AECOM
111 SW Columbia
Portland, OR 97201
aecom.com

Project name:
Shell Seattle Terminal

Project ref:
Consent Decree 99-2-07176-0SEA

From:
Nicky Moody

Date:
March 28, 2018

To:
Mr. Jerome Cruz
Washington Department of Ecology
Northwest Region Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

CC:
Shell Oil Products US
HSE – Environmental Services
Delivery Group – US Region

Memo

Subject: Bio-Sparging System Installation

AECOM, on behalf of Equilon Enterprises LLC dba Shell Oil Products US (Shell), submits the following memorandum summarizing installation and planned operation and maintenance procedures of the bio-sparging system in the TX-03A Area of the Seattle Terminal. The bio-sparging system was installed in accordance with Consent Decree No. 99-2-07176-0SEA Section XI.

This memorandum includes the following attachments:

A. Installation permits
B. Bio-sparging system as-built
C. Bio-sparging boring/well logs
D. Bio-sparging system installation photograph log
E. Operation and maintenance schedule
F. Investigation-derived waste disposal manifests
G. Bio-sparging system survey
H. Template field forms

1. Location

The Shell Harbor Island Terminal is a petroleum distribution facility located on Harbor Island, located approximately one mile southwest of downtown Seattle at the mouth of the Duwamish River (Figure 1). The site is comprised of three parcels; 2555 13th Avenue SW, 1835 13th Avenue SW, and 1711 13th Avenue SW. These parcels are designated as the Main Tank Farm, North Tank Farm, and Shoreline Manifold Area, respectively.

This Technical Memorandum documents the installation and startup of the bio-sparging system, located in the TX-03A Area (Figure 2), adjacent to SW Florida Street (16th Ave SW). The TX-03A Area includes the northern portion of the Main Tank Farm, a City of Seattle public parking lot (City parking lot) and associated City of Seattle public walkway (City walkway). The Olympic Pipeline, a BP-owned petroleum pipeline, carries petroleum from west to east under the City parking lot.

2. Summary of Installation Activities

Installation of the bio-sparging system involved the following activities:

- Obtain permits from the Seattle Department of Transportation (SDOT)
- Installation of 37 bio-sparging wells: 19 within the City parking lot (BSW-1 through BSW-19) and 18 within the northern portion of the Main Tank Farm (BSW-20 through BSW-37)
- Installation of aboveground system piping (trunklines and laterals) within the Main Tank Farm
- Trenching and installation of system piping (trunklines and laterals) within the City parking lot and walkway
- Site restoration within the City parking lot and walkway
- Installation of the bio-sparging system manifold (manifold), including the programmable logic controller, electrical and sensory components, and associated air flow pipe
- System calibration, troubleshooting, and minor repairs

2.1 Permits

Prior to conducting installation activities, the following permits were obtained. Copies of the permits are provided in Attachment A:

- SDOT Street Use Permit No. 313272 for closure of the City parking lot (issued July 14, 2016)
- SDOT Utility Permit (Major Utility Installation Permit) No. 316339 for trenching activities associated with installation of the bio-sparging system (issued March 30, 2017)
- SDOT Utility Permit (Annual Permit) No. 328030 for installation and operation of bio-sparging system in City of Seattle parking lot (issued April 3, 2017)

2.2 Monitoring Well Installation

Monitoring wells MW-313, MW-314, MW-315 were installed in July 2016 to monitor effectiveness of the bio-sparging system. Well installation activities are described in detail in the *2016 Annual Compliance Monitoring Report* for Shell Harbor Island Terminal (AECOM 2017).

2.3 Bio-Sparging Well Installation

AECOM oversaw installation of 37 bio-sparging wells in November 2016 (BSW-1 through BSW-37). Each bio-sparging well was installed as described in the bio-sparging system as-built, provided in Attachment B. Attachment C provides boring and well construction logs for the bio-sparging wells.

2.3.1 Boring Advancement

Each bio-sparging well was initially advanced to a depth of 5 feet by Cascade Drilling using high vacuum extraction and air-knifing methods to minimize impacts to unknown or abandoned buried utilities. The borings were then advanced to 15 feet below ground surface (bgs) using an 8-inch diameter hollow stem auger (see Photograph 1, Attachment D). In addition, four borings (BSW-12, BSW-19, BSW-20, and BSW-35) were initially advanced by a direct-push drill rig fitted with a macrocore liner to allow for lithologic assessment and field screening. These four borings were sampled continuously from 5 to 15 feet bgs. For the remaining 33 borings, soil cuttings generated during hollow-stem auger drilling were periodically sampled. Sampling and field screening included inspection of the cuttings and classification of the soil lithology using the Unified Soil Classification System. The volatile organic carbon (VOC) content and lower explosive limit in the breathing zone was tested by photoionization detector.

Prior to commencement of drilling and well installation activities, Cascade Drilling obtained all required start cards from the Washington State Department of Ecology (Ecology). Prior to drilling at each location, the drilling augers and rods were decontaminated using a solution of Alconox with potable water followed by a rinse.

2.3.2 Bio-Sparging Well Installation

Bio-sparging wells BSW-1 through BSW-37 were installed upon completion of the borings in accordance with Ecology regulations set forth in Washington Administrative Code (WAC) 173-160. The bio-sparging well specifications are listed below:

- One-inch diameter, Schedule 40 polyvinyl chloride (PVC) well casing to 13 feet bgs
- One-inch diameter, 0.010-inch slotted PVC well screen placed from 13 to 15 feet bgs
- 10/20 clean Colorado silica sand filter pack from the bottom of the boring to 1 foot above the screen interval (12 to 15 feet bgs)
- Bentonite chip seal placed above the filter pack to approximately 10 feet bgs and hydrated with clean water
- Cement-bentonite grout was placed above the bentonite chip seal to approximately 1 feet bgs
- For wells within the Main Tank Farm area, a flush-mount, traffic-rated well box was then installed at ground surface and concrete mix was placed around the well box from approximately 0.5 to 1 feet bgs. Washed rock from the surrounding area was then used to backfill the remaining annular space to ground surface (see Photograph 2, Attachment D). For wells within the City parking lot, concrete mix was placed around the well and smoothed to match the surrounding asphalt surface grade.
- The top of each well casing was fitted with a PVC tee junction. A pressure gauge port was installed on top of the tee and a ball valve was connected to the side port of the tee. One-inch PVC piping was routed below the well box skirt and attached to the lateral air supply lines.

Well construction details are included on the boring/well logs presented in Attachment C.

2.4 System Installation

The bio-sparging system consisted of the manifold, six trunklines (AS-1 through AS-6) that transport compressed air from the manifold to the bio-sparging area, and 37 laterals that transport compressed air from the trunklines to each bio-sparging well. Trunklines AS-1, AS-2, and AS-3 are located within the City parking lot; trunklines AS-4, AS-5, AS-6 are located within the Main Tank Area. Attachment E lists system components installed at the manifold and on the bio-sparging lines.

System installation occurred in two phases. Between November 28 and December 2, 2016, the main trunklines and laterals were installed within the Main Tank Farm. Trunklines and laterals within the City parking lot and walkway were installed between April 17 and April 21, 2017, after AECOM received the permits from SDOT for the installation and operation of the bio-sparging trunklines and laterals within the City parking lot and walkway. The site restoration in the City parking lot and walkway was completed and approved by the City of Seattle on May 2, 2017.

The manifold was constructed in November 28 through 30, 2016 and April 17 through May 3, 2017. System calibration, troubleshooting, and minor repairs were completed in May 2017.

System startup commenced on May 25, 2017.

2.4.1 Manifold Installation

The manifold was constructed by Cowlitz Clean Sweep (CCS) in November 28 through 30, 2016 and in April 17 through May 3, 2017 (See Photographs 3 through 6, Attachment D). The manifold is in the bio-sparging equipment compound, on the exterior of the west terminal wall of the Main Tank Farm in the Manifold Area (Figure 2). The manifold is described in detail in the as-built drawings (Drawings F03 and F04, Attachment B); manifold materials are summarized in Attachment E and include: Pressure gauges, pressure transmitters, an in-line air filter, a pressure regulator, a pressure relief valve, solenoid and ball valves, check valves, flow sensors and flow meters, an air velocity meter, a thermometer, header pipe struts, and air and electrical conduit.

Between April 24 and May 25, 2017, Direct Electric wired electric components of the bio-sparging system, including the Programmable Logic Controller (PLC), electrical sensors (e.g. flow meters), and physical regulatory components (e.g. solenoids). Direct Electric also calibrated the system controller.

The PLC is a Sensaphone Sentinel Monitoring System (Product number SCD-1200). Features of the Sentinel Monitoring System include a supervised internet connection, storage of sensor readings in “the cloud”, able to send notifications through an Internet or cellular connection to an unlimited number of people by e-mail, text message or voice phone calls in the event of an alarm, up to twelve external sensors.

2.4.2 Trenching

Trenches were advanced within the City parking lot and walkway for installation of the trunklines for AS-1 and AS-2 and lateral lines from AS-1, AS-2, and AS-3 (see Photographs 7 and 8, Attachment D). Trenching was not performed for trunklines and associated laterals for AS-4, AS-5, and AS-6 (within the Main Tank Farm), because these trunklines were installed above ground surface. Multiple aboveground pipes are already present in this area, and Shell maintains standard operating practices to prevent damage to pipes in the Main Tank Farm. Trunkline AS-3 and portions of AS-1 and AS-2 within the City walkway were placed on ground surface and covered with asphalt, as described in Section 2.4.4.

Asphalt within the parking lot was saw-cut by American Concrete Cutting on April 17, 2017 to a minimum of 4 inches bgs. An extruded concrete curb, present along the western and south sides of the City parking lot, was also saw-cut to ground surface in the areas where trenching crossed the curbs. The cut materials were removed from ground surface using a mini-excavator and placed into lined roll-off dumpster via a skid-steer.

Trenches were advanced on April 18 through 20, 2017 by CCS using high vacuum extraction/air-knifing methods or mechanical excavation by a mini excavator. Approximately 150 linear feet of trench was advanced to install

the trunkline for AS-1 and AS-2 and an additional 163 linear feet of trench was advanced to install lateral lines from AS-1, AS-2, and AS-3 to bio-sparging wells. Fill material underlying the asphalt was removed to approximately 2 feet below the asphalt surface. The extracted soil was placed in a lined and covered roll-off soil bin.

2.4.3 Pipe Installation

An existing compressed air supply is present along the interior of the west terminal wall of the Main Tank Farm, south of the TX-03A Area. Additionally, an existing electrical panel is present south of the TX-03A Area, on the exterior of the Main Tank Farm wall, within the Terminal rail yard. These utilities were extended northward along the inside face of the west terminal wall. The air supply was extended using galvanized 1-inch diameter pipe. The electrical conduit consisted of 3/4-inch diameter galvanized piping. The air supply piping was connected to the manifold, as detailed in Drawing F03, Attachment B.

Trunklines AS-1 through AS-6 transport compressed air from the manifold to the bio-sparging wells. Each trunkline is constructed of 2-inch Schedule 80 PVC. Lengths of PVC are connected by Schedule 80 couplings and sealed with low-VOC solvent weld primer and cement. As needed, pipes are connected by Schedule 80 PVC elbows with 45-degree or 90-degree angles and sealed. Photographs 9 through 12 (Attachment D) show pipe installation for trunklines AS-1 through AS-3.

Trunklines AS-4, AS-5, and AS-6, located entirely within the Main Tank Farm, were installed aboveground. The pipes were banded with red and white 2-inch reflective tape at 6-foot intervals to identify the potential trip hazard (See Photograph 13, Attachment D). Three warning signs identifying “Trip Hazard/Above Ground Pipes” were also installed within the Main Tank Farm near BSW-30, BSW-32, and BSW-36.

Lateral piping directs compressed air from the trunklines to each bio-sparging well. Lateral piping consists of 1-inch Schedule 80 PVC. A 2-inch Schedule 80 PVC wye fitted with a 1-inch Schedule 80 PVC reducer bushing was used to connect each lateral to the trunkline. All PVC connections between the trunklines and laterals were sealed with low-VOC cement.

Prior to trench backfilling and site restoration, each pipe and trunkline was tested for air leaks. Additional cement was used as needed to close leaks in fittings.

2.4.4 Trench Backfilling and Restoration

After installation of pipes, trenches within the City parking lot and walkway were backfilled by CCS to approximately 4 inches bgs with controlled density fill (City of Seattle STD Specification 9-01.5), see photograph 14, Attachment D.

Site restoration was completed by Roads Paving, with oversight by AECOM, in April and May 2017. The trenches for trunklines AS-1 and AS-2 were filled from 4 inches bgs to ground surface with hot mix asphalt and compacted by a vibratory drum roller. The trenches for the laterals from AS-3 were filled with cold patch asphalt and compacted by roller and by hand tamp. After compaction, the interface between the new asphalt and the existing asphalt was sealed with a hot-applied thermoplastic sealant (See Photograph 15, Attachment D).

A portion of the AS-3 trunkline was placed aboveground in the City parking lot between the extruded curb and the northern wall of the Main Tank Farm. In addition, trunklines AS-1 and AS-2 are aboveground within the City walkway. Aboveground portions of trunklines AS-1 and AS-2 were covered with cold patch asphalt and tamped in place by hand. This asphalt rollover was painted with approximately 24-inch yellow bands placed at 24-inch intervals to indicate the trip hazard (See Photograph 16, Attachment D). Portions of AS-3 and associated laterals within the City parking lot were covered with cold patch asphalt and hand-tamped.

CurbPro repaired the cut extruded curbs by placing concrete and using hand trowels to shape the concrete.

2.5 Investigation-Derived Waste

Investigation-derived waste (IDW) included soil cuttings from bio-sparging well installation and trenching, construction debris from trenching, and water generated from decontamination of drill augers. IDW soil and construction debris was placed in 55-gallon drums or roll-off bins and transported to Columbia Ridge Landfill in Arlington, Oregon as petroleum-impacted soils (Attachment F). IDW water was placed in 55-gallon drums. On December 21, 2016, Stericycle removed 31 drums of soil cuttings and 2 drums of decontamination water from the site.

2.6 Site Survey

Locations of the bio-sparging wells, trunklines, and laterals were surveyed on May 30, 2017 by Plog Consulting using a 3-second Leica Viva TS15 Smart Pole Total Station with RTK GPS. Elevation was established using the North American Datum of 1983 and the North American Vertical Datum of 1988. The survey is provided in Attachment G.

2.7 Deviations from Work Plan

Deviations from the work plan were limited and are not expected to affect performance of the bio-sparging system. The engineering design was included in the permit package for SDOT permit 316339 (Attachment A).

The trunkline for AS-2 was extended further east and terminated at the same eastern limit as AS-1 and the locations of some bio-sparging wells were moved slightly. This change was made to streamline the installation of piping and organize the bio-sparging wells in the City parking lot into zones defined by an east-west alignment. Bio-sparging wells were re-numbered in the field. The final well locations and identifications are depicted in Attachment B.

3. System Startup

On May 25, 2017, the bio-sparging system was turned on. The system was initially programmed to cycle between trunklines every 10 minutes with an average flow rate of 8.3 cubic feet per minute (cfm). Pressure at bio-sparging wells was monitored at the beginning, middle, and end of each cycle. Pressures at all wells were fairly constant throughout the cycle duration (10 minutes) and typically varied by approximately 0.5 psig. This indicates that the cycle timing of 10 minutes per cycle does not result in a buildup or collapse of pressure around each bio-sparging well.

The Figure 3 summarizes air flow rates and cumulative volume of air injected into the bio-sparging wells from system startup (May 25, 2017) until September 26, 2017. As shown in Figure 3, the bio-sparging system was turned off periodically to allow for semi-annual groundwater monitoring at the Seattle Terminal (see AECOM, 2018).

The bio-sparging system was optimized to the minimum pressure that could be detected by the pressure gauges in the manifold. The low pressure increases the oxygen content of the groundwater and enhances biodegradation without increasing volatilization of VOCs in groundwater.

The air flow rate ranged from 0.0 to 46.0 cfm on May 25, 2017. On May 26 through noon (central time) on June 1, 2017, the air flow rate ranged from 5.7 to 8.9 cfm, with an average of 7.2 cfm. Starting at 1 pm on June 1, 2017, the flow rate was reduced to an average of 1.7 cfm (from 1.3 to 2.2 cfm).

Repairs conducted during system startup and optimization included the following:

- On May 25, 2017, during system startup, a disconnected section of piping was identified on the lateral line connection to well BSW-26 (trunkline AS-4). AECOM re-connected and glued the piping. Minor leaks were

also identified from fittings at the manifold and along the compressed air conveyance piping during startup. Fittings were subsequently tightened and leaks were eliminated.

- On November 13, 2017, an additional low-point drain was installed on the system air compressor supply line. The drain valve was located on the interior of the Main Tank Farm wall where the compressor line crosses over to the Manifold Area.

4. Operation and Maintenance Requirements

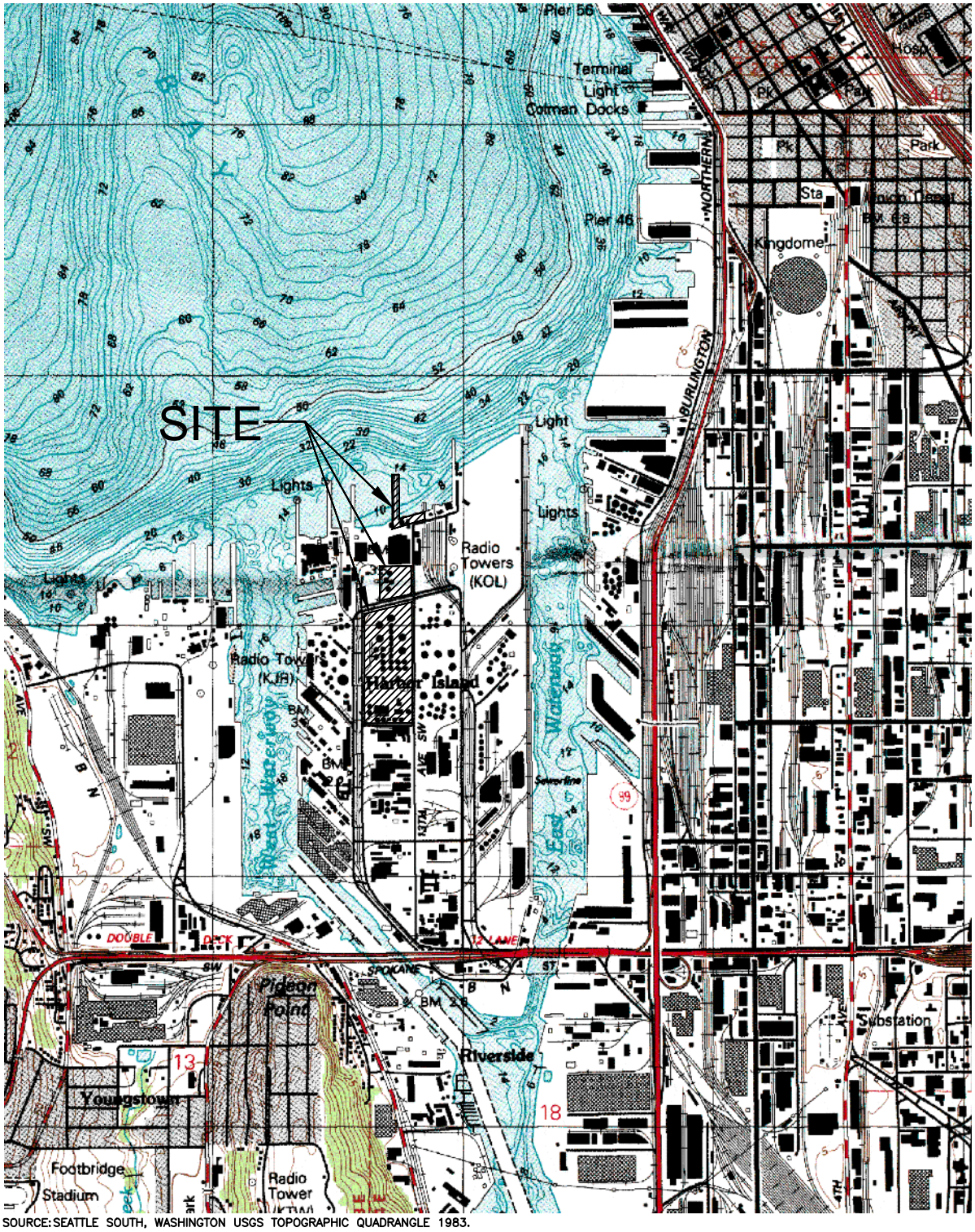
Maintenance requirements include assessments of the manifold components, air regulators and transmitters, piping, and asphalt placed during site restoration activities. Attachment E provides a summary of system components and the associated maintenance for each component. Attachment H provides template field forms for logging system inspections and repairs.

5. References

AECOM. 2017. Annual Compliance Monitoring Report 2016, Shell Harbor Island Terminal, Seattle, Washington. May 2017.

AECOM. 2018. Annual Compliance Monitoring Report 2017, Shell Harbor Island Terminal, Seattle, Washington. February 2018.

Figures



SOURCE: SEATTLE SOUTH, WASHINGTON USGS TOPOGRAPHIC QUADRANGLE 1983.

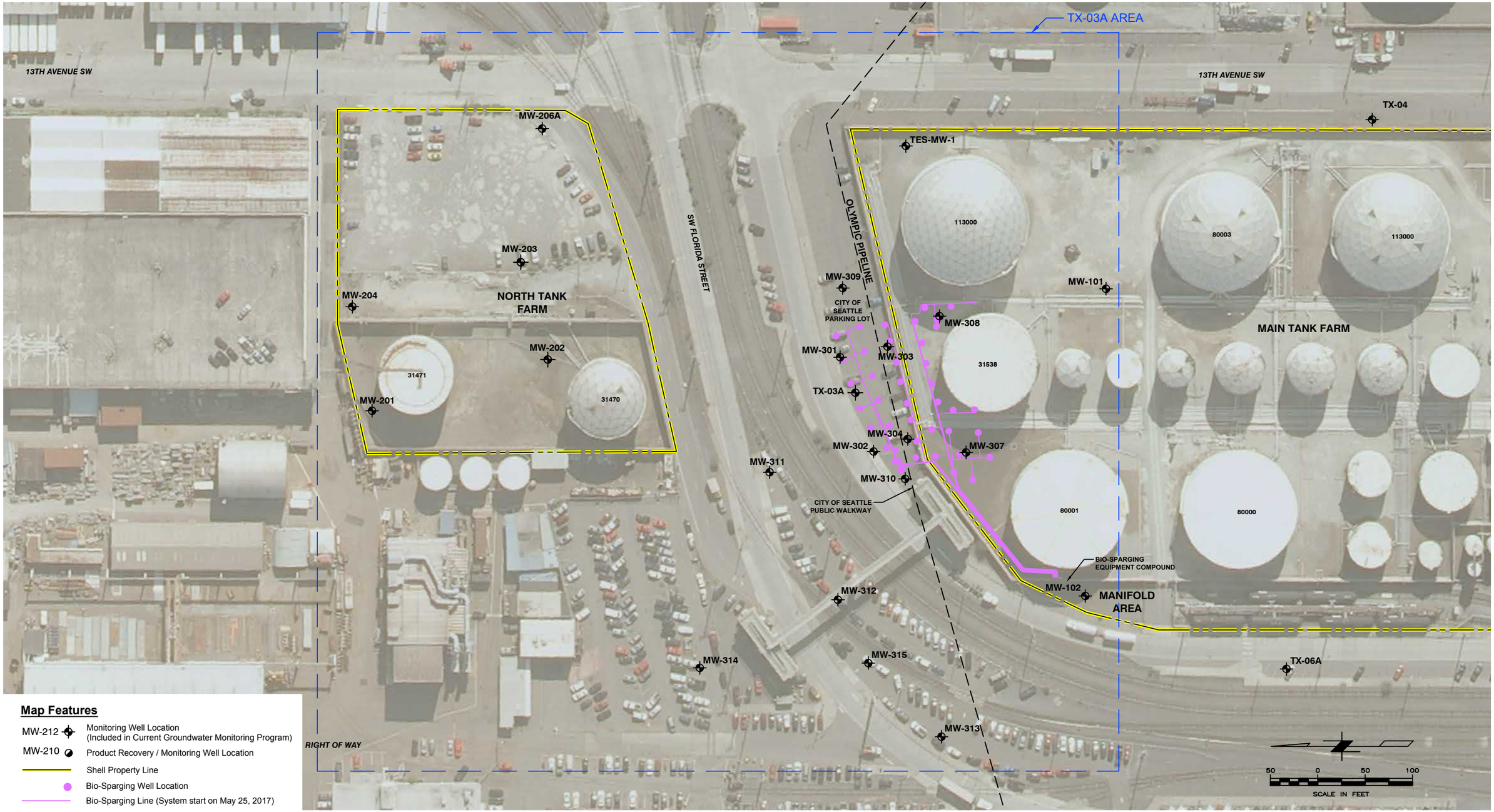
SITE LOCATION MAP

SHELL HARBOR ISLAND TERMINAL
BIO-SPARGING SYSTEM INSTALLATION MEMORANDUM
SEATTLE, WASHINGTON

FIGURE 1

AECOM

K:\46194268_Seattle_Terminal\MXD\2018\CCR\Fig 1 Site Vicinity Map.dwg Mar 05, 2018 - 8:48am



Map Features

- MW-212 — Monitoring Well Location (Included in Current Groundwater Monitoring Program)
- MW-210 — Product Recovery / Monitoring Well Location
- Shell Property Line
- Bio-Sparging Well Location
- Bio-Sparging Line (System start on May 25, 2017)

AECOM

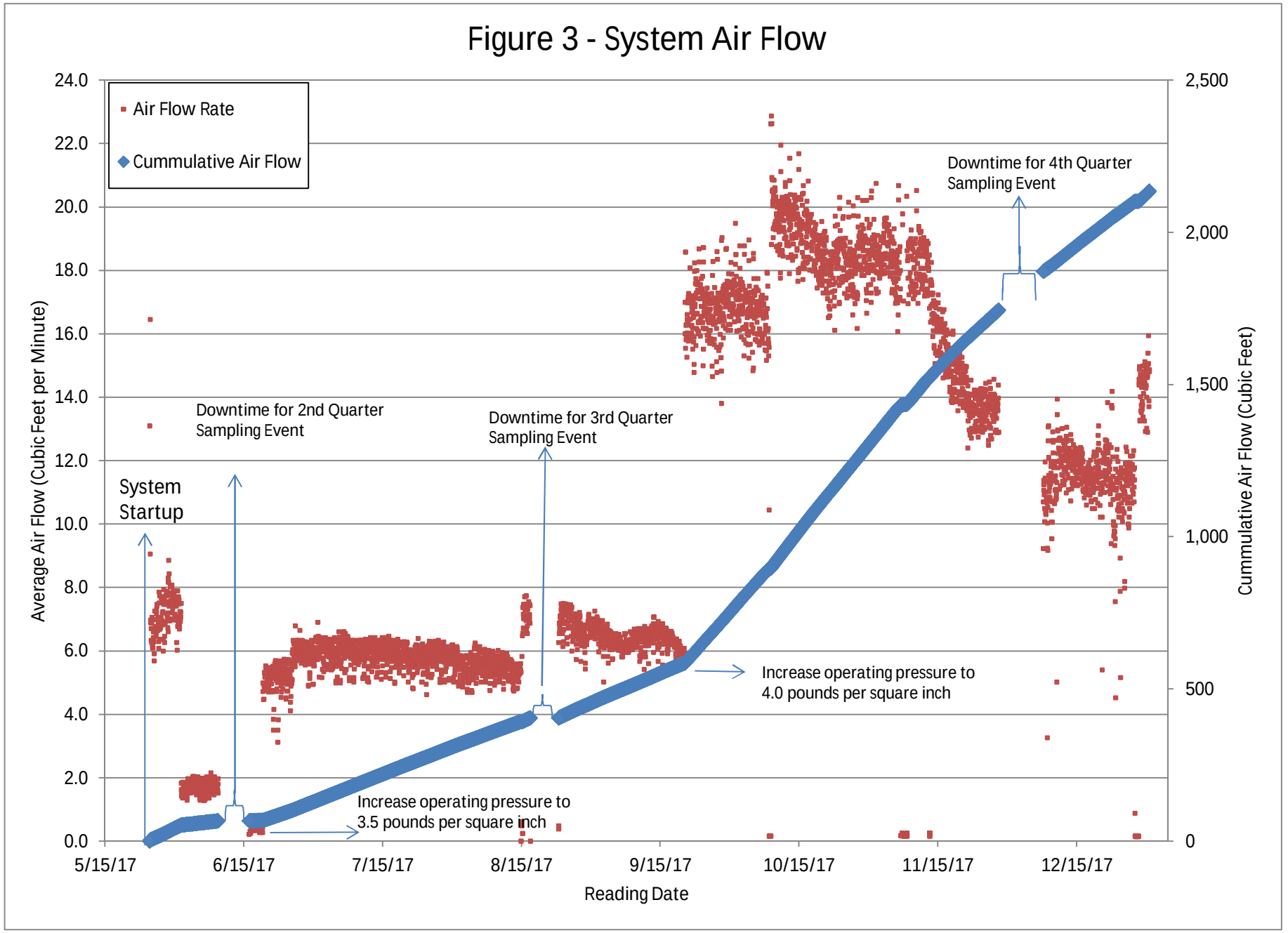
SITE MAP

SHELL HARBOR ISLAND TERMINAL
BIO-SPARGING SYSTEM INSTALLATION MEMORANDUM
SEATTLE, WASHINGTON

FIGURE 2

K:\4519426B_Seattle_Terminal\MXD\2018\CSR\Fig 2 Site Map.dwg Mar 05, 2018 - 12:08pm

Figure 3 - System Air Flow



Attachment A
Installation Permits

Seattle Dept of Transportation
Street Use Permits, 23rd Floor
700 Fifth Ave, Suite 2300
P O Box 34996
Seattle, WA 98124-4996

STREET USE PERMIT

Permit No.: 313272

☐ Inspector Copy ☐ Permittee Copy ☐ File Copy

Project ID: **IMPACT Project ID: N/A** **Estimated Project Completion Date: 07/12/2016**

Inspector: Ted Malveaux
Inspection District: WEST SEATTLE

LOCATION

Address: 2555 13TH AVE SW
High Impact Area: N
Details:

Application Date: 7/13/16 9:35 am
Issue Date: 7/14/16 11:16 am

PARTIES (* Primary Applicant)

Role	Name	Address	Phone	From	To
*Contractor'S Agent	PALMIERI, ANTHONY	1111 3RD AVE,SUITE 1600,SEATTLE,WA,98101	(206)438-2417		
Permittee	EQUILON ENTERPRISES LLC	2555 13TH AVE SW,DBA SHELL OIL PRODUCT US / DAVE FELGER,SEA,WA,98134-	(310)816-2053		
24 Hour Contact	MOODY, NICKY	111 SW COLUMBIA ST , SUITE 1500,,PORTLAND,OR,97201	(205)969-6310		
Contractor'S Agent	JOHNSON, AZALEA	1111 3RD AVE,SUITE 1000,SEATTLE,WA,98101	(206)438-2166		

PERMITTED USES

To Be Restored By: PERMITTEE

SW FLORIDA ST BETWEEN 13TH AVE SW AND 16TH AVE SW - NON-ARTERIAL

Use 511 Space A - Prepatory or exploratory work for upcoming projects, including surveying, installing monitoring wells, and soil sampling

Condition Description

Start Date 07/18/2016 - City owned parking lot & unimproved ROW

Start Date	Duration	End Date	Sq. Ft	Issue Date	Ext.	Side of Street	Location Type	Closure Type	Peak Work OK	Day or Time Rstrctns
07/18/2016	30	08/17/2016	1,250	07/14/2016	N	SOUTH	PARKING LANE	CLOSED		

CONDITIONS OF USE

DESCRIPTION OF WORK :

Additional Notes: *SCOPE: Install 3 x PVC geotechnical monitoring wells for environmental investigation - 2" diameter, 15' deep, in place for approximately 3 years installed via 8" auger drill, Arterial, AC Pavement/Dirt/Gravel*
MOBILITY IMPACT: South side of SW Florida St, 200' & 700' West CL of 13th Ave SW, City owned parking lot/Unimproved ROW
ANTICIPATED RESTORATION IMPACT: Restore wells per PORR & Seattle Standards, AC/Bentonite/Dirt/Gravel
CUSTOMER DESCRIPTION: Temporary use of City Parking located east of the railroad tracks and non-arterial ROW along Florida St. for staging and access to the City Storm Sewer line for sliplining repair work in accordance with the Voluntary Compliance Agreement (See Attachment1, VCA) between City of Seattle and Shell. The work will be conducted according to the City approved design (See attachment 2(Design Drawings). Additional access to City Parking Lot located west of the railroad tracks adjacent to Florida Street to install groundwater monitoring wells for continued enviromental monitoring (See attachments #(Figure 3). The City of Seattle Parking lot where staging will occur is located near the existing groundwater monitoring well monumnent for TX-03A, located at northing: 1265260.25838 and easting: 216716.6368992 coordinate point in the NAD83 State Plane Washington North (US Survey Feet). See Attachment 3 / Figure 3). The storm sewer pipe routes directly west under Florida Street, with MH-015 located within Florida St.

ADDITIONAL CONDITIONS :

Additional Notes: *DESCRIPTION CONTINUED: Two groundwater monitoring wells, MW313 & MW315 (see attachment 3/ Fig. 3) will be installed within the City Parking lot located West of Florida St. A traffic control plan is attached for the work that will be conducted within the non-arterial ROW (See attachment 2/ Design Drawings). Lane closure will occur for up to 5 days during the pipe sliplng activities.*

E1.15 :
MULCHING AND MATTING - Apply mulch to protect exposed soils and promote plant establishment.

E1.40 :

Project ID: IMPACT Project ID: N/A Estimated Project Completion Date: 07/12/2016

PERMANENT SEEDING AND PLANTING - Install temporary surface runoff control measures prior to seeding or planting to protect the surface from erosion until the vegetation is established. Establish permanent vegetation (e.g., grasses, legumes, trees, and shrubs) as rapidly as possible to prevent soil erosion by wind or water.

E1.45 :
SODDING - Establish permanent turf for immediate erosion protection or to stabilize drainage pathways where concentrated overland flow will occur.

E1.50 :
TOPSOILING - Preserve and use topsoil to enhance final site stabilization with vegetation and to provide a suitable growth medium for final site stabilization with vegetation.

E3.25 :
STORM DRAIN INLET PROTECTION - Install storm drain covers on stormwater structures less than 12 inches deep during construction. Install catch basin filter socks in stormwater structures greater than 12 inches deep. Place the storm drain or catch basin grate on top of the catch basin filter sock to hold it in place.

C1.20 :
USE OF CHEMICALS DURING CONSTRUCTION - Use only the recommended amounts of chemical materials and apply them in a proper manner. Neutralize the pH of concrete wash water from concrete mixers, if necessary.

C1.35 :
SAWCUTTING AND PAVING POLLUTION PREVENTION - Vacuum slurry and cuttings during the activity to prevent migration offsite and do not leave slurry and cuttings on permanent concrete or asphalt paving overnight. Dispose of collected slurry and cuttings, waste material, and demolition debris in a manner that does not violate groundwater or surface water quality standards. Implement preventative measures such as berms, barriers, secondary containment, and vactor trucks if observations indicate that a violation of water quality standards could occur.

