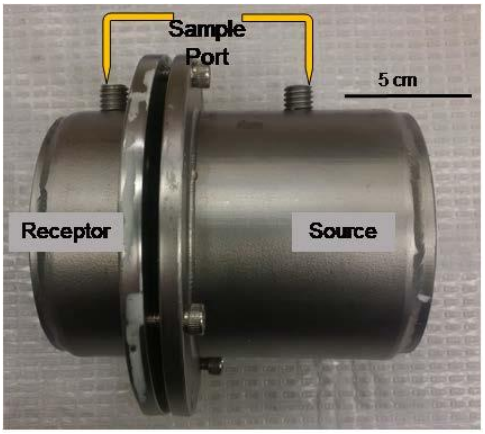


Figure 1: Double Compartment Cell

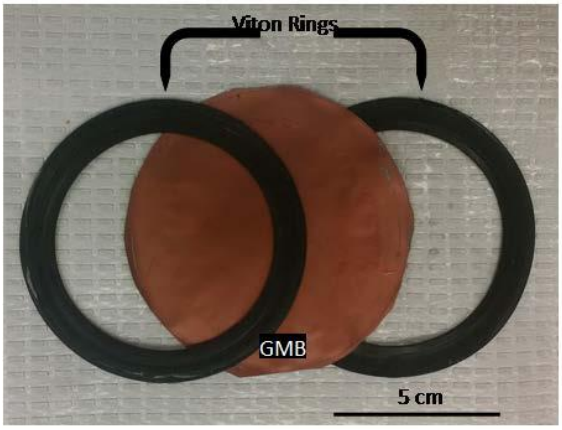


Figure 2: Membrane and Viton Rings

Sorption testing was also performed to directly measure the partitioning coefficients for each chemical. The sorption testing was conducted using 20-ml vials where a specimen was placed in double deionized water. The mass of the specimen was recorded beforehand. The vials were filled with double deionized water so that there was no airspace in the vial. Known masses of contaminants were added and 50 µl samples were taken daily from the vials for analysis and replaced with double deionized water until equilibrium was reached. The chemical analysis of these specimens was performed in the same manner as chemical analysis of the diffusion tests. This analysis is described in Appendix B.

The results from the diffusion and sorption tests were transduced and analyzed using the finite layer modeling and analysis program, POLLUTE v7, to create the results seen in Table 2.

In addition to whole-film testing, the discrete layers that make up Drago Wrap were tested to determine their respective permeation, diffusion and partitioning coefficients. The results obtained from the mathematical modeling of these tests do not necessarily equate to the values obtained from whole-film permeation testing. In other words, the full membrane benefits from a synergistic effect: the whole is greater than the sum of its parts. Due to its unique design, the testing demonstrated a very important feature to Drago Wrap: its ability to degrade chlorinated solvents like TCE. The results show about a 50-day half-life for TCE when the membrane is installed in its intended orientation. The results in Table 2 come from the most conservative approach to analyzing the results and do not consider these synergies.

RESULTS

As described earlier, the values displayed in Table 2 result from a conservative approach to the analysis of data generated from several phases and years of testing, and subsequent numerical modeling. The preferred methodology for obtaining accurate results requires an aqueous-to-aqueous testing scenario. Table 2 depicts these results. There exist scenarios where mass flux design with Drago Wrap requires additional consideration of phase-change analysis beyond what is offered in Table 2. Please contact the Stego Industries' Technical Department for assistance should the need arise.

Table 1 – Descriptions of the Tested Chemicals

Chemical	Abbreviation	Family	Use
Benzene	Btex	Aromatic Hydrocarbon	Gasoline byproduct
Toluene	bTex	Aromatic Hydrocarbon	Gasoline byproduct
Ethylbenzene	btEx	Aromatic Hydrocarbon	Gasoline byproduct
M&P-Xylenes	bteX	Aromatic Hydrocarbon	Gasoline byproduct
O-Xylene	bteX	Aromatic Hydrocarbon	Gasoline byproduct
Trichloroethylene	TCE	Chlorinated Hydrocarbon	Dry Cleaning and Solvent
Tetrachloroethylene	PCE	Chlorinated Hydrocarbon	Dry Cleaning and Solvent
Methyl tert-butyl ether	MTBE	Oxygenate	Octane-increasing additive to fuel
Dichloromethane	DCM	Chlorinated Hydrocarbon	Paint Stripper, Decaffeinate, Aerosol propellant
Naphthalene	Naphthalene	Polycyclic Aromatic Hydrocarbon	Fumigant, Pyrotechnics, Wetting Agent
1,4-Dichlorobenzne	1,4-DCB	Chlorinated Hydrocarbon	Pesticide, Disinfectant, Deodorant

Table 2 – Aqueous Coefficients

Chemical	Diffusion, D_g [x 10^{-15} m^2/s]	Partitioning, S_{gf} [-]	Permeation, P_g [x 10^{-13} m^2/s]
Benzene	2.6	171	4.5
Toluene	1.5	339	5.1
Ethylbenzene	0.41	764	3.1
M&P-Xylenes	0.4	743	2.9
O-Xylene	0.4	670	2.7
TCE	3.9	251	9.8
PCE	1.1	610	6.6
MTBE	1	1	0.01
DCM	0.95	475	4.5
Naphthalene	0.014	1710	0.25
1,4-DCB	0.94	760	7.1

CONCLUSION

Drago Wrap has proven to be a superior barrier to standard geomembranes like HDPE (by a factor of about 10 to 200 – See Appendix A) for all contaminants where comparisons could be made to HDPE and has remarkably low values for BTEX, TCE; PCE; MTBE; Naphthalene; DCM; and 1,4 DCB with permeation coefficients of the order of magnitude of 10^{-13} – 10^{-14} m^2/s. In addition, the testing has shown that chlorinated solvents experience degradation while permeating through the membrane with a half-life of 50 days for TCE when the film is correctly oriented relative to the contaminant source.

APPENDIX A – COMPARISON TO HDPE (WHERE AVAILABLE)

	Permeation Coefficients- 20-mil Drago Wrap			Permeation Coefficients – 80-mil HDPE[1]			
	D_g (m^2/s)	S_{gf} (-)	P_g (m^2/s)	D_g (m^2/s)	S_{gf} (-)	P_g (m^2/s)	Ratio (P_{gDrago}/P_{gHDPE})
Benzene	$2.6x10^{-15}$	171	$4.5x10^{-13}$	$3.5x10^{-13}$	30	$1.05 x10^{-11}$	23
Toluene	$1.5x10^{-15}$	339	$5.1x10^{-13}$	$3.0 x10^{-13}$	100	$3.0 x10^{-11}$	60
Ethylbenzene	$4.1x10^{-16}$	764	$3.0x10^{-13}$	$1.8 x10^{-13}$	285	$5.1 x10^{-11}$	170
m&p-Xylenes	$4.0x10^{-16}$	743	$2.9x10^{-13}$	$1.7 x10^{-13}$	347	$5.9 x10^{-11}$	200
o-Xylene	$4.0x10^{-16}$	670	$2.7x10^{-13}$	$1.5 x10^{-13}$	240	$3.6 x10^{-11}$	130
TCE	$3.9x10^{-15}$	251	$9.8x10^{-13}$	$4.0 x10^{-13}$	85	$3.4 x10^{-11}$	35
PCE	$1.1x10^{-15}$	610	$6.6x10^{-13}$	-	-	-	-
MTBE	$1.0x10^{-15}$	1	$1.0x10^{-15}$	-	-	-	-
DCM	$9.5x10^{-16}$	475	$4.5x10^{-13}$	$6.5 x10^{-13}$	6	$3.9 x10^{-12}$	9
Naphthalene	$1.4x10^{-17}$	1710	$2.5x10^{-14}$	-	-	-	-
1,4-DCB	$9.4 x10^{-16}$	760	$7.1x10^{-13}$	-	-	-	-