C1.45 :
SOLID WASTE HANDLING AND DISPOSAL - Remove and dispose of accumulated solid waste at authorized disposal areas. Label waste containers and place them in a covered area with closed lids. Salvage and recycle any useful materials.

BMP5 :
SPILL PREVENTION AND CLEANUP-Keep a spill cleanup kit in a nearby vehicle or next to the work site so that it is easily accessible. Make sure the contents of the spill kit are appropriate for the types and quantities of materials used for this work task. Refill spill kit materials before beginning work.

BMP16 :
CONCRETE POURING, CONCRETE/ASPHALT CUTTING, AND ASPHALT APPLICATION - Sweep or shovel loose aggregate chunks and dust for recycling or proper disposal. Place storm drain covers or similarly effective containment devices over all storm drains located downslope or adjacent to the work area. Shovel or vacuum all slurry and remove from the site. Perform cleaning of concrete application and mixing equipment or concrete-delivery vehicles in a designated area where the rinse water is controlled.

BMP20 :
LANDSCAPING AND LAWN VEGETATION MANAGEMENT - Use proper fertilizer and herbicide application techniques to minimize nutrient pollution of stormwater. Implement proper landscaping and mulching techniques to prevent plant material and excess mulch from entering the separate storm drainage system. Do not dispose of collected vegetation in separate storm drainage systems, waterways, water bodies or greenbelt areas.

DAMAGED OR DESTROYED UTILITY :
SDOT makes no representation regarding the safety or integrity of the subject structure. If the structure is damaged or destroyed, SDOT will have no obligation to provide an alternative location for the permit utility.

OLYMPIC PIPELINE :
PERMITTEE MUST COORDINATE WITH OLYMPIC PIPELINE COMPANY (OPLC) FOR WORK IN CITY RIGHT-OF WAY AT LEAST TEN WORKING DAYS PRIOR TO JOB START. (NO DEPTH OF MAINLINE ON RECORD.) CONTACT (425) 981-2506 FOR REVIEW OF THE DRAWINGS. UNLESS CONTACT IS MADE, PERMIT IS REVOKED.

PED MOBILITY COORDINATION :
PEDESTRIAN MOBILITY COORDINATION: One sidewalk at this location must remain open for safe pedestrian passage at all times. Prior to the beginning of any construction, this permit requires: Contractor will coordinate with existing permit holders to coordinate construction impacts on this street segment. Contractor must ensure that one sidewalk or temporary pedestrian pathway remain open at all times to provide for safe pedestrian passage. SDOT reserves the right to require documentation confirming coordination on future permit requests or extensions when deemed necessary. Permittee is required to notify the district Street Use inspector to ensure all required inspections are scheduled.

RIGHTS - ALREADY APV CONTRACTR :
RIGHTS TO OTHER CONTRACTORS ALREADY APPROVED FOR WORK: The scope of work listed in this permit is approved for the scheduled dates only. SDOT recognizes that construction coordination may be required to allow other contractors with existing approved permits priority in conducting work in the right of way where potential construction conflicts may occur. If, in any given area, the work allowed under this permit conflicts with other area work where contractors demonstrate an existing approved permit, the permittee must move to another location. Permittee is required to notify district Street Use inspector regarding conflicts and any work that is rescheduled due to conflicts. Work that is rescheduled may require an extension or revision to the Street Use permit.

TREE TRUNK OR ROOTS :

Seattle Dept of Transportation
Street Use Permits, 23rd Floor
700 Fifth Ave, Suite 2300
P O Box 34996
Seattle, WA 98124-4996

STREET USE PERMIT

Permit No.: 313272

Project ID: **IMPACT Project ID: N/A** **Estimated Project Completion Date: 07/12/2016**

Contact the City Arborist Office (684-8733) a minimum of five working-days prior to digging within any landscaped areas in the street rights-of-way. The edge of all trenching must be at least five feet (5') from any street trees. When trenching near trees with trunks greater than twelve inches (12") in diameter, hand dig all trenching for a distance of ten feet (10'), measured five feet (5') radius from the tree trunk. When encountering tree roots, cut off cleanly with sharp saw (do not leave torn or ripped tree roots unattended). Do not cut roots greater than two inches (2") in diameter (contractor will have to hand tunnel underneath the roots). Do not paint ends of roots. Notify Landscape Maintenance at 684-4121 at least forty eight (48) hours in advance when working in landscaped areas or on trees.

FEES PAID AT THE COUNTER OR ONLINE

Description	Date	Amount
ISSUANCE FEE - SIGNIFICANT	07/13/2016	$305.00
USE FEE - USE 511 - SPACE A	07/13/2016	$0
Totals:		$305.00

STREET USE INSPECTOR Ted Malveaux (206) 615-1293

Permittee _____ Director Per _____

GENERAL REQUIREMENTS

1. ***Nature of permit.*** This permit is issued according to Seattle Municipal Code ("SMC"), Chapter 15.04, for the use or occupancy of the public right of way in a manner consistent with the terms and conditions in this permit. This permit is wholly of a temporary nature, vests no permanent rights, and is revocable according to SMC Section 15.04.070.
2. ***Acceptance of terms, conditions, and requirements.*** The Permittee accepts the terms, conditions, and requirements of this permit and agrees to comply with them to the satisfaction of the Seattle Department of Transportation, Street Use Division ("Street Use"), or such other agency as may be designated by the City. The Permittee further agrees to comply with all applicable City ordinances, including but not limited to SMC Title 15, and all applicable state and federal laws.
3. ***Copy of permit.*** A copy of the issued permit and current approved plans shall be on site and available at all times.
4. ***Expiration of permit.*** This permit shall remain valid until revoked according to SMC Section 15.04.070; provided that the permit shall expire automatically if the authorized work does not begin within six months from the date the permit is issued. The Permittee is responsible for keeping the permit up to date including submitting updated plans for approval. The Permittee shall submit requests to update a permit in writing or in person, and all requests shall be made to Street Use in a timely manner; otherwise, the Permittee may lose access to requested schedule for continued work in the right of way.
5. ***Superiority of Street Improvement Permits.*** When a Street Improvement Permit exists, rights acquired under the Street Improvement Permit supersede those acquired under any other Street Use or Utility Permits. Work not approved under the Street Improvement Permit shall require separate Street Use or Utility Permits and Permittee shall obtain these permits in advance of work.
6. ***Compliance with technical requirements and standards.*** All work within the public right of way shall be performed and completed according to the current or subsequently-amended requirements in the following technical documents published by the City: Right-of-Way Improvements Manual; Street Tree Manual; Standard Specifications for Road, Bridge and Municipal Construction; Standard Plans for Municipal Construction; Street and Sidewalk Pavement Opening and Restoration Rule; and Traffic Control Manual for In-Street Work.
7. ***Scope of work.*** The Permittee shall stage equipment or materials and construct or install the improvements and infrastructure reflected in and in accordance with this permit and the City-approved construction plans. Any revisions, omissions, or additions to the scope of work shall be reviewed and approved by the City before implementation.
8. ***Street Use notification.*** Construction work may be completed in several phases: site preparation (installing traffic control, saw-cutting, etc.); ground breaking; restoration; and staging of equipment and materials. Before beginning any phase of work in the public right of way, the Permittee shall notify Street Use of each start date. The Permittee shall be responsible for notifying Street Use Job Start at (206-684-5270) or SDOTJobStart@seattle.gov a minimum of 2-business days before starting work and shall provide the following information:
   - Permit number;
   - Job-site address;
   - Start date: please specify if Job Start date is the same as the excavation or ground breaking date. If the dates are different, please provide both dates;
   - Brief work description; and
   - Job-site contact name and phone number.

   Failure to notify Street Use Job Start shall result in a $300 penalty or other amounts according to SMC Section 15.04.074. For Street Improvement Permits and Utility Major Permits, a preconstruction meeting is required before starting construction, and the assigned inspector

shall be notified a minimum of 2-business days before required inspections. Construction or utility activity occurring with, but not approved under, a Street Improvement or Utility Major Permit shall be permitted under separate Street Use permits. The Permittee shall apply for and obtain these Street Use permits in advance of work. Failure to do so may subject the Permittee to penalties and additional permit review charges may apply.

9. ***Underground and overhead utility notification.*** The Permittee shall notify the following entities, as applicable, 2-business days in advance:
   - Utility Underground Locate Center (811 or 1-800-424-5555) before ground disturbance; and
   - Seattle City Light (206-684-4911) if working within 10 feet of high-voltage lines.
10. ***Olympic Pipe Line Company notification.*** When work in the right of way occurs within 100 feet of an Olympic Pipe Line Company ("OPLC") pipeline, the Permittee shall coordinate the work with OPLC, which may include submitting detailed construction plans to OPLC. The Permittee shall notify OPLC's field coordinator 10-business days in advance of the work (425-981-2506) and an OPLC representative may be required to be onsite during the work.
11. ***Public notification.*** The Permittee shall notify all potentially affected residents and businesses at least 10-business days before starting work in the public right of way, including alleys. Notification methods and timelines, including when ongoing notification is needed, must comply with Street Use standards and requirements.
    - If a tree has been approved for removal, the Permittee shall post a "tree removal" public-notice placard at least 10-business days before starting work.
    - If an SDOT public notice comment period is required prior to permitting, the Permittee shall conduct the public notice outreach prior to commencement of the SDOT public notice comment period.
12. ***Alley notification.*** Where this permit authorizes work in an alley, the Permittee shall notify all potentially impacted property owners and businesses prior to any activity occurring in the alley, including and especially those property owners and businesses with tenants using the alley to access parking or for building ingress/egress or deliveries. The Permittee shall schedule work around waste-management-collection days. If this is not possible, the Permittee shall coordinate with waste management services to either provide intermittent alley access during waste pickup or to temporarily establish waste pickup at an alternate location. If an alley is to remain open during permitted work, a minimum 11-foot clear width is required for vehicular access. If an alley is closed to through traffic, the Permittee shall notify the nearest Seattle Fire Department fire station and the Seattle Police Department at the non-emergency numbers prior to commencing work.
13. ***Coordination of work.*** In performing work authorized by this permit, the Permittee shall coordinate with other contractors working in the public right of way to minimize impact to the public. Documented coordination agreements may be required prior to permit issuance and additional notification to the public may be required.
14. ***Hours of work.*** Work performed in the public right of way shall occur only during hours authorized under all applicable codes, regulations, rules, and permits.
15. ***Off-hours work.*** Work outside of normal working hours, 8:00 AM - 5:00 PM Monday through Friday, is considered "off-hours work" and requires a minimum of 3-business days advanced notice to the Street Use Inspection Supervisor before the off-hours work commences. Off-hours work may also require a separately-approved traffic control plan. A minimum of two hours of inspection time shall be charged for off-hours inspections at the premium rate. A Stop Work order or Citation may be issued for failing to notify Street Use at least 3-business days before the off-hours work.
16. ***Inspection fees.*** The Permittee shall pay for City inspections of work authorized under this permit according to the current fee schedule established by SMC Section 15.04.074 and all other associated costs.
17. ***Billing.*** All fees and costs billed according to this permit shall be paid to the City of Seattle within 30-calendar days from the invoice date. Past due invoices may be subject to interest charges and may be sent to collections.
18. ***Deposits, charges, and future billings.*** The Permittee, also identified as the "Financially Responsible Party" on Street Use permit applications, is responsible and liable for all permit-related charges. If a deposit was made for estimated future Street Use services, any unused portion of the deposit shall be refunded to the Permittee. Any charges in excess of the deposit shall be billed to the Permittee on a monthly basis.
19. ***Corrective work.*** The Permittee is responsible for any additional costs incurred by the City resulting from temporary or corrective measures required to bring the work area into compliance with standards that apply, including but not limited to: temporary traffic control, requirements for temporary structures, temporary stabilization, and temporary restoration when the Permittee is not on site.
20. ***Indemnification.*** The Permittee agrees to defend, indemnify, and hold harmless the City of Seattle, its officials, officers, employees, and agents; against any liability, claims, causes of action, judgments, or expenses, including reasonable attorney fees; resulting directly or indirectly from any act or omission of the Permittee, its contractors, subcontractors, anyone directly or indirectly employed by them, and anyone for whose acts or omissions they may be liable; arising out of the Permittee's use or occupancy of the public right of way; and all loss by the failure of the Permittee to fully or adequately perform, in any respect, all authorizations or obligations under this Permit.
21. ***Insurance.*** The Permittee shall obtain and maintain in full force and effect, at its own expense, public liability insurance in an amount sufficient to protect the City from all potential claims and risks of loss from perils in connection with any activity that may arise from or be related to the Permittee's activity upon or the use or occupation of the public right of way allowed by the permit; and all claims and risks in connection with activities performed by the Permittee by virtue of the permission granted by the permit. The Permittee shall meet all other insurance requirements in SMC 15.04.045.

EXISTING IMPROVEMENTS

1. ***Costs of damage to City property and improvements.*** The Permittee shall be responsible for the costs of repairing any damage to City property or improvements, including street trees, resulting from work performed by or on behalf of the Permittee within the public right of way. Damage to

street trees is assessed on the value of the tree according to SMC subsection 15.90.018.B.

2. ***Utility protection.*** The Permittee shall be responsible for checking locations and providing adequate protection for all utilities in the work area.
3. ***Utility relocation.*** The Permittee shall be responsible for notifying affected utilities and requesting any necessary relocation.
4. ***Survey monuments.*** Before removing, destroying, disturbing, or covering a survey monument such that the survey point is no longer visible or readily accessible, the Permittee shall obtain a permit from the Department of Natural Resources according to Washington Administrative Code, Chapter 332-120.
5. ***Protecting, removing, and relocating existing improvements.*** The Permittee, at their own cost and expense, shall be responsible for coordinating the removal and relocation of existing improvements within the public right of way that their construction or permitted project may interfere with. These existing improvements include, but are not limited to trees, bike racks, newsstands, bike-share stations, signs, benches, artwork, and waste receptacles.
   - For bike-share stations, the Permittee shall contact the bike-share operator at least 30-calendar days before starting work in order to coordinate the removal and relocation of the bike-share station.
   - For all other existing improvements, the Permittee shall contact the improvement owner at least 10-business days before starting work to coordinate the temporary removal of the improvement.
   - For newsstands, the Permittee shall coordinate temporary relocation during the construction period by posting notice of upcoming construction projects at SeattleNewsstands.org at least 10-business days before starting work.

   The Permittee shall be responsible for reinstalling the improvements or coordinating the reinstallation in their original location or at a reasonable alternative location approved by the existing improvement owner and meeting all applicable City requirements. The Permittee is further responsible for protecting all trees within the construction project area and shall contact Urban Forestry to disclose and describe any construction impacts to trees.

   Failure to contact the improvement owners or Urban Forestry is cause for Street Use to revoke this permit.
6. ***Monorail system proximity requirements.*** The Permittee shall be responsible for coordinating with the Seattle Center when any work, deliveries, or loading/unloading will occur within 14 feet of a Monorail structure or 20 feet of a Monorail foundation or below-ground installation. The Permittee shall contact the Seattle Center at 206-905-2601 at least 10-business days before starting construction. Failure to do so is cause for permit revocation.
7. ***Monorail system proximity guidelines.*** Below grade: The restricted digging area includes a 45-degree cone extending outward and downward from the ground level of all monorail piers. Nearby excavations shall be monitored to assure footing stability. At- or above-grade: The piers above ground level cannot be moved, nor can any item like lighting or signage be attached to the piers without prior written consent from the Seattle Center Director. Piers shall not be painted. Landscaping shall not occur adjacent to piers or within 10 feet of a Monorail structure without prior written consent of the Seattle Center Director. Any construction activity in the area of the power rails shall follow OSHA guidelines for working around high voltage. Construction equipment shall be located and operated in awareness of and taking account of beam height and the train's 14-foot-operational envelope from each side of the beam. Contractors shall string warning lines from pier to pier under the beams as a guide. Spotters shall be employed when any construction activity occurs within 25 feet of the beams.

ENVIRONMENTAL PROTECTION

1. ***Best management practices required.*** The Permittee shall be responsible for protecting the public place, including but not limited to protecting existing street trees and green stormwater infrastructure, and controlling surface runoff, erosion and sediment at the construction site, as required by: the Stormwater Code, (SMC Title 22, Subtitle VIII); the Street and Sidewalk Use Code, (SMC Title 15); the Standard Specifications for Road, Bridge, and Municipal Construction; and Department of Planning and Development Director's Rule 21-2015/Seattle Public Utilities DWW 200, or successor rules or provisions. The site and the surrounding area shall generally be kept clean and free of construction debris or other material, including but not limited to mud, dust, rock, asphalt, and concrete. Waste materials shall be collected and disposed of at an appropriate disposal site. These materials shall be prevented from entering any part of the public sewer and storm drain system, and any surface waters.

TRAFFIC CONTROL REQUIREMENTS

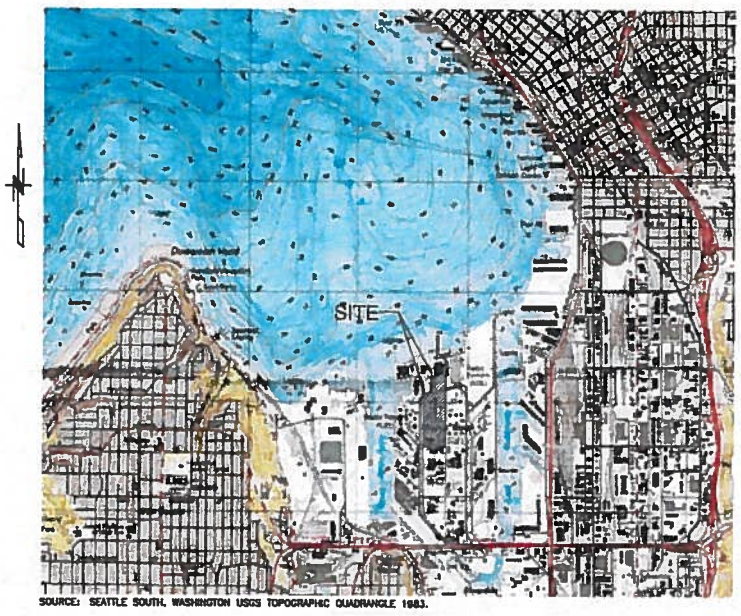
1. ***Compliance with the Traffic Control Manual for In-Street Work.*** In order to provide safe and effective work areas and to ward, control, protect, and expedite vehicular and pedestrian traffic; signage for all construction within the public right of way shall comply with the City of Seattle Traffic Control Manual for In-Street Work, as amended. When required, the conditions on the traffic control plan shall supersede any conflicting provisions or requirements in the City of Seattle Traffic Control Manual for In-Street Work. A copy of the current City of Seattle Traffic Control Manual for

   In-Street Work and the approved traffic control plan shall be on site at all times.
2. ***Lanes to remain open during peak hours.*** Traffic lanes shall not be closed during the following peak hours: 6:00 AM-9:00 AM and 3:00 PM-7:00 PM in the Central Business District; and 7:00 AM-9:00 AM and 4:00 PM-6:00 PM for arterials elsewhere in the City, unless specifically noted on the approved traffic control plan.
3. ***Maintain access.*** Access to adjoining properties and businesses shall be maintained or accommodated during construction. Pedestrian access around construction sites shall be implemented and maintained per SDOT Director's Rule 10-2015, or successor rule.
4. ***Width of temporary traffic lanes.*** Temporary traffic lanes created during the permitted work shall be a minimum of 11 feet in width unless otherwise approved on the traffic control plan.
5. ***Working within restricted curb spaces.*** When the project impacts a restricted curb space, such as meters, pay stations, specific use and load zones; the Permittee shall obtain permission from SDOT Traffic Operations and reserve the spaces with the Traffic Operations Permit Counter

(206-684-5086) before starting work.

6. ***Temporary No Parking signs and easels.*** In areas without parking pay stations or parking meters, or when Traffic Operations allows reserved parking spaces to be controlled with Temporary No Parking signs, establishing a Temporary No Parking Zone requires placing type R7-T38 (T-38) or R7-T39 (T-39) easels and completing an online verification form in conformance with the Traffic Control Manual for In-Street Work. In high impact areas, the Central Business District, and in areas where construction projects are densely clustered (such as in City-designated "Construction Hubs"), additional requirements for establishing a Temporary No Parking Zone may apply.
7. ***Nighttime illumination.*** Four or more Type B warning lights of sufficient brilliance to be seen from 500 feet shall be maintained at all times during the hours of darkness at the points of obstruction or excavation of any right of way.
8. ***Work in alleys.*** For work occurring in alleys that impedes vehicular access, including but not limited to egress, ingress, or through travel; "Street Closed" signs shall be placed at each end of the alley. Property owners adjacent to the alley shall be contacted, and their access concerns shall be addressed and mitigated if possible. This may require alternative work scheduling in the case of Solid Waste collection days and hours.

SHELL HARBOR ISLAND TERMINAL
STORMWATER DISCHARGE PIPE REPAIR
DRAFT ENGINEERING DESIGN
SEATTLE WASHINGTON



SOURCE: SEATTLE SOUTH, WASHINGTON USGS TOPOGRAPHIC QUADRANGLE 1983.

VICINITY MAP

N.T.S.

NOTE:
HARBOR ISLAND CULTURAL FEATURES DEPICTED ON THIS MAP DO NOT REFLECT ISLAND-WIDE RE-DEVELOPMENT BY THE PORT OF SEATTLE AND OTHER PARTIES.

313272

DRAWING INDEX

SHEET #	FIGURE #	SHEET TITLE
1	F01	COVER SHEET, VICINITY MAP, AND DRAWING INDEX
2	F02	CURRENT SITE LAYOUT
3	F03	TRAFFIC CONTROL PLAN
4	F04	STAGING AREAS AND STORM WATER SYSTEM BYPASS PLAN
5	F05	UTILITY REPAIR PLAN OVERVIEW
6	F06	UTILITY REPAIR DETAILS

GENERAL NOTES:

1. MATERIALS AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE FOLLOWING:
   a. DEPARTMENT OF ENVIRONMENTAL QUALITY AND CITY OF SEATTLE, APPROVED STORM WATER UTILITY REPAIR WORK PLAN AND FINAL ENGINEERING DESIGN, PREPARED FOR SHELL OIL PRODUCTS BY AECOM, AUGUST 2015.
   b. CURRENT EDITION OF THE STANDARD FOR SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION PREPARED BY THE WASHINGTON STATE CHAPTER OF THE AMERICAN PUBLIC WORKS ASSOCIATED AND THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION.
   c. CONDITIONS AND STANDARDS SET FORTH IN THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) DESIGN MANUAL, AS AMENDED AND APPROVED BY WSDOT.
   d. DOT CONSTRUCTION MANUAL, AS AMENDED AND APPROVED BY WSDOT.
   e. OTHER SPECIFICATIONS NOT LISTED ABOVE THAT MAY BE REQUIRED BY THE CITY OF SEATTLE.
2. CONSTRUCTION ACTIVITIES ARE BEING CONDUCTED IN ACCORDANCE WITH THE WASHINGTON DEPARTMENT OF ECOLOGY, NORTHWEST REGION OFFICE, LOCATED AT 3190 160TH AVENUE SE, BELLEVUE, WASHINGTON 98008, CONSENT DECREE NO. 99-2-07176.

ENGINEER:
AECOM
111 SW COLUMBIA, SUITE 1500
PORTLAND, OR 97201
(503) 222-7200

OWNER:
SHELL OIL PRODUCTS, SOIL & GW FOCUS DELIVERY GROUP – US REGION
P.O. BOX 2463
HOUSTON, TX 77252
(425) 413-1164

No.	DATE	BY	REVISION

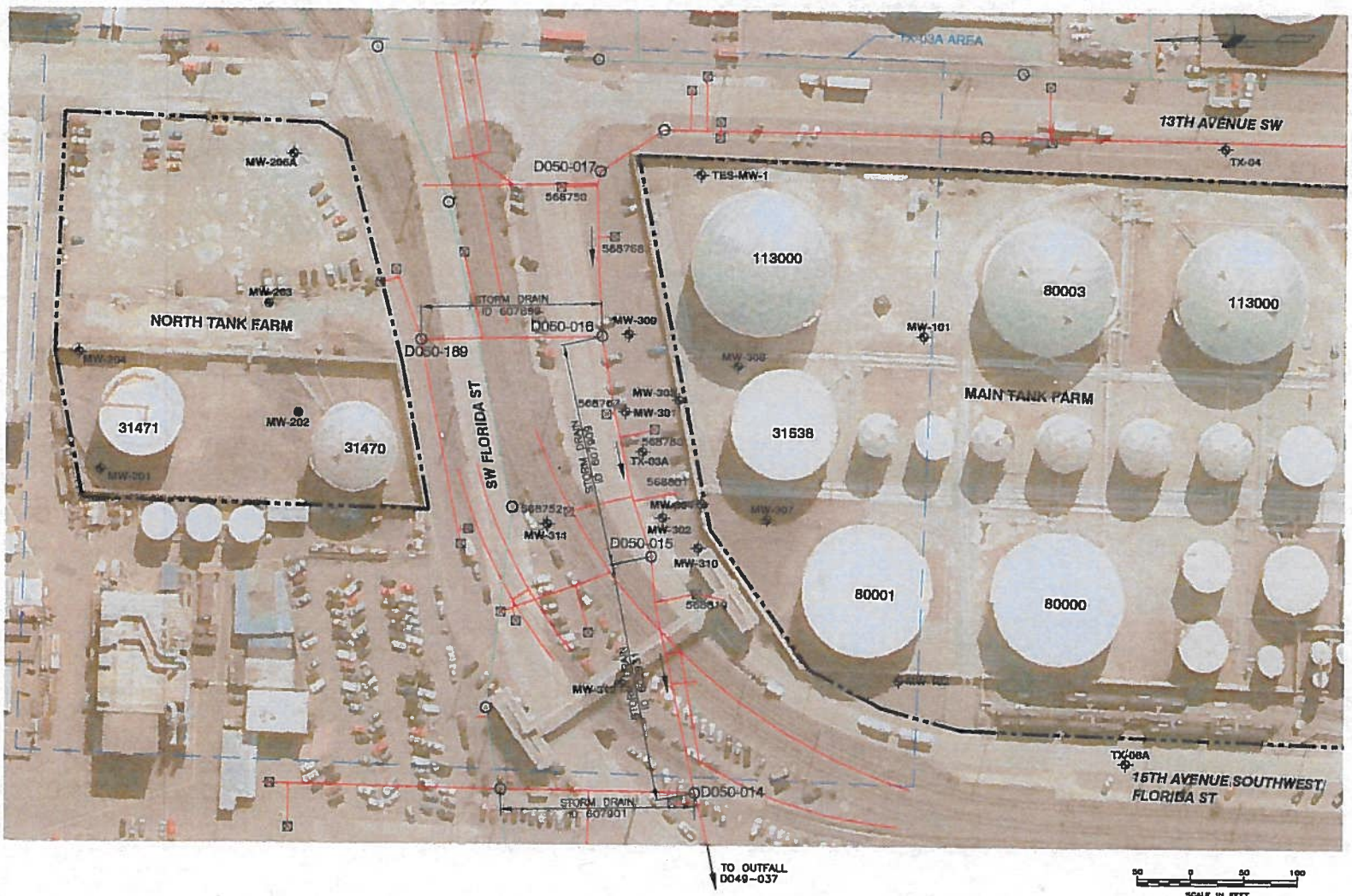
JOB No. 60411076 | DESIGNED: HWN | PROJ. ENGINEER: HWN
SCALE: AS NOTED | DRAWN BY: BJR | APPROVED BY: HWN
CHECKED BY: BG | DATE: JUNE 25, 2015

AECOM
111 SW Columbia, Suite 1500
Portland, Oregon 97201-5814
(tel) 503-222-7200
(fax) 503-222-4292
www.aecom.com

SHELL HARBOR ISLAND
SEATTLE, WASHINGTON

STORMWATER DESCHARGE PIPE REPAIR
COVER SHEET, VICINITY MAP, AND DRAWING INDEX

DRAWING NUMBER: FIGURE 1
CAD FILE NUMBER:
SHEET: OF | REV.



LEGEND:

- 11300 TANK NUMBER ID
- MW-212 SHALLOW GROUNDWATER MONITORING WELL LOCATION.
- MW-205 DEEP GROUNDWATER MONITORING WELL LOCATION.
- D050-015 MANHOLE
- 568819 CATCH BASIN/INLET
- 568801 ABANDONED CATCH BASIN
- STORM DIRECTION FLOW
- SHELL PROPERTY LINE.
- STORM WATER SYSTEM
- COMBINED SEWER
- TX-03A AREA

No.	DATE	BY	REVISION

JOB No. 60411076 | SCALE: AS NOTED | DESIGNED: HWN | DRAWN BY: BJR | CHECKED BY: BC | PROJ. ENGINEER: HWN | APPROVED BY: HWN | DATE: JUNE 25, 2015

WARNING: IF BAR DOES NOT MEASURE 1" AT FULL SIZE, THEN SCALES ON DRAWING NOT TO SCALE.

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SHELL HARBOR ISLAND

SEATTLE, WASHINGTON

STORMWATER DESCHARGE PIPE REPAIR

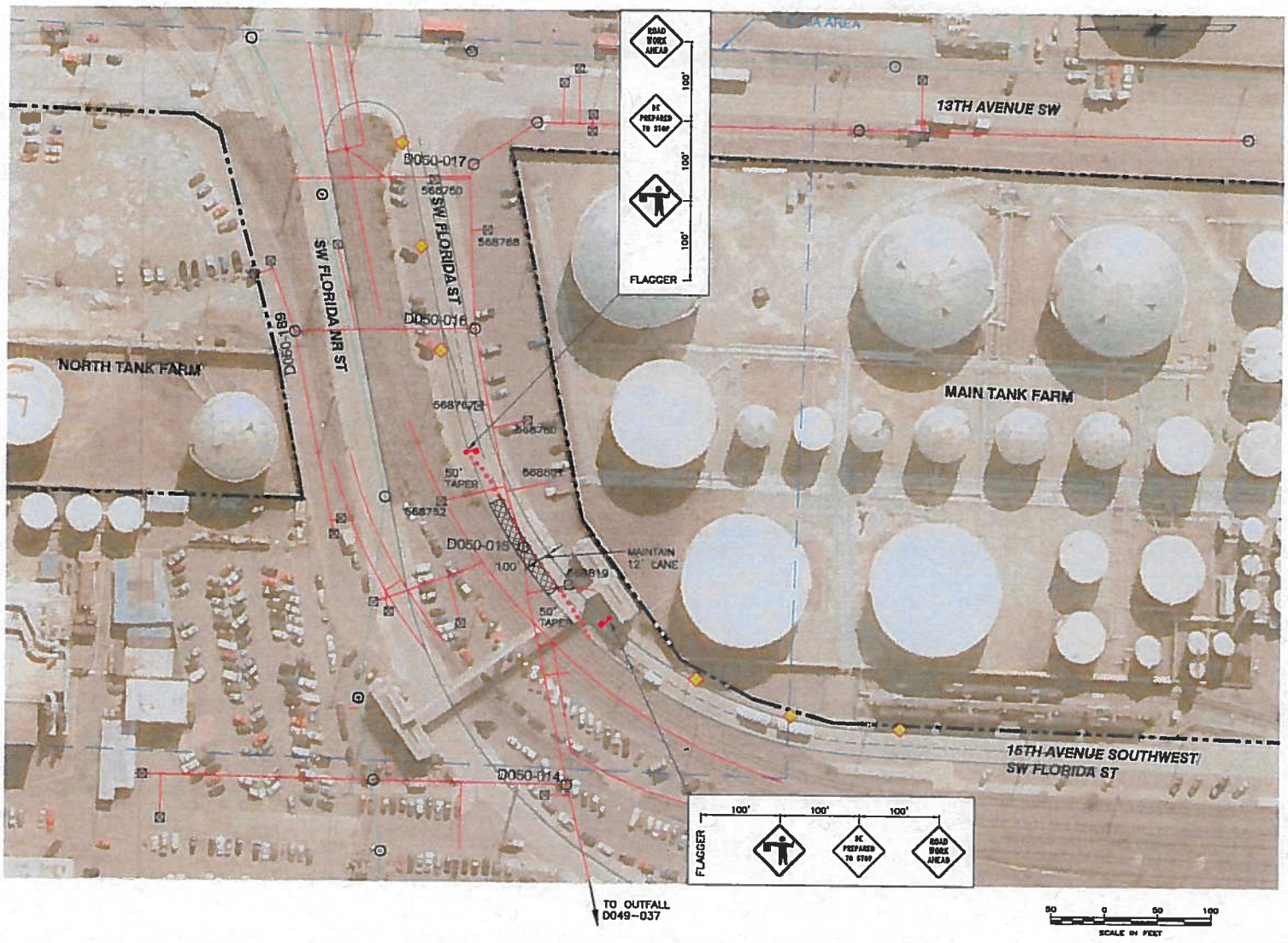
CURRENT SITE LAYOUT

DRAWING NUMBER: FIGURE 2

CAD FILE NUMBER:

SHEET: OF | REV:

3/327



SIGN SPACING	
MPH	SPACE
30	100'

CHANNELIZATION DEVICE SPACING		
MPH	TAPER	TANGENT
30	30	60

TAPER LENGTH (IN FT)		
MPH	LANE WIDTH 12'	LANE BUFFER
30	180	90

SUMMERY OR DEVICES
2-48" ROAD WORK AHEAD
2-48" BE PREPARED TO STOP
2-48" FLAGGER SYMBOLS
25-CONES
2-FLAGGERS

LEGEND:

- TRAFFIC SIGN
- TRAFFIC CONE
- FLAGGER
- WORK ZONE
- D050-015 MANHOLE
- 568819 CATCH BASIN/INLET
- 568801 ABANDONED CATCH BASIN
- SHELL PROPERTY LINE
- STORM WATER SYSTEM
- COMBINED SEWER
- TX-03A AREA

NOTES:

1. ALL WORK CONDUCTED WITHIN THE PUBLIC RIGHT OF WAY (ROW) SHALL BE PERFORMED AND COMPLETED ACCORDING TO THE CURRENT OR SUBSEQUENTLY-AMENDED REQUIREMENTS IN THE FOLLOWING TECHNICAL DOCUMENTS PUBLISHED BY THE CITY OF SEATTLE: RIGHT-OF-WAY IMPROVEMENTS MANUAL; STREET TREE MANUAL; STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION; STANDARD PLANS FOR MUNICIPAL CONSTRUCTION; AND TRAFFIC CONTROL MANUAL FOR IN-STREET WORK.
2. A STREET USE PERMIT, APPROVED BY THE CITY OF SEATTLE, DEPARTMENT OF TRANSPORTATION SHALL BE OBTAINED BEFORE BEGINNING WORK IN THE ROW. ANY REVISIONS, OMISSIONS, OR ADDITIONS TO THIS PLAN SHALL BE REVIEWED AND APPROVED BY THE CITY OF SEATTLE, BEFORE IMPLEMENTATION.
3. STREET WORK WILL INVOLVE OPENING MANHOLE, D050-015, WITHIN AN ARTERIAL STREET, AT AN APPROXIMATE LOCATION OF 1370 SW FLORIDA ST. ON HARBOR ISLAND, NEAR THE PEDESTRIAN FOOTBRIDGE OVER FLORIDA STREET AND THE RAILROAD TRACKS ADJACENT TO THE VIGOR SHIPYARD.
4. CITY OF SEATTLE USE CODES ASSOCIATED WITH THE STREET WORK ARE 48 - STREET OPENINGS AND 31 - CONSTRUCTION USE.
5. FLAGGERS WILL DIRECT TRAFFIC THROUGH THE OPEN (NORTHBOUND) ROAD LANE. FLAGGERS SHALL REFER AND FOLLOW THE WASHINGTON ADMINISTRATIVE CODE (WAC) 296-155-305.
6. THE WORK ZONE CONSISTS OF AN APPROXIMATE 11 FT WIDE BY 100 FT LONG WORK AREA, WITH TAPERS TO THE CURB ON BOTH ENDS OF THE WORK ZONE, FOR AN APPROXIMATE TOTAL AREA OF 2,200 SQUARE FEET.
7. NOTIFICATION OF STREET USE IS REQUIRED A MINIMUM OF 2-BUSINESS DAYS BEFORE STARTING WORK WITHIN THE ROW, AT (206) 684-5270 OR SDOTJOBSTART@SEATTLE.GOV.
8. ALL WORK WITHIN THE ROW SHALL BE CONDUCTED DURING NORMAL WORKING HOURS OF 8AM AND 5PM PST, MONDAY THROUGH FRIDAY.
9. ALL TRAFFIC CONTROL DEVICES SHALL BE REMOVED FROM THE PUBLIC ROW, FOLLOWING COMPLETION OF THE WORK AT MANHOLE, D050-015.