[1]Sangam & Rowe (2001)

APPENDIX B– CHEMICAL ANALYSIS

The cells were sampled at regular time intervals. During each sampling event, 10 ul to 100 ul was removed from the cell, and that volume was replaced with DDI water so there was no airspace in the cell.

The samples were added to a vial containing 0.4 ml of methanol, 0.01 ml internal standard, and water was added so the total fluid volume in the vial was 1.6 ml. A Solid Phase Micro Extraction (SPME) fiber was inserted into vial headspace and the volatile compounds sorbed onto the fiber. This fiber was analyzed using gas chromatography (GC), and results compared to a certified laboratory standard calibration curve for the contaminant in question. Two types of detectors were used (depending on the cell in question); namely, a mass selective detector and a flame ionization detector. A quality assurance certified lab standard (from a different source to the calibration standards) was assessed during each sampling event.

All laboratory testing was conducted in a Canadian Association for Laboratory Accreditation (CALA) lab and followed CALA methods. This means that rigorous quality assurance practices were followed during chemical analysis. CALA frequently reviews the methods used and the accreditation is renewed every two years.

REFERENCES

Rowe, R. K., and Booker, J. R. (2004). "POLLUTE V.7 - 1D Pollutant Migration through a Non-homogenous Soil." GAEA Environmental Engineering Ltd.

Sangam, H. P., and Rowe, R. K. (2001). "Migration of dilute aqueous organic pollutants through HDPE geomembranes." Geotextiles and Geomembranes, 19(6), 329–357.

DRAGO® WRAP VAPOR INTRUSION BARRIER
RESISTANCE TO DEGRADATION – ADDITIONAL CONSIDERATIONS

Drago Wrap Vapor Intrusion Barrier, and the technologies that underlie this game-changing vapor intrusion protection product, has undergone extensive testing to determine its ability to attenuate VOCs and other relevant material properties. These tests exposed Drago Wrap to a host of deleterious chemicals that may exist at or below a project site, including various petroleum distillates, chlorinated solvents, etc. The results of these tests are positive and telling; they show that Drago Wrap is extremely impermeable to a wide range of chemical vapors and, more importantly for our current considerations, maintains such impermeability over the course of years of exposure to these deleterious compounds.

While the results of such testing speak extensively to Drago Wrap's ability to resist degradation in extreme exposure conditions, we wished to pursue multiple exposure scenarios to further increase the confidence project team members should have in Drago Wrap as a critical component of the vapor intrusion systems they utilize on their projects. The following pages detail these measures. The conclusions indicate that there were no significant changes in mass or volume of Drago Wrap when exposed to direct contact with soils contaminated with benzene, toluene, ethylbenzene, xylene (collectively known as BTEX), trichloroethylene (TCE), perchloroethylene (PCE, or tetrachloroethylene), cis-1,2-dichloroehtylne (C-DCE), trans-1,2-dichloroehtylene (T-DCE), and sulfates. Additionally, we tested the post-exposure samples to determine their tensile strength (ASTM E882) and permeance to water vapor (F1249), and we observed that Drago Wrap maintains its ability to meet each corresponding performance threshold for high-performance water vapor barriers: for D882, Drago Wrap remains a Class A Vapor Barrier per ASTM E1745; for F1249, Drago Wrap maintains a permeance well below 0.01 perms.

If additional questions remain regarding any aspect of Drago Wrap, please be sure to contact the Stego Technical Department. We are happy to help and look forward to the opportunity to provide an effective and economical solution to your barrier needs.

Regards,

Dan Marks CSI CDT LEED Green Associate
Technical Director | Stego Industries, LLC
O: (949) 325-2035| F: (949) 325-2062
danmarks@stegoindustries.com

SETUP

To simulate a hydrocarbon contaminated brownfield site, a senior chemist at a research and testing lab prepared contaminated water to contain 1,000 ppb of each benzene, toluene, ethylbenzene, and xylene (BTEX). Two liters of this mixture were placed in a chamber, 49 cm x 23.5 cm wide by 27 cm tall. ASTM C778 standard 20-30 sand was added to the vessel until it was 5 cm above the original water line. At this level, the sand was damp with no free-standing water. Drago Wrap samples were placed on top of the damp sand, and the entire surface of the membrane were weighted down with sand-filled plastic bags to ensure full contact of the Drago Wrap with the damp sand. The test vessel was covered and sealed. After 30 days of exposure under ambient laboratory conditions (21-25°C), the samples were removed for evaluation.

Simply stated:
We took relatively large amounts of often-seen hydrocarbons resulting from fuel spills and old service station sites and put them into a water table just 2 inches below a sample of Drago Wrap. This can be considered an extreme situation in that water tables are not typically that close to the slab and vapor barrier membrane. After a 30-day exposure, the mass and volume changes were analyzed, and we subsequently tested the material for its water vapor permeance rating and tensile strength.

RESULTS

Mass and Volume

The chemist conducted mass and volume measurements before and after exposure. The following comes directly from her report: *"All of the test coupons exhibited slight changes in mass and volume, no matter what their exposure conditions were. Statistical analysis by the two-tailed t-test showed that the changes for the BTEX-exposed coupons were not significantly different from the changes for the control-exposed coupons."*

Conclusion: In other words, Drago Wrap mass and volume were not significantly affected by the BTEX exposure.

Tensile Strength

Samples were sent by the lab to our in-house lab and tested per ASTM E882 in both the machine and transverse directions. After the 30-day extreme BTEX solvent exposure, the results were 50.2 lbf/in and 49.6 lbf/in for machine and transverse directions respectively. These results were not significantly different than the water-exposed control samples (48.7 lbf/in, 48.5 lbf/in) or the unexposed samples (48.5 lbf/in, 46.8 lbf/in). For another point of comparison, consider that to be labeled as Class A per ASTM E1745, new-material tensile need only test at 45 lbf/in.

Conclusion: BTEX exposure has little to no effect on Drago Wrap's physical integrity in below-slab applications.

Water Vapor Permeance

The testing lab then sent exposed and control samples to our in-house lab where they were subsequently tested per ASTM F1249. The results were very positive. The permeance of the sample exposed to the BTEX solution (0.00733 perms) increased minimally compared to the control (0.00614 perms), both staying well below the threshold of 0.01 perms.