No.	DATE	BY	REVISION

JOB No.	DESIGNED:	PROJ. ENGINEER:
60411076	HWN	HWN
SCALE: AS NOTED	DRAWN BY: BJR	APPROVED BY: HWN
	CHECKED BY: BG	DATE: JUNE 25, 2015

WARNING
1/2"
IF BAR DOES NOT MEASURE 1" AT FULL SIZE, THEN SCALES ON DRAWING NOT TO SCALE.

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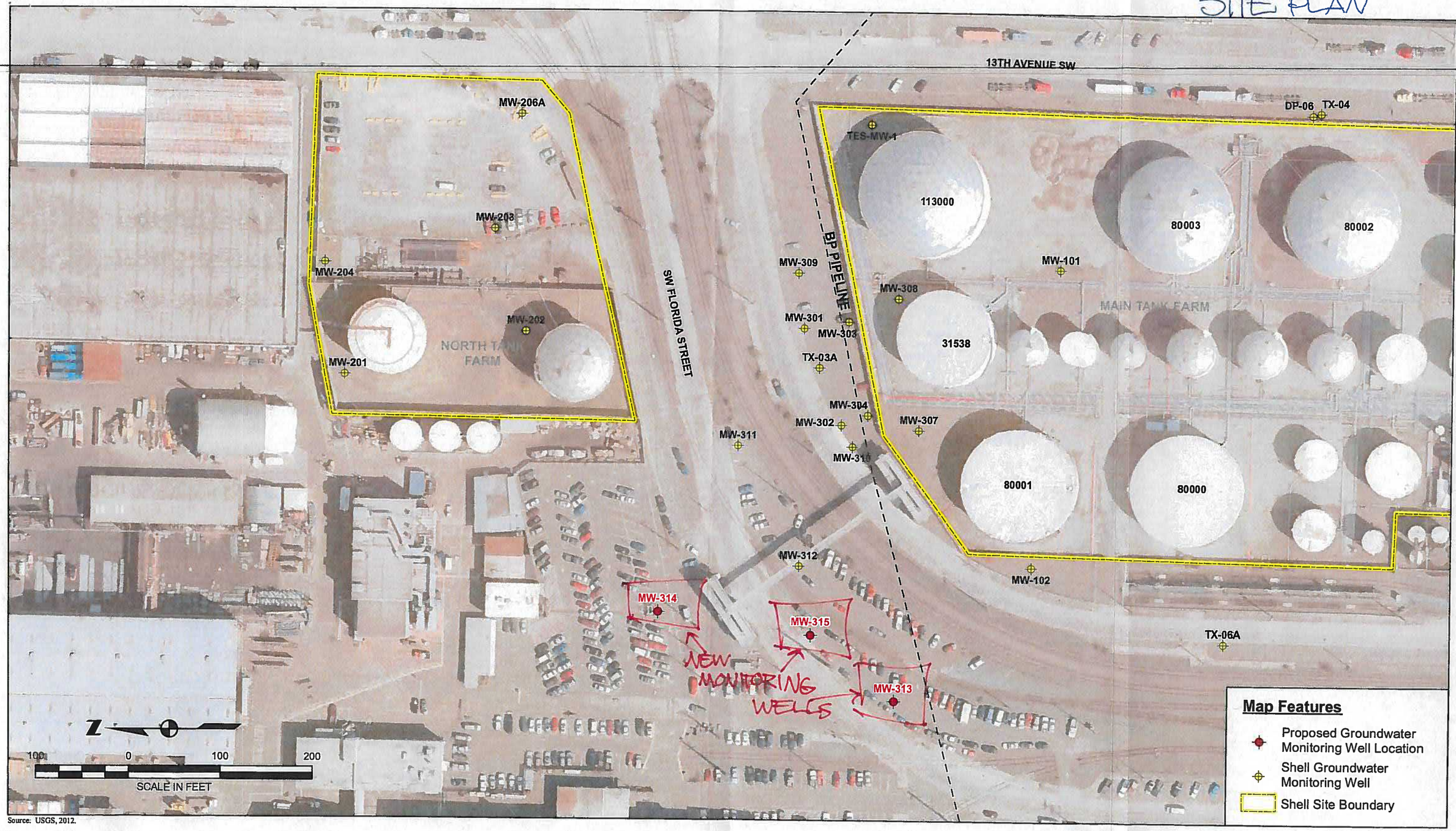
SHELL HARBOR ISLAND
SEATTLE, WASHINGTON

STORMWATER DESCHARGE PIPE REPAIR
TRAFFIC CONTROL PLAN

DRAWING NUMBER: FIGURE 3
CAD FILE NUMBER:
SHEET: OF
REV

313272

SITE PLAN



Source: USGS, 2012.

Document Path: K:\46194268 Seattle Terminal\MXD\2016\Fig 3 Proposed GW MW Locations.mxd

AECOM

313272

Revised Figure 3 - May 17, 2016

PROPOSED GROUNDWATER MONITORING WELL LOCATIONS

SHELL
HARBOR ISLAND TERMINAL
SEATTLE, WASHINGTON

FIGURE 3

Seattle Dept of Transportation
Street Use Permits, 23rd Floor
700 Fifth Ave, Suite 2300
P O Box 34996
Seattle, WA 98124-4996

UTILITY PERMIT

Permit No.: 316339

Job No.: 214795

☐ Inspector Copy ☐ Permittee Copy ☐ File Copy

Inspector:

LOCATION

Inspection District: WEST SEATTLE

Address: 2555 13TH AVE SW

Details: AFFECTED AREA: AT SW FLORIDA STREET PARKING LOT FROM 200 FEET WEST OF 13TH AVE SW TO 500 WEST OF 13TH AVE SW

Application Date: 8/9/16 10:21 am

Issue Date: 3/30/17 10:43 am

PARTIES (* Primary Applicant)

Role	Name	Address	Phone
*24 Hour Contact	PALMIERI, ANTHONY	1111 3RD AVE,SUITE 1600,SEATTLE,WA,98101	(206)245-7679
Permittee	EQUILON ENTERPRISES LLC	DBA SHELL OIL PRODUCTS US,20945 S WILMINGTON AVE,CARSON,CA,90810-	(823)337-7398
24 Hour Contact	MOODY, NICKY	111 SW COLUMBIA ST , SUITE 1500,,PORTLAND,OR,97201	(205)969-6310

PERMITTED USES

Use Code: 51 **Vault Plan #:** 790-517 **Plan Serial #:** 36948

Right of Way: NON-ARTERIAL **DPD #:** 214795 **To Be Restored By:** PERMITTEE

Space	Start Date	Duration	Sq. Feet	Description	Conditions
A	04/14/2017	30	40,000.00	Job # 60483182-08001	

CONDITIONS OF USE

E1.15 :
MULCHING AND MATTING - Apply mulch to protect exposed soils and promote plant establishment.

E1.40 :
PERMANENT SEEDING AND PLANTING - Install temporary surface runoff control measures prior to seeding or planting to protect the surface from erosion until the vegetation is established. Establish permanent vegetation (e.g., grasses, legumes, trees, and shrubs) as rapidly as possible to prevent soil erosion by wind or water.

E1.45 :
SODDING - Establish permanent turf for immediate erosion protection or to stabilize drainage pathways where concentrated overland flow will occur.

E1.50 :
TOPSOILING - Preserve and use topsoil to enhance final site stabilization with vegetation and to provide a suitable growth medium for final site stabilization with vegetation.

E3.25 :
STORM DRAIN INLET PROTECTION - Install storm drain covers on stormwater structures less than 12 inches deep during construction. Install catch basin filter socks in stormwater structures greater than 12 inches deep. Place the storm drain or catch basin grate on top of the catch basin filter sock to hold it in place.

C1.20 :
USE OF CHEMICALS DURING CONSTRUCTION - Use only the recommended amounts of chemical materials and apply them in a proper manner. Neutralize the pH of concrete wash water from concrete mixers, if necessary.

C1.35 :
SAWCUTTING AND PAVING POLLUTION PREVENTION - Vacuum slurry and cuttings during the activity to prevent migration offsite and do not leave slurry and cuttings on permanent concrete or asphalt paving overnight. Dispose of collected slurry and cuttings, waste material, and demolition debris in a manner that does not violate groundwater or surface water quality standards. Implement preventative measures such as berms, barriers, secondary containment, and vactor trucks if observations indicate that a violation of water quality standards could occur.

C1.45 :
SOLID WASTE HANDLING AND DISPOSAL - Remove and dispose of accumulated solid waste at authorized disposal areas. Label waste containers and place them in a covered area with closed lids. Salvage and recycle any useful materials.

BMP5 :
SPILL PREVENTION AND CLEANUP-Keep a spill cleanup kit in a nearby vehicle or next to the work site so that it is easily accessible. Make sure the contents of the spill kit are appropriate for the types and quantities of materials used for this work task. Refill spill kit materials before beginning work.

BMP16 :
CONCRETE POURING, CONCRETE/ASPHALT CUTTING, AND ASPHALT APPLICATION - Sweep or shovel loose aggregate chunks and dust for recycling or proper disposal. Place storm drain covers or similarly effective containment devices over all storm drains located downslope or adjacent to the work area. Shovel or vacuum all slurry and remove from the site. Perform cleaning of concrete application and mixing equipment or concrete-delivery vehicles in a designated area where the rinse water is controlled.

BMP20 :

LANDSCAPING AND LAWN VEGETATION MANAGEMENT - Use proper fertilizer and herbicide application techniques to minimize nutrient pollution of stormwater. Implement proper landscaping and mulching techniques to prevent plant material and excess mulch from entering the separate storm drainage system. Do not dispose of collected vegetation in separate storm drainage systems, waterways, water bodies or greenbelt areas.

CONST PER APPROVED PLANS :
The Permittee has permission to construct the scope of improvements reflected in, and in accordance with, the City-approved construction plans. Any and all revisions, omissions and/or additions to the construction plans shall be reviewed and approved by the City prior to implementation.

DAMAGED OR DESTROYED UTILITY :
SDOT makes no representation regarding the safety or integrity of the subject structure. If the structure is damaged or destroyed, SDOT will have no obligation to provide an alternative location for the permit utility.

INTEGRITY OF BACKFILL :
Permittee also agrees to guarantee the integrity of the backfill and permanent street restoration work done in conjunction with this permit for the period of time stipulated in the City of Seattle "Street and Sidewalk Pavement Opening and Restoration Rules" (SDOT Director's Rule 94-8). No permanent restoration of street or alley pavement shall be done by Permittee or its contractor until a City of Seattle/SDOT-Street Use inspector has marked the periphery of the pavement to be repaired and/or replaced. The use of Uretek or materials similar thereto in the backfill will not be allowed without prior review and approval of the use of this material by the owners the underground utilities in which the backfill will come in contact with.

PRECON MEETING REQUIRED :
A pre-construction meeting with the SDOT Street Use is required prior to the start of work.

TREE TRUNK OR ROOTS :
Contact the City Arborist Office (684-8733) a minimum of five working-days prior to digging within any landscaped areas in the street rights-of-way. The edge of all trenching must be at least five feet (5') from any street trees. When trenching near trees with trunks greater than twelve inches (12") in diameter, hand dig all trenching for a distance of ten feet (10'), measured five feet (5') radius from the tree trunk. When encountering tree roots, cut off cleanly with sharp saw (do not leave torn or ripped tree roots unattended). Do not cut roots greater than two inches (2") in diameter (contractor will have to hand tunnel underneath the roots). Do not paint ends of roots. Notify Landscape Maintenance at 684-4121 at least forty eight (48) hours in advance when working in landscaped areas or on trees.

FEES

Description	Date	Amount
DEPOSIT - OTC	08/29/2016	$2,500.00
ISSUANCE FEE - USE 51	12/20/2016	$146.00
DEPOSIT - OTC		$0
DEPOSIT - OTC	12/20/2016	$4,000.00
REVIEW CHARGE	10/6/2016	$392.00
REVIEW CHARGE	11/9/2016	$588.00
REVIEW CHARGE	01/5/2017	$1,764.00
REVIEW CHARGE	02/9/2017	$627.00
REVIEW CHARGE	03/8/2017	$313.50
Totals:		$10,330.50

STREET USE INSPECTOR

Permittee _____ Director Per _____

GENERAL REQUIREMENTS

1. ***Nature of permit.*** This permit is issued according to Seattle Municipal Code ("SMC"), Chapter 15.04, for the use or occupancy of the public right of way in a manner consistent with the terms and conditions in this permit. This permit is wholly of a temporary nature, vests no permanent rights, and is revocable according to SMC Section 15.04.070.
2. ***Acceptance of terms, conditions, and requirements.*** The Permittee accepts the terms, conditions, and requirements of this permit and agrees to comply with them to the satisfaction of the Seattle Department of Transportation, Street Use Division ("Street Use"), or such other agency as may be designated by the City. The Permittee further agrees to comply with all applicable City ordinances, including but not limited to SMC Title 15, and all applicable state and federal laws.
3. ***Copy of permit.*** A copy of the issued permit and current approved plans shall be on site and available at all times.
4. ***Expiration of permit.*** This permit shall remain valid until revoked according to SMC Section 15.04.070; provided that the permit shall expire automatically if the authorized work does not begin within six months from the date the permit is issued. The Permittee is responsible for keeping the permit up to date including submitting updated plans for approval. The Permittee shall submit requests to update a permit in writing or in person, and all requests shall be made to Street Use in a timely manner; otherwise, the Permittee may lose access to requested schedule for continued work in the right of way.

5. ***Superiority of Street Improvement Permits.*** When a Street Improvement Permit exists, rights acquired under the Street Improvement Permit supersede those acquired under any other Street Use or Utility Permits. Work not approved under the Street Improvement Permit shall require separate Street Use or Utility Permits and Permittee shall obtain these permits in advance of work.
6. ***Compliance with technical requirements and standards.*** All work within the public right of way shall be performed and completed according to the current or subsequently-amended requirements in the following technical documents published by the City: Right-of-Way Improvements Manual; Street Tree Manual; Standard Specifications for Road, Bridge and Municipal Construction; Standard Plans for Municipal Construction; Right of Way Opening and Restoration Rule; and Traffic Control Manual for In-Street Work.
7. ***Scope of work.*** The Permittee shall stage equipment or materials and construct or install the improvements and infrastructure reflected in and in accordance with this permit and the City-approved construction plans. Any revisions, omissions, or additions to the scope of work shall be reviewed and approved by the City before implementation.
8. ***Street Use notification.*** Construction work may be completed in several phases: site preparation (installing traffic control, saw-cutting, etc.); ground breaking; restoration; and staging of equipment and materials. Before beginning any phase of work in the public right of way, the Permittee shall notify Street Use of each start date. The Permittee shall be responsible for notifying Street Use Job Start at (206-684-5270) or SDOTJobStart@seattle.gov a minimum of 2-business days before starting work and shall provide the following information:
   - Permit number;
   - Job-site address;
   - Start date: please specify if Job Start date is the same as the excavation or ground breaking date. If the dates are different, please provide both dates;
   - Brief work description; and
   - Job-site contact name and phone number.

   Failure to notify Street Use Job Start shall result in a $300 penalty or other amounts according to SMC Section 15.04.074. For Street Improvement Permits and Utility Major Permits, a preconstruction meeting is required before starting construction, and the assigned inspector shall be notified a minimum of 2-business days before required inspections. Construction or utility activity occurring with, but not approved under, a Street Improvement or Utility Major Permit shall be permitted under separate Street Use permits. The Permittee shall apply for and obtain these Street Use permits in advance of work. Failure to do so may subject the Permittee to penalties and additional permit review charges may apply.
9. ***Underground and overhead utility notification.*** The Permittee shall notify the following entities, as applicable, 2-business days in advance:
   - Utility Underground Locate Center (811 or 1-800-424-5555) before ground disturbance; and
   - Seattle City Light (206-684-4911) if working within 10 feet of high-voltage lines.
10. ***Olympic Pipe Line Company notification.*** When work in the right of way occurs within 100 feet of an Olympic Pipe Line Company ("OPLC") pipeline, the Permittee shall coordinate the work with OPLC, which may include submitting detailed construction plans to OPLC. The Permittee shall notify OPLC's field coordinator 10-business days in advance of the work (425-981-2506) and an OPLC representative may be required to be onsite during the work.
11. ***King County Metro notification.*** The contractor shall notify King County Metro Transit in advance of any construction that may disrupt transit service according to the following schedule.
   - Five working days notice for any work requiring a temporary bus stop.
   - Ten working days notice for relocation of a bus shelter or reroute of bus service.
   - King County Metro Transit's electric storage battery Trolley Busses can be activated for weekend outage requires with 15 working days notification. Subject to vehicle and staff support capacity restrictions.
   - No two consecutive transit stops may be closed.

   If trolley wires are present, call (206) 477-1150 or email trolley.impacts@kingcounty.gov

   If trolley wires are not present, call (206) 477-1140 or email construction.coord@kingcounty.gov

12. ***Public notification.*** The Permittee shall notify all potentially affected residents and businesses at least 10-business days before starting work in the public right of way, including alleys. If work requires removal of existing permitted structures, then at-least a 30-calendarday notice is required for any permit modification or revocation requests. Notification methods and timelines, including when ongoing notification is needed, must comply with Street Use standards and requirements.
   - If a tree has been approved for removal, the Permittee shall post a "tree removal" public-notice placard at least 10-business days before starting work.
   - If an SDOT public notice comment period is required prior to permitting, the Permittee shall conduct the public notice outreach prior to commencement of the SDOT public notice comment period.
13. ***Alley notification.*** Where this permit authorizes work in an alley, the Permittee shall notify all potentially impacted property owners and businesses prior to any activity occurring in the alley, including and especially those property owners and businesses with tenants using the alley to access parking or for building ingress/egress or deliveries. The Permittee shall schedule work around waste-management-collection days. If this is not possible, the Permittee shall coordinate with waste management services to either provide intermittent alley access during waste pickup or to temporarily establish waste pickup at an alternate location. If an alley is to remain open during permitted work, a minimum 11-foot clear width is required for vehicular access. If an alley is closed to through traffic, the Permittee shall notify the nearest Seattle Fire Department fire station and the Seattle Police Department at the non-emergency numbers prior to commencing work.
14. ***Coordination of work.*** In performing work authorized by this permit, the Permittee shall coordinate with other contractors, public agencies and other permitees working in the public right of way to minimize impact to the public. Documented coordination agreements may be required prior to permit issuance and additional notification to the public may be required.
15. ***Hours of work.*** Work performed in the public right of way shall occur only during hours authorized under all applicable codes, regulations, rules,

and permits.

16. ***Off-hours work.*** Work outside of normal working hours, 8:00 AM - 5:00 PM Monday through Friday, is considered "off-hours work" and requires a minimum of 3-business days advanced notice to the Street Use Inspection Supervisor before the off-hours work commences. Off-hours work may also require a separately-approved traffic control plan. A minimum of two hours of inspection time shall be charged for off-hours inspections at the premium rate. A Stop Work order or Citation may be issued for failing to notify Street Use at least 3-business days before the off-hours work.
17. ***Inspection fees.*** The Permittee shall pay for City inspections of work authorized under this permit according to the current fee schedule established by SMC Section 15.04.074 and all other associated costs.
18. ***Billing.*** All fees and costs billed according to this permit shall be paid to the City of Seattle within 30-calendar days from the invoice date. Past due invoices may be subject to interest charges and may be sent to collections.
19. ***Deposits, charges, and future billings.*** The Permittee, also identified as the "Financially Responsible Party" on Street Use permit applications, is responsible and liable for all permit-related charges. If a deposit was made for estimated future Street Use services, any unused portion of the deposit shall be refunded to the Permittee. Any charges in excess of the deposit shall be billed to the Permittee on a monthly basis.
20. ***Corrective work.*** The Permittee is responsible for any additional costs incurred by the City resulting from temporary or corrective measures required to bring the work area into compliance with standards that apply, including but not limited to: temporary traffic control, requirements for temporary structures, temporary stabilization, and temporary restoration when the Permittee is not on site.
21. ***Indemnification.*** The Permittee agrees to defend, indemnify, and hold harmless the City of Seattle, its officials, officers, employees, and agents; against any liability, claims, causes of action, judgments, or expenses, including reasonable attorney fees; resulting directly or indirectly from any act or omission of the Permittee, its contractors, subcontractors, anyone directly or indirectly employed by them, and anyone for whose acts or omissions they may be liable; arising out of the Permittee's use or occupancy of the public right of way; and all loss by the failure of the Permittee to fully or adequately perform, in any respect, all authorizations or obligations under this Permit.
22. ***Insurance.*** The Permittee shall obtain and maintain in full force and effect, at its own expense, public liability insurance in an amount sufficient to protect the City from all potential claims and risks of loss from perils in connection with any activity that may arise from or be related to the Permittee's activity upon or the use or occupation of the public right of way allowed by the permit; and all claims and risks in connection with activities performed by the Permittee by virtue of the permission granted by the permit. The Permittee shall meet all other insurance requirements in SMC 15.04.045.

EXISTING IMPROVEMENTS

1. ***Costs of damage to City property and improvements.*** The Permittee shall be responsible for the costs of repairing any damage to City property or improvements, including street trees, resulting from work performed by or on behalf of the Permittee within the public right of way. Damage to street trees is assessed on the value of the tree according to SMC subsection 15.90.018.B.
2. ***Utility protection.*** The Permittee shall be responsible for checking locations and providing adequate protection for all utilities in the work area.
3. ***Utility relocation.*** The Permittee shall be responsible for notifying affected utilities and requesting any necessary relocation.
4. ***Survey monuments.*** Before removing, destroying, disturbing, or covering a survey monument such that the survey point is no longer visible or readily accessible, the Permittee shall obtain a permit from the Department of Natural Resources according to Washington Administrative Code, Chapter 332-120.
5. ***Protecting, removing, and relocating existing improvements.*** In addition to General Requirements item 12, the Permittee, at their own cost and expense, shall be responsible for coordinating the removal and relocation of existing improvements within the public right of way that their construction or permitted project may interfere with. These existing improvements include, but are not limited to trees, bike racks, newsstands, bike-share stations, signs, benches, artwork, and waste receptacles.
   - For bike-share stations, the Permittee shall contact the bike-share operator at least 30-calendar days before starting work in order to coordinate the removal and relocation of the bike-share station.
   - For all other existing improvements, the Permittee shall contact the improvement owner at least 10-business days before starting work to coordinate the temporary removal of the improvement.
   - For newsstands, the Permittee shall coordinate temporary relocation during the construction period by posting notice of upcoming construction projects at SeattleNewsstands.org at least 10-business days before starting work.

   The Permittee shall be responsible for reinstalling the improvements or coordinating the reinstallation in their original location or at a reasonable alternative location approved by the existing improvement owner and meeting all applicable City requirements. The Permittee is further responsible for protecting all trees within the construction project area and shall contact Urban Forestry to disclose and describe any construction impacts to trees.

   Failure to contact the improvement owners or Urban Forestry is cause for Street Use to revoke this permit.
6. ***Monorail system proximity requirements.*** The Permittee shall be responsible for coordinating with the Seattle Center when any work, deliveries, or loading/unloading will occur within 14 feet of a Monorail structure or 20 feet of a Monorail foundation or below-ground installation. The Permittee shall contact the Seattle Center at 206-905-2601 at least 10-business days before starting construction. Failure to do so is cause for permit revocation.
7. ***Monorail system proximity guidelines.*** Below grade: The restricted digging area includes a 45-degree cone extending outward and downward from the ground level of all monorail piers. Nearby excavations shall be monitored to assure footing stability. At- or above-grade: The piers above ground level cannot be moved, nor can any item like lighting or signage be attached to the piers without prior written consent from the Seattle Center Director. Piers shall not be painted. Landscaping shall not occur adjacent to piers or within 10 feet of a Monorail structure without prior written consent of the Seattle Center Director. Any construction activity in the area of the power rails shall follow OSHA guidelines for working around high voltage. Construction equipment shall be located and operated in awareness of and taking account of beam height and the train's 14-foot-operational envelope from each side of the beam. Contractors shall string warning lines from pier to pier under the beams as a guide. Spotters shall be employed when any construction activity occurs within 25 feet of the beams.

ENVIRONMENTAL PROTECTION

1. ***Best management practices required.*** The Permittee shall be responsible for protecting the public place, including but not limited to protecting existing street trees and green stormwater infrastructure, and controlling surface runoff, erosion and sediment at the construction site, as required by: the Stormwater Code, (SMC Title 22, Subtitle VIII); the Street and Sidewalk Use Code, (SMC Title 15); the Standard Specifications for Road, Bridge, and Municipal Construction; and Department of Planning and Development Director's Rule 21-2015/Seattle Public Utilities DWW 200, or successor rules or provisions. The site and the surrounding area shall generally be kept clean and free of construction debris or other material, including but not limited to mud, dust, rock, asphalt, and concrete. Waste materials shall be collected and disposed of at an appropriate disposal site. These materials shall be prevented from entering any part of the public sewer and storm drain system, and any surface waters.

TRAFFIC CONTROL REQUIREMENTS

1. ***Compliance with the Traffic Control Manual for In-Street Work.*** In order to provide safe and effective work areas and to ward, control, protect, and expedite vehicular and pedestrian traffic; signage for all construction within the public right of way shall comply with the City of Seattle Traffic Control Manual for In-Street Work, as amended. When required, the conditions on the traffic control plan shall supersede any conflicting provisions or requirements in the City of Seattle Traffic Control Manual for In-Street Work. A copy of the current City of Seattle Traffic Control Manual for
   In-Street Work and the approved traffic control plan shall be on site at all times.
2. ***Lanes to remain open during peak hours.*** Traffic lanes shall not be closed during the following peak hours: 6:00 AM-9:00 AM and 3:00 PM-7:00 PM in the Central Business District; and 7:00 AM-9:00 AM and 4:00 PM-6:00 PM for arterials elsewhere in the City, unless specifically noted on the approved traffic control plan.
3. ***Maintain access.*** Access to adjoining properties and businesses shall be maintained or accommodated during construction. Pedestrian access around construction sites shall be implemented and maintained per SDOT Director's Rule 10-2015, or successor rule.
4. ***Width of temporary traffic lanes.*** Temporary traffic lanes created during the permitted work shall be a minimum of 11 feet in width unless otherwise approved on the traffic control plan.
5. ***Working within restricted curb spaces.*** When the project impacts a restricted curb space, such as meters, pay stations, specific use and load zones; the Permittee shall obtain permission from SDOT Traffic Operations and reserve the spaces with the Traffic Operations Permit Counter (206-684-5086) before starting work.
6. ***Temporary No Parking signs and easels.*** In areas without parking pay stations or parking meters, or when Traffic Operations allows reserved parking spaces to be controlled with Temporary No Parking signs, establishing a Temporary No Parking Zone requires placing type R7-T38 (T-38) or R7-T39 (T-39) easels and completing an online verification form in conformance with the Traffic Control Manual for In-Street Work. In high impact areas, the Central Business District, and in areas where construction projects are densely clustered (such as in City-designated "Construction Hubs"), additional requirements for establishing a Temporary No Parking Zone may apply.
7. ***Nighttime illumination.*** Four or more Type B warning lights of sufficient brilliance to be seen from 500 feet shall be maintained at all times during the hours of darkness at the points of obstruction or excavation of any right of way.
8. ***Work in alleys.*** For work occurring in alleys that impedes vehicular access, including but not limited to egress, ingress, or through travel; "Street Closed" signs shall be placed at each end of the alley. Property owners adjacent to the alley shall be contacted, and their access concerns shall be addressed and mitigated if possible. This may require alternative work scheduling in the case of Solid Waste collection days and hours.

SHELL HARBOR ISLAND TERMINAL

BIO-SPARGING SYSTEM

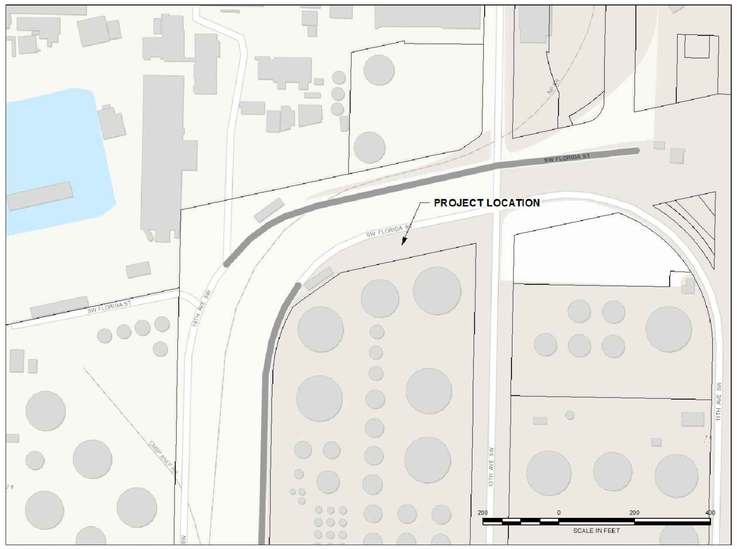
UTILITY MAJOR PERMIT PLAN #316339

SEATTLE, WASHINGTON

GENERAL NOTES:

1. ALL WORK SHALL CONFORM TO THE 2014 EDITION OF CITY OF SEATTLE STANDARD SPECIFICATIONS, THE 2014 EDITION OF THE CITY OF SEATTLE STANDARD PLANS; AND SEATTLE DEPARTMENT OF TRANSPORTATION DIRECTOR'S RULE 05–2009 FOR STREET AND SIDEWALK PAVEMENT OPENING AND RESTORATION. A COPY OF THESE DOCUMENTS SHALL BE ON SITE DURING CONSTRUCTION.
2. A COPY OF THE APPROVED PLAN MUST BE ON SITE WHENEVER CONSTRUCTION IS IN PROGRESS.
3. ERRORS AND OMISSIONS ON THE PERMITTED PLANS MUST BE CORRECTED BY THE ENGINEER AND APPROVED BY THE CITY OF SEATTLE.
4. ALL PERMITS REQUIRED FOR WORK WITHIN THE PUBLIC RIGHT OF WAY MUST BE OBTAINED PRIOR TO THE START OF CONSTRUCTION.
5. PRIOR TO THE START OF CONSTRUCTION WITHIN THE RIGHT OF WAY, THE PERMITTEE SHALL SCHEDULE AND ATTEND A PRECONSTRUCTION MEETING WITH THE CITY OF SEATTLE DEPARTMENT OF TRANSPORTATION.
6. PERMITTEE SHALL CONTACT SEATTLE DEPARTMENT OF TRANSPORTATION, STREET USE INSPECTOR A MINIMUM OF 2 BUSINESS DAYS PRIOR TO NEEDING AN INSPECTION.
7. ALL DAMAGE TO CITY INFRASTRUCTURE CAUSED BY THE CONSTRUCTION SHALL BE IMMEDIATELY REPORTED AND REPAIRED AS REQUIRED BY THE SEATTLE DEPARTMENT OF TRANSPORTATION. TO REPORT DAMAGE TO SEATTLE PUBLIC UTILITY INFRASTRUCTURE, INCLUDING ANY SEWAGE RELEASE OR BLOCKAGE, CALL 206–386–1800.
8. THE APPROVED PLANS SHOW THE APPROXIMATE AREA OF PAVEMENT RESTORATION BASED ON THE DEPTH OF UTILITY CUTS AND/OR THE AREA OF CURB AND/OR PAVEMENT TO BE REMOVED AND REPLACED. THE ACTUAL LIMITS OF THE PAVEMENT RESTORATION SHALL BE PER THE STREET AND SIDEWALK PAVEMENT OPENING AND RESTORATION DIRECTOR'S RULE 05–2009 AND WILL BE DETERMINED IN THE FIELD BY THE SEATTLE DEPARTMENT OF TRANSPORTATION STREET USE INSPECTOR PRIOR TO THE PAVEMENT RESTORATION.
9. DATUM: NAVD 88 (VERTICAL) AND NAD83 (1991) (HORIZONTAL).
10. SURVEYING AND STAKING OF ALL IMPROVEMENTS IN THE PUBLIC RIGHT OF WAY SHALL BE COMPLETED PRIOR TO CONSTRUCTION. PERMITTEE TO STAKE THE CURB AT THE CENTERLINE OF DRAINAGE GRATES PER STANDARD PLAN 260A. SURVEY CUT SHEETS MUST BE SUBMITTED AND APPROVED BY THE SEATTLE DEPARTMENT OF TRANSPORTATION AT LEAST 5 BUSINESS DAYS PRIOR TO CONSTRUCTION.
11. IF AN EXISTING CURB IS TO BE REMOVED AND REPLACED IN THE SAME LOCATION THE PERMITTEE SHALL PROVIDE THE STREET USE INSPECTOR A PLAN WITH EXISTING FLOW LINE AND TOP OF CURB ELEVATIONS IDENTIFIED. PERMITTEE TO STAKE THE LOCATION OF THE EXISTING CURB PRIOR TO DEMOLITION.
12. THE PERMITTEE SHALL BE RESPONSIBLE FOR REFERENCING AND REPLACING ALL MONUMENTS THAT MAY BE DISTURBED, DESTROYED OR REMOVED BY THE PROJECT AND SHALL FILE AN APPLICATION FOR PERMIT TO REMOVE OR DESTROY A SURVEY MONUMENT WITH THE WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES, PURSUANT TO RCW 58.24.040(8).
13. THE PERMITTEE SHALL SUBMIT ALL APPLICABLE DOCUMENTS REQUIRED UNDER SECTION 1–05.3 OF THE STANDARD SPECIFICATIONS PRIOR TO CONSTRUCTION. A MATERIAL SOURCE FORM FOR ALL MATERIALS TO BE PLACED IN THE RIGHT OF WAY AND MIX DESIGNS FOR ALL ASPHALT, CONCRETE AND AGGREGATES TO BE PLACED IN THE RIGHT OF WAY MUST BE SUBMITTED TO THE SEATTLE DEPARTMENT OF TRANSPORTATION FOR REVIEW AND APPROVAL PRIOR TO BEGINNING CONSTRUCTION. A REVISED MATERIAL SOURCE FORM AND MIX DESIGNS MUST BE SUBMITTED FOR REVIEW AND APPROVAL PRIOR TO PLACEMENT OF ANY SUBSTITUTE MATERIALS.
14. THE PERMITTEE SHALL NOTIFY THE SEATTLE FIRE DEPARTMENT DISPATCHER (206–386–1495) AT LEAST TWENTY–FOUR (24) HOURS IN ADVANCE OF ALL WATER SERVICE INTERRUPTIONS, HYDRANT SHUTOFFS, AND STREET CLOSURES OR OTHER ACCESS BLOCKAGE. THE PERMITTEE SHALL ALSO NOTIFY THE DISPATCHER OF ALL NEW, RELOCATED, OR ELIMINATED HYDRANTS RESULTING FROM THIS WORK.
15. THE PERMITTEE SHALL LOCATE AND PROTECT ALL CASTINGS AND UTILITIES DURING CONSTRUCTION.
16. THE PERMITTEE SHALL CONTACT THE UNDERGROUND UTILITIES LOCATOR SERVICE (1–800–424–5555) AT LEAST 48 HOURS PRIOR TO CONSTRUCTION. BP PIPELINE INSPECTOR SHALL BE ON SITE DURING TRENCHING ACTIVITIES.
17. IT IS THE SOLE RESPONSIBILITY OF THE PERMITTEE TO VERIFY THE ACCURACY OF ALL UTILITY LOCATIONS SHOWN AND TO FURTHER DISCOVER AND AVOID ANY OTHER UTILITIES NOT SHOWN WHICH MAY BE AFFECTED BY THE IMPLEMENTATION OF THIS PLAN.
18. THE PERMITTEE SHALL ADJUST ALL EXISTING MANHOLE RIMS, DRAINAGE STRUCTURE LIDS, VALVE BOXES, AND UTILITY ACCESS STRUCTURES TO FINISH GRADE WITHIN AREAS AFFECTED BY THE PROPOSED IMPROVEMENTS.
19. THE PERMITTEE SHALL FOLLOW SPU CORE TAP PROCEDURES FOR ALL NEW CONNECTIONS TO EXISTING SEWER OR DRAINAGE MAINS OR STRUCTURES. CONTRACTORS ARE NOT ALLOWED TO CORE INTO MAINS OR STRUCTURES WITHOUT PRIOR APPROVAL FROM SPU–DWW. TO SCHEDULE CORE CUTS CONTACT SPU–DWW AT 206–615–0511 A MINIMUM OF 48 HOURS IN ADVANCE.
20. UTILITY SERVICE CONNECTIONS SHOWN ON THIS PLAN REQUIRE SEPARATE PERMITS.
21. THE PERMITTEE SHALL PROVIDE FOR ALL TESTING AS REQUIRED BY THE STREET USE INSPECTOR.
22. INSPECTION AND ACCEPTANCE OF ALL WORK IN THE PUBLIC RIGHT–OF–WAY SHALL BE DONE BY REPRESENTATIVES OF THE CITY OF SEATTLE. IT SHALL BE THE PERMITTEE'S RESPONSIBILITY TO COORDINATE AND SCHEDULE APPROPRIATE INSPECTIONS ALLOWING FOR PROPER ADVANCE NOTICE. THE SEATTLE DEPARTMENT OF TRANSPORTATION STREET USE INSPECTOR MAY REQUIRE REMOVAL AND RECONSTRUCTION OF ANY ITEMS PLACED IN THE RIGHT OF WAY THAT DO NOT MEET CITY STANDARDS OR THAT WERE CONSTRUCTED WITHOUT APPROPRIATE INSPECTIONS.
23. THE PERMITTEE SHALL PROVIDE A PLAN FOR STORMWATER AND EROSION CONTROL AND INSTALL, MAINTAIN AND REMOVE TEMPORARY FACILITIES PER SECTION 8–01. AS CONSTRUCTION PROGRESSES AND CONDITIONS DICTATE, ADDITIONAL CONTROL FACILITIES MAY BE REQUIRED. DURING THE COURSE OF CONSTRUCTION IT SHALL BE THE OBLIGATION AND RESPONSIBILITY OF THE PERMITTEE TO ADDRESS ANY NEW CONDITIONS THAT MAY BE CREATED BY THE PERMITTEE'S ACTIVITIES AND TO PROVIDE ADDITIONAL FACILITIES THAT MAY BE NEEDED TO PROTECT ADJACENT PROPERTIES.
24. ALL DISTURBED SOILS MUST BE AMENDED PER STANDARD PLAN 142 AND SECTION 8–02 OF THE STANDARD SPECIFICATIONS UNLESS WITHIN ONE FOOT OF A CURB OR SIDEWALK, THREE FEET OF A UTILITY STRUCTURE (E.G. WATER METER, UTILITY POLE, HAND HOLE, ETC.), OR THE DRIPLINE OF AN EXISTING TREE.
25. ALL TRAFFIC CONTROL SHALL BE IN ACCORDANCE WITH THE CITY OF SEATTLE TRAFFIC CONTROL MANUAL FOR IN–STREET WORK. AN APPROVED TRAFFIC CONTROL PLAN WILL BE REQUIRED FOR ALL ARTERIAL STREETS PRIOR TO BEGINNING CONSTRUCTION.
26. PERMITTEE SHALL NOTIFY KING COUNTY METRO AT 684–2732 FOURTEEN DAYS IN ADVANCE OF ANY IMPACT TO TRANSIT OPERATIONS.
27. COORDINATE SIGN AND PAY STATION AND/OR PARKING METER HEAD REMOVAL AND INSTALLATION WITH SEATTLE DEPARTMENT OF TRANSPORTATION AT 684–5370. SIGNPOSTS ARE TO BE INSTALLED IN ACCORDANCE WITH STANDARD PLANS 616, 620, 621A, 621B, 625, & 626.
28. ALL STREET NAME SIGNS MUST BE INSTALLED BY SEATTLE DEPARTMENT OF TRANSPORTATION AT THE PERMITTEE'S EXPENSE.
29. ALL WORK PERFORMED BY SEATTLE CITY LIGHT, SEATTLE PUBLIC UTILITIES, AND OTHER UTILITIES TO REPAIR, REMOVE OR RELOCATE EXISTING UTILITIES SHALL BE DONE AT THE PERMITTEE'S EXPENSE.
30. PERMITTEE MUST CONTACT THE SEATTLE DEPARTMENT OF PARKS AND RECREATION TO APPLY FOR A SEPARATE PERMIT IF WORKING WITHIN A DESIGNATED PARK BOULEVARD.
31. CARE SHALL BE EXERCISED WHEN EXCAVATING OR REMOVING PAVEMENT NEAR EXISTING CHARGED WATER MAINS. CAST IRON WATER MAINS ARE KNOWN TO BE SENSITIVE TO EXCESSIVE VIBRATION. COORDINATE PROTECTION METHODS WITH SPU.
32. PERMITTEE SHALL CONTACT SEATTLE DEPARTMENT OF TRANSPORTATION, STREET USE INSPECTOR A MINIMUM OF 2 BUSINESS DAYS PRIOR TO PLANTING FOR INSPECTION OF STREET TREES AND LANDSCAPING.
33. IN THE EVENT THE EXISTING CATCH BASIN, #56878, BECOMES CLOGGED OR REQUIRES REPAIR, SEATTLE PUBLIC UTILITIES WILL NOT BE RESPONSIBLE FOR ANY FLOOD RELATED DAMAGE TO THE BIO SPARGING SYSTEM, AND WILL NOT BE RESPONSIBLE FOR ANY UNKNOWN CONTAMINATION DRAINING TO THE CATCH BASIN AND INTO THE STORM DRAIN THAT OUTFALLS INTO THE RIVER / SOUND. ANY DAMAGE AND/OR CONTAMINATION TO SEATTLE PUBLIC UTILITIES INFRASTRUCTURE SHALL BE REMEDIATED AS DIRECTED BY SEATTLE PUBLIC UTILITIES AT THE OWNER'S EXPENSE.
34. IN THE EVENT THAT SEATTLE PUBLIC UTILITIES IS CALLED IN TO MAINTAIN THE CATCH BASIN, #56878, A REPRESENTATIVE OF SHELL OIL SHALL OPEN THE GATE AND ESCORT THEM UNTIL THE PROJECT IS COMPLETE AND CLOSE THE GATE WHEN THEY ARE FINISHED. PLEASE REFERENCE CONSULTANT/ENGINEER CONTACT INFORMATION THIS SHEET FOR ALL SITE–ACCESS NEEDS.

SEC 7, TWP 24 N, RNG 4 E, WM



SOURCE: Esri, HERE, DeLorme, intermap, increment P Corp., GEBCO,USGS, FAO, NPS, NRCAN, GeoBase, IGN KadasterN., Ordance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, Mapmy India, OpenStreetMap contributors, and the GIS User Community

VICINITY MAP

SCALE: 1"=200'

DRAWING INDEX

SHEET #	FIGURE #	SHEET TITLE
1	P01	COVER SHEET, VICINITY MAP, DRAWING INDEX AND NOTES
2	P02	BIO–SPARGING SYSTEM LAYOUT
3	P03	BIO–SPARGING SYSTEM CROSS SECTIONS

PROJECT SCHEDULE

WORK ACTIVITY	DURATION	ANTICIPATED SCHEDULE	NOTES
SYSTEM INSTALLATION	2 WEEKS	DECEMBER 2016	PENDING UMP#316339 ANNUAL PERMIT #328030
SYSTEM OPERATION	1 YEAR	START: JANUARY 2017 END: DECEMBER 2017	AIR INJECTED AT LOW FLOW (4 CFM) AND LOW PRESSURE (8 PSI)
SYSTEM MONITORING	2 YEARS	MARCH, JUNE, SEPTEMBER, AND DECEMBER 2017–2018	QUARTERLY GROUNDWATER MONITORING
ANNUAL REPORTING	1 DAY	FEBRUARY 2019	ANNUAL MONITORING REPORT AND SYSTEM DECOMMISSIONING WORK PLAN (TO DOE)
SYSTEM DECOMMISSIONING	3 WEEKS	JUNE 2019	SEE GENERAL NOTE 8, SHEET 3 OF 3

OWNER
SHELL OIL PRODUCTS, SOIL & GW FOCUS
DELIVERY GROUP – US REGION
CONTACT: ANDREA WING
P.O. BOX 2463
HOUSTON, TX 77252
(425) 413–1164

SURVEYOR
WH PACIFIC
CONTACT: SHAWN FITZPATRIC
12100 NE 195TH, STE 300
BOTHELL, WA 98011
(425) 951–4854

CONSULTANT/ENGINEER
AECOM
CONTACT: NICKY MOODY
111 SW COLUMBIA, SUITE 1500
PORTLAND, OR 97201
(503) 222–7200
(503) 969–6310

NO.	MARK	NATURE REVISIONS	MADE	CHK'D	REV'D
1	12–16	FINAL APPROVED SET			

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Portland, Oregon 97201-5814
(tel) 503-222-7200
(fax) 503-222-4292
www.aecom.com

REVIEWED BY SPU/WATER ENGINEERING	NAME OR INITIALS AND DATE	INITIALS AND DATE
	DESIGNED . HN	REVIEWED:
REVIEWED BY SPU/DRAINAGE	CHECKED . RSW DRAWN . BJR CHECKED . HN	PROJECT MANAGER
APPROVED BY SDOT STREET IMPROVEMENT PERMITTING	DESIGN REVIEW RSW	REVISED AS–BUILT
	All work done in accordance with the City of Seattle Standard Plans and Specifi–cations in effect on the date shown above, and supplemented by Special Provisions.	

City of Seattle
Seattle Department of Transportation

SCALE: H. V. INSPECTORS'S BOOK

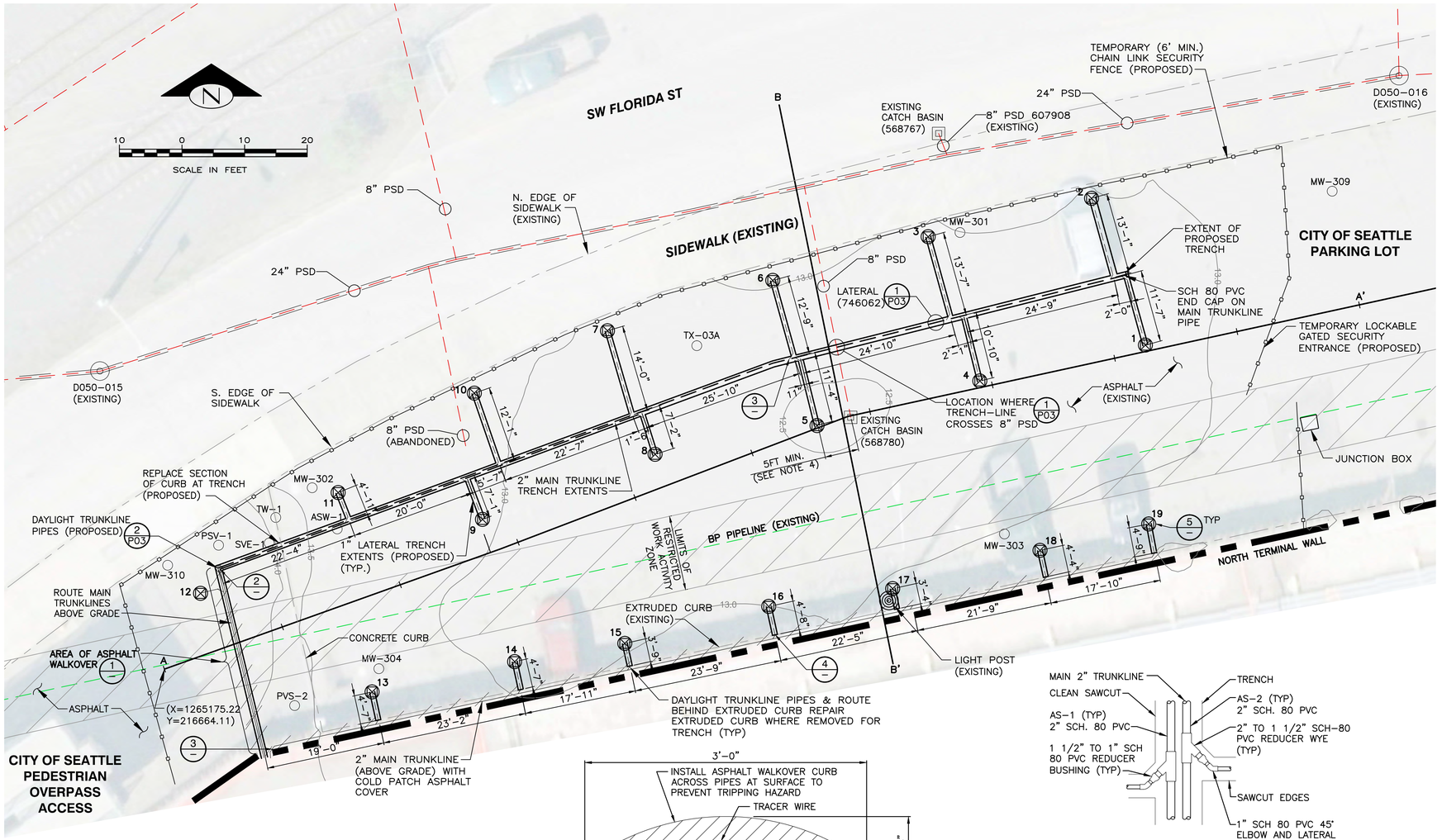
BIO–SPARGING SYSTEM DESIGN

ELECTRICAL PERMIT # 6572073

SHELL HARBOR ISLAND

COVER SHEET, VICINITY MAP AND DRAWING INDEX

SDOT PROJECT NO.	316339
VAULT PLAN NO.	790–517
VAULT SERIAL NO.	36948
SHEET	1 OF 3



LEGEND:

- MW-309 ○ — MONITORING WELL (EXISTING)
- 12 ⊗ — BIO-SPARGING WELL (PROPOSED)
- 568752 ⊡ — CATCH BASIN/INLET (EXISTING)
- D050-016 ⊙ — MANHOLE (EXISTING)
- BP PIPELINE NO DRILL ZONE
- A — A' CROSS SECTION LOCATION
- CURB AND SIDEWALK LIMITS (EXISTING)
- 2" SUBSURFACE SCH. 80 PVC PIPING TRUNK LINE (PROPOSED)
- 1" SUBSURFACE SCH. 80 PVC PIPING TRUNK LINE (PROPOSED)
- 2" ABOVE GRADE SCH. 80 PVC PIPING TRUNK LINE (PROPOSED)
- 13.0 — ELEVATION (0.5 FT CONTOURS)
- TRENCH LIMITS (PROPOSED)
- PSD — PUBLIC STORM DRAINS (EXISTING)

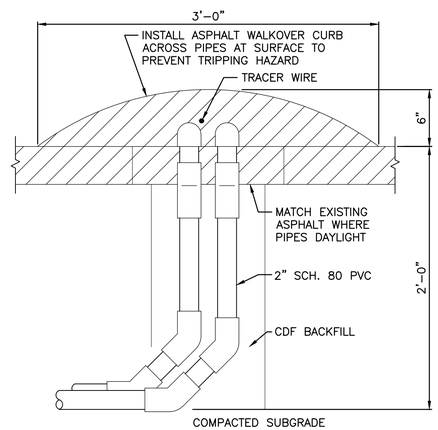
NOTES:

1. TOTAL RESTORED TRENCH LENGTH IS 335 LINEAR FEET.
2. ESTIMATED SOIL REMOVAL AND BACKFILL VOLUME IS 25 CUBIC YARDS.
3. TRENCH LINE CROSSES ABOVE ONE LATERAL 8" PSD (746062). CLEARANCE BETWEEN THE BOTTOM OF THE PROPOSED TRENCH AND THE EXISTING LATERAL IS AT LEAST 1'-0".
4. BIOSPARGING WELL #5 SHALL BE INSTALLED AT THE FOLLOWING COORDINATES: NORTHING 216703.01 AND EASTING 1265278.45. WITH THE WELL AND THE ASSOCIATED LATERAL PIPING A MINIMUM OF 5-FEET CLEAR DISTANCE FROM EXISTING CITY OF SEATTLE CATCH BASIN #568780 AND LATERAL (746026).

NOTE:
1. LINES IN PARKING LOT TRENCH WILL BE ROUTED BELOW GRADE WITHIN PARKING LOT. PIPES DAYLIGHT IN PEDESTRIAN OVERPASS ACCESS AREA. PIPES WILL BE ROUTED ABOVE GRADE ACROSS EXISTING BP PIPELINE. COVER PIPES WITH COLD PATCH WITHIN WALKOVER ASPHALT SURFACE.
2. MAIN TRUNK LINE ADJACENT TERMINAL WALL ROUTED BELOW GRADE TO BEHIND EXTRUDED CURB, WHERE PIPE DAYLIGHTS. COVER PIPE WITH ASPHALT COVER AT SURFACE.

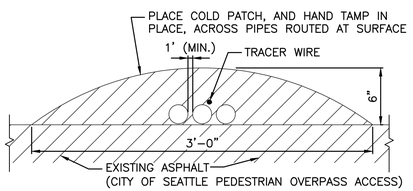
BIO-SPARGING WELL (TYP.) 6
N.T.S.

TRENCH PLAN VIEW 3
N.T.S.



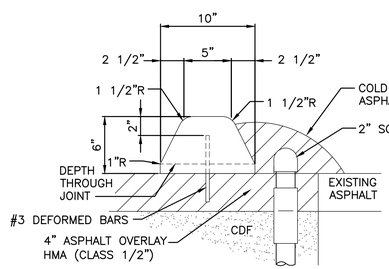
NOTE:
ASPHALT REQUIREMENTS SHALL MEET CITY OF SEATTLE CODES FOR COLD PATCH, ABOVE GRADE, AROUND PIPES.

PIPE DAYLIGHT/ WALKOVER ASPHALT SURFACE 2
N.T.S.



NOTE:
IF COVERING MULTIPLE PIPES, PIPES SHALL BE SPACED A MINIMUM SEPARATION OF 1 INCHES.

ASPHALT WALKOVER SURFACE 1
N.T.S.



NOTE:
1. SEE COS STN PLN #412 FOR FURTHER DETAIL.
2. ALTERNATIVELY, THE USE OF EPOXY BONDING AGENT, IN PLACE OF #3 DEFORMED BARS, WILL BE ALLOWED.

CONCRETE EXTRUDED CURB REPLACEMENT 4
N.T.S.

BIO-SPARGING SYSTEM DESIGN

ELECTRICAL PERMIT # 6572073

MARK	NATURE	MADE	CHK'D	REV'D
1	FINAL APPROVED SET			
2-16	REVISIONS			

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	NAME OR INITIALS AND DATE	INITIALS AND DATE
REVIEWED BY SPU/WATER ENGINEERING	DESIGNED . HN	REVIEWED:
REVIEWED BY SPU/DRAINAGE	CHECKED . RSW	PROJECT MANAGER
	DRAWN . BJR	
APPROVED BY SDOT STREET IMPROVEMENT PERMITTING	CHECKED . HN	REVISED AS-BUILT
	DESIGN REVIEW RSW	

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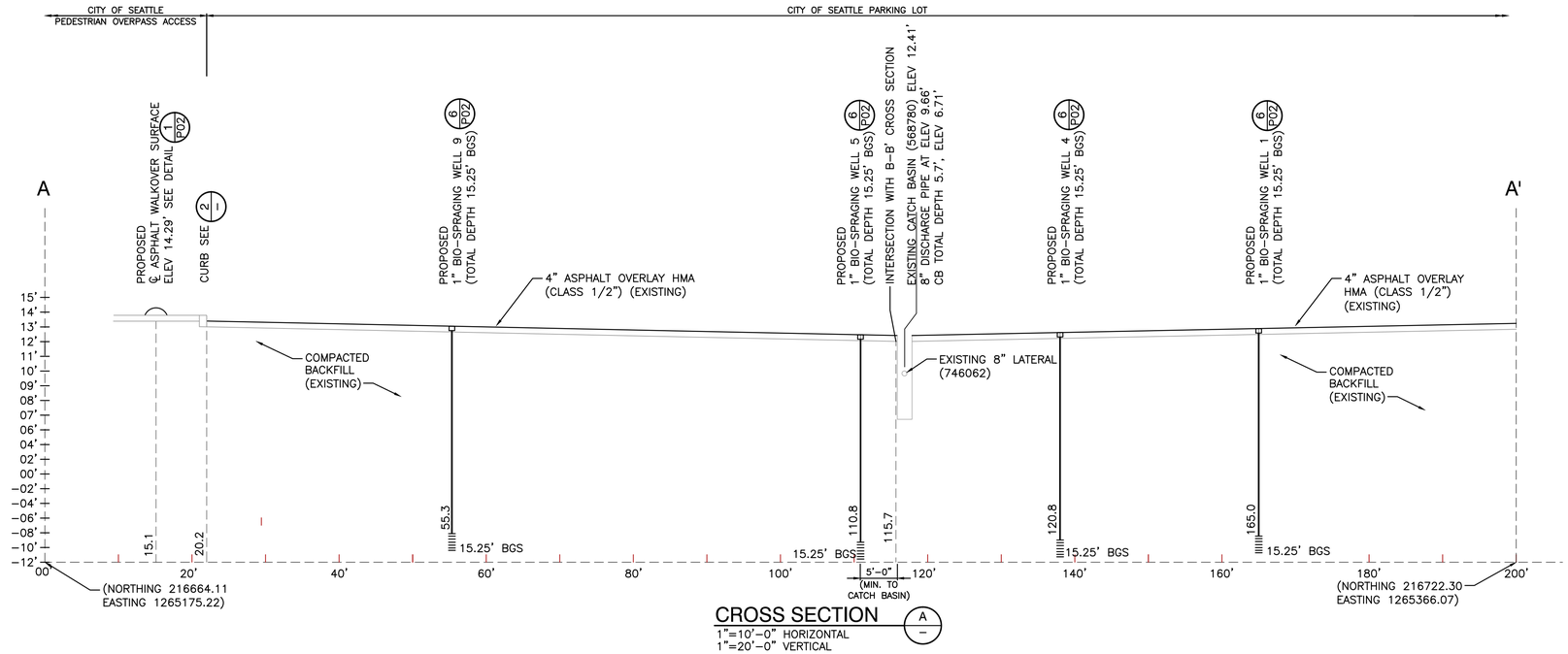
Seattle Department of Transportation

SCALE: H. V. INSPECTORS'S BOOK

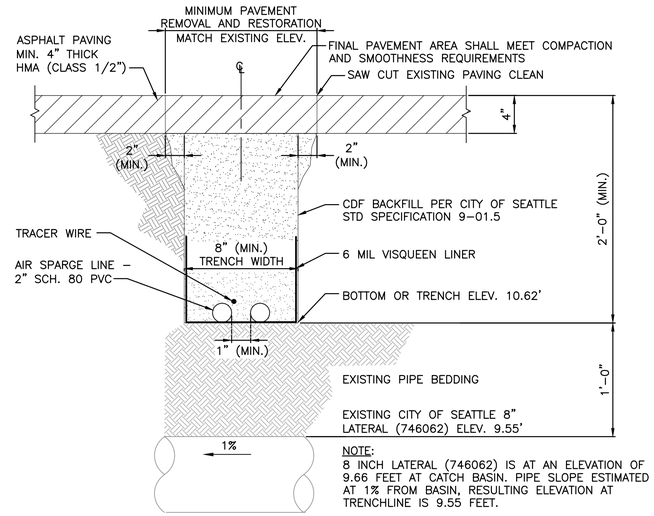
SHELL HARBOR ISLAND
BIO-SPARGING SYSTEM DESIGN

SDOT PROJECT NO. 316339
VAULT PLAN NO. 790-517
VAULT SERIAL NO. 36948
SHEET 2 OF 3



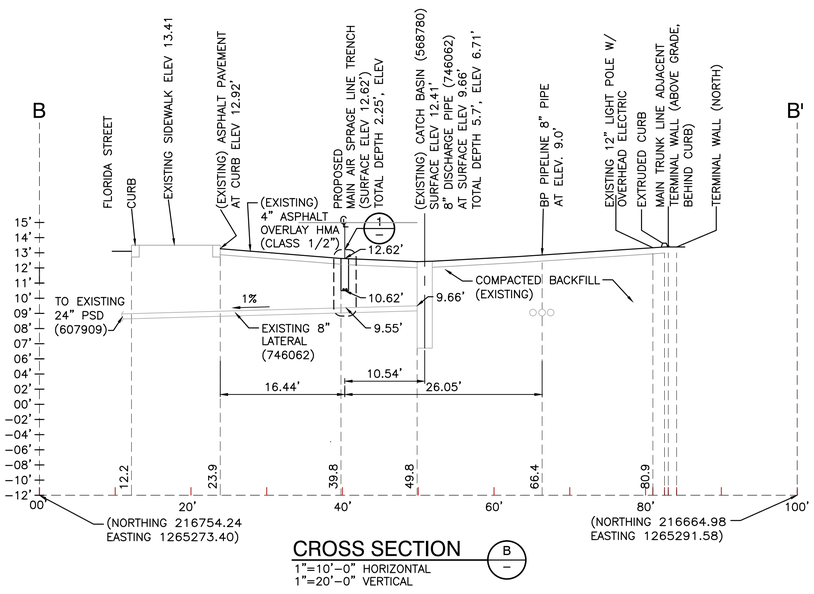
CROSS SECTION A/-

1"=10'-0" HORIZONTAL
1"=20'-0" VERTICAL



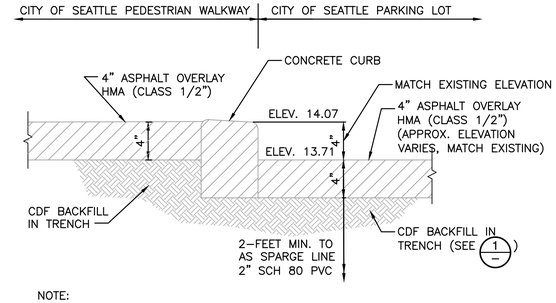
TRENCH DETAIL AT INTERSECTION WITH EXISTING 8" LATERAL 1/-

N.T.S.



CROSS SECTION B/-

1"=10'-0" HORIZONTAL
1"=20'-0" VERTICAL



NOTE:
1. REFERENCE COS STN PLN #412 FOR CONCRETE EXTRUDED CURB.
2. CURB/ASPHALT WILL BE REPAIRED TO MATCH EXISTING HEIGHT OF ADJACENT CURB WHERE TRENCH CROSSES CURB. ELEVATION AT TOP OF CURB IS 14.07' AT TRENCH LINE ELEVATION AT BASE OF CURB IS 13.71'.

CURB REPAIR AT WEST END OF PARKING LOT 2/-

N.T.S.

GENERAL NOTES:

1. THE SITE WILL BE SECURED DURING ALL WORK ACTIVITIES WITH TEMPORARY FENCING AROUND THE WORK AREA. SITE ACCESS WILL BE RESTRICTED TO CONTRACTORS AND PERSONNEL, APPROVED BY THE SHELL TERMINAL OPERATOR, OR SHELL'S REPRESENTATIVE, AT ALL TIMES.
2. DUST MONITORING WILL BE CONDUCTED BY THE CONTRACTOR AND DUST SUPPRESSION TECHNIQUES SHALL BE IMPLEMENTED, AS NECESSARY, TO MEET ALL FEDERAL AND STATE REQUIREMENTS.
3. THE CONTRACTOR SHALL USE STEEL PLATES TO COVER ANY TRENCHED AREAS REMAINING OPEN OVERNIGHT.
4. THE CONTRACTOR SHALL AIR KNIFE ALL EXCAVATIONS/TRENCHES BETWEEN GRADE AND 5-FEET BELOW GRADE.
5. MATERIALS SHALL MEET THE REQUIREMENTS OF THE 2014 STANDARD SPECIFICATIONS FOR ROAD BRIDGE AND MUNICIPAL CONSTRUCTION.
6. ALL TOPOGRAPHOCAL SURVEYS SHALL BE PERFORMED UNDER THE DIRECTION OF A LAND SURVEYOR LICENSED IN THE STATE OF WASHINGTON.
7. SITE CONTROL SHALL BE TIED TO TX-03A AT NORTHING: 216723.10, EASTING: 1265263.33, ELEV 12.26. HORIZONTAL DATUM WASHINGTON ST. PLANE N. NAD83, VERTICAL DATUM NAVD88.
8. INFRASTRUCTURE, INCLUDING WELLS AND PIPING WILL BE MAINTAINED IN ACCORDANCE WITH PUBLIC SPACE ANNUAL PERMIT #328030.
9. ALL SYSTEM WELLS AND TRENCHING WILL BE DECOMMISSIONED IN ACCORDANCE WITH A DECOMMISSIONING WORK PLAN, APPROVED BY DOE, FOLLOWING SUCCESSFUL REMEDIATION OF THE GROUNDWATER. THE APPROVED SYSTEM DECOMMISSIONING WORK PLAN WILL ALSO BE PROVIDED TO CITY OF SEATTLE FOR REVIEW FOR APPROVAL, AS A REQUIREMENT OF THIS UTILITY MAJOR PERMIT. THE SYSTEM DECOMMISSIONING ACTIVITIES WILL BE COMPLETED UNDER A SEPARATE UTILITY MAJOR PERMIT.

WASTE HANDLING AND MANAGEMENT:

1. ALL WASTE MUST BE CONTAINED, STORED AND MANAGED IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL REGULATIONS.
2. ASPHALT PAVEMENT REMOVED DURING TRENCHING AND SOIL EXCAVATION SHALL BE SEPARATED FROM OTHER MATERIALS REMOVED DURING TRENCHING AND DISPOSED OF AS CONSTRUCTION DEBRIS BY THE CONTRACTOR.
3. SOIL ENCOUNTERED DURING EXCAVATION OR AIR KNIFING SHALL BE TRANSPORTED OFF-SITE AS NON-HAZARDOUS WASTE.
4. THE CONTRACTOR SHALL REMOVE ANY OTHER WASTE MATERIAL GENERATED DURING THE SYSTEM INSTALLATION ACTIVITIES, INCLUDING TRASH AND DEBRIS, AND LEGALLY DISPOSE OF IT OFF-SITE.
5. IF IMPACTED SOIL IS ENCOUNTERED DURING TRENCHING, THE CONTRACTOR SHALL STOP WORK. THE WASTE SOIL WILL BE CHARACTERIZED BEFORE THE SOIL IS TRANSPORTED OFF-SITE FOR DISPOSAL. AECOM WILL CHARACTERIZE, PROFILE, AND PERMIT THE WASTE BEFORE DISPOSAL. CONTRACTOR SHALL ALLOW FOR 4 DAYS FOR WASTE PROFILING PRIOR TO SCHEDULING TRANSPORTATION AND DISPOSAL. IMPACTED MATERIAL, IF ENCOUNTERED, WILL BE CONTAINED IN LINED ROLL-OFF CONTAINERS WITH COVERS.

MARK	NATURE	MADE	CHK'D	REV'D
1 12-16	FINAL APPROVED SET			
	REVISIONS			

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REVIEWED BY SPU/WATER ENGINEERING
REVIEWED BY SPU/DRAINAGE
APPROVED BY SDOT STREET IMPROVEMENT PERMITTING

NAME OR INITIALS AND DATE	INITIALS AND DATE
DESIGNED . HN	REVIEWED:
CHECKED . RSW	
DRAWN . BJR	PROJECT MANAGER
CHECKED . HN	
DESIGN REVIEW RSW	REVISED AS-BUILT

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City of Seattle
Seattle Department of Transportation

SCALE: H. V. INSPECTOR'S BOOK

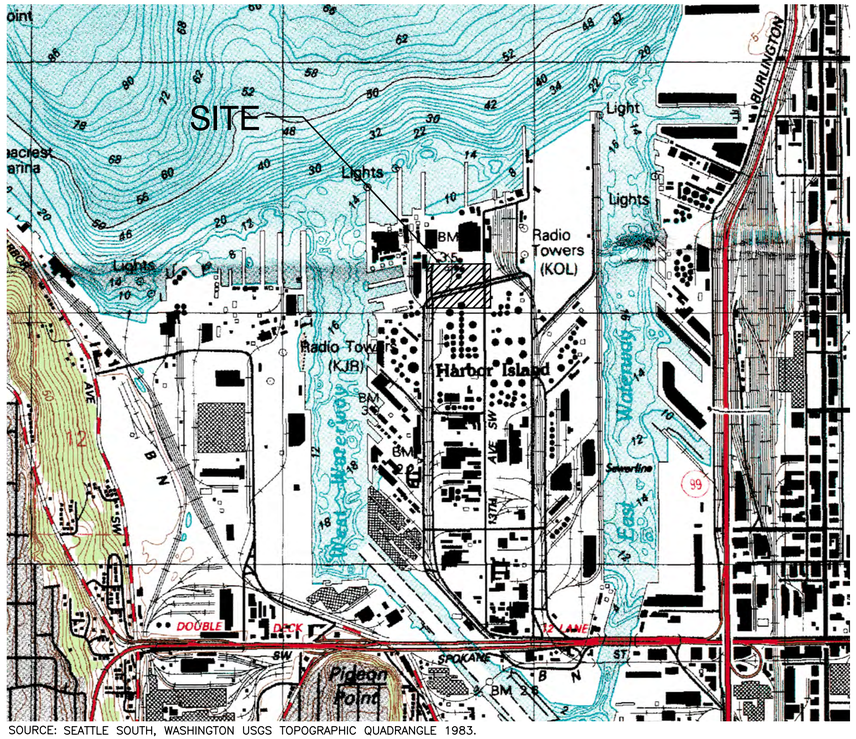
BIO-SPARGING SYSTEM DESIGN ELECTRICAL PERMIT # 6572073

SHELL HARBOR ISLAND
BIO-SPARGING SYSTEM DESIGN

SDOT PROJECT NO. 316339
VAULT PLAN NO. 790-517
VAULT SERIAL NO. 36948
SHEET 3 OF 3

SHELL HARBOR ISLAND TERMINAL

BIO-SPARGING SYSTEM
ENGINEERING DESIGN
SEATTLE, WASHINGTON



SOURCE: SEATTLE SOUTH, WASHINGTON USGS TOPOGRAPHIC QUADRANGLE 1983.