Conclusion: BTEX exposure had minimal effect on Drago Wrap's ability to retard water vapor.

SETUP

To simulate a dry-cleaning brownfield site, a senior chemist at a research and testing lab prepared contaminated water to contain 3,600 ppb perchloroethylene (PCE), 12,500 PPB trichloroethylene (TCE), 16,200 PPB CIS-1,2-dichloroethylene (C-DCE), AND 1,700 PPB trans-1,2-dichlorothylene (T-DCE). Two liters of this mixture were placed in a chamber, 49 cm x 23.5 cm wide and 27 cm tall. ASTM C778 standard 20-30 sand was added to the vessel until it was 5 cm above the original water line. At this level, the sand was damp with no free-standing water. Drago Wrap samples were placed on top of the damp sand, and the entire surface of the vapor barrier was weighted down with sand-filled plastic bags to ensure full contact of the Drago Wrap with the damp sand. The test vessel was covered and sealed. After 30 days of exposure under ambient laboratory conditions (21-25°C), the samples were removed for evaluation.

Simply stated:
We took an actual soils report from an old dry cleaning site and recreated the conditions, roughly. In the actual scenario the water table was 20 feet below the vapor barrier. In our setup, we created a contaminated water table just 2 *inches* below Drago Wrap. After a 30-day exposure, the mass and volume changes were analyzed, and we subsequently tested the material for its water vapor permeance rating and tensile strength.

RESULTS

Mass and Volume

The chemist conducted mass and volume measurements before and after exposure. The following comes directly from her report: *"All of the test coupons exhibited slight changes in mass and volume, no matter what their exposure conditions were. Statistical analysis by the two-tailed t-test showed that the changes for the chlorinated solvent-exposed coupons were not significantly different from the changes for the control-exposed coupons."*

Conclusion: Drago Wrap's mass and volume were not significantly affected by the chlorinated solvent exposure.

Tensile Strength

Samples were sent by the lab to our in-house lab and tested per ASTM E882 in both the machine and transverse directions. After the 30-day extreme chlorinated solvent exposure, the results were 51.2 lbf/in and 49.7 lbf/in for machine and transverse directions respectively. These results were not significantly different than the water-exposed control samples (48.7 lbf/in, 48.5 lbf/in) or the unexposed samples (48.5 lbf/in, 46.8 lbf/in). For another point of comparison, consider that to be labeled as Class A per ASTM E1745, new-material tensile need only test at 45 lbf/in.

Conclusion: Chlorinated solvent exposure has little to no effect on Drago Wrap's physical integrity in below-slab applications.

Water Vapor Permeance

The testing lab then sent exposed and control samples to our in-house lab where they were subsequently tested per ASTM F1249. The results were very positive. The permeance of the sample exposed to the BTEX solution (0.00713 perms) increased minimally compared to the control (0.00614 perms), both staying well below the threshold of 0.01 perms.

Conclusion: Chlorinated solvent exposure had minimal effect on Drago Wrap's ability to retard water vapor.

SETUP

To simulate the worst possible sulfate exposure, a senior chemist at a research and testing lab prepared water contaminated with 10,000 PPM of SO4 (sulfate.) This sulfate concentration was chosen because it was rated as "very severe" (the highest or worst classification) by UC Berkeley professors conducting research for the Caltrans Long Life Pavement Rehabilitation Strategy (LLPRS) Program. The Chemist took this worst-case scenario concentration and soaked samples of Drago Wrap in it for 28 days. Upon removal, the samples were analyzed for changes in mass and volume, and subsequently the exposed product was tested to determine its tensile strength and water vapor permeance rate.

RESULTS

Mass & Volume

The chemist conducted mass and volume measurements before and after exposure. The following comes directly from her report: *"All of the test coupons exhibited slight changes in mass and volume, no matter what their exposure conditions were. Statistical analysis by the two-tailed t-test showed that the changes for the sulfate-exposed coupons were not significantly different from the changes for the control-exposed coupons."*

Conclusion: In other words, Drago Wrap's mass and volume were not significantly affected by the sulfate exposure.

Tensile

Samples were sent by the lab to our in-house lab and tested per ASTM E882 in both the machine and transverse directions. After the 28-day extreme sulfate exposure, the results were 49.6 lbf/in and 52.3 lbf/in for machine and transverse directions respectively. These results were not significantly different than the water-exposed control samples (48.7 lbf/in, 50.8 lbf/in) or the unexposed samples (48.5 lbf/in, 46.8 lbf/in). For another point of comparison, consider that to be labeled as Class A per ASTM E1745, new-material tensile need only test at 45 lbf/in.

Conclusion: Sulfate exposure has little to no effect on Drago Wrap's physical integrity in below-slab applications.

Water Vapor Permeance

The testing lab then sent exposed and control samples to our in-house lab where they were subsequently tested per ASTM F1249. The results were very positive. The permeance of the sample exposed to the sulfate solution (0.00734 perms) increased minimally compared to the control (0.00698 perms), both staying well below the threshold of 0.01 perms.

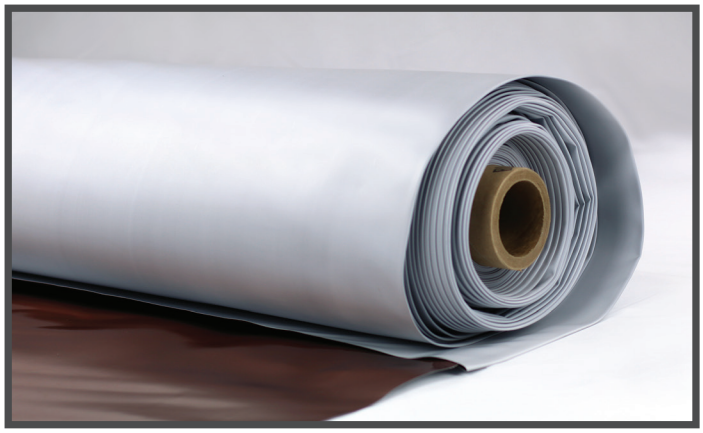
Conclusion: Sulfate exposure had no significant effect on Drago Wrap's ability to retard water vapor.

DRAGO® WRAP
VAPOR INTRUSION BARRIER

A STEGO TECHNOLOGY, LLC INNOVATION | VAPOR RETARDERS 07 26 00, 03 30 00 | VERSION: 2/22/2019

1. PRODUCT NAME

DRAGO WRAP VAPOR INTRUSION BARRIER



2. MANUFACTURER

c/o Stego® Industries, LLC*
216 Avenida Fabricante, Suite 101
San Clemente, CA 92672
Sales, Technical Assistance
Ph: (877) 464-7834
Fx: (949) 257-4113
www.stegoindustries.com

3. PRODUCT DESCRIPTION

USES: Drago Wrap is specifically engineered to attenuate volatile organic compounds (VOCs) and serve as a below-slab moisture vapor barrier.

COMPOSITION: Drago Wrap is a multi-layered plastic extrusion that combines uniquely designed materials with only high grade, prime, virgin resins.

ENVIRONMENTAL FACTORS: Drago Wrap can be used in systems for the control of various VOCs including hydrocarbons, chlorinated solvents, radon, methane, soil poisons, and sulfates.

4. TECHNICAL DATA

TABLE 4.1: PHYSICAL PROPERTIES OF DRAGO WRAP VAPOR INTRUSION BARRIER

PROPERTY	TEST	RESULTS
Under Slab Vapor Retarders	ASTM E1745 – Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs	ASTM E1745 Compliant
Water Vapor Permeance	ASTM F1249 – Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor	0.0069 perms
Push-Through Puncture	ASTM D4833 – Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products	183.9 Newtons
Tensile Strength	ASTM D882 – Test Method for Tensile Properties of Thin Plastic Sheeting	53.5 lbf/in
Permeance After Conditioning (ASTM E1745 Sections 7.1.2 - 7.1.5)	ASTM E154 Section 8, F1249 – Permeance after wetting, drying, and soaking ASTM E154 Section 11, F1249 – Permeance after heat conditioning ASTM E154 Section 12, F1249 – Permeance after low temperature conditioning ASTM E154 Section 13, F1249 – Permeance after soil organism exposure	0.0073 perms 0.0070 perms 0.0062 perms 0.0081 perms
Hydrocarbon Attenuation Factors	Contact Stego Industries' Technical Department	
Chlorinated Solvent Attenuation Factors	Contact Stego Industries' Technical Department	
Methane Transmission Rate	ASTM D1434 – Test Method for Determining Gas Permeability Characteristics of Plastic Film and Sheeting	7.0 GTR** (mL(STP)/m^2*day)
Radon Diffusion Coefficient	K124/02/95	9.8 x 10^{-14} m^2/second
Thickness		20 mil
Roll Dimensions		14' x 105' or 1,470 ft^2
Roll Weight		150 lb

Note: perm unit = grains/(ft^2*hr*in-Hg) ** GTR = Gas Transmission Rate

Continued...
Note – legal notice on page 2.

DRAGO® WRAP
VAPOR INTRUSION BARRIER

A STEGO TECHNOLOGY, LLC INNOVATION | VAPOR RETARDERS 07 26 00, 03 30 00 | VERSION: 2/22/2019

5. INSTALLATION

UNDER SLAB: Unroll Drago Wrap over a tamped aggregate, sand, or earth base. Overlap all seams a minimum of 12 inches and tape using Drago® Tape. All penetrations must be sealed using a combination of Drago Wrap and Drago Accessories.

Review Drago Wrap's complete installation instructions prior to installation.

6. AVAILABILITY & COST

Drago Wrap is available nationally through our network of building supply distributors. For current cost information, contact your local Drago distributor or Stego Industries' Sales Representative.

7. WARRANTY

Stego Industries, LLC believes to the best of its knowledge, that specifications and recommendations herein are accurate and reliable. However, since site conditions are not within its control, Stego Industries does not guarantee results from the use of the information provided and disclaims all liability from any loss or damage. Stego Technology, LLC does offer a limited warranty on Drago Wrap. Please see www.stegoindustries.com/legal.

8. MAINTENANCE

Store Drago Wrap in a dry and temperate area.

9. TECHNICAL SERVICES

Technical advice, custom CAD drawings, and additional information can be obtained by contacting Stego Industries or by visiting the website.

Contact Number: (877) 464-7834
Website: www.stegoindustries.com

10. FILING SYSTEMS

- www.stegoindustries.com

DRAGO® WRAP LIMITED WARRANTY
ISSUER: STEGO TECHNOLOGY, LLC ("Stego Tech")

This Drago Wrap Limited Warranty ("the Warranty") commences on the Effective Date and applies to Drago Wrap Vapor Intrusion Barrier (for the purposes of this Warranty "Drago Wrap").

Stego Tech recommends installation of Drago Wrap per ASTM E1643, its published installation instructions, and in accordance with all site-specific recommendations of the project's design team. Drago Wrap is specifically engineered to be installed in conjunction with its proprietary accessories, including Drago® Tape, DragoTack™ Tape, Drago® Sealant, and Drago® Sealant Form. Additionally, to avoid puncturing Drago Wrap and comply with ASTM E1643, Stego Tech recommends utilizing the Beast® Screed system of vapor barrier-safe accessories.

WARRANTY TERMS AND CONDITIONS

1 DRAGO WRAP WARRANTY

Stego Tech recognizes the most current version of ASTM E1745 (at the time of the material purchase) as the governing standard specification for under-slab vapor retarders. Subject to the limitations set forth below, for the Life of the Building™ Stego Tech warrants that Drago Wrap:

(a) meets all of the requirements for its designated ASTM E1745 classification;
(b) has been tested in accordance with each of the following ASTM test methods:
  i. ASTM E1745 – *Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs*
  ii. ASTM F1249 – *Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor*
  iii. ASTM D1709 – *Test Methods for Impact Resistance of Plastic Film by Free-Falling Dart Method*
  iv. ASTM D882 – *Test Method for Tensile Properties of Thin Plastic Sheeting*
  v. ASTM E154 – *Sections 8, 11, 12, 13 – Permeance After Conditioning* [1]
  vi. ASTM D1434 – *Standard Test Method for Determining Gas Permeability Characteristics of Plastic Film and Sheeting*
  vii. ASTM D4833 – *Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products*
(c) will be free from Manufacturing Composition Defects;
(d) eligible for input on project-specific installation best practices by a Stego Tech-authorized representative during the preconstruction phase upon reasonable notice, in-person or remotely; and
(e) eligible for Site Review by a Stego Tech-authorized representative, in-person or digitally, for input on installation prior to concrete placement upon reasonable notice.
(f) will meet or exceed its published product literature for **a period not less than two (2) years from the Date of Installation.**

This Warranty is the sole Warranty given by Stego Tech or its Affiliates as to Drago Wrap. All installations or uses of Drago Wrap automatically activate this Warranty. If you do not wish to be bound by the terms of this Warranty, please return the Drago Wrap for a full Refund. Otherwise, all installations will be presumed to have agreed to the terms herein.

2 NOTICE AND CLAIMS

Any Claim pursuant to this Warranty must be Certified and must be made within sixty (60) days of the date discovered or the date it should reasonably have been discovered in order for Stego Tech to evaluate the Claim and replace the Drago Wrap. Claims may be made at any time during the Life of the Building. Such replacement (or at Stego Tech's option, Refund of the verified purchase price) shall be your sole and exclusive remedy for any such Claim.

[1] Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.

Continued...
Note - legal notice on last page.

3 WARRANTY AND CONDITIONS TO COVERAGE

This Warranty excludes any defect or damage caused by: (a) faulty or improper installation of the Drago Wrap, including the failure to comply with published specification and installation recommendations in effect at the time of installation; (b) improper use, storage or site conditions (e.g noncompliance with the terms of the Drago Wrap Material Safety Data Sheet); (c) any below-concrete slab or similar activity, and any other maintenance, repair, alteration or new installation to the Building that occurs after the completion of the original installation that impacts the Drago Wrap; (d) damage caused by non-Stego Tech materials; (e) factors beyond the reasonable control of Stego Tech or its Affiliates, including, but not limited to, natural disasters such as lightning, floods, windstorms, seismic disturbances, hurricanes, tornadoes, or impact of foreign objects or other violent storms or casualty; (f) damage resulting from any form of misuse, abuse or negligence; (g) structural defects or failures in the Building to which the Drago Wrap is installed.