VICINITY MAP

n.t.s.

DRAWING INDEX

SHEET #	FIGURE #	SHEET TITLE
1	F01	COVER SHEET, VICINITY MAP, AND DRAWING INDEX
2	F02	PRE-CONSTRUCTION SITE LAYOUT
3	F03	BIO-SPARGING SYSTEM SCHEMATIC
4	F04	BIO-SPARGING SYSTEM LAYOUT
5	F05	PHOTO LOG OF SITE LAYOUT
6	F06	BIO-SPARGING SYSTEM DETAILS
7	F07	BIO-SPARGING SYSTEM NOTES

GENERAL NOTES:

1. MATERIALS AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE FOLLOWING:
   a. WASHINGTON DEPARTMENT OF ECOLOGY AND CITY OF SEATTLE, APPROVED REMEDIATION WORK PLAN, TX-03 AREA, SHELL HARBOR ISLAND TERMINAL, PREPARED FOR SHELL OIL PRODUCTS BY AECOM, FEBRUARY 2016.
   b. CURRENT EDITION OF THE STANDARD FOR SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION PREPARED BY THE WASHINGTON STATE CHAPTER OF THE AMERICAN PUBLIC WORKS ASSOCIATED AND THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION.
   c. CONDITIONS AND STANDARDS SET FORTH IN THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) DESIGN MANUAL, AS AMENDED AND APPROVED BY WSDOT.
   d. DOT CONSTRUCTION MANUAL, AS AMENDED AND APPROVED BY WSDOT.
   e. OTHER SPECIFICATIONS NOT LISTED ABOVE THAT MAY BE REQUIRED BY THE CITY OF SEATTLE.
2. CONSTRUCTION ACTIVITIES ARE BEING CONDUCTED IN ACCORDANCE WITH THE WASHINGTON DEPARTMENT OF ECOLOGY, NORTHWEST REGION OFFICE, LOCATED AT 3190 160TH AVENUE SE, BELLEVUE, WASHINGTON 98008, CONSENT DECREE NO. 99-2-07176.
3. ENGINEER/CONSULANT:
   AECOM
   CONTACT: NICKY MOODY
   111 SW COLUMBIA, SUITE 1500
   PORTLAND, OR 97201
   (503) 222-7200
4. OWNER:
   SHELL OIL PRODUCTS, SOIL & GW FOCUS DELIVERY GROUP – US REGION
   CONTACT: ANDREA WING
   P.O. BOX 2463
   HOUSTON, TX 77252
   (425) 413-1164
5. SITE LOCATION:
   SHELL HARBOR ISLAND TERMINAL
   CONTACT: PAUL KATZ
   2555 13th AVENUE SW
   SEATTLE, WA 98134
   (206) 224-0484
6. CONTRACTOR:
   CCS/PNE
   CONTACT: MIKE TAYLOR
   1121 COLUMBIA BLVD
   LONGVIEW, WASHINGTON 98632
   (306) 270-0862

No.	DATE	BY	REVISION
D	10/25/16	BJR	90% DESIGN
C	07/13/16	BJR	75% DESIGN – PERMIT SET
B	06/3/16	BJR	60% DESIGN – PERMIT SET
A	05/13/16	BJR	60% DESIGN

JOB No. 60483182 | DESIGNED: HWN | PROJ. ENGINEER: HWN
SCALE: AS NOTED | DRAWN BY: BJR | APPROVED BY: RSW
CHECKED BY: RSW | DATE: JUNE 2, 2016

WARNING
0 1/2 1
IF BAR DOES NOT MEASURE 1" AT FULL SIZE, THEN SCALES ON DRAWING NOT TO SCALE.

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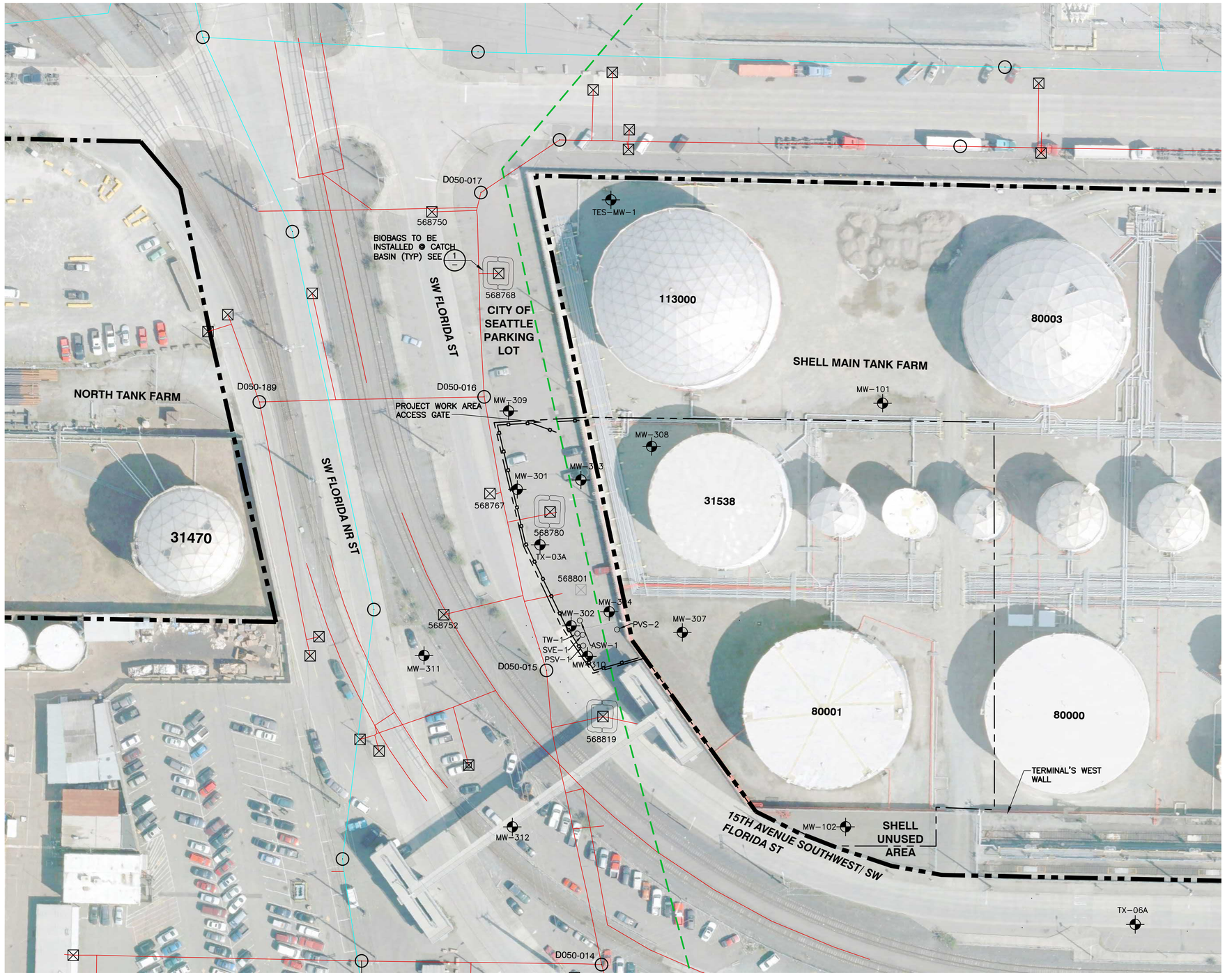
SHELL HARBOR ISLAND
TX-03 AREA
SEATTLE, WASHINGTON

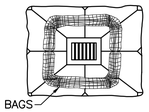
BIO-SPARGING SYSTEM DESIGN
COVER SHEET, VICINITY MAP AND DRAWING INDEX

DRAWING NUMBER: F01
CAD FILE NUMBER:
SHEET: 1 OF 7 | REV.: D



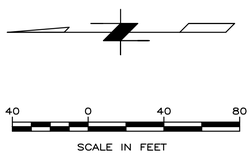
LEGEND

- 80001 — TANK NUMBER ID
- D050-015 — MANHOLE
- 568819 — CATCH BASIN/INLET
- 568801 — ABANDONED CATCH BASIN
- SHELL PROPERTY LINE
- STORM WATER SYSTEM
- COMBINED SEWER
- BP PIPELINE
- EXISTING MONITORING WELLS
- PROPOSED PROJECT WORK AREA
- PROPOSED AREA FOR TEMPORARY SECURITY FENCING TO BE INSTALLED WITH LOCKABLE ACCESS GATE



NOTES:
1. BIOBAGS MUST BE USED IN COMBINATION WITH INLET INSERTS.
2. BAGS SHALL BE 18 TO 20 INCHES LONG AND A MINIMUM OF 4 INCHES IN HEIGHT.
3. REMOVE SEDIMENT NEAR BAGS WHEN IT REACHES 1/3 THE HEIGHT.

BIOBAG FILTRATION 1/— N.T.S.



No.	DATE	BY	REVISION
D	10/25/16	BJR	90% DESIGN
C	07/13/16	BJR	75% DESIGN – PERMIT SET
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A	05/13/16	BJR	60% DESIGN

JOB No.: 60483182	DESIGNED: HWN	PROJ. ENGINEER: HWN
SCALE: AS NOTED	DRAWN BY: BJR	APPROVED BY: RSW
	CHECKED BY: RSW	DATE: JUNE 2, 2016

WARNING
0 1/2 1
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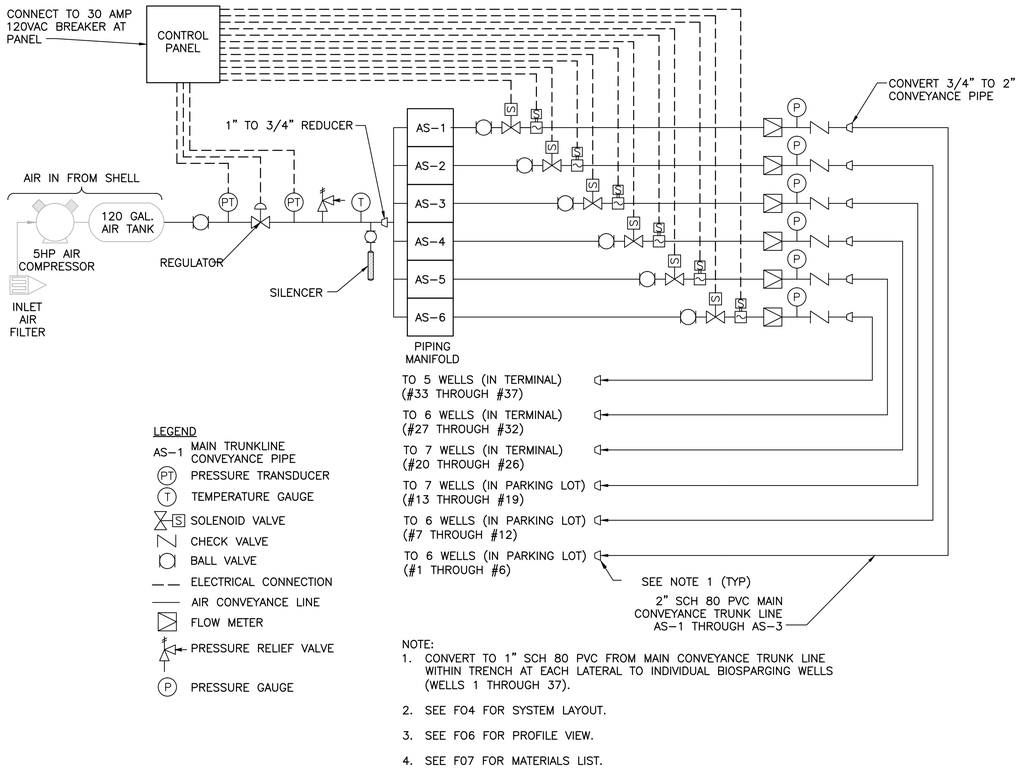
SHELL HARBOR ISLAND

TX-03 AREA
SEATTLE, WASHINGTON

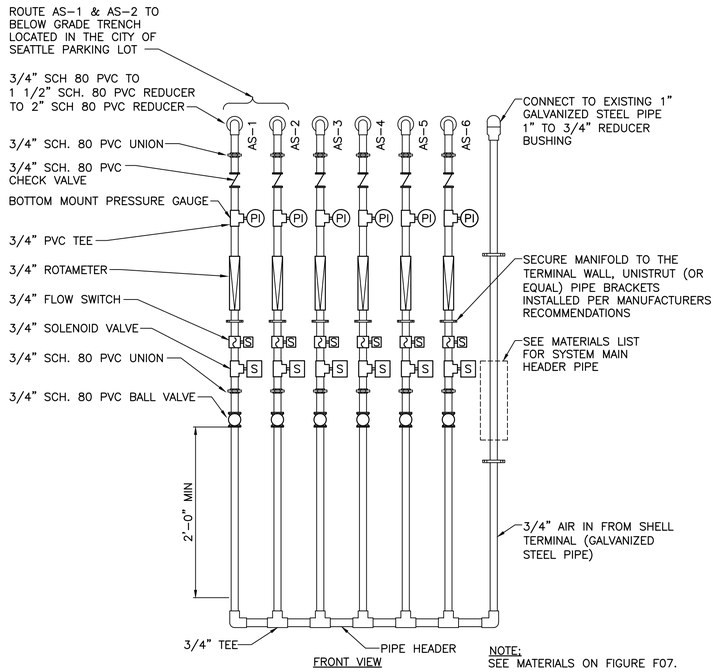
BIO-SPARGING SYSTEM DESIGN

PRE–CONSTRUCTION SITE LAYOUT

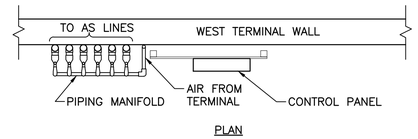
DRAWING NUMBER: F02
CAD FILE NUMBER: .
SHEET: 2 OF 7
REV.: D



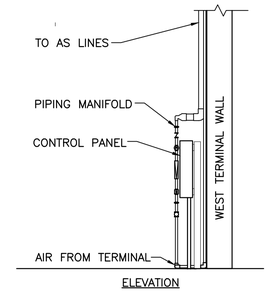
NOTE:
1. CONVERT TO 1" SCH 80 PVC FROM MAIN CONVEYANCE TRUNK LINE WITHIN TRENCH AT EACH LATERAL TO INDIVIDUAL BIOSPARGING WELLS (WELLS 1 THROUGH 37).
2. SEE F04 FOR SYSTEM LAYOUT.
3. SEE F06 FOR PROFILE VIEW.
4. SEE F07 FOR MATERIALS LIST.



AIR SPARGE MANIFOLD
N.T.S.



PLAN



ELEVATION

EQUIPMENT COMPOUND
N.T.S.

No.	DATE	BY	REVISION
D	10/25/16	BJR	90% DESIGN
C	07/13/16	BJR	75% DESIGN – PERMIT SET
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JOB No.: 60483182	DESIGNED: HWN	PROJ. ENGINEER: HWN
SCALE: AS NOTED	DRAWN BY: BJR	APPROVED BY: RSW
	CHECKED BY: RSW	DATE: JUNE 2, 2016

WARNING
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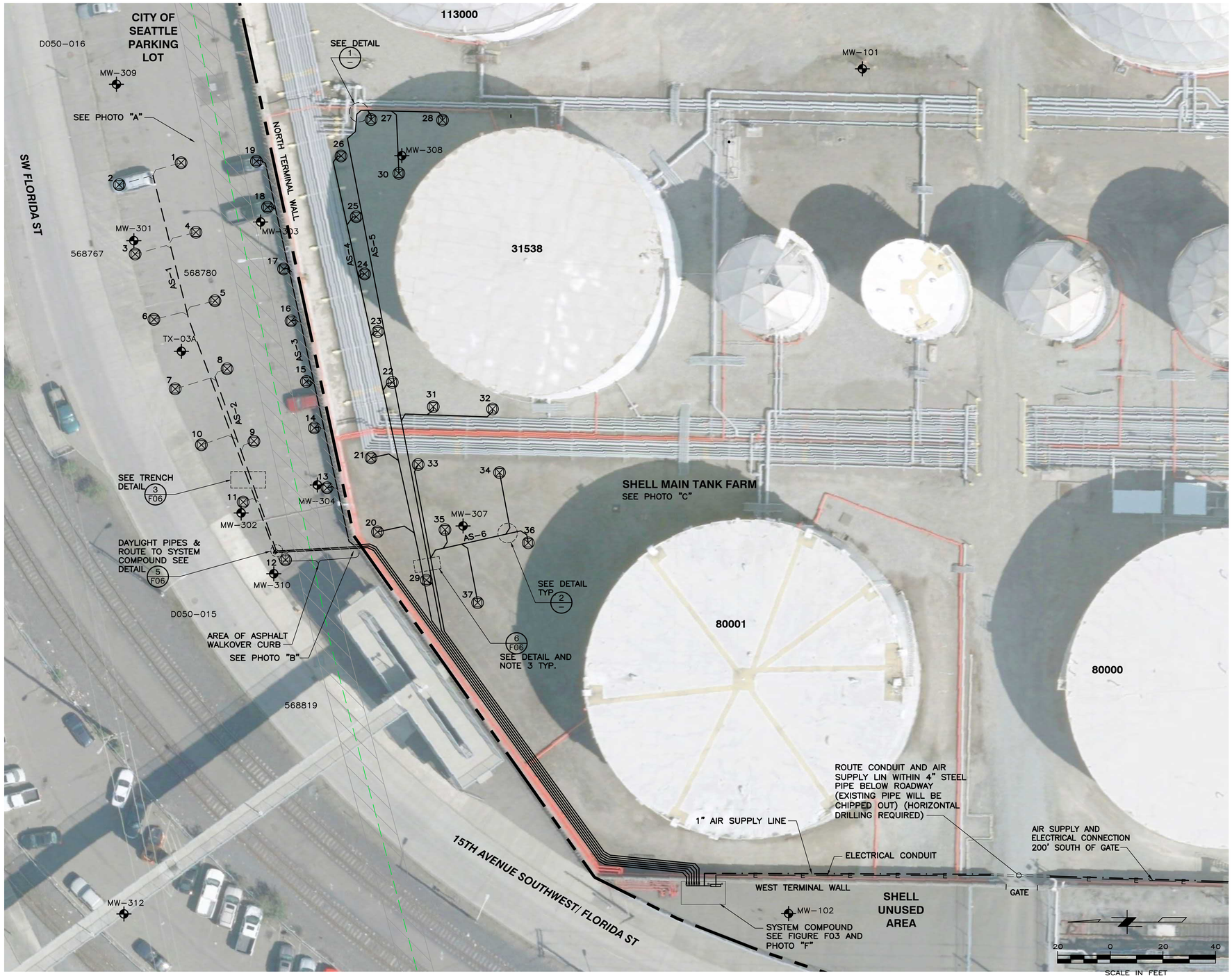
SHELL HARBOR ISLAND

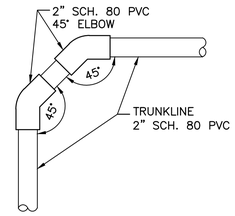
TX-03 AREA
SEATTLE, WASHINGTON

BIO-SPARGING SYSTEM DESIGN

BIO–SPARGING SYSTEM SCHEMATIC

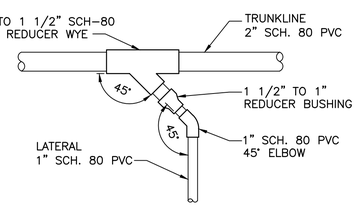
DRAWING NUMBER: F03
CAD FILE NUMBER: .
SHEET: 3 OF 7
REV.: D





TYPICAL CORNER

DETAIL 1 — N.T.S.



TYPICAL CONNECTION TO LATERAL

DETAIL 2 — N.T.S.

LEGEND:

- MW-307 — MONITORING WELL (EXISTING)
- 12 — SPARGING WELL (PROPOSED)
- 568752 — CATCH BASIN/INLET (EXISTING)
- D050-016 — MANHOLE (EXISTING)
- 80001 — TANK NUMBER ID (EXISTING)
- BP PIPELINE (EXISTING)
- NO DRILL ZONE
- 2" SUBSURFACE SCH. 80 PVC PIPING TRUNK LINE (PROPOSED)
- 1" SUBSURFACE SCH. 80 PVC PIPING TRUNK LINE (PROPOSED)
- 2" ABOVE GRADE SCH. 80 PVC PIPING TRUNK LINE (PROPOSED)
- 1" ABOVE GRADE SCH. 80 PVC PIPING TRUNK LINE (PROPOSED)
- AIR SUPPLY LINE (PROPOSED)

TRUNK LINE	WELL	NORTHING (FT)	EASTING (FT)	LATERAL LENGTH (FT)	WELL COMPLETION
AS-1	1	216715.87	1265331.89	12'	
LENGTH (S): 151'	2	216739.39	1265323.55	15'	
LENGTH (A): 221'	3	216733.36	1265297.22	16'	SEE DETAIL 4A, F05
	4	216710.27	1265305.46	11'	
	5	216703.01	1265279.45	12'	
	6	216726.20	1265272.39	16'	
AS-2	7	216718.17	1265245.99	17'	
LENGTH (S): 70'	8	216698.42	1265253.59	6'	
LENGTH (A): 222'	9	216688.22	1265226.07	9'	SEE DETAIL 4A, F05
	10	216708.20	1265224.72	14'	
	11	216692.38	1265202.83	6'	
	12	216676.22	1265180.99	4'	
AS-3	13	216660.46	1265208.39	4'	
LENGTH (A): 343'	14	216665.25	1265231.14	4'	
	15	216668.30	1265248.79	3'	
	16	216674.13	1265271.79	4'	SEE DETAIL 4B, F05
	17	216676.96	1265291.53	3'	
	18	216683.00	1265315.07	3'	
	19	216687.29	1265332.48	4'	
AS-4	20	216641.29	1265191.63	19'	
LENGTH (A): 329'	21	216643.75	1265219.78	21'	
	22	216635.66	1265248.44	3'	
	23	216641.13	1265267.80	4'	SEE DETAIL 4C, F05
	24	216646.16	1265289.66	5'	
	25	216649.34	1265311.36	5'	
	26	216655.11	1265334.47	7'	
AS-5	27	216643.72	1265348.30	8'	
LENGTH (A): 392'	28	216616.60	1265348.09	5'	
	29	216622.72	1265173.30	4'	
	30	216633.17	1265327.84	14'	SEE DETAIL 4C, F05
	31	216620.10	1265239.20	12'	
	32	216597.59	1265238.35	34'	
AS-6	33	216625.81	1265217.23	31'	
LENGTH (A): 208'	34	216594.94	1265214.16	27'	
	35	216615.66	1265192.48	6'	SEE DETAIL 4C, F05
	36	216584.04	1265187.48	12'	
	37	216603.26	1265164.74	23'	

NOTES:

1. (A)= ABOVE GROUND AND (S)= SUBSURFACE.
2. SEE F02 FOR PRE-CONSTRUCTION SITE LAYOUT. TEMPORARY FENCING AND BIO-BAGS MUST BE INSTALLED BEFORE BEGINNING SYSTEM INSTALLATION ACTIVITIES.
3. ALL PIPING SHALL BE COVERED WITH A GRAVEL WALKOVER CURB INSIDE THE MAIN TANK FARM.

No.	DATE	BY	REVISION
D	10/25/16	BJR	90% DESIGN
C	07/13/16	BJR	75% DESIGN – PERMIT SET
B	06/3/16	BJR	60% DESIGN – PERMIT SET
A	05/13/16	BJR	60% DESIGN

JOB No. 60483182 | DESIGNED: HWN | PROJ. ENGINEER: HWN
SCALE: AS NOTED | DRAWN BY: BJR | APPROVED BY: RSW
CHECKED BY: RSW | DATE: JUNE 2, 2016

WARNING
0 1/2 1
IF BAR DOES NOT MEASURE 1" AT FULL SIZE, THEN SCALES ON DRAWING NOT TO SCALE.

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Portland, Oregon 97201-5814
(tel) 503-222-7200
(fax) 503-222-4292
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SHELL HARBOR ISLAND

TX-03 AREA
SEATTLE, WASHINGTON

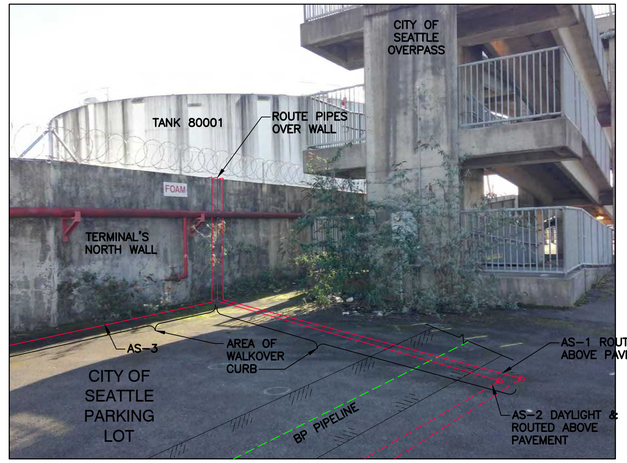
BIO-SPARGING SYSTEM DESIGN

BIO-SPARGING SYSTEM LAYOUT

DRAWING NUMBER: F04
CAD FILE NUMBER: .
SHEET: 4 OF 7
REV.: D

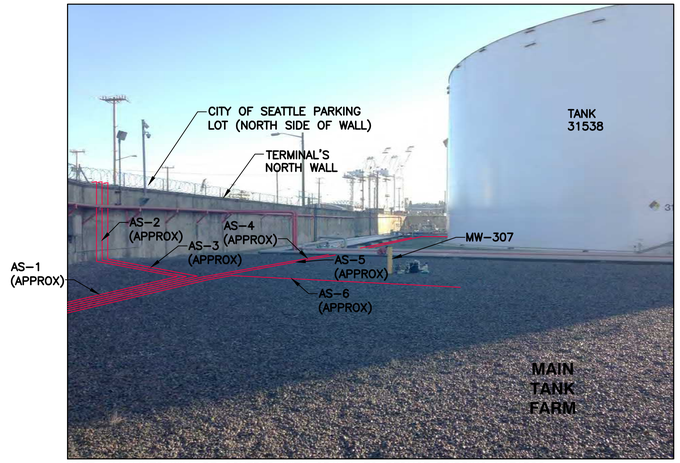
PIPING IN CITY OF SEATTLE PARKING LOT

PHOTO A
N.T.S.



TRANSITION PIPING TO MAIN TANK FARM

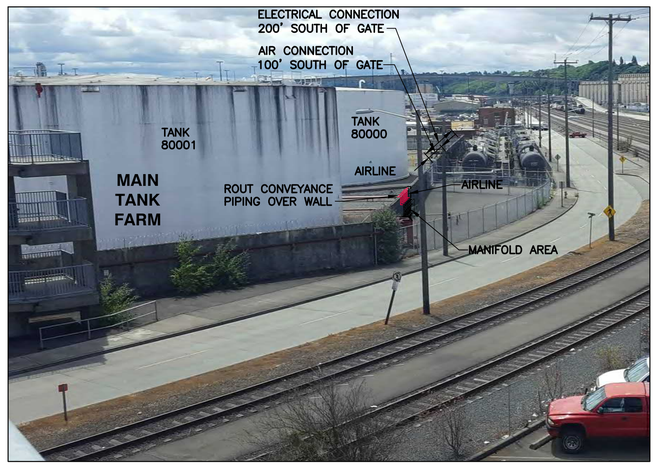
PHOTO B
N.T.S.



NOTE: ALL LINES WILL BE COVERED WITH GRAVEL TO REDUCE TRIPPING HAZARDS.

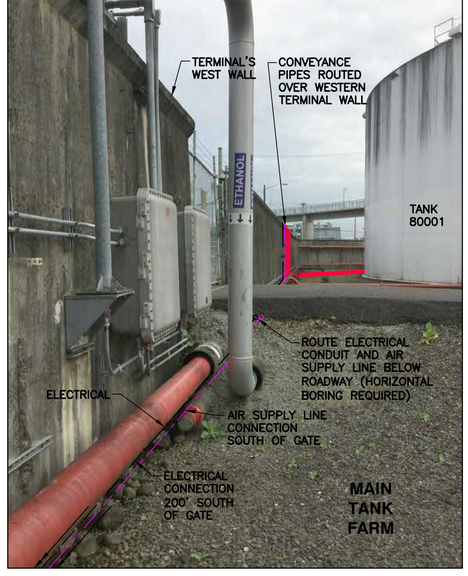
PIPING TRUNKLINES IN MAIN TANK FARM

PHOTO C
N.T.S.



AIR SUPPLY IN MAIN TANK FARM

PHOTO D
N.T.S.



ELECTRICAL SUPPLY IN MAIN TANK FARM

PHOTO E
N.T.S.

AREA OF SECURE COMPOUND

PHOTO F
N.T.S.

AIR SUPPLY

PHOTO G
N.T.S.

No.	DATE	BY	REVISION
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JOB No. 60483182 | DESIGNED: HWN | PROJ. ENGINEER: HWN
SCALE: AS NOTED | DRAWN BY: BJR | APPROVED BY: RSW
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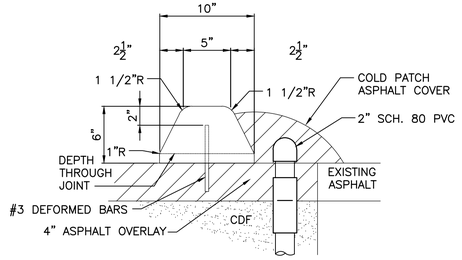
SHELL HARBOR ISLAND
TX-03 AREA
SEATTLE, WASHINGTON

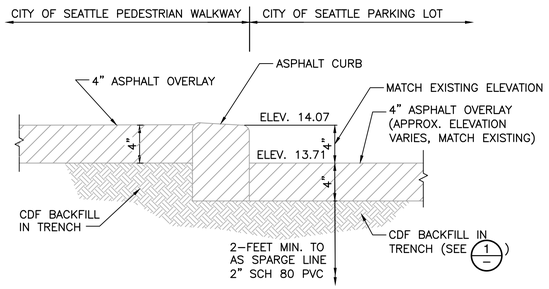
BIO-SPARGING SYSTEM DESIGN
PHOTO LOG OF SITE LAYOUT

DRAWING NUMBER: F05
CAD FILE NUMBER: .
SHEET: 5 OF 7
REV. C



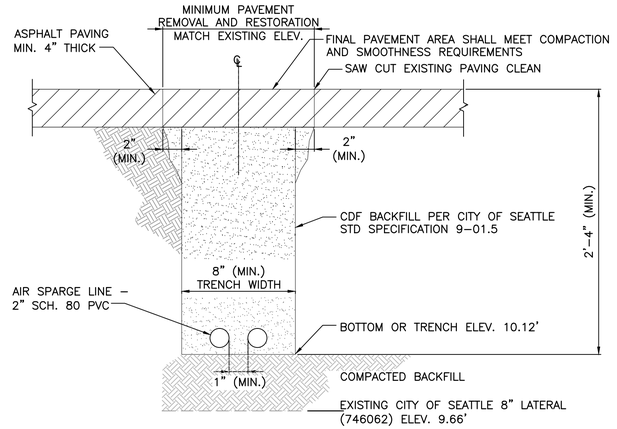
NOTE:
1. SEE CITY OF SEATTLE PLAN.
2. ALTERNATIVELY, THE USE OF EPOXY BONDING AGENT, IN PLACE OF #3 DEFORMED BARS, WILL BE ALLOWED.

EXTRUDED CURB REPLACEMENT (1/–)
N.T.S.

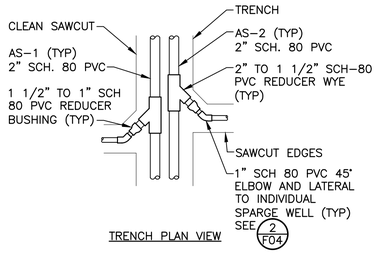


NOTE:
1. SEE STD PLAN NO 411 FOR CURB DOWELS.
2. CURB/ASPHALT WILL BE REPAIRED TO MATCH EXISTING HEIGHT OF ADJACENT CURB WHERE TRENCH CROSSES CURB. ELEVATION AT TOP OF CURB IS 14.07' AT TRENCH LINE ELEVATION AT BASE OF CURB IS 13.71'.

CURB REPAIR AT WEST END OF PARKING LOT (2/–)
N.T.S.

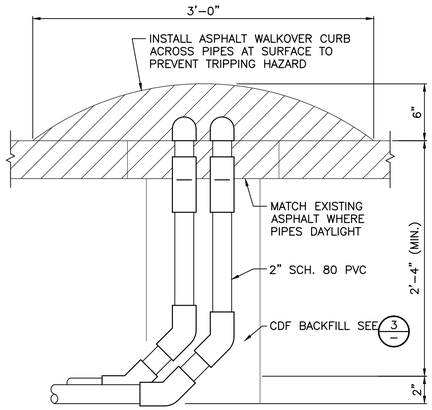


TRENCH DETAIL (3/–)
N.T.S.



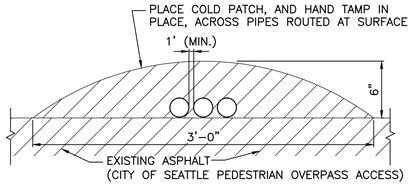
TRENCH PLAN VIEW

NOTES:
1. THE ENGINEER WILL PHYSICALLY MARK THE EXTENT OF ALL TRENCHES.
2. THE CONTRACTOR SHALL PROTECT THE LIVE UTILITIES AND BP PIPELINE LOCATED WITHIN THE CITY OF SEATTLE RIGHT OF WAY, INCLUDING THE PARKING LOT.
3. THE CONTRACTOR SHALL INSTALL SECURITY FENCE, EROSION AND CONTROL BMPS, AS SHOWN IN FIGURE F02.
4. IMPACTED SOIL SHALL BE EXCAVATED, SEGREGATED, AND TRANSPORTED OFF SITE SEPARATELY. THE ENGINEER WILL IDENTIFY THE LIMITS OF EACH OF THE IMPACTED AREAS BASED OF FIELD EVIDENCE OF IMPACTS.
5. ALL TRENCHES AND EXCAVATION CAVITIES SHALL BE BACKFILLED AND RETURNED TO EXISTING CONDITIONS.