Your sole remedy under this Warranty is, at Stego Tech's option: (a) Refund of the purchase price paid; or (b) replacement of so much of the Drago Wrap as Stego Tech deems necessary.

4 WARRANTY EXCLUSIONS

Except where prohibited by law, this Warranty and the remedies expressly stated herein are the exclusive warranties and remedies provided to you with respect to the Drago Wrap and supersede any prior, contrary or additional representations, whether oral or written. No representative, distributor, dealer or any other person is authorized to make, or makes any warranty, representation, condition or promise with respect to the Drago Wrap. ALL OTHER WARRANTIES ARE DISCLAIMED AND EXCLUDED – WHETHER EXPRESS, IMPLIED, OR STATUTORY – INCLUDING ANY **WARRANTY OF MERCHANTABILITY**, ANY **WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE**, AND ANY IMPLIED WARRANTIES OTHERWISE ARISING FROM COURSE OF DEALING, COURSE OF PERFORMANCE, OR USAGE OF TRADE.

In no event shall Stego Tech or its Affiliates be liable for any incidental, special, indirect, consequential damages, including but not limited to lost income or loss of use. This exclusion applies regardless of whether such damages are sought for breach of warranty, breach of contract, negligence, or strict liability in tort or any other legal or equitable theory.

5 SEVERANCE

If any provision in this Warranty is found to be invalid or unenforceable, then the remainder shall have full force and effect, and the invalid provision shall be modified or partially enforced to the maximum extent permitted by law to effectuate the purpose of the Warranty.

6 DISPUTE RESOLUTION

It is the intention of the parties to use their reasonable best efforts to informally resolve, where possible, any dispute, claim, demand or controversy arising out of the performance of this Warranty by mutual negotiation and cooperation. In the event that the parties are unable to informally resolve a dispute, the Parties agree that such disputes shall be completely and finally settled by submission to arbitration before a single arbitrator under the Judicial Arbitration and Mediation Services (JAMS) Arbitration Rules then in effect. Good faith mediation shall be a condition precedent to initiating arbitration. Unless the parties agree otherwise, the arbitration shall take place in Orange County, California, U.S.A. The award of the arbitrator shall be in writing, shall be final and binding upon the parties, shall not be appealed from or contested in any court and may, in appropriate circumstances, include injunctive relief. Judgment on such award may be entered in any court of appropriate jurisdiction, or application may be made to that court for a judicial acceptance of the award and an order of enforcement, as the party seeking to enforce that award may elect. The prevailing party shall be entitled to recover its attorney fees and costs. This Agreement shall be governed in all respects by the laws of the State of California without regard to the conflict of law provisions thereof. Neither party will consolidate, or seek class treatment for any action unless previously agreed to in writing by all parties.

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Note - legal notice on last page.

DEFINITIONS

"***Affiliates***" means Stego Tech affiliated entities, partners, joint venturers, suppliers, vendors, subcontractors, representatives, and agents.

"***Applicable Date***" means the Limited Warranty applies to material sold on or after January 1, 2018.

"***Building***" means the building above which Drago Wrap was installed, as verified by Stego Tech.

"***Certified***" means that you have investigated whether a breach of this Warranty occurred and obtained and provided a qualified inspector report confirming evidence exists of such a Defect. Stego Tech reserves the right to independently verify any Claims.

"***Claim***" means a claim for relief under the Warranty.

"***Date of Installation***" means the date Drago Wrap was installed, as verified by Stego Tech.

"***Effective Date***" means date of first sale as verified.

"***Life of the Building***" means the duration of which the building originally installed atop of the Drago Wrap is in good and working condition.

"***Manufacturing Composition Defect***" means any condition of the Drago Wrap that does not meet the material's intended design and is disclosed to Stego Tech during the Life of the Building.

"***Refund***" means Stego Tech providing a monetary return in the amount verified to be the cost of the Drago Wrap subject to the Claim.

"***Site Review***" means a review of representative portions of the Drago Wrap installation (digitally or in-person, when possible, and as determined by Stego Tech authorized representative) prior to concrete placement to help ensure compliance with governing installation standard, ASTM E1643, Stego Tech's installation instructions, and/or, if applicable, the design team's recommendations (e.g. contract documents). Site Reviews are not a full site inspection.

"***Stego Tech***" means Stego Technology, LLC, a California limited liability company with its principal place of business located at 216 Avenida Fabricante, #101, San Clemente, California 92672. Stego Industries, LLC is the exclusive representative of Drago Wrap and accessory products, owned by Stego Technology, LLC, a wholly independent company.

"***Warranty***" means this Drago Wrap Limited Warranty.

DRAGO® WRAP SAFETY DATA SHEET

Revision Date: July 30, 2018 | Date of Issue: June 1, 2017 | Version Number: 2.0

SECTION 1: IDENTIFICATION

Product Identifier
Product Name: Drago Wrap

Intended Use of the Product
Vapor Intrusion Barrier

Company Name, Address, and Telephone of the Responsible Party
Stego Technology, LLC or C/O Stego® Industries, LLC*
216 Avenida Fabricante #101
San Clemente, CA 92672

Emergency Telephone Number
Emergency Number: 1 (800) 424-9300 (24 Hrs.) CHEMTREC
Main Contact Number: (877) 464-7834

SECTION 2: HAZARDS IDENTIFICATION

Classification: This product is not classified as hazardous in accordance with 29 C.F.R. § 1910.1200.
Signal word: None.
Pictogram(s): None.
Hazard statement(s): None.
Precautionary statement(s): None.
Hazards not otherwise classified: Polymer film can burn if exposed to excessive temperatures beyond the normal use of the product.

SECTION 3: COMPOSITION / INFORMATION ON INGREDIENTS

Ingredient	CAS Number	% by WT.
Copper	Proprietary*	<10%*

The selections marked with an '*' are proprietary and considered to be Trade Secrets. This is the reason that they are listed as such, or provided as a range.

SECTION 4: FIRST AID MEASURES

The following first aid recommendations are based on an assumption that appropriate personal and industrial hygiene practices are followed.

Inhalation: Not a respirable film. If exposed to fumes from combustion, move subject to fresh air; if breathing is difficult, give oxygen and get medical attention; if victim has stopped breathing, give artificial respiration and get medical attention.
Eye Contact: Not a probable route of exposure. If exposed to fumes from overheating or from combustion, move subject to fresh air. Flush with plenty of water; if irritation continues, get medical attention.
Skin Contact: No treatment necessary. For thermal burns, cool molten materials with water and get medical attention.
Ingestion: Not a probable route of exposure.