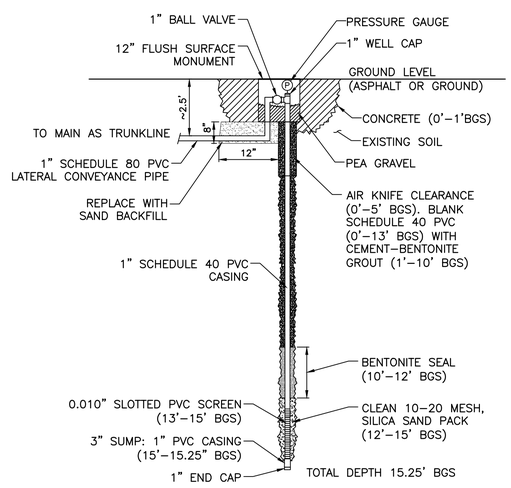
NOTE:
ASPHALT REQUIREMENTS SHALL MEET CITY OF SEATTLE CODES.

PIPE DAYLIGHT/ WALKOVER ASPHALT SURFACE (5/–)
N.T.S.



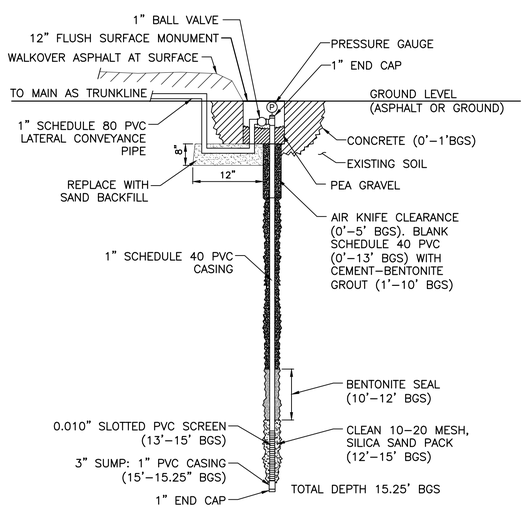
NOTE:
IF COVERING MULTIPLE PIPES, PIPES SHALL BE SPACED A MINIMUM SEPARATION OF 1 INCHES.

WALKOVER GRAVEL SURFACE (6/–)
N.T.S.



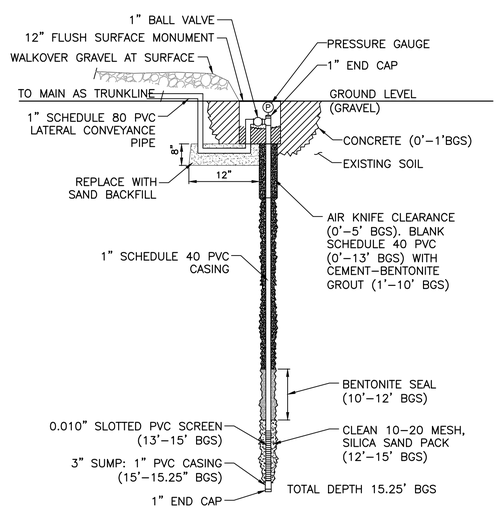
IN TRENCHED AREAS

BIO-SPARGING WELL (4A/–)
N.T.S.



ALONG NORTH TERMINAL WALL

BIO-SPARGING WELL (4B/–)
N.T.S.



IN MAIN TANK FARM

BIO-SPARGING WELL (4C/–)
N.T.S.

No.	DATE	BY	REVISION
D	10/25/16	BJR	90% DESIGN
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JOB No.: 60483182	DESIGNED: HWN	PROJ. ENGINEER: HWN
SCALE: AS NOTED	DRAWN BY: BJR	APPROVED BY: RSW
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SHELL HARBOR ISLAND

TX-03 AREA
SEATTLE, WASHINGTON

BIO-SPARGING SYSTEM DESIGN

BIO–SPARGING SYSTEM DETAILS

DRAWING NUMBER: F06
CAD FILE NUMBER: .
SHEET: 6 OF 7
REV.: D

GENERAL NOTES:

1. THE SITE WILL BE SECURED DURING ALL WORK ACTIVITIES WITH TEMPORARY FENCING AROUND THE WORK AREA. SITE ACCESS WILL BE RESTRICTED TO CONTRACTORS AND PERSONNEL, APPROVED BY THE SHELL TERMINAL OPERATOR, OR SHELL'S REPRESENTATIVE, AT ALL TIMES.
2. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UNDERGROUND UTILITIES AT OR NEAR AREAS OF INSTALLATION ACTIVITIES. NO DISRUPTION OF UTILITY SERVICES SHALL BE ALLOWED WITHOUT PRIOR WRITTEN APPROVAL BY THE UTILITY OWNER. THE CONTRACTOR SHALL PROTECT EXISTING UTILITIES AND EXISTING GROUNDWATER MONITORING WELLS FROM DAMAGE THROUGHOUT THE CONSTRUCTION ACTIVITIES. WHERE ACTIVE UTILITIES ARE ENCOUNTERED BUT ARE NOT SHOWN ON THE DRAWINGS, THE ENGINEER SHALL BE ADVISED; SUCH FACILITIES TO REMAIN IN USE SHALL BE ADEQUATELY PROTECTED BY THE CONTRACTOR, SUPPORTED OR RELOCATED AS DIRECTED BY THE ENGINEER AND THE CONTRACT PRICE WILL BE ADJUSTED FOR ANY SUCH ADDITIONAL WORK. ANY UTILITY DAMAGE CAUSED BY THE CONSTRUCTION ACTIVITIES SHALL BE REPAIRED BY THE CONTRACTOR AT NO ADDITIONAL EXPENSE TO AECOM, TO SHELL, OR TO THE UTILITY OWNER.
3. TRAFFIC CONTROL WILL BE USED, AS NECESSARY AND REQUIRED BY THE CITY OF SEATTLE, TO ALLOW WORK IN CITY PARKING LOT, LOCATED ADJACENT TO THE MAIN TANK FARM OF THE TERMINAL ON FLORIDA STREET, TO PROCEED DURING CONSTRUCTION. TRAFFIC CONTROL WILL BE SUBCONTRACTED BY AECOM, AS NEEDED.
4. DUST MONITORING WILL BE CONDUCTED BY THE CONTRACTOR AND DUST SUPPRESSION TECHNIQUES SHALL BE IMPLEMENTED, AS NECESSARY, TO MEET ALL FEDERAL AND STATE REQUIREMENTS.
5. THE CONTRACTOR SHALL USE STEEL PLATES TO COVER ANY TRENCHED AREAS REMAINING OPEN OVERNIGHT.
6. THE SYSTEM INSTALLATION AND OPERATION SHALL BE COMPLETED CONSIDERING THE FINAL APPROVED PLANS, AND SPECIFICATIONS IN CONJUNCTION WITH ALL FEDERAL, STATE, AND LOCAL PERMITTING REQUIREMENTS.
7. SYSTEM STARTUP OPERATIONS WILL BE CONDUCTED BY AECOM, FOLLOWING SYSTEM INSTALLATION, ALL NECESSARY INSPECTIONS, AND FINAL APPROVALS BY THE CITY AND SHELL.
8. ALL BIO SPARGING WELLS SHALL BE INSTALLED BY OTHERS. THE WORK ACTIVITIES WILL BE COORDINATED THROUGHOUT THE PROJECT.
9. THE CONTRACTOR SHALL AIR KNIFE ALL EXCAVATIONS BETWEEN GRADE AND 5-FEET BELOW GRADE.
10. ROUTINE HEATH AND SAFETY MEETINGS WILL BE MANDATORY AT THE BEGINNING OF EACH WORK DAY. HEALTH AND SAFETY MEETINGS WILL BE HELD AT THE MAIN TERMINAL OFFICE, LOCATED IN THE MAIN TANK FARM.
11. ALL WORK SHALL CONFORM TO THE 2014 EDITION OF CITY OF SEATTLE STANDARD SPECIFICATIONS, THE 2014 EDITION OF THE CITY OF SEATTLE STANDARD PLANS; AND SEATTLE DEPARTMENT OF TRANSPORTATION DIRECTOR'S RULE 05-2009 FOR STREET AND SIDEWALK PAVEMENT OPENING AND RESTORATION. A COPY OF THESE DOCUMENTS SHALL BE ON SITE DURING CONSTRUCTION.
12. PRIOR TO THE START OF CONSTRUCTION WITHIN THE RIGHT OF WAY, THE PERMITTEE SHALL SCHEDULE AND ATTEND A PRECONSTRUCTION MEETING WITH THE CITY OF SEATTLE DEPARTMENT OF TRANSPORTATION.
13. PERMITTEE SHALL CONTACT SEATTLE DEPARTMENT OF TRANSPORTATION, STREET USE INSPECTOR A MINIMUM OF 2 BUSINESS DAYS PRIOR TO NEEDING AN INSPECTION.
14. ALL DAMAGE TO CITY INFRASTRUCTURE CAUSED BY THE CONSTRUCTION SHALL BE IMMEDIATELY REPORTED AND REPAIRED AS REQUIRED BY THE SEATTLE DEPARTMENT OF TRANSPORTATION. TO REPORT DAMAGE TO SPU INFRASTRUCTURE, INCLUDING ANY SEWAGE RELEASE OR BLOCKAGE, CALL 206-386-1800.
15. EXISTING CURB IS TO BE REMOVED AND REPLACED IN THE SAME LOCATION THE PERMITTEE SHALL PROVIDE THE STREET USE INSPECTOR A PLAN WITH EXISTING FLOW LINE AND TOP OF CURB ELEVATIONS IDENTIFIED. PERMITTEE TO STAKE THE LOCATION OF THE EXISTING CURB PRIOR TO DEMOLITION.
16. THE PERMITTEE SHALL SUBMIT ALL APPLICABLE DOCUMENTS REQUIRED UNDER SECTION 1-05.3 OF THE STANDARD SPECIFICATIONS PRIOR TO CONSTRUCTION. A MATERIAL SOURCE FORM FOR ALL MATERIALS TO BE PLACED IN THE RIGHT OF WAY AND MIX DESIGNS FOR ALL ASPHALT, CONCRETE AND AGGREGATES TO BE PLACED IN THE RIGHT OF WAY MUST BE SUBMITTED TO THE SEATTLE DEPARTMENT OF TRANSPORTATION FOR REVIEW AND APPROVAL PRIOR TO BEGINNING CONSTRUCTION. A REVISED MATERIAL SOURCE FORM AND MIX DESIGNS MUST BE SUBMITTED FOR REVIEW AND APPROVAL PRIOR TO PLACEMENT OF ANY SUBSTITUTE MATERIALS.
17. THE PERMITTEE SHALL CONTACT THE UNDERGROUND UTILITIES LOCATOR SERVICE (1-800-424-5555) AT LEAST 48 HOURS PRIOR TO CONSTRUCTION.

PIPING:

1. ALL PIPING SHALL BE INSTALLED IN ACCORDANCE WITH THE APPROPRIATE STATE AND LOCAL REGULATIONS AND STANDARDS.
2. THE PIPING LOCATIONS AND DIMENSIONS SHALL BE FIELD VERIFIED. THE FINAL LOCATIONS MAY BE REVISED IN THE FIELD, IF APPROVED BY THE ENGINEER, BASED ON CONDITIONS ENCOUNTERED DURING THE TIME OF INSTALLATION.
3. SYSTEM AIR CONVEYANCE PIPING FROM THE MANIFOLD TO THE WELLS SHALL BE POLYVINYL CHLORIDE SCHEDULE 80 SYSTEM PIPING SHALL BE HARD-PIPED AND GLUED IN ACCORDANCE WITH ASTM D2564, UNLESS OTHERWISE STATED IN THE FINAL DESIGN PLANS AND SPECIFICATIONS.
4. ALL NEWLY INSTALLED AIR DISTRIBUTION PIPING MAINS SHALL BE TESTED, PRIOR TO BURIAL, TO ENSURE PROPER INSTALLATION AND TIGHTNESS, USING A LOW PRESSURE TESTING TECHNIQUE. TESTING PRESSURES SHALL NOT EXCEED 5 POUNDS PER SQUARE INCH GAUGE (PSIG) AND PIPE SHALL HOLD PRESSURE FOR A PERIOD OF 15 MINUTES WITHOUT ANY LOSSES. THE CONTRACTOR SHALL NOTIFY AECOM PRIOR TO THE START OF ANY TIGHTNESS TESTING. TESTING PROCEDURES, ACCURACY, AND RESULTS SHALL BE APPROVED BY AECOM. ALL TESTING IS THE RESPONSIBILITY OF THE CONTRACTOR AND ANY PIPING FAILING THE TIGHTNESS TEST SHALL BE REPAIRED BY CONTRACTOR AT NO EXPENSE TO AECOM OR SHELL.
5. ALL PIPING SHALL BE FREE OF DIRT AND DEBRIS AFTER INSTALLATION.
6. PIPING WORK SHALL NOT BE COVERED OR ENCLOSED BEFORE IT HAS BEEN INSPECTED AND APPROVED BY AECOM.
7. THE CONTRACTOR SHALL TAKE CARE TO ENSURE THAT NO DAMAGE WILL OCCUR TO PIPING DURING PLACEMENT AND BACKFILL OF PIPES AND TRENCH SECTIONS. THE CONTRACTOR SHALL REPLACE ANY PIPE DAMAGED DURING WORK UNDER THIS CONTRACT AT NO ADDITIONAL EXPENSE TO AECOM OR SHELL.

EARTHWORK:

1. ALL EARTHWORK SHALL COMPLY WITH THE APPROPRIATE FEDERAL, STATE AND LOCAL REGULATIONS AND STANDARDS.
2. A BEDDING LAYER OF SAND SHALL BE PLACED IN ANY TRENCHED AREAS IMMEDIATELY BELOW PIPING AND FITTINGS TO PROVIDE STABILITY BEFORE PLACING THE BACKFILL.
3. IF THE CONTRACTOR ENCOUNTERS SOILS WITH UNANTICIPATED CONDITIONS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY AND CEASE EARTHWORK OPERATIONS. EARTHWORK OPERATIONS SHALL PROCEED ONLY UPON APPROVAL BY THE ENGINEER. SOIL DETERMINED BY THE ENGINEER TO BE ADVERSELY IMPACTED SHALL NOT BE REUSED AS BACKFILL.
4. THE CONTRACTOR SHALL PLACE BACKFILL AND FILL MATERIALS IN LAYERS NOT MORE THAN 8 INCHES IN LOOSE DEPTH FOR MATERIAL COMPACTED BY HEAVY COMPACTION EQUIPMENT, AND NOT MORE THAN 4 INCHES IN LOOSE DEPTH FOR MATERIAL COMPACTED BY HAND-OPERATED TAMPERS.
5. THE CONTRACTOR SHALL CAREFULLY COMPACT MATERIAL UNDER PIPE HAUNCHES AND BRING BACKFILL EVENLY UP ON BOTH SIDES AND ALONG THE FULL LENGTH OF UTILITY PIPING OR CONDUIT TO AVOID DAMAGE OR DISPLACEMENT OF UTILITY SYSTEM.
6. THE CONTRACTOR SHALL COMPACT SOIL TO NOT LESS THAN 93 PERCENT FOR GRANULAR MATERIAL AND 90 PERCENT FOR FINE-GRAINED MATERIAL OF MAXIMUM DRY UNIT WEIGHT ACCORDING TO ASTM D 1557.
7. THE CONTRACTOR SHALL CONFIRM COMPACTION OF THE BACKFILL WITHIN THE TRENCH, AT A MINIMUM FREQUENCY OF ONE TEST EVERY 100 FEET FOR EACH LIFT OF MATERIAL PLACED.

RESTORATION:

1. ALL RESTORATION ACTIVITIES SHALL BE CONDUCTED IN ACCORDANCE WITH THE APPROPRIATE STATE AND LOCAL REGULATIONS AND STANDARDS.
2. THE CONTRACTOR SHALL RESTORED ALL WORK AREAS TO THE SAME OR BETTER CONDITIONS FOLLOWING THE INSTALLATION ACTIVITIES.
3. RESTORE THE ASPHALT, MATCHING THE ASPHALT THAT IS REMOVED, WITH A MINIMUM 4 INCH LIFT, ACROSS THE TRENCH LINE AREAS OF THE CITY OF SEATTLE PARKING LOT. THE FINISHED PAVEMENT SURFACE SHALL BE SMOOTH, UNIFORM IN TEXTURE AND CONFORM TO THE EXISTING GRADE. THE EDGES OF THE ASPHALT SHALL BE SEALED WITH SEALANT MEETING THE REQUIREMENTS OF ASTM D3405/AASHTO M302. PLACEMENT OF ANY MIXTURE DURING RAIN OR OTHER ADVERSE WEATHER CONDITIONS WILL NOT BE PERMITTED.
4. THE CONTRACTOR SHALL CLEAN UP AND REMOVE ALL REFUSE, DEBRIS AND UNUSED MATERIALS OF ANY KIND RESULTING FROM THE WORK AS THE WORK PROGRESSES AND IMMEDIATELY AFTER COMPLETION OF THE WORK. CONTRACTOR SHALL ALSO CLEAN ALL SIDEWALKS, WHETHER NEW OR EXISTING.
5. ALL TEMPORARY STRUCTURES, CHAIN-LINK FENCING, OR ANY OTHER TEMPORARY FACILITIES MUST BE REMOVED BY THE CONTRACTOR UPON COMPLETION OF THE WORK AND PRIOR TO DEMOBILIZATION FROM THE SITE.
6. THE CONTRACTOR SHALL DEMOBILIZE ALL REMAINING EQUIPMENT AND PERSONNEL FROM THE SITE, FOLLOWING APPROVAL BY SHELL OR ITS REPRESENTATIVE, AND THE CITY OF SEATTLE, FOR ANY WORK COMPLETED WITHIN THE CITY PARKING LOT.

WASTE HANDLING AND MANAGEMENT:

1. ALL WASTE MUST BE CONTAINED, STORED AND MANAGED IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL REGULATIONS.
2. ASPHALT PAVEMENT REMOVED DURING TRENCHING AND SOIL EXCAVATION SHALL BE SEPARATED FROM OTHER MATERIALS REMOVED DURING TRENCHING AND DISPOSED OF AS CONSTRUCTION DEBRIS BY THE CONTRACTOR.
3. SOIL IMPACTED BY PETROLEUM HYDROCARBONS IS NOT ANTICIPATED WITHIN THE TRENCHED SECTION OF THE CONVEYANCE PIPING; HOWEVER, IF IMPACTED SOIL IS ENCOUNTERED DURING EXCAVATION OR AIRKNIFING, OR UNANTICIPATED CONDITIONS ARE ENCOUNTERED THEN WORK SHALL BE STOPPED AND WORK WILL PROCEED UNDER THE DIRECTION OF THE ENGINEER.
4. IF DIRECTED BY THE ENGINEER, IMPACTED SOILS MAY BE TEMPORARILY STOCKPILED ON THE ADJACENT ASPHALT ABOVE AN HDPE LINER MATERIAL OF A MINIMUM OF 40 MIL THICKNESS. IF MORE THAN ONE PIECE OF HDPE IS USED ON THE BASE, IT SHALL BE OVERLAPPED A MINIMUM OF 2 FEET (24 INCHES) IN THE DIRECTION OF DRAINAGE. STOCKPILES SHALL BE COVERED WITH MINIMUM 6-MIL HDPE SHEETING AT THE END OF EACH WORKING DAY AND WITHIN AN AREA SECURED WITH TEMPORARY FENCING. SHEETING SHALL BE SECURED TO PREVENT MOVEMENT AND DAMAGE, AND TO PREVENT WIND FROM UNCOVERING AND ERODING THE STOCKPILE. CONTRACTOR SHALL INSTALL STRAW WATTLES AROUND PERIMETER OF STOCKPILE LINER, AND MOVE AND/OR REPLACE AS NECESSARY DURING THE WORK. STORMWATER RUNOFF SHALL BE DIRECTED AWAY FROM THE STOCKPILE.
5. THE CONTRACTOR SHALL REMOVE ANY OTHER WASTE MATERIAL GENERATED DURING THE SYSTEM INSTALLATION ACTIVITIES, INCLUDING TRASH AND DEBRIS, AND LEGALLY DISPOSE OF IT OFF-SITE.
6. IF IMPACTED SOIL IS PRESENT, THE WASTE SOIL WILL BE CHARACTERIZED FOR DISPOSAL BEFORE THE SOIL IS TRANSPORTED OFF-SITE FOR DISPOSAL BY THE CONTRACTOR. AECOM WILL CHARACTERIZE, PROFILE AND PERMIT THE WASTE BEFORE DISPOSAL. CONTRACTOR SHALL ALLOW FOR 4 DAYS FOR WASTE PROFILING PRIOR TO SCHEDULING TRANSPORTATION.

ELECTRICAL:

1. THE ELECTRICAL WORK, INCLUDING ELECTRICAL WIRING AND EQUIPMENT, SHALL BE COMPLETED IN ACCORDANCE ALL FEDERAL, STATE AND CITY REQUIREMENTS, INCLUDING THE 2014 SEATTLE ELECTRICAL CODES IN CONJUNCTION WITH THE 2014 NATIONAL ELECTRICAL CODE (NEC) BY AN ELECTRICIAN LICENSED IN THE STATE OF WASHINGTON.
2. THE CONTRACTOR SHALL REQUEST AND COORDINATE INSPECTIONS, AS NECESSARY, FOR REVIEW OF ALL PIPING, AND ELECTRICAL EQUIPMENT GROUNDING AND FOR CONDUIT SYSTEMS THAT HAS BEEN INSTALLED AND SECURED TO THE TERMINAL WALL. A FINAL INSPECTION SHALL BE CONDUCTED AFTER ALL THE WIRING HAS BEEN COMPLETED.
3. THE CONTRACTOR SHALL GUARANTEE THAT ALL ELECTRICAL EQUIPMENT, WIRING TERMINALS, INSULATORS, AND OTHER SURFACES SHALL NOT BE DAMAGED OR HAVE ANY FOREIGN MATERIAL ON THEM, SUCH AS PAINT OR CORROSIVE RESIDUES. THERE SHALL BE NO DAMAGED PARTS THAT MAY ADVERSELY AFFECT THE OPERATION OR MECHANICAL STRENGTH OF THE EQUIPMENT SUCH AS PARTS THAT ARE BROKEN, BENT, CUT OR DETERIORATED.
4. THE CONTRACTOR SHALL CONNECT INTO THE EXISTING ELECTRICAL PANEL AT THE TERMINAL INTO 30 AMP, 120 VOLT SERVICE.
5. CONTROL PANEL SHALL BE A NEMA-RATED TYPE 4 ENCLOSURE AND BE EQUIPPED WITH A SENSAPHONE SERIES MONITORING SYSTEM.

SURVEYING:

1. ALL SURVEYS SHALL BE PERFORMED UNDER THE DIRECTION OF A LAND SURVEYOR LICENSED IN THE STATE OF WASHINGTON.
2. THE CONTRACTOR SHALL LAYOUT ALL WORK AND PERFORM ALL SURVEYS FOR CONSTRUCTION INCLUDING ESTABLISHING AND REESTABLISHING CONSTRUCTION CONTROL TIED TO THE EXISTING COORDINATE SYSTEM IN HORIZONTAL, NAD83 STATE PLANE WASHINGTON NORTH (US SURVEY FEET), AND ELEVATIONS. NAVD88:

WELL:	TX-03A
NORTHING- COORDINATE:	216716.636892
EASTING- COORDINATE:	1265260.25838
ELEVATION:	12.26

3. THE CONTRACTOR SHALL LOCATE THE FOLLOWING, AT A MINIMUM, AS DIRECTED BY THE ENGINEER: BIOSPARGING WELL TOP OF PIPE, ADJACENT GROUND SURFACE, ENDS OF EACH BIOSPARGING TRUNK-LINE AND CHANGES IN DIRECTION ALONG THE TRUNK LINE, AND LOCATION OF THE EQUIPMENT COMPOUND.
4. SURVEYS SHALL BE COMPLETED TO AN ACCURACY OF 0.05 FEET HORIZONTALLY AND VERTICALLY.

MATERIALS:

PART	NUMBER	DESCRIPTION
INDIVIDUAL AS-LINES		
Ball Valve	6	Nibco PVC Schedule 80 Ball Valve 3/4" True Union
Solenoid Valve	6	"Redhat, Solenoid Valve, 3/4 In, Normally Closed, 120V, Aluminum
Flow Switch	6	Series VID Flowtect, Mini-Size Flow Switch
Air Flow Meter	6	Blue-White F410N, 3/4 inch, 4-38 LPM
Pressure Gauge	6	WIKA 9804315 Capsule Low Pressure Gauge, Liquid-Filled, Stainless Steel 316L Wetted Parts, 4" Dial, 0-30" WC Range, +/-1.5% Accuracy, 1/2" Male NPT Connection, Bottom Mount
Check Valve	6	Plast-O-Matic, PVC Check Valve
SYSTEM MAIN HEADER PIPE		
Air compressor	1	Atlas-Copco GX-11 EL FF Tank Mounted, 15 hP (existing compressor at Terminal, connect at 1-inch pipe located off 2-inch line to railroad tracks)
In-line Air Filter	1	PneumaticPlus SAF Series Particulate Filter, 3/4" NPT with Bracket
Pressure Transducer	1	Dwyer, 628-04GH-P1-E3-S1, Industrial pressure transmitter with 9' cable and 4-20 mA
Regulator	1	PneumaticPlus SAR4000M-N06BG Air Pressure Reguator with 3/4" NPT, with gauge and bracket
Flow Gage	1	Dwyer, 641-6, Air velocity transmitter with 6-inch probe length.
Pressure Transducer	1	Dwyer, 628-08GH-P1-E3-S1, Industrial pressure transmitter with 9' cable and 4-20 mA
Pressure Relief Valve	1	pneumaticsPlus, Adjustable Relief Valve
Silencer	1	Solberg Air Compressor Filter/Silencer Tube
Temperature Gauge	1	Grainger, Analog Panel Mount Thermometer, 0-100 Degrees, with U Clamp
Auto Valve	1	Auto Valve
CONTROL PANEL		
Sensiphone Monitoring System	1	Sensaphone Sentinel Monitoring System, Product number SCD-1200

Note: Equivalent parts may be substituted, pending review for approval by the Engineer.

No.	DATE	BY	REVISION
D	10/25/16	BJR	90% DESIGN
C	07/13/16	BJR	75% DESIGN - PERMIT SET
B	06/3/16	BJR	60% DESIGN - PERMIT SET
A	05/13/16	BJR	60% DESIGN

JOB No. 60483182 | DESIGNED: HWN | PROJ. ENGINEER: HWN
SCALE: AS NOTED | DRAWN BY: BJR | APPROVED BY: RSW
CHECKED BY: RSW | DATE: JUNE 2, 2016

WARNING
0 1/2 1
IF BAR DOES NOT MEASURE 1" AT FULL SIZE, THEN SCALES ON DRAWING NOT TO SCALE.

AECOM
111 SW Columbia, Suite 1500
Portland, Oregon 97201-5814
(tel) 503-222-7200
(fax) 503-222-4292
www.aecom.com

SHELL HARBOR ISLAND
TX-03 AREA
SEATTLE, WASHINGTON

BIO-SPARGING SYSTEM DESIGN
BIO-SPARGING SYSTEM NOTES

DRAWING NUMBER: F07
CAD FILE NUMBER: .
SHEET: 7 OF 7 | REV. D

Seattle Dept of Transportation
Street Use Permits, 23rd Floor
700 Fifth Ave, Suite 2300
P O Box 34996
Seattle, WA 98124-4996

UTILITY PERMIT

Permit No.: 328030

Job No.:BIOSPARGE TEMPORARY UTILITY

☐ Inspector Copy ☐ Permittee Copy ☐ File Copy

Inspector:

LOCATION

Inspection District: WEST SEATTLE

Address: 2555 13TH AVE SW	**Application Date:** 11/15/16 10:26 am
Details:	**Issue Date:** 4/3/17 3:31 pm

PARTIES (* Primary Applicant)

Role	Name	Address	Phone	From	To
*24 Hour Contact	REGISTER, ALLEN	DBA SHELL OIL PRODUCTS,20945 S. WILMINGTON AVE,CARSON,CA,90810	(823)337-7398		
Permittee	EQUILON ENTERPRISES LLC	DBA SHELL OIL PRODUCTS US,20945 S WILMINGTON AVE,CARSON,CA,90810-	(823)337-7398		
Contractor'S Agent	MOODY, NICKY	111 SW COLUMBIA ST , SUITE 1500,,PORTLAND,OR,97201	(503)478-2765		

PERMITTED USES

First Day of Occupation: 4/1/17 **First Year Payment Terms:** ALL OTC

Use	Space	Sq. Ft.	Use Description	Conditions
21A	A	0	Non-public utilities	BIOSPARGING SYSTEM MEASURING 335 LONG X 1.5 WIDE AND UP TO 2 DEEP IN THE PAVED PARKING AREA ON THE SOUTH SIDE OF SW FLORIDA STREET

CONDITIONS of USE

DAMAGED OR DESTROYED UTILITY :
SDOT makes no representation regarding the safety or integrity of the subject structure. If the structure is damaged or destroyed, SDOT will have no obligation to provide an alternative location for the permit utility.

REMOVAL OF UTILITY INSTALL :
Permittee shall move or remove utility insulation at no expense to SDOT, if access by SDOT is required.

USE 21A :
Permittee shall adhere to all applicable City, State, and Federal rules and regulations regarding the maintenance and operation of non-public utilites. SDOT must be notified of changes in property ownership.

FEES

Description	Date	Amount
ISSUANCE FEE - USE 21A	04/3/2017	$146.00
Totals:		$146.00

STREET USE INSPECTOR

Permittee _____ Director Per _____

GENERAL REQUIREMENTS

1. ***Nature of permit.*** This permit is issued according to Seattle Municipal Code ("SMC"), Chapter 15.04, for the use or occupancy of the public right of way in a manner consistent with the terms and conditions in this permit. This permit is wholly of a temporary nature, vests no permanent rights, and is revocable according to SMC Section 15.04.070.
2. ***Acceptance of terms, conditions, and requirements.*** The Permittee accepts the terms, conditions, and requirements of this permit and agrees to comply with them to the satisfaction of the Seattle Department of Transportation, Street Use Division ("Street Use"), or such other agency as may be designated by the City. The Permittee further agrees to comply with all applicable City ordinances, including but not limited to SMC Title 15, and all applicable state and federal laws.
3. ***Copy of permit.*** A copy of the issued permit and current approved plans shall be on site and available at all times.
4. ***Expiration of permit.*** This permit shall remain valid until revoked according to SMC Section 15.04.070; provided that the permit shall expire automatically if the authorized work does not begin within six months from the date the permit is issued. The Permittee is responsible for keeping the permit up to date including submitting updated plans for approval. The Permittee shall submit requests to update a permit in writing or in person, and all requests shall be made to Street Use in a timely manner; otherwise, the Permittee may lose access to requested schedule for continued work in the right of way.
5. ***Superiority of Street Improvement Permits.*** When a Street Improvement Permit exists, rights acquired under the Street Improvement Permit

supersede those acquired under any other Street Use or Utility Permits. Work not approved under the Street Improvement Permit shall require separate Street Use or Utility Permits and Permittee shall obtain these permits in advance of work.

6. ***Compliance with technical requirements and standards.*** All work within the public right of way shall be performed and completed according to the current or subsequently-amended requirements in the following technical documents published by the City: Right-of-Way Improvements Manual; Street Tree Manual; Standard Specifications for Road, Bridge and Municipal Construction; Standard Plans for Municipal Construction; Right of Way Opening and Restoration Rule; and Traffic Control Manual for In-Street Work.
7. ***Scope of work.*** The Permittee shall stage equipment or materials and construct or install the improvements and infrastructure reflected in and in accordance with this permit and the City-approved construction plans. Any revisions, omissions, or additions to the scope of work shall be reviewed and approved by the City before implementation.
8. ***Street Use notification.*** Construction work may be completed in several phases: site preparation (installing traffic control, saw-cutting, etc.); ground breaking; restoration; and staging of equipment and materials. Before beginning any phase of work in the public right of way, the Permittee shall notify Street Use of each start date. The Permittee shall be responsible for notifying Street Use Job Start at (206-684-5270) or SDOTJobStart@seattle.gov a minimum of 2-business days before starting work and shall provide the following information:
   - Permit number;
   - Job-site address;
   - Start date: please specify if Job Start date is the same as the excavation or ground breaking date. If the dates are different, please provide both dates;
   - Brief work description; and
   - Job-site contact name and phone number.

   Failure to notify Street Use Job Start shall result in a $300 penalty or other amounts according to SMC Section 15.04.074. For Street Improvement Permits and Utility Major Permits, a preconstruction meeting is required before starting construction, and the assigned inspector shall be notified a minimum of 2-business days before required inspections. Construction or utility activity occurring with, but not approved under, a Street Improvement or Utility Major Permit shall be permitted under separate Street Use permits. The Permittee shall apply for and obtain these Street Use permits in advance of work. Failure to do so may subject the Permittee to penalties and additional permit review charges may apply.
9. ***Underground and overhead utility notification.*** The Permittee shall notify the following entities, as applicable, 2-business days in advance:
   - Utility Underground Locate Center (811 or 1-800-424-5555) before ground disturbance; and
   - Seattle City Light (206-684-4911) if working within 10 feet of high-voltage lines.
10. ***Olympic Pipe Line Company notification.*** When work in the right of way occurs within 100 feet of an Olympic Pipe Line Company ("OPLC") pipeline, the Permittee shall coordinate the work with OPLC, which may include submitting detailed construction plans to OPLC. The Permittee shall notify OPLC's field coordinator 10-business days in advance of the work (425-981-2506) and an OPLC representative may be required to be onsite during the work.
11. ***King County Metro notification.*** The contractor shall notify King County Metro Transit in advance of any construction that may disrupt transit service according to the following schedule.
   - Five working days notice for any work requiring a temporary bus stop.
   - Ten working days notice for relocation of a bus shelter or reroute of bus service.
   - King County Metro Transit's electric storage battery Trolley Busses can be activated for weekend outage requires with 15 working days notification. Subject to vehicle and staff support capacity restrictions.
   - No two consecutive transit stops may be closed.

   If trolley wires are present, call (206) 477-1150 or email trolley.impacts@kingcounty.gov

   If trolley wires are not present, call (206) 477-1140 or email construction.coord@kingcounty.gov

12. ***Public notification.*** The Permittee shall notify all potentially affected residents and businesses at least 10-business days before starting work in the public right of way, including alleys. If work requires removal of existing permitted structures, then at-least a 30-calendarday notice is required for any permit modification or revocation requests. Notification methods and timelines, including when ongoing notification is needed, must comply with Street Use standards and requirements.
   - If a tree has been approved for removal, the Permittee shall post a "tree removal" public-notice placard at least 10-business days before starting work.
   - If an SDOT public notice comment period is required prior to permitting, the Permittee shall conduct the public notice outreach prior to commencement of the SDOT public notice comment period.
13. ***Alley notification.*** Where this permit authorizes work in an alley, the Permittee shall notify all potentially impacted property owners and businesses prior to any activity occurring in the alley, including and especially those property owners and businesses with tenants using the alley to access parking or for building ingress/egress or deliveries. The Permittee shall schedule work around waste-management-collection days. If this is not possible, the Permittee shall coordinate with waste management services to either provide intermittent alley access during waste pickup or to temporarily establish waste pickup at an alternate location. If an alley is to remain open during permitted work, a minimum 11-foot clear width is required for vehicular access. If an alley is closed to through traffic, the Permittee shall notify the nearest Seattle Fire Department fire station and the Seattle Police Department at the non-emergency numbers prior to commencing work.
14. ***Coordination of work.*** In performing work authorized by this permit, the Permittee shall coordinate with other contractors, public agencies and other permitees working in the public right of way to minimize impact to the public. Documented coordination agreements may be required prior to permit issuance and additional notification to the public may be required.