Continued...
Note - legal notice on page 5

Revision Date: July 30, 2018 | Date of Issue: June 1, 2017 | Version Number: 2.0

SECTION 5: FIRE-FIGHTING MEASURES

Unusual Hazards: Polymer film can burn if exposed to excessive temperature beyond the normal use of the product.
Extinguishing Agents: Use extinguishing media appropriate for surrounding fire: carbon dioxide, foam, dry chemical, and water fog.
Personal Protective: Equipment unnecessary unless resin is burned, which is not an intended use of the product. If resin is burning, wear self-contained breathing apparatus (pressure-demand MSHAINIOSH approved or equivalent) and full protective gear.

Note: See Section 10 for hazardous combustion and thermal decomposition information.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Personal Protection: None necessary.
Procedures: None necessary.

SECTION 7: HANDLING AND STORAGE

Storage Conditions: Cool, dry storage recommended. Indoor storage recommended.
Avoid storing films in areas containing aromatic hydrocarbons, halogenated compounds, chlorinated compounds, oxidative agents, solvents or other known polyethylene solubilizers, prodegradants, as they may impact the product performance and/or service life.
Handling Procedures: Avoid direct sunlight. Avoiding direct UV exposure of product. Avoid contact with incompatible materials.
Installation Temperature Range: Below 110°F (ambient). Please also see technical and safety data sheets for accessory products installation/application temperature ranges.
In-Service Temperature Range: Below 85°F (soil and slab temperature, beginning 28 days following slab placement). Please also see technical and safety data sheets for accessory products installation/application temperature ranges.
Exposure to Ultraviolet Radiation/Weather Events: The amount of time between when Stego Wrap is installed and when concrete is placed or other complete protection from sunlight and weather events is provided should be minimized while not exceeding 7 days.

Please review the remainder of the SDS and this wrap's technical data sheet for storage and additional information. If any of the conditions cited above pose a problem for the typical installation of Drago Wrap, please contact Stego Industries for additional information and solutions.

SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

Ingredient	OSHA PEL	ACGIH TWA
Copper	0.1 mg/m^3 (Cu fume)	0.2 mg/m^3 (Cu fume)

Respiratory Protection: None required during handling. Local exhaust to remove fumes from heat sealing and hot wire cutting areas of packaging or bag converting for worker comfort.
Eye Protection: None necessary.
Hand Protection: None necessary.
Engineering Controls (Ventilation): Use local exhaust ventilation when routinely heat sealing this product. Recommended ventilation is with a minimum capture velocity of 100 ft/min. (30 m/min.) at the point of vapor evolution. Refer to the current edition of *Industrial Ventilation: A Manual of Recommended Practice* published by the American Conference of Governmental Industrial Hygienists for information on the design, installation, use, and maintenance of exhaust systems.

Continued...
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SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES *Continued...*

General Physical Form: Solid plastic film.

INFORMATION ON BASIC PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Plastic film
Color:	Copper and Gray
State:	Solid
Odor Characteristics:	None
Odor Threshold:	None
pH:	Not Applicable
Melting Point/Freezing Point:	Not Applicable
Initial Boiling Point and Boiling Point Range:	Not Applicable
Flash Point:	Not Applicable
Evaporation Rate:	Not Applicable
Flammability (solid, gas):	Not Applicable
Upper flammability:	Not Applicable
Lower Flammability:	Not Applicable
Vapor Pressure:	Not Applicable
Vapor Density:	Not Applicable
Relative Density:	Not Applicable
Solubility:	Not Applicable
Partition Coefficient: n-octanol/water:	Not Applicable
Auto ignition-temperature:	Not Applicable
Decomposition temperature:	>325°C (617°F)
Viscosity:	Not Applicable

SECTION 10: STABILITY AND REACTIVITY

Instability: This material is considered stable. Thermal decomposition is dependent on time and temperature.

HAZARDOUS DECOMPOSITION PRODUCTS

Substance	Condition
Hydrocarbons	Combustion by-product
Carbon Monoxide	Combustion by-product
Carbon Dioxide	Combustion by-product
Copper Fume	Combustion by-product

Hazardous Polymerization: Product will not undergo hazardous polymerization. Product does not decompose at ambient temperatures.
Incompatibility: Lead azide and lead stiphanate commonly used in high explosive detonators react violently with copper.
Reactivity: Reacts and binds with polar gases such as Hydrogen sulfide (H_2S), Ozone (0_3), Carbonyl sulfide (COS), Sulfur Dioxide ($S0_2$), Hydrogen chloride (HCI), Formic Acid, Acetic Acid.
Hazardous Decomposition: Under recommended usage conditions, hazardous decomposition products are not expected. Hazardous decomposition products may occur as a result of oxidation, heating, or reaction with another material.

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SECTION 11: TOXICOLOGICAL INFORMATION

This product, when used under reasonable conditions and in accordance with the directions for use, should not present a health hazard. However, use or processing of the product in a manner not in accordance with the product's directions for use may affect the performance of the product and may present potential health and safety hazards.

Acute Data: No Toxicity data are available for this material.

PRIMARY ROUTES OF EXPOSURE

Skin Contact: Only if burned.
Eye Contact: Only if burned.
Respiratory Contact: Only if burned.

ACUTE EFFECTS OF EXPOSURE

Ingestion: Not a probable route of exposure.
Inhalation: No inhalation risk unless product is heated to point of burning, which in normal applications does not occur. Fumes from combustion are unlikely to be produced during heat shrinking. Local ventilation should be used for comfort. Testing data shows copper/polymer particulate count at approximately 0.007mg/m^3, which is well below OSHA PEL of 0.1 mg/m^{3+}.
Eye Contact: No eye exposure risk during all product usage except during heating if plastic is heated to point of combustion, which does not occur during the intended use of the product. Fumes from combustion, which have a low toxicity, may be produced during hot wire cutting or heat sealing. Fumes are unlikely to be produced during heat shrinking when used as directed.
Skin Contact: Not irritating when used as directed. Hot polymer created during heat shrinking, wire cutting, or heat sealing, may produce thermal bums.
Chronic Effects of Exposure: None known when used as directed.
Carcinogenicity: None known when used as directed.

SECTION 12: ECOLOGICAL INFORMATION

This material is insoluble in water and not expected to present any environmental problems in normal application, however areas containing aromatic hydrocarbons, halogenated compounds, chlorinated compounds, pH extremities, oxidative agents, solvents or other known polyethylene solubilizers, prodegradants, etc. may impact the product performance and/or service life.

SECTION 13: DISPOSAL CONSIDERATIONS

Procedure: Reclaim if feasible. If product can't be reclaimed, no special requirements are necessary; dispose of as ordinary solid waste. Pick up film for good "housekeeping" and to prevent a slipping hazard. Incineration or landfill in compliance with federal, state and local regulations. *Since regulations vary, consult applicable regulations or authorities before disposal.*

SECTION 14: TRANSPORT INFORMATION

US DOT Hazard Class: Not regulated.

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SECTION 15: REGULATORY INFORMATION

Workplace Classification: This product is not considered hazardous under the OSHA Hazard Communication Standard (29 C.F.R. § 1910.1200).
CERCLA Information (40 C.F.R. 302.4): Because of the form in which copper is contained within the resin, releases of this material to air, land, or water are not reportable to the National Response Center under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).
Waste Classification: When this product becomes a waste, it is classified as a non-hazardous waste under criteria of the Resource Conservation and Recovery Act (40 C.F.R. 261).

SECTION 16: OTHER INFORMATION

HAZARD RATING
Health: 0 | Flammability: 1 | Reactivity: 0 | Special Hazards: None
Scale: 4 = Extreme | 3 = High | 2 = Moderate | 1 = Slight | 0 = Insignificant
National Fire Protection Association (NFPA) hazard ratings are designed for use by emergency response personnel to address the hazards that are presented by short-term, acute exposure to a material under conditions of fire, spill, or similar emergencies. Hazard ratings are primarily based on the inherent physical and toxic properties of the material, but also include the toxic properties of combustion or decomposition products that are known to be generated in significant quantities.
Rating are based on internal supplier's guidelines, and they are intended for internal use only.

ABBREVIATIONS
ACGIH = American Conference of Governmental Industrial Hygienists
OSHA = Occupational Safety and Health Administration
TLV = Threshold Limit Value
PEL = Permissible Exposure Limit
TWA = Time Weighted Average
STEL = Short-Term Exposure Limit

Disclaimer: The information contained herein relates only to the specific material identified. Stego Technology, LLC believes that such information is accurate and reliable as of the date of this material safety data sheet, but no representation, guarantee or warranty, expressed or implied, is made as to the accuracy, reliability, or completeness of the information. Stego Technology, LLC urges persons receiving this information to make their own determination as to the information's suitability and completeness for their particular application.

Please read the product statements for all Drago® products by navigating here:
http://www.stegoindustries.com/legal

DRAGO® WRAP
VAPOR INTRUSION BARRIER

INSTALLATION INSTRUCTIONS

Engineered protection to create a ***healthy*** built environment.

DRAGO® WRAP VAPOR INTRUSION BARRIER
INSTALLATION INSTRUCTIONS

IMPORTANT: Please read these installation instructions completely, prior to beginning any Drago Wrap installation. The following installation instructions are generally 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*. There are specific instructions in this document that go beyond what is stated in ASTM E1643 to take into account vapor intrusion mitigation. 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:

1. Drago Wrap has been engineered to be installed over a tamped aggregate, sand, or earth base. It is not typically necessary to have a cushion layer or sand base, as Drago Wrap is tough enough to withstand rugged construction environments.

NOTE: Drago Wrap must be installed with the gray facing the subgrade.

Fig.1: UNDER-SLAB INSTALLATION

2. Unroll Drago Wrap over the area where the slab is to be placed. Drago Wrap should completely cover the concrete placement area. All joints/seams should be overlapped a minimum of 12 inches and taped using Drago® Tape. (Fig. 1). If additional protection is needed, install DragoTack™ Tape in between the overlapped seam in combination with Drago Tape on top of the seam.

NOTE: The area of adhesion should be free from dust, dirt, moisture, and frost to allow maximum adhesion of the pressure-sensitive tape. Ensure that all seams are taped with applied pressure to allow for maximum and continuous adhesion of the pressure-sensitive Drago Tape. Adhesives should be installed above 40°F. In temperatures below 40°F, take extra care to remove moisture/frost from the area of adhesion.

3. ASTM E1643 requires sealing the perimeter of the slab. Extend vapor retarder over footings and seal to foundation wall or grade beam at an elevation consistent with the top of the slab or terminate at impediments such as waterstops or dowels. Consult the structural and environmental engineer of record before proceeding.

Fig.2a: SEAL TO PERIMETER WALL

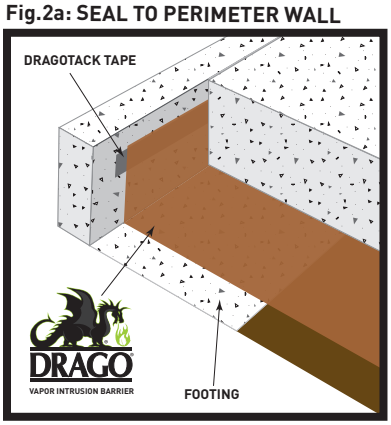
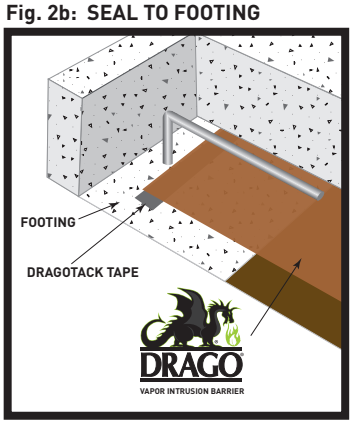


Fig. 2b: SEAL TO FOOTING



SEAL TO PERIMETER WALL OR FOOTING WITH DRAGOTACK TAPE: (Fig. 2a and 2b)

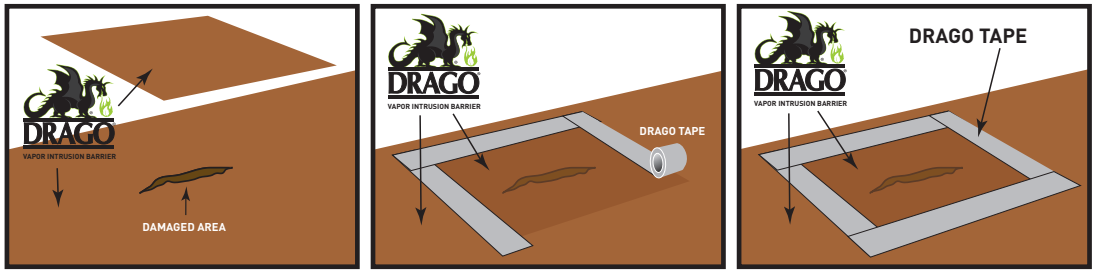
- **a.** Make sure area of adhesion is free of dust, dirt, debris, moisture, and frost to allow maximum adhesion.
- **b.** Remove release liner on one side and stick to desired surface.
- **c.** When ready to apply Drago Wrap, remove the exposed release liner and press firmly against DragoTack Tape to secure.
- **d.** If a mechanical seal is needed, fasten a termination bar over the top of the Drago Wrap inline with the DragoTack Tape.

NOTE: If sealing to the footing, the footing should receive a hand float finish to allow for maximum adhesion.

Continued ...

4. In the event that Drago Wrap is damaged during or after installation, repairs must be made. Cut a piece of Drago Wrap to a size and shape that covers any damage by a minimum of 6 inches in all directions. Clean all adhesion areas of dust, dirt, moisture, and frost. Tape down all edges using Drago Tape. (Fig. 3)

Fig. 3: SEALING DAMAGED AREAS



5. **IMPORTANT: ALL PENETRATIONS MUST BE SEALED.** All pipe, ducting, rebar, and block outs should be sealed using Drago Wrap, Drago Tape, and/or Drago® Sealant and Drago® Sealant Form. (Fig. 4a). Drago accessories should be sealed directly to the penetrations.