15. ***Hours of work.*** Work performed in the public right of way shall occur only during hours authorized under all applicable codes, regulations, rules, and permits.
16. ***Off-hours work.*** Work outside of normal working hours, 8:00 AM - 5:00 PM Monday through Friday, is considered "off-hours work" and requires a minimum of 3-business days advanced notice to the Street Use Inspection Supervisor before the off-hours work commences. Off-hours work may also require a separately-approved traffic control plan. A minimum of two hours of inspection time shall be charged for off-hours inspections at the premium rate. A Stop Work order or Citation may be issued for failing to notify Street Use at least 3-business days before the off-hours work.
17. ***Inspection fees.*** The Permittee shall pay for City inspections of work authorized under this permit according to the current fee schedule established by SMC Section 15.04.074 and all other associated costs.
18. ***Billing.*** All fees and costs billed according to this permit shall be paid to the City of Seattle within 30-calendar days from the invoice date. Past due invoices may be subject to interest charges and may be sent to collections.
19. ***Deposits, charges, and future billings.*** The Permittee, also identified as the "Financially Responsible Party" on Street Use permit applications, is responsible and liable for all permit-related charges. If a deposit was made for estimated future Street Use services, any unused portion of the deposit shall be refunded to the Permittee. Any charges in excess of the deposit shall be billed to the Permittee on a monthly basis.
20. ***Corrective work.*** The Permittee is responsible for any additional costs incurred by the City resulting from temporary or corrective measures required to bring the work area into compliance with standards that apply, including but not limited to: temporary traffic control, requirements for temporary structures, temporary stabilization, and temporary restoration when the Permittee is not on site.
21. ***Indemnification.*** The Permittee agrees to defend, indemnify, and hold harmless the City of Seattle, its officials, officers, employees, and agents; against any liability, claims, causes of action, judgments, or expenses, including reasonable attorney fees; resulting directly or indirectly from any act or omission of the Permittee, its contractors, subcontractors, anyone directly or indirectly employed by them, and anyone for whose acts or omissions they may be liable; arising out of the Permittee's use or occupancy of the public right of way; and all loss by the failure of the Permittee to fully or adequately perform, in any respect, all authorizations or obligations under this Permit.
22. ***Insurance.*** The Permittee shall obtain and maintain in full force and effect, at its own expense, public liability insurance in an amount sufficient to protect the City from all potential claims and risks of loss from perils in connection with any activity that may arise from or be related to the Permittee's activity upon or the use or occupation of the public right of way allowed by the permit; and all claims and risks in connection with activities performed by the Permittee by virtue of the permission granted by the permit. The Permittee shall meet all other insurance requirements in SMC 15.04.045.

EXISTING IMPROVEMENTS

1. ***Costs of damage to City property and improvements.*** The Permittee shall be responsible for the costs of repairing any damage to City property or improvements, including street trees, resulting from work performed by or on behalf of the Permittee within the public right of way. Damage to street trees is assessed on the value of the tree according to SMC subsection 15.90.018.B.
2. ***Utility protection.*** The Permittee shall be responsible for checking locations and providing adequate protection for all utilities in the work area.
3. ***Utility relocation.*** The Permittee shall be responsible for notifying affected utilities and requesting any necessary relocation.
4. ***Survey monuments.*** Before removing, destroying, disturbing, or covering a survey monument such that the survey point is no longer visible or readily accessible, the Permittee shall obtain a permit from the Department of Natural Resources according to Washington Administrative Code, Chapter 332-120.
5. ***Protecting, removing, and relocating existing improvements.*** In addition to General Requirements item 12, the Permittee, at their own cost and expense, shall be responsible for coordinating the removal and relocation of existing improvements within the public right of way that their construction or permitted project may interfere with. These existing improvements include, but are not limited to trees, bike racks, newsstands, bike-share stations, signs, benches, artwork, and waste receptacles.
   - For bike-share stations, the Permittee shall contact the bike-share operator at least 30-calendar days before starting work in order to coordinate the removal and relocation of the bike-share station.
   - For all other existing improvements, the Permittee shall contact the improvement owner at least 10-business days before starting work to coordinate the temporary removal of the improvement.
   - For newsstands, the Permittee shall coordinate temporary relocation during the construction period by posting notice of upcoming construction projects at SeattleNewsstands.org at least 10-business days before starting work.

   The Permittee shall be responsible for reinstalling the improvements or coordinating the reinstallation in their original location or at a reasonable alternative location approved by the existing improvement owner and meeting all applicable City requirements. The Permittee is further responsible for protecting all trees within the construction project area and shall contact Urban Forestry to disclose and describe any construction impacts to trees.

   Failure to contact the improvement owners or Urban Forestry is cause for Street Use to revoke this permit.
6. ***Monorail system proximity requirements.*** The Permittee shall be responsible for coordinating with the Seattle Center when any work, deliveries, or loading/unloading will occur within 14 feet of a Monorail structure or 20 feet of a Monorail foundation or below-ground installation. The Permittee shall contact the Seattle Center at 206-905-2601 at least 10-business days before starting construction. Failure to do so is cause for permit revocation.
7. ***Monorail system proximity guidelines.*** Below grade: The restricted digging area includes a 45-degree cone extending outward and downward from the ground level of all monorail piers. Nearby excavations shall be monitored to assure footing stability. At- or above-grade: The piers above ground level cannot be moved, nor can any item like lighting or signage be attached to the piers without prior written consent from the Seattle Center Director. Piers shall not be painted. Landscaping shall not occur adjacent to piers or within 10 feet of a Monorail structure without prior written consent of the Seattle Center Director. Any construction activity in the area of the power rails shall follow OSHA guidelines for working around high voltage. Construction equipment shall be located and operated in awareness of and taking account of beam height and the train's 14-foot-operational envelope from each side of the beam. Contractors shall string warning lines from pier to pier under the beams as a guide.

Spotters shall be employed when any construction activity occurs within 25 feet of the beams.

ENVIRONMENTAL PROTECTION

1. ***Best management practices required.*** The Permittee shall be responsible for protecting the public place, including but not limited to protecting existing street trees and green stormwater infrastructure, and controlling surface runoff, erosion and sediment at the construction site, as required by: the Stormwater Code, (SMC Title 22, Subtitle VIII); the Street and Sidewalk Use Code, (SMC Title 15); the Standard Specifications for Road, Bridge, and Municipal Construction; and Department of Planning and Development Director's Rule 21-2015/Seattle Public Utilities DWW 200, or successor rules or provisions. The site and the surrounding area shall generally be kept clean and free of construction debris or other material, including but not limited to mud, dust, rock, asphalt, and concrete. Waste materials shall be collected and disposed of at an appropriate disposal site. These materials shall be prevented from entering any part of the public sewer and storm drain system, and any surface waters.

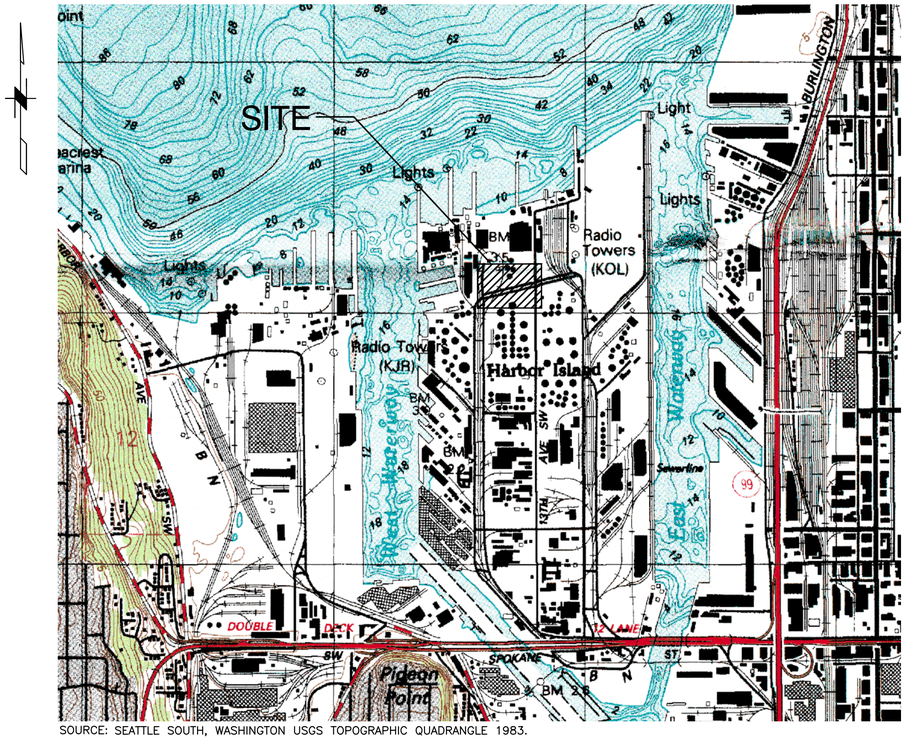
TRAFFIC CONTROL REQUIREMENTS

1. ***Compliance with the Traffic Control Manual for In-Street Work.*** In order to provide safe and effective work areas and to ward, control, protect, and expedite vehicular and pedestrian traffic; signage for all construction within the public right of way shall comply with the City of Seattle Traffic Control Manual for In-Street Work, as amended. When required, the conditions on the traffic control plan shall supersede any conflicting provisions or requirements in the City of Seattle Traffic Control Manual for In-Street Work. A copy of the current City of Seattle Traffic Control Manual for
   In-Street Work and the approved traffic control plan shall be on site at all times.
2. ***Lanes to remain open during peak hours.*** Traffic lanes shall not be closed during the following peak hours: 6:00 AM-9:00 AM and 3:00 PM-7:00 PM in the Central Business District; and 7:00 AM-9:00 AM and 4:00 PM-6:00 PM for arterials elsewhere in the City, unless specifically noted on the approved traffic control plan.
3. ***Maintain access.*** Access to adjoining properties and businesses shall be maintained or accommodated during construction. Pedestrian access around construction sites shall be implemented and maintained per SDOT Director's Rule 10-2015, or successor rule.
4. ***Width of temporary traffic lanes.*** Temporary traffic lanes created during the permitted work shall be a minimum of 11 feet in width unless otherwise approved on the traffic control plan.
5. ***Working within restricted curb spaces***. When the project impacts a restricted curb space, such as meters, pay stations, specific use and load zones; the Permittee shall obtain permission from SDOT Traffic Operations and reserve the spaces with the Traffic Operations Permit Counter (206-684-5086) before starting work.
6. ***Temporary No Parking signs and easels.*** In areas without parking pay stations or parking meters, or when Traffic Operations allows reserved parking spaces to be controlled with Temporary No Parking signs, establishing a Temporary No Parking Zone requires placing type R7-T38 (T-38) or R7-T39 (T-39) easels and completing an online verification form in conformance with the Traffic Control Manual for In-Street Work. In high impact areas, the Central Business District, and in areas where construction projects are densely clustered (such as in City-designated "Construction Hubs"), additional requirements for establishing a Temporary No Parking Zone may apply.
7. ***Nighttime illumination.*** Four or more Type B warning lights of sufficient brilliance to be seen from 500 feet shall be maintained at all times during the hours of darkness at the points of obstruction or excavation of any right of way.
8. ***Work in alleys.*** For work occurring in alleys that impedes vehicular access, including but not limited to egress, ingress, or through travel; "Street Closed" signs shall be placed at each end of the alley. Property owners adjacent to the alley shall be contacted, and their access concerns shall be addressed and mitigated if possible. This may require alternative work scheduling in the case of Solid Waste collection days and hours.

Attachment B
Bio-Sparging System As-Built

SHELL HARBOR ISLAND TERMINAL

BIO-SPARGING SYSTEM
AS BUILT
SEATTLE, WASHINGTON



SOURCE: SEATTLE SOUTH, WASHINGTON USGS TOPOGRAPHIC QUADRANGLE 1983.

VICINITY MAP
n.t.s.

DRAWING INDEX

SHEET #	FIGURE #	SHEET TITLE
1	F01	COVER SHEET, VICINITY MAP, AND DRAWING INDEX
2	F02	PRE-CONSTRUCTION SITE LAYOUT
3	F03	BIO-SPARGING SYSTEM SCHEMATIC
4	F04	BIO-SPARGING SYSTEM LAYOUT
5	F05	BIO-SPARGING SYSTEM DETAILS

GENERAL NOTES:

1. MATERIALS AND CONSTRUCTION CONDUCTED IN ACCORDANCE WITH THE FOLLOWING:
   a. WASHINGTON DEPARTMENT OF ECOLOGY AND CITY OF SEATTLE, APPROVED REMEDIATION WORK PLAN, TX-03 AREA, SHELL HARBOR ISLAND TERMINAL, PREPARED FOR SHELL OIL PRODUCTS BY AECOM, FEBRUARY 2016.
   b. CURRENT EDITION OF THE STANDARD FOR SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION PREPARED BY THE WASHINGTON STATE CHAPTER OF THE AMERICAN PUBLIC WORKS ASSOCIATED AND THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION.
   c. CONDITIONS AND STANDARDS SET FORTH IN THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) DESIGN MANUAL, AS AMENDED AND APPROVED BY WSDOT.
   d. DOT CONSTRUCTION MANUAL, AS AMENDED AND APPROVED BY WSDOT.
   e. OTHER SPECIFICATIONS NOT LISTED ABOVE THAT MAY BE REQUIRED BY THE CITY OF SEATTLE.
2. CONSTRUCTION ACTIVITIES CONDUCTED IN ACCORDANCE WITH THE WASHINGTON DEPARTMENT OF ECOLOGY, NORTHWEST REGION OFFICE, LOCATED AT 3190 160TH AVENUE SE, BELLEVUE, WASHINGTON 98008, CONSENT DECREE NO. 99-2-07176.
3. ENGINEER/CONSULTANT:
   AECOM
   CONTACT: NICKY MOODY
   111 SW COLUMBIA, SUITE 1500
   PORTLAND, OR 97201
   (503) 222-7200
4. OWNER:
   SHELL OIL PRODUCTS, SOIL & GW FOCUS DELIVERY GROUP – US REGION
   CONTACT: ANDREA WING
   P.O. BOX 2463
   HOUSTON, TX 77252
   (425) 413-1164
5. SITE LOCATION:
   SHELL HARBOR ISLAND TERMINAL
   CONTACT: PAUL KATZ
   2555 13th AVENUE SW
   SEATTLE, WA 98134
   (206) 224-0484
6. CONSTRUCTION CONTRACTOR:
   CCS/PNE
   CONTACT: MIKE TAYLOR
   1121 COLUMBIA BLVD
   LONGVIEW, WA 98632
   (306) 270-0862

No.	DATE	BY	REVISION
B	10/09/17	BJR	REVISION B-FINAL AS BUILT
A	09/22/17	BJR	REVISION A-DRAFT AS BUILT

JOB No. 60528105 | DESIGNED: HWN | PROJ. ENGINEER: HWN
SCALE: AS NOTED | DRAWN BY: BJR | APPROVED BY: NM
CHECKED BY: NM | DATE: OCT. 2017

WARNING
0 1/2 1
IF BAR DOES NOT MEASURE 1" AT FULL SIZE, THEN SCALES ON DRAWING NOT TO SCALE.

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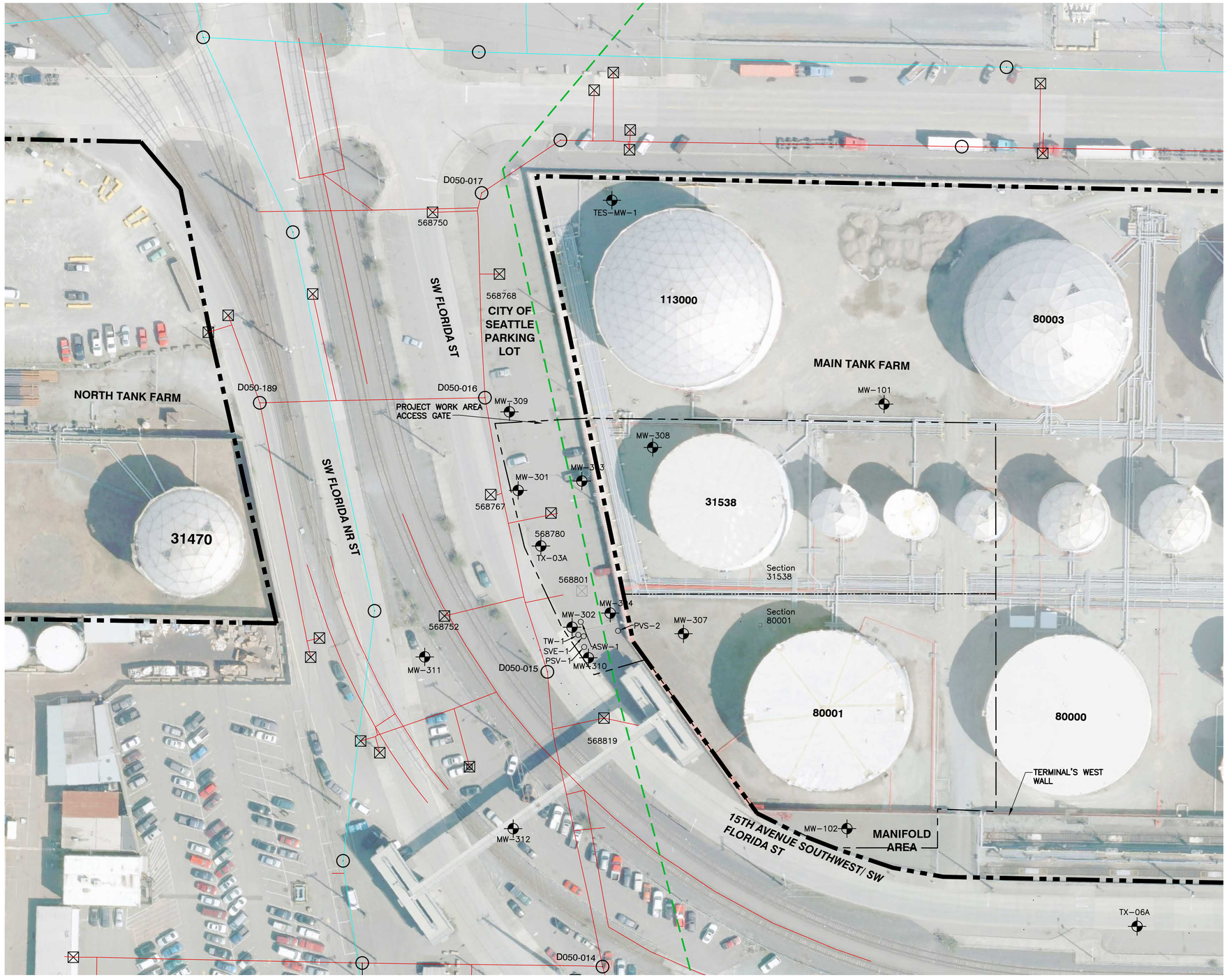
TX-03 AREA
SEATTLE, WASHINGTON

BIO-SPARGING SYSTEM AS BUILT
COVER SHEET, VICINITY MAP AND DRAWING INDEX

DRAWING NUMBER: F01
CAD FILE NUMBER:
SHEET: 1 OF 5 | REV. B



LEGEND

- 80001 TANK NUMBER
- D050-015 MANHOLE
- 568819 CATCH BASIN/INLET
- 568801 ABANDONED CATCH BASIN
- SHELL PROPERTY LINE
- STORM WATER SYSTEM
- COMBINED SEWER SYSTEM
- BP PIPELINE
- EXISTING MONITORING WELLS
- PROJECT WORK AREA

40 0 40 80

SCALE IN FEET

No.	DATE	BY	REVISION
B	10/09/17	BJR	REVISION B–FINAL AS BUILT
A	09/22/17	BJR	REVISION A–DRAFT AS BUILT

JOB No. 60528105	DESIGNED: HWN	PROJ. ENGINEER: HWN
SCALE: AS NOTED	DRAWN BY: BJR	APPROVED BY: NM
	CHECKED BY: NM	DATE: OCT. 2017

WARNING

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SEATTLE, WASHINGTON

BIO-SPARGING SYSTEM AS BUILT

PRE–CONSTRUCTION EXISTING SITE LAYOUT

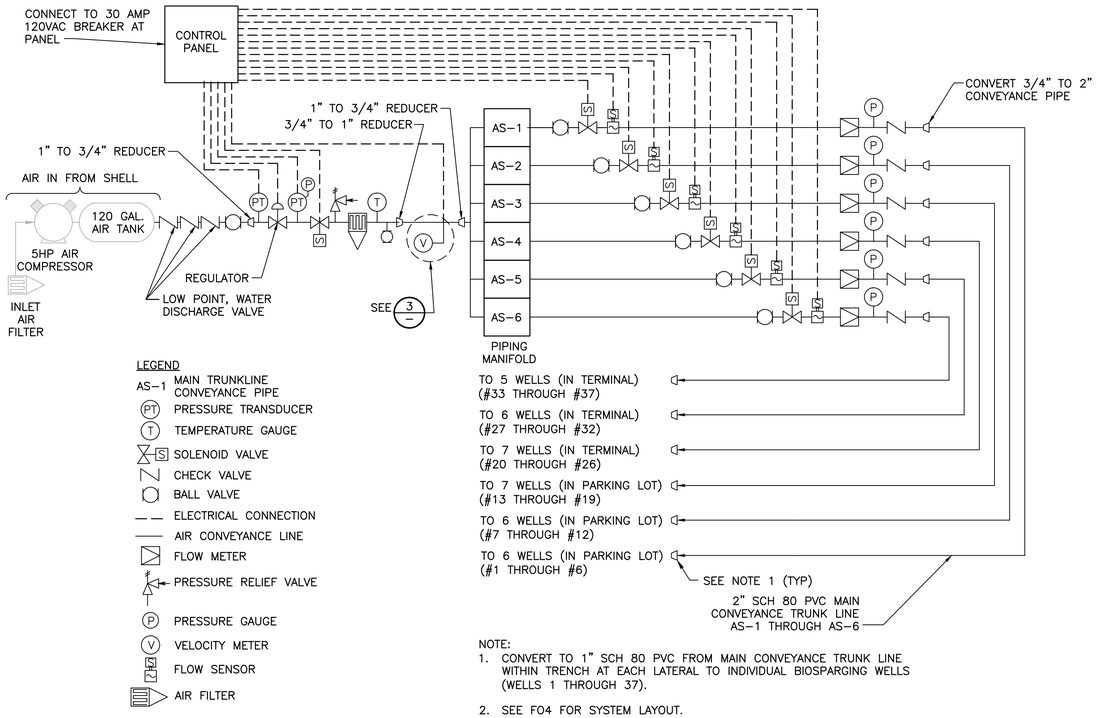
DRAWING NUMBER: F02

CAD FILE NUMBER: .

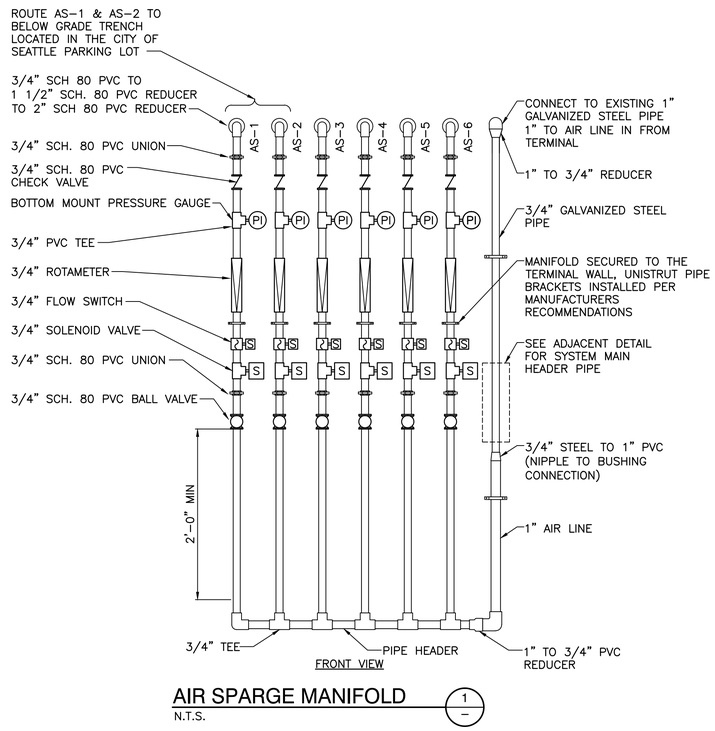
SHEET: 2 OF 5

REV. B

O:\25211158 Shell\2017\Seattle Terminal\400-Technical\450 CAD\F02 Site Layout.dwg User:betty.ruff Plotted:Oct 09, 2017 – 11:19am Last Saved:Sep 21, 2017 – 2:03pm

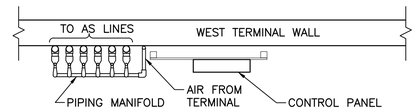


NOTE:
1. CONVERT TO 1" SCH 80 PVC FROM MAIN CONVEYANCE TRUNK LINE WITHIN TRENCH AT EACH LATERAL TO INDIVIDUAL BIOSPARGING WELLS (WELLS 1 THROUGH 37).
2. SEE F04 FOR SYSTEM LAYOUT.

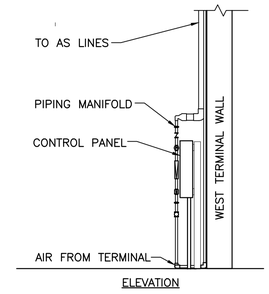


FRONT VIEW

AIR SPARGE MANIFOLD
N.T.S. (1)

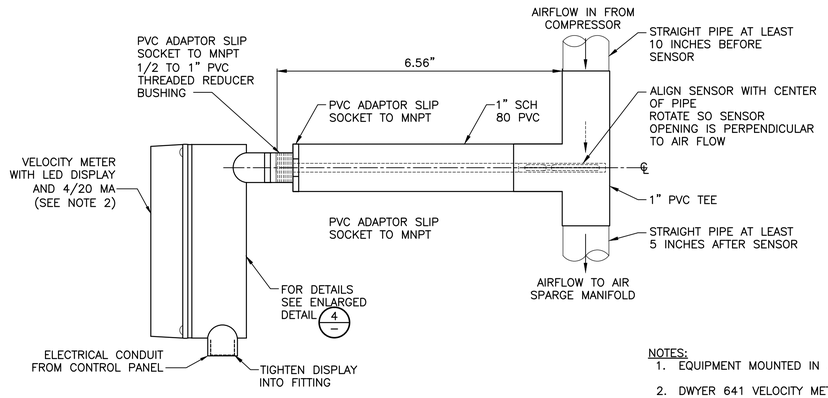


PLAN



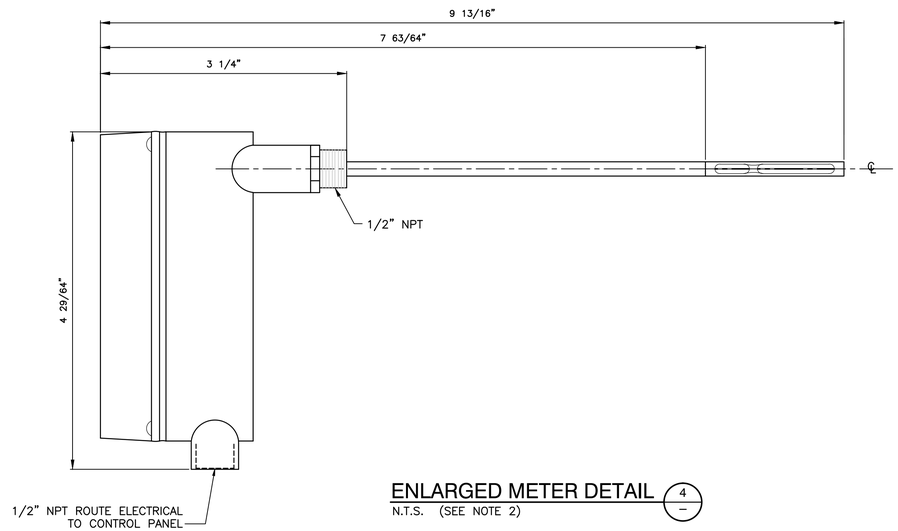
ELEVATION

EQUIPMENT COMPOUND
N.T.S. (2)



NOTES:
1. EQUIPMENT MOUNTED IN UPRIGHT POSITION.
2. DWYER 641 VELOCITY METER WITH LED DISPLAY (12–35 VDC).

VELOCITY METER DETAIL
N.T.S. (3)



ENLARGED METER DETAIL
N.T.S. (SEE NOTE 2) (4)

No.	DATE	BY	REVISION
B	10/09/17	BJR	REVISION B–FINAL AS BUILT
A	09/22/17	BJR	REVISION A–DRAFT AS BUILT

JOB No.	DESIGNED:	PROJ. ENGINEER:
60528105	HWN	HWN
SCALE: AS NOTED	DRAWN BY: BJR	APPROVED BY: NM
	CHECKED BY: NM	DATE: OCT. 2017

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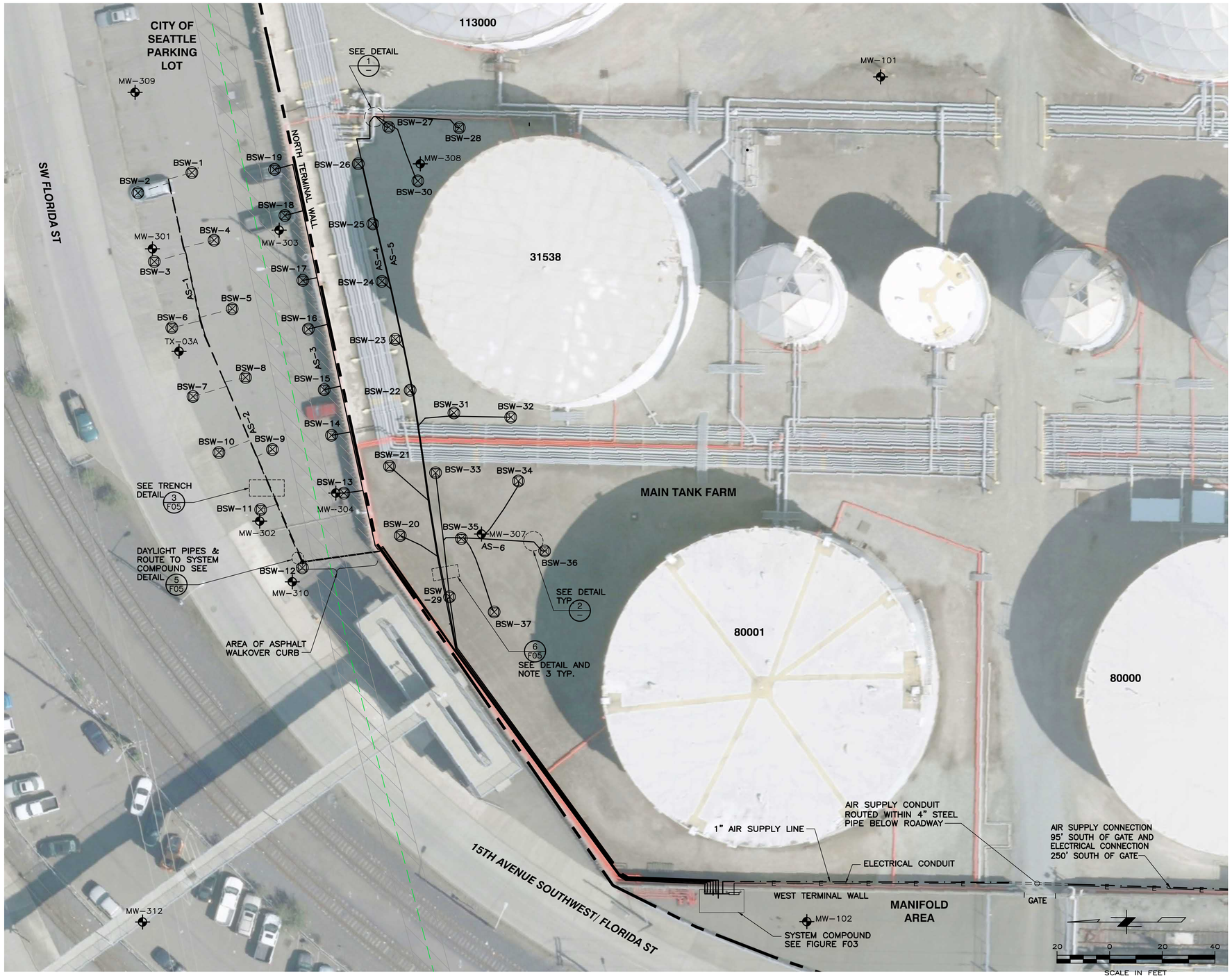
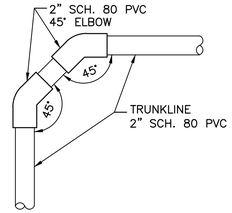
BIO-SPARGING SYSTEM AS BUILT

BIO–SPARGING SYSTEM SCHEMATIC

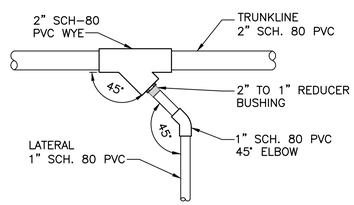
DRAWING NUMBER: F03
CAD FILE NUMBER: .
SHEET: 3 OF 5
REV.: B





TYPICAL CORNER

DETAIL 1/— N.T.S.



TYPICAL CONNECTION TO LATERAL

DETAIL 2/— N.T.S.

LEGEND:

- MW-307 — MONITORING WELL (EXISTING)
- BSW-12 — BIO-SPARGING WELL INSTALLED
- 80001 — TANK NUMBER ID (EXISTING)
- BP PIPELINE (EXISTING)
- PIPING EXCLUSION ZONE
- 2" SUBSURFACE SCH. 80 PVC PIPING TRUNK LINE
- 1" SUBSURFACE SCH. 80 PVC PIPING TRUNK LINE
- 2" ABOVE GRADE SCH. 80 PVC PIPING TRUNK LINE
- 1" ABOVE GRADE SCH. 80 PVC PIPING TRUNK LINE
- AIR SUPPLY LINE

TRUNK LINE	WELL	NORTHING (FT)	EASTING (FT)	LATERAL LENGTH (FT)	WELL COMPLETION
AS-1	2	216732.28	1265320.48	12'	SEE DETAIL 4A, F05
LENGTH (S): 151'	3	216726.04	1265294.36	12'	
LENGTH (A): 221'	6	216719.39	1265269.21	11'	
	7	216711.32	1265243.07	13'	
	10	216701.48	1265221.82	12'	
	11	216685.61	1265200.10	6'	
AS-2	1	21671l.74	1265328.14	9'	SEE DETAIL 4A, F05
LENGTH (S): 70'	4	216703.31	1265302.47	12'	
LENGTH (A): 222'	5	216696.41	1265276.41	13'	
	8	216691.34	1265250.31	8'	
	9	216681.16	1265222.95	6'	
	12	216669.76	1265177.96	2'	
AS-3	13	216653.98	1265206.38	7'	SEE DETAIL 4B, F05
LENGTH (A): 343'	14	216658.71	1265228.33	7'	
	15	216661.46	1265245.67	6'	
	16	216667.49	1265268.69	7'	
	17	216669.60	1265287.21	6'	
	18	216676.40	1265311.87	7'	
	19	216680.32	1265329.35	7'	
AS-4	20	216632.55	1265190.23	16'	SEE DETAIL 4C, F05
LENGTH (A): 329'	21	216636.64	1265216.56	20'	
	22	216628.78	1265245.46	2'	
	23	216634.41	1265264.76	5'	
	24	216639.53	1265286.83	5'	
	25	216642.98	1265308.67	2'	
	26	216648.53	1265331.52	2'	
AS-5	27	216636.97	1265345.44	7'	SEE DETAIL 4C, F05
LENGTH (A): 392'	28	216610.09	1265345.20	5'	
	30	216625.87	1265325.01	30'	
	31	216612.15	1265236.83	15'	
	32	216590.55	1265235.21	24'	
AS-6	33	216619.14	1265214.09	27'	SEE DETAIL 4C, F05
LENGTH (A): 208'	34	216587.81	1265211.14	27'	
	35	216609.33	1265189.09	4'	
	36	216577.65	1265184.38	6'	
	37	216596.85	1265161.20	31'	

NOTES:

1. (A)= ABOVE GROUND AND (S)= SUBSURFACE.
2. SEE F02 FOR PRE-CONSTRUCTION SITE LAYOUT. TEMPORARY FENCING AND BIO-BAGS WERE INSTALLED BEFORE BEGINNING SYSTEM INSTALLATION ACTIVITIES.
3. PIPING IS ILLUMINATED WITH GLOW STRIPING INSIDE THE MAIN TANK FARM.