Fig. 4a: PIPE PENETRATION SEALING

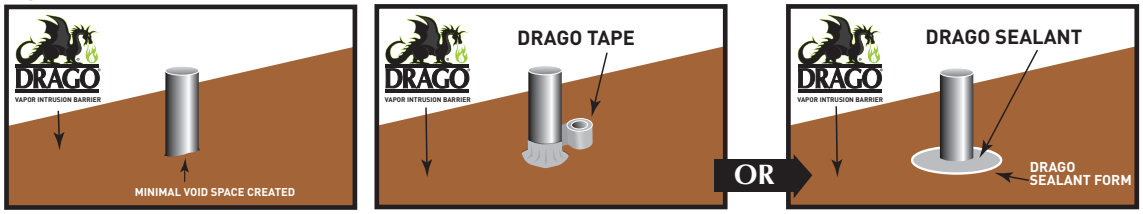
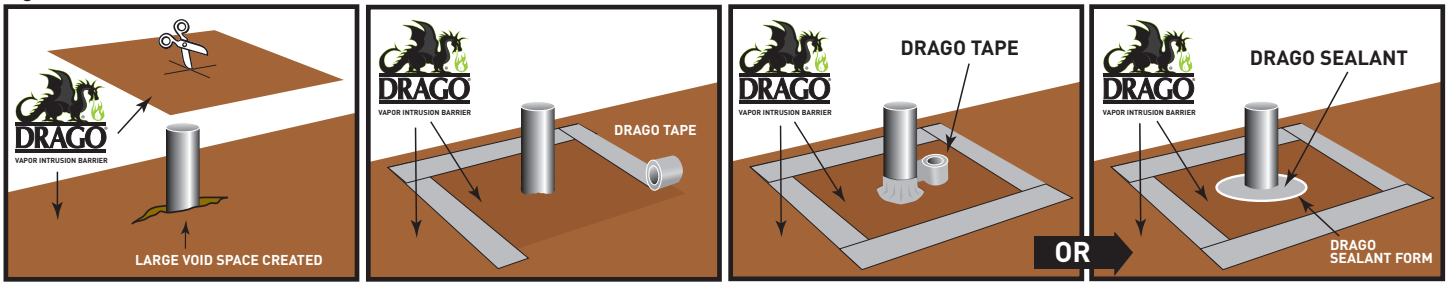


Fig. 4b: DETAIL PATCH FOR PIPE PENETRATION SEALING



DETAIL PATCH FOR PIPE PENETRATION SEALING: (Fig. 4b)

a. Install Drago Wrap around pipe penetrations by slitting/cutting material as needed. Try to minimize void space created.

b. If Drago Wrap is close to pipe and void space is minimized, proceed to step d.

c. If void space exists, then
   i. Cut a detail patch to a size and shape that creates a 6-inch overlap on all edges around the void space at the base of the pipe.
   ii. Cut an "X" slightly smaller than the size of the pipe diameter in the center of the detail patch and slide tightly over pipe.
   iii. Tape the edges of the detail patch using Drago Tape.

d. Seal around the base of the pipe using Drago Tape and/or Drago Sealant and Drago Sealant Form.
   i. If Drago Sealant is used to seal around pipe, make sure Drago Wrap is flush with the base of the penetration prior to pouring Drago Sealant.

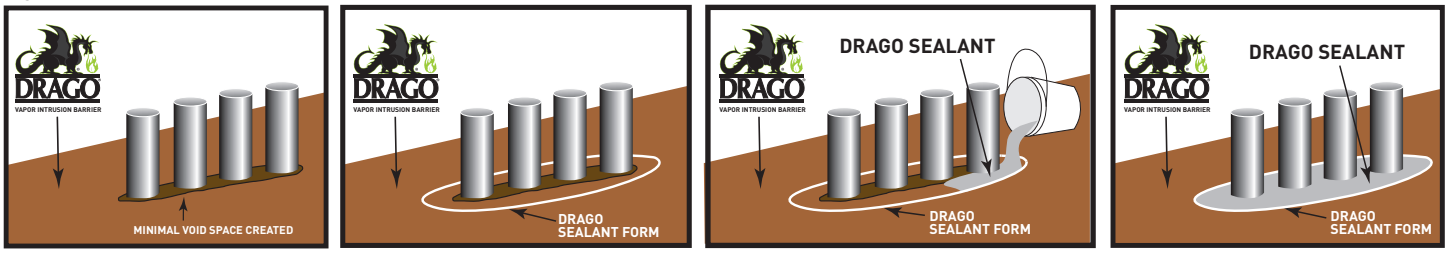
Continued ...

MULTIPLE PIPE PENETRATION SEALING: (Fig. 5)

NOTE: Multiple pipe penetrations in close proximity may be most efficiently sealed using Drago Wrap, Drago Sealant, and Drago Sealant Form for ease of installation.

a. Cut a hole in Drago Wrap such that the membrane fits over and around the base of the pipes as closely as possible, ensuring that it is flush with the base of the penetrations.
b. Install Drago Sealant Form continuously around the entire perimeter of the group of penetrations and at least 1 inch beyond the terminating edge of Drago Wrap.
c. Pour Drago Sealant inside of Drago Sealant Form to create a seal around the penetrations.
d. If the void space between Drago Wrap and the penetrations is not minimized and/or the base course allows for too much drainage of sealant, a second coat of Drago Sealant may need to be poured after the first application has cured.

Fig. 5: MULTIPLE PIPE PENETRATION SEALING

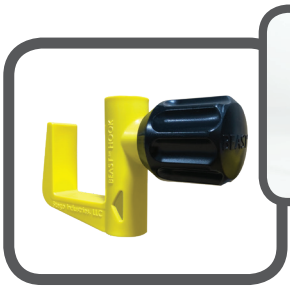


BEAST® CONCRETE ACCESSORIES - VAPOR BARRIER SAFE

Stego Industries* recommends the use of BEAST vapor barrier-safe concrete accessories, to help eliminate the use of non-permanent penetrations in Drago Wrap installations.

BEAST® SCREED

Improve efficiency and maintain concrete floor levelness with the BEAST SCREED SYSTEM!



BEAST® HOOK

Locate it and lock it down!

BEAST® FORM STAKE

The Stego barrier-safe forming system that prevents punctures in the vapor barrier.

IMPORTANT: AN INSTALLATION COMPLETED PER THESE INSTRUCTIONS SHOULD CREATE A MONOLITHIC MEMBRANE BETWEEN ALL INTERIOR INTRUSION PATHWAYS AND VAPOR SOURCES BELOW THE SLAB AS WELL AS AT THE SLAB PERIMETER. THE UNDERLYING SUBBASE SHOULD NOT BE VISIBLE IN ANY AREA WHERE CONCRETE WILL BE PLACED. IF REQUIRED BY THE DESIGN ENGINEER, ADDITIONAL INSTALLATION VALIDATION CAN BE DONE THROUGH SMOKE TESTING.

NOTE: While Drago Wrap 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 products, please call us at 877-464-7834 for technical assistance. While Stego Industries' 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.