No.	DATE	BY	REVISION
B	10/09/17	BJR	REVISION B-FINAL AS BUILT
A	09/22/17	BJR	REVISION A-DRAFT AS BUILT

JOB No. 60528105 | DESIGNED: HWN | PROJ. ENGINEER: HWN
SCALE: AS NOTED | DRAWN BY: BJR | APPROVED BY: NM
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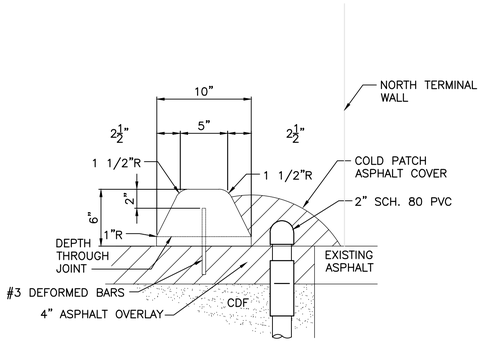
BIO-SPARGING SYSTEM AS BUILT

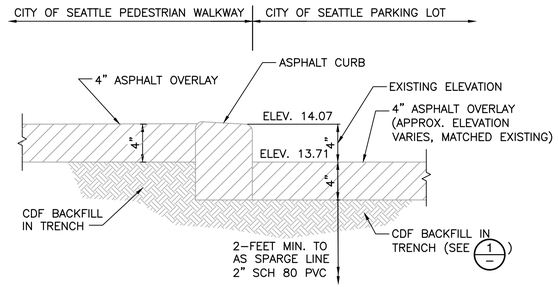
BIO-SPARGING SYSTEM LAYOUT

DRAWING NUMBER: F04
CAD FILE NUMBER: .
SHEET: 4 OF 5
REV. B



EXTRUDED CURB REPLACEMENT (1/–)

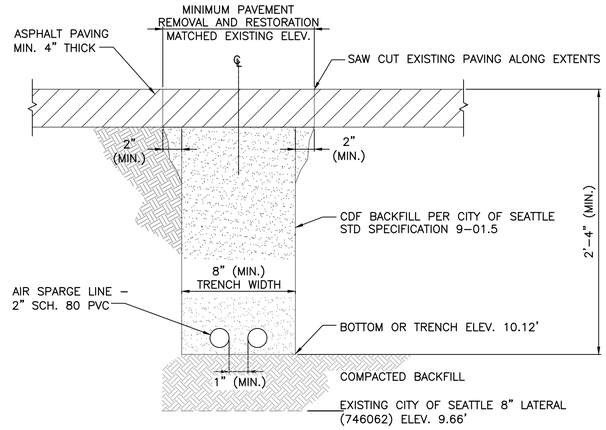
N.T.S.



NOTE:
1. SEE STD PLAN NO 411 FOR CURB DOWELS.
2. CURB/ASPHALT WILL BE REPAIRED TO MATCH EXISTING HEIGHT OF ADJACENT CURB WHERE TRENCH CROSSES CURB. ELEVATION AT TOP OF CURB IS 14.07' AT TRENCH LINE ELEVATION AT BASE OF CURB IS 13.71'.

CURB REPAIR AT WEST END OF PARKING LOT (2/–)

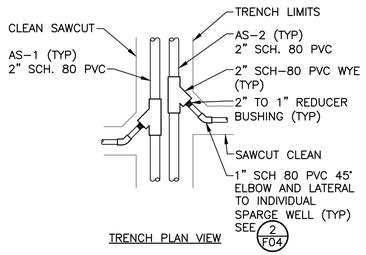
N.T.S.



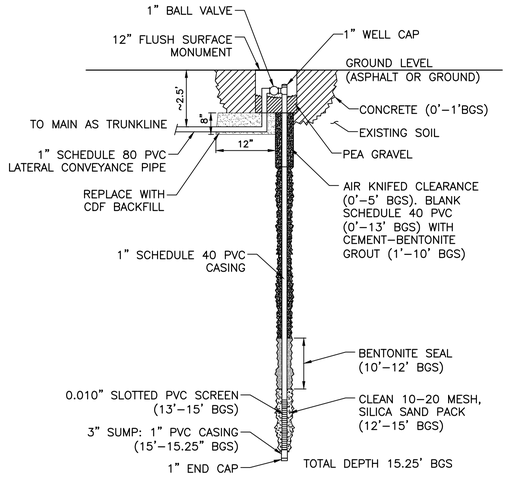
TRENCH DETAIL (3/–)

N.T.S.

NOTES:
1. IMPACTED SOIL EXCAVATED, SEGREGATED, AND TRANSPORTED OFF SITE TO WAST MANAGEMENT, ARLINGTON, OR.
2. ALL TRENCHES AND EXCAVATION CAVITIES BACKFILLED AND RETURNED TO EXISTING CONDITIONS.



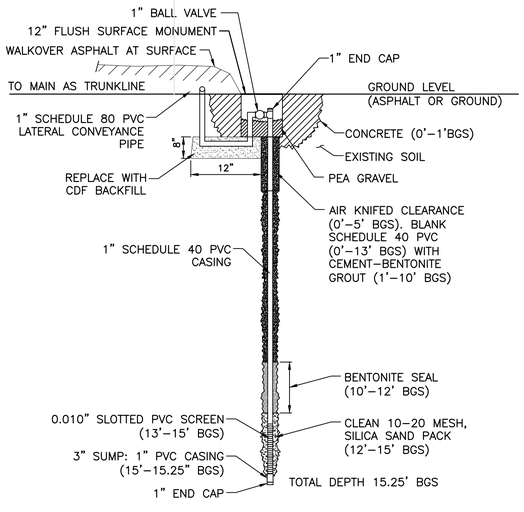
TRENCH PLAN VIEW



IN TRENCHED AREAS

BIO-SPARGING WELL (4A/–)

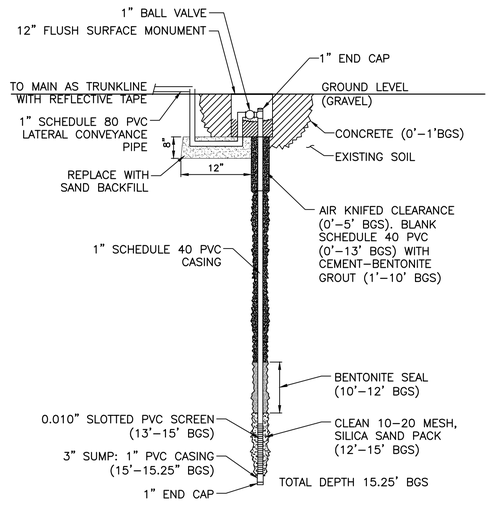
N.T.S.



ALONG SOUTH SIDE OF NORTH TERMINAL WALL

BIO-SPARGING WELL (4B/–)

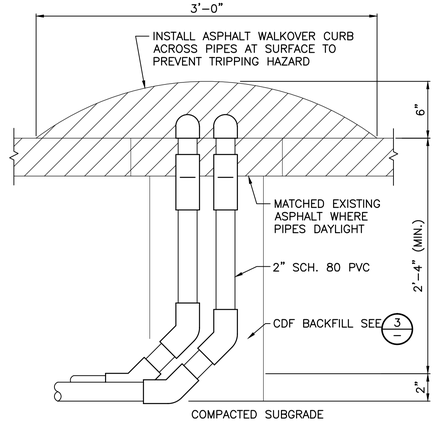
N.T.S.



IN MAIN TANK FARM

BIO-SPARGING WELL (4C/–)

N.T.S.



PIPE DAYLIGHT/ WALKOVER ASPHALT SURFACE (5/–)

N.T.S.

No.	DATE	BY	REVISION
B	10/09/17	BJR	REVISION B–FINAL AS BUILT
A	09/22/17	BJR	REVISION A–DRAFT AS BUILT

JOB No. 60528105	DESIGNED: HWN	PROJ. ENGINEER: HWN
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BIO-SPARGING SYSTEM AS BUILT

BIO–SPARGING SYSTEM AS BUILT DETAILS

DRAWING NUMBER: F05
CAD FILE NUMBER: .
SHEET: 5 OF 5
REV.: B

Attachment C
Bio-Sparging Boring/Well Logs

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-1

Sheet 1 of 1

Date(s) Drilled	**11/18/2016 - 11/21/2016**	Logged By	**L. Brown**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured	**5 feet bgs, 11/21/2016**	Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Monitoring Well Installed**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				Asphalt pavement.		
					GRAVELLY SAND with SILT Dark grey to black. Fine to coarse grained sand. Asphalt and some metal debris.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
	2						
	4				**SAND** Black, moist. Fine to medium grained sand. Slight hydrocarbon odor.		
					Grades to dark grey to black, moist to wet. Trace fines. Moderate hydrocarbon odor.		
	6				Grades to wet.		Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
					Strongest hydrocarbon odor (7-10 feet below ground surface).		
	8						
	10						Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-1

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-2

Sheet 1 of 1

Date(s) Drilled	**11/11/2016 - 11/21/2016**	Logged By	**D. Lewis and L. Brown**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured	**5 feet bgs, 11/21/2016**	Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Monitoring Well Installed**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				Asphalt pavement.		
					SILTY SAND with GRAVEL Tan to dark brown.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
	2						
	4						
					SAND Dark grey to black, moist to wet. Fine to medium grained sand. Trace fines. Occasional shell fragment. Slight hydrocarbon odor.		
	6				Grades to wet. Sheen observed.		Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	8						
	10						Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-2

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-3

Sheet 1 of 1

Date(s) Drilled	**11/11/2016 - 11/11/2016**	Logged By	**D. Lewis**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured		Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Bentonite**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				Asphalt pavement.		
					SILTY SAND with GRAVEL Tan to black. Fine grained sand.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
	2				Grades to grey to black sand and silt. Fine grained sand.		
	4						
					SAND Black, wet. Medium grained sand. Hydrocarbon odor.		
	6						Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	8						
	10				Grades to grey-brown. Slight hydrocarbon odor.		Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-3

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-4

Sheet 1 of 1

Date(s) Drilled	**11/18/2016 - 11/21/2016**	Logged By	**L. Brown**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured	**5 feet bgs, 11/21/2016**	Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Monitoring Well Installed**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				Asphalt pavement.		
					GRAVELLY SAND with SILT Dark grey, dry to moist. Fine to coarse grained sand. Fine to coarse, subangular gravel. No hydrocarbon odor.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
	2				**SAND with GRAVEL** Dark grey to black, moist. Fine to medium grained sand. Cobbles at 2 to 3 feet bgs. Hydrocarbon odor increases with depth.		
	4						
					SAND Dark grey to black, moist to wet. Fine to medium grained sand. Trace fines and occasional gravel. Hydrocarbon odor.		
	6						Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	8						
	10						Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-4

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-5

Sheet 1 of 1

Date(s) Drilled	**11/11/2016 - 11/21/2016**	Logged By	**D. Lewis and L. Brown**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured	**6 feet bgs, 11/21/2016**	Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Monitoring Well Installed**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				Asphalt pavement.		
					SAND and GRAVEL Brown.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
	2				**SANDY SILT with GRAVEL** Grey, moist.		
	4						
					SAND Dark grey to black, moist. Find to medium grained sand. Trace fines. Hydrocarbon odor.		
	6				Grades to wet.		Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	8						
	10						Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-5

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-6

Sheet 1 of 1

Date(s) Drilled	**11/11/2016 - 11/18/2016**	Logged By	**D. Lewis**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured		Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Bentonite**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				Asphalt pavement.		
					SAND and SILT with GRAVEL Brown.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
	2				**SAND with GRAVEL** Grey. Fine grained sand.		
					SAND Black, wet. Medium grained sand. Strong hydrocarbon odor.		
	4						
	6						Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	8						
	10						Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-6

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-7

Sheet 1 of 1

Date(s) Drilled	**11/11/2016 - 11/18/2016**	Logged By	**D. Lewis**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured		Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Bentonite**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				Asphalt pavement.		
					SAND and GRAVEL Grey.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
	2				**SAND with SILT and GRAVEL** Brown. Fine grained sand.		
					SAND with GRAVEL Grey.		
	4						
	6						Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	8						
	10				**SAND** Black, wet. Medium grained sand. Hydrocarbon odor.		Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-7

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-8

Sheet 1 of 1

Date(s) Drilled	**11/11/2016 - 11/22/2016**	Logged By	**D. Lewis and L. Brown**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured	**6 feet bgs, 11/22/2016**	Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Monitoring Well Installed**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				Asphalt pavement.		
					SAND and GRAVEL Brown.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
	2				Grades to dark brown.		
	4						
					SAND Black, moist to wet. Fine to medium grained sand. Trace fines. Hydrocarbon odor, slight sheen.		
	6				Grades to wet.		Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	8						
	10						Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-8

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-9

Sheet 1 of 1

Date(s) Drilled	**11/21/2016 - 11/22/2016**	Logged By	**L. Brown**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured	**5 feet bgs, 11/22/2016**	Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Monitoring Well Installed**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				Asphalt pavement.		
					GRAVEL Grey, moist. Cobble and sand. Fine to coarse gravel.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
	2						
					SILT and CLAY Grey, moist. Some Gravel. Strong hydrocarbon odor.		
	4				**SAND** Grey to black, moist. Fine to medium grained sand. Trace fines. Moderate to strong hydrocarbon odor.		
					Grades to black, wet. Hydrocarbon odor, slight sheen.		
	6						Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	8						
	10						Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-9

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-10

Sheet 1 of 1

Date(s) Drilled	**11/11/2016 - 11/18/2016**	Logged By	**D. Lewis**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured		Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Bentonite**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				Asphalt pavement.		
					SAND and GRAVEL Grey.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
	2				Grades to light brown.		
					Grades to dark brown.		
	4						
					SAND Black, wet. Medium grained sand. Strong hydrocarbon odor.		
	6						Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	8						
	10						Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-10

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-11

Sheet 1 of 1

Date(s) Drilled	**11/11/2016 - 11/18/2016**	Logged By	**D. Lewis**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured		Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Bentonite**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				Asphalt pavement.		
					SAND with GRAVEL Brown.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
	2						
	4						
	6						Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	8						
	10				**SAND** Black, wet. Medium grained sand. Strong hydrocarbon odor.		Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-11

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-12

Sheet 1 of 1

Date(s) Drilled	**11/18/2016 - 11/23/2016**	Logged By	**D. Lewis and L. Brown**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured	**5 feet bgs, 11/23/2016**	Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Monitoring Well Installed**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				Asphalt pavement.		
					SAND with GRAVEL Coarse grained sand.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
	2						
	4						
					SAND Dark grey, moist to wet. Fine to medium grained sand. Trace fines. Hydrocarbon odor and sheen.		
	6						Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	8						
	10						Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-12

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-13

Sheet 1 of 1

Date(s) Drilled	**11/18/2016 - 11/23/2016**	Logged By	**D. Lewis and L. Brown**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured	**5 feet bgs, 11/23/2016**	Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Monitoring Well Installed**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				Asphalt pavement.		
					SAND and SILT with GRAVEL Brown.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
	2						
					Grades to fine sand with gravel.		
	4						
					SAND Dark grey, moist to wet. Fine to medium grained sand. Trace fines. Hydrocarbon odor, slight sheen.		
	6						Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	8						
	10						Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-13

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-14

Sheet 1 of 1

Date(s) Drilled	**11/18/2016 - 11/22/2016**	Logged By	**L. Brown**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured	**6 feet bgs, 11/22/2016**	Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Monitoring Well Installed**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				Asphalt pavement.		
					SANDY GRAVEL with some SILT Black. Fine to coarse grained sand and gravel.		Flush-mount protective casing - 0 to 1 foot bgs.
	2				**SAND** Black, moist. Fine to medium grained sand. Some gravel and trace fines. Increasing hydrocarbon odor with depth.		Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
					Construct debris at 3 feet below ground surface.		
	4						
					Grades to wet. Trace fines. Hydrocarbon odor.		
	6						Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	8						
	10						Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-14

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-15

Sheet 1 of 1

Date(s) Drilled	**11/21/2016 - 11/22/2016**	Logged By	**L. Brown**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured	**6 feet bgs, 11/22/2016**	Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Monitoring Well Installed**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				Asphalt pavement.		
					GRAVEL Grey, moist. Fine to coarse, subangular to angular. Some sand and silt.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
	2				Grades to sand with gravel. Fine to medium grained sand. Trace hydrocarbon odor. Perched water at 2.5 feet bgs to 3 feet bgs.		
					SILT and CLAY Brown to grey, moist to wet. Some gravel. Hydrocarbon odor.		
	4				**SAND** Dark grey to black, moist. Fine to medium grained sand. Trace fines and gravel. Strong hydrocarbon odor.		
	6				Grades to wet. Slight sheen.		Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	8						
	10						Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-15

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-16

Sheet 1 of 1

Date(s) Drilled	**11/21/2016 - 11/22/2016**	Logged By	**L. Brown**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured	**6 feet bgs, 11/22/2016**	Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Bentonite**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				Asphalt pavement.		
					GRAVEL Grey, moist. Fine to coarse, subrounded to angular. Sand and some fines.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
	2				Slight hydrocarbon odor.		
					SILT and CLAY Brown to grey, moist. Hydrocarbon odor.		
	4				**SAND** Dark grey to black, moist. Fine to medium grained sand. Trace fines. Strong hydrocarbon odor.		
	6				Grades to wet. Hydrocarbon odor, slight sheen.		Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	8						
	10						Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-16

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-17

Sheet 1 of 1

Date(s) Drilled	**11/21/2016 - 11/22/2016**	Logged By	**L. Brown**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured	**6 feet bgs, 11/22/2016**	Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Monitoring Well Installed**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				Asphalt pavement.		
					GRAVEL Grey, moist. Sand and trace fines. Hydrocarbon odor.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
	2						
					SILT and CLAY Brown to grey, moist. Trace gravel. Hydrocarbon odor.		
	4				**SAND** Dark grey to black, moist. Fine to medium grained sand. Trace fines. Strong hydrocarbon odor.		
	6				Grades to wet. Strong hydrocarbon odor, slight sheen.		Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	8						
	10						Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-18

Sheet 1 of 1

Date(s) Drilled	**11/21/2016 - 11/23/2016**	Logged By	**L. Brown**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured	**6 feet bgs, 11/23/2016**	Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Monitoring Well Installed**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				Asphalt pavement.		
					GRAVELLY SAND Grey to black, moist. Fine to coarse, subrounded to angular gravel. Fine to coarse grained sand. Hydrocarbon odor.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
	2						
					SILT and CLAY Grey, moist. Hydrocarbon odor.		
					SAND Dark grey to black, moist. Fine to medium grained sand. Trace fines. Strong hydrocarbon odor.		
	4						
					Grades to wet. Hydrocarbon odor, slight sheen.		Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	6						
	8						
	10						Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-18

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-19

Sheet 1 of 1

Date(s) Drilled	**11/21/2016 - 11/23/2016**	Logged By	**L. Brown**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured	**6 feet bgs, 11/23/2016**	Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Monitoring Well Installed**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				Asphalt pavement.		
					GRAVEL Grey, moist. Sand, some fines and cobbles. Slight hydrocarbon odor.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
	2						
					SAND Dark grey to black, moist. Fine to medium grained sand. Trace fines. Strong hydrocarbon odor.		
	4						
					Grades to wet. Strong hydrocarbon odor, slight to moderate sheen.		Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	6						
	8						
					Moderate hydrocarbon odor.		Bentonite Chip Seal - 10 to 12 feet bgs.
	10						
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-19

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-20

Sheet 1 of 1

Date(s) Drilled	**11/21/2016 - 11/23/2016**	Logged By	**L. Brown**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured	**6 feet bgs, 11/23/2016**	Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Monitoring Well Installed**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				**GRAVEL** 3/4", washed.		
					SILTY SAND Brown, moist. Fine to medium grained sand. Gravel.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
	2						
					SAND Black, moist to wet. Fine to medium grained. Trace fines and occasional medium gravel. Strong hydrocarbon odor, sheen.		
	4						
	6						Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	8						
	10						Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-20

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-21

Sheet 1 of 1

Date(s) Drilled	**11/9/2016 - 11/10/2016**	Logged By	**L. Brown**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured	**6 feet bgs, 11/10/2016**	Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Monitoring Well Installed**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				**GRAVEL** 3/4", washed.		
					SILTY SAND Brown. Fine grained sand. Trace gravel.		Flush-mount protective casing - 0 to 1 foot bgs.
	2				**SAND** Dark grey to black, moist to wet. Fine to medium grained sand. Trace fines.		Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
	4				Slight to strong hydrocarbon odor. Decreasing odor with depth.		
	6						Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	8						
	10				Lens of dark grey to black silt with wood fragments.		Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-21

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-22

Sheet 1 of 1

Date(s) Drilled	**11/14/2016 - 11/15/2016**	Logged By	**L. Brown**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured	**6 feet bgs, 11/15/2016**	Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Monitoring Well Installed**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				**GRAVEL** Fine to coarse, subrounded gravel.		
					SAND Black, moist to wet, loose. Fine to medium grained sand. Trace fines.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
	2				Perched water at 2 feet bgs to 2.5 feet bgs.		
	4						
					SAND Dark grey to black, wet. Trace fines. Strong hydrocarbon odor, slight to moderate sheen.		
	6				Grades to wet.		Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	8						
	10						Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-22

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-23

Sheet 1 of 1

Date(s) Drilled	**11/14/2016 - 11/15/2016**	Logged By	**L. Brown**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured	**6 feet bgs, 11/15/2016**	Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Bentonite**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				**GRAVEL** Fine to coarse, washed, subrounded gravel.		
					SAND Black, moist to wet, loose. Fine to medium grained sand. Trace fines. Moderate hydrocarbon odor.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
	2						
	4						
	6				Grades to wet.		Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	8						
	10						Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-23

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-24

Sheet 1 of 1

Date(s) Drilled	**11/14/2016 - 11/15/2016**	Logged By	**L. Brown**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured	**6 feet bgs, 11/15/2016**	Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Monitoring Well Installed**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				**GRAVEL** Fine to coarse, washed, subrounded gravel.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
					SAND Black, moist to wet, loose. Fine to medium grained sand. Trace fines. Moderate hydrocarbon odor.		
	2				1.5-inch diameter branch.		
	4						
	6				Grades to wet.		Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	8						
	10						Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-24

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-25

Sheet 1 of 1

Date(s) Drilled	**11/14/2016 - 11/16/2016**	Logged By	**L. Brown**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured	**6 feet bgs, 11/16/2016**	Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Monitoring Well Installed**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				**GRAVEL** Fine to coarse, washed, subrounded gravel.		
					GRAVELLY SAND Dark grey, moist. Fine to coarse grained sand. Fine to coarse gravel. Trace fines and roots.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
	2				**SAND** Black, moist. Fine to medium grained sand. Trace fines and occasional fine to coarse gravel.		
					Grades to fine to medium grained sand.		
	4				Grades to strong hydrocarbon odor, slight sheen.		
	6				Grades to wet.		Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	8						
	10						Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-25

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-26

Sheet 1 of 1

Date(s) Drilled	**11/15/2016 - 11/16/2016**	Logged By	**L. Brown**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured	**7 feet bgs, 11/16/2016**	Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Monitoring Well Installed**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				**CRUSHED ROCK** Grey, moist. 3/4".		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
	2				**GRAVEL** Grey, moist. Fine to coarse, subrounded gravel. Perched water at 1.5 feet bgs to 2 feet bgs. **SAND** Dark grey to black, moist. Fine to medium grained sand. Trace fines. Strong hydrocarbon odor.		
	4				Grades to black, wet. Slight sheen.		
	6						Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	8						
	10						Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
	15				Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-26

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-27

Sheet 1 of 1

Date(s) Drilled	**11/15/2016 - 11/16/2016**	Logged By	**L. Brown**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured	**7 feet bgs, 11/16/2016**	Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Monitoring Well Installed**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				**GRAVEL** Fine to coarse, subrounded gravel.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
					SAND and GRAVEL Grey, moist to wet. Fine to coarse grained sand. Fine to coarse, subrounded to angular gravel.		
	2				**SAND** Dark grey to black, moist to wet. Fine to medium grained. Trace fines. Slight hydrocarbon odor.		
	4						
	6						Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	8						
	10				Grades to wet. Moderate to strong hydrocarbon odor, slight sheen.		Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-27

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-28

Sheet 1 of 1

Date(s) Drilled	**11/15/2016 - 11/16/2016**	Logged By	**L. Brown**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured	**6 feet bgs, 11/16/2016**	Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Monitoring Well Installed**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				**GRAVEL** Fine to coarse, subrounded gravel.		
					SAND with SILT Brown, moist. Fine to medium grained sand. Trace roots.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
	2				**SAND** Dark grey to black, moist.		
	4						
	6				Grades to wet. Strong hydrocarbon odor, slight sheen.		Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	8						
	10						Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-28

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-29

Sheet 1 of 1

Date(s) Drilled	**11/8/2016 - 11/9/2016**	Logged By	**L. Brown**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured	**7 feet bgs, 11/9/2016**	Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Monitoring Well Installed**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				**GRAVEL** Fine to coarse, subrounded gravel.		
					SAND and GRAVEL Brown to dark grey to black, moist. Fine to medium grained sand. Trace fines.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
	2				**SAND** Dark grey to black. Fine to medium grained sand. Trace fines. Strong hydrocarbon odor, slight to moderate sheen. Perched water at 2.5 feet bgs to 3 feet bgs.		
	4						
	6				Grades to wet.		Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	8						
	10						Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-29

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-30

Sheet 1 of 1

Date(s) Drilled	**11/14/2016 - 11/16/2016**	Logged By	**L. Brown**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured	**7 feet bgs, 11/16/2016**	Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Monitoring Well Installed**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				**GRAVEL** Fine to coarse, subrounded gravel.		
					SANDY-SILTY GRAVEL Brown to dark grey, moist, well-consolidated. Fine to coarse, subangular to subrounded gravel. Fine to coarse grained sand.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
	2						
	4				**SAND** Black to dark grey, moist to wet. Fine to medium grained sand. Trace fines.		
					Strong hydrocarbon odor, slight sheen.		
	6						Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
					Grades to wet.		
	8						
	10						Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-30

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-31

Sheet 1 of 1

Date(s) Drilled	**11/15/2016 - 11/15/2016**	Logged By	**L. Brown**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured	**5 feet bgs, 11/15/2016**	Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Monitoring Well Installed**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				**GRAVEL** Fine to coarse, subrounded gravel.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
					SAND Dark grey to black, moist to wet. Fine to medium grained sand. Trace fines.		
	2				Perched water at 1.5 feet bgs to 2 feet bgs.		
	4				Grades to wet. Moderate hydrocarbon odor.		
	6						Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	8						
	10						Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-31

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-32

Sheet 1 of 1

Date(s) Drilled	**11/15/2016 - 11/15/2016**	Logged By	**L. Brown**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured	**6 feet bgs, 11/15/2016**	Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Monitoring Well Installed**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				**GRAVELLY SAND** Brown, moist. Some fines.		
					SAND Dark grey to black, moist to wet. Fine to medium grained sand. Trace fines.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
	2				Perched water at 1.5 feet bgs to 2 feet bgs.		
	4						
	6				Grades to wet. Strong hydrocarbon odor, slight sheen.		Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	8						
	10						Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-32

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-33

Sheet 1 of 1

Date(s) Drilled	**11/9/2016 - 11/10/2016**	Logged By	**L. Brown**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured	**6 feet bgs, 11/10/2016**	Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Monitoring Well Installed**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				**GRAVEL** 3/4", washed.		
					GRAVELLY SAND with SILT Moist. Fine grained sand.		Flush-mount protective casing - 0 to 1 foot bgs.
	2				**SAND** Dark grey to black, wet. Fine grained sand. Trace fines. Strong hydrocarbon odor to 15 feet bgs.		Boring air knifed from 0 to 5 feet bgs.
					Grades to wet.		Cement grout - 1 to 10 feet bgs.
	4						
	6						Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	8						
	10						Bentonite Chip Seal - 10 to 12 feet bgs.
					SILT Black, wet. Trace fine grained sand. Wood fibers and roots at 11 feet bgs to 12 feet bgs.		
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-33

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-34

Sheet 1 of 1

Date(s) Drilled	**11/8/2016 - 11/10/2016**	Logged By	**L. Brown**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured	**7 feet bgs, 11/10/2016**	Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Monitoring Well Installed**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				**GRAVEL** 3/4", washed.		
					SAND Brown, moist. Fine grained sand.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
	2				Grades to black.		
	4				Grades to wet.		
	6						Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	8						
	10						Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-34

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-35

Sheet 1 of 1

Date(s) Drilled	**11/9/2016 - 11/10/2016**	Logged By	**L. Brown**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured	**7 feet bgs, 11/10/2016**	Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Monitoring Well Installed**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				**GRAVEL** Grey. 3/4", washed.		
					GRAVEL and SAND Brown, damp. Fine to coarse, subrounded gravel. Dark grey, damp. Fine to medium grained sand.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
					SAND Dark grey to black, moist. Strong hydrocarbon odor.		
	2				Perched water at 2 feet bgs to 2.5 feet bgs.		
	4						
	6						Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
					Grades to wet.		
	8						
	10						Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-35

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-36

Sheet 1 of 1

Date(s) Drilled	**11/8/2016 - 11/9/2016**	Logged By	**L. Brown**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured	**7 feet bgs, 11/9/2016**	Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Monitoring Well Installed**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				**GRAVEL** 3/4", washed.		
					SILTY SAND Brown to dark grey. Intermediate. Some gravel and fine sand.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
	2				**SAND** Dark grey to black. Trace to no fines. Strong hydrocarbon odor, sheen. Perched water at 2.3 feet bgs to 2.5 feet bgs.		
	4						
	6						Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
					Grades to wet.		
	8						
	10						Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-36

Project: Shell Seattle Harbor Island Terminal
Project Location: 2555 SW 13th Street, Seattle WA
Project Number:

Log of Boring/Well BSW-37

Sheet 1 of 1

Date(s) Drilled	**11/8/2016 - 11/9/2016**	Logged By	**L. Brown**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-inch diameter**	Total Depth of Borehole	**15.0 feet**
Drill Rig Type		Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**N/A**
Groundwater Level and Date Measured	**7 feet bgs, 11/9/2016**	Sampling Method(s)	**Grab**	Hammer Data	**N/A**
Borehole Backfill	**Bentonite**	Location	**See Figure**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Graphic Log	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0				**GRAVEL** 3/4", washed.		
					SILTY SAND with GRAVEL Brown, moist. Lenses of black medium sand.		Flush-mount protective casing - 0 to 1 foot bgs. Boring air knifed from 0 to 5 feet bgs. Cement grout - 1 to 10 feet bgs.
	2				**SAND** Black, moist.		
					Grades to wet. Perched water at 2.6 feet bgs.		
	4						
					SAND Dark grey to black, moist to wet. Trace to no fines. Strong hydrocarbon odor, sheen.		
	6						Well Casing, 10-inch Sch. 40 PVC - 10 to 12 feet bgs.
	8						
	10						Bentonite Chip Seal - 10 to 12 feet bgs.
	12						Filter Pack, 10/20 Silica Sand - 12 to 15 feet bgs.
	14						Screen Interval, 1-inch Sch. 40 PVC with 0.010-inch slots - 13 to 15 feet bgs.
					Boring terminated at 15 feet below ground surface.		
	16						
	18						
	20						

Report: PORT_ENV_PID_WELL; File: SHELL SEATTLE TERMINAL - NOV 2016.GPJ; 3/26/2018 BSW-37

Attachment D
Bio-Sparging System Installation Photograph Log

AECOM

Field Photographic Log

Client Name:	Project:	AECOM Project No.
Shell (Equilon)	Bio-Sparging System Installation Shell Harbor Island	60561813

Photo No.	Date:
1	11/16/2016

Direction Photo Taken:

Northeast

Description:

View of drilling BSW-28 using hollow stem auger methods within the Main Tank Farm.

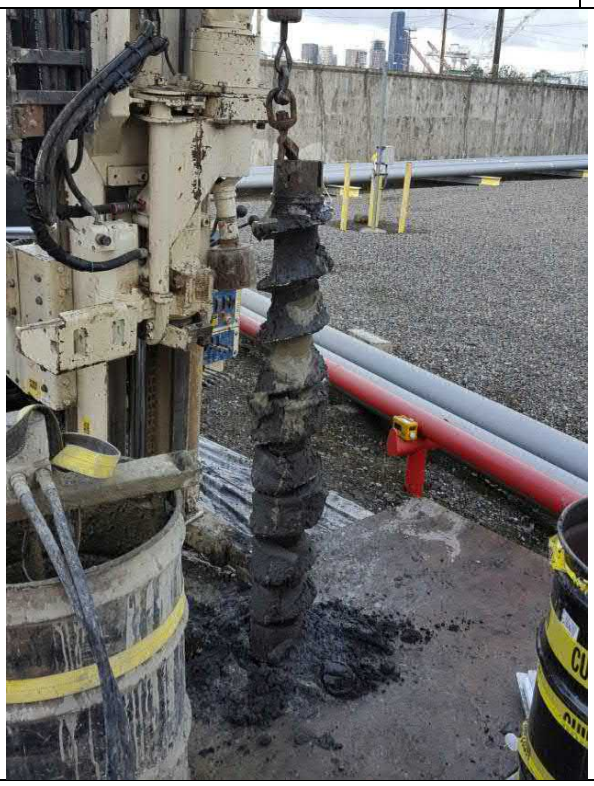


Photo No.	Date:
2	11/11/2016

Direction Photo Taken:

N/A

Description:

View of installing BSW-29 with ball valve and flush-mounted protective well monument within the Main Tank Farm.

AECOM

Field Photographic Log

Client Name:	Project:	AECOM Project No.
Shell (Equilon)	Bio-Sparging System Installation Shell Harbor Island	60561813

Photo No.	Date:
3	4/26/17

Direction Photo Taken:

Northeast

Description:

View of the installation of bio-sparging system manifold piping on the exterior west wall of the Main Tank Farm within the Manifold Area.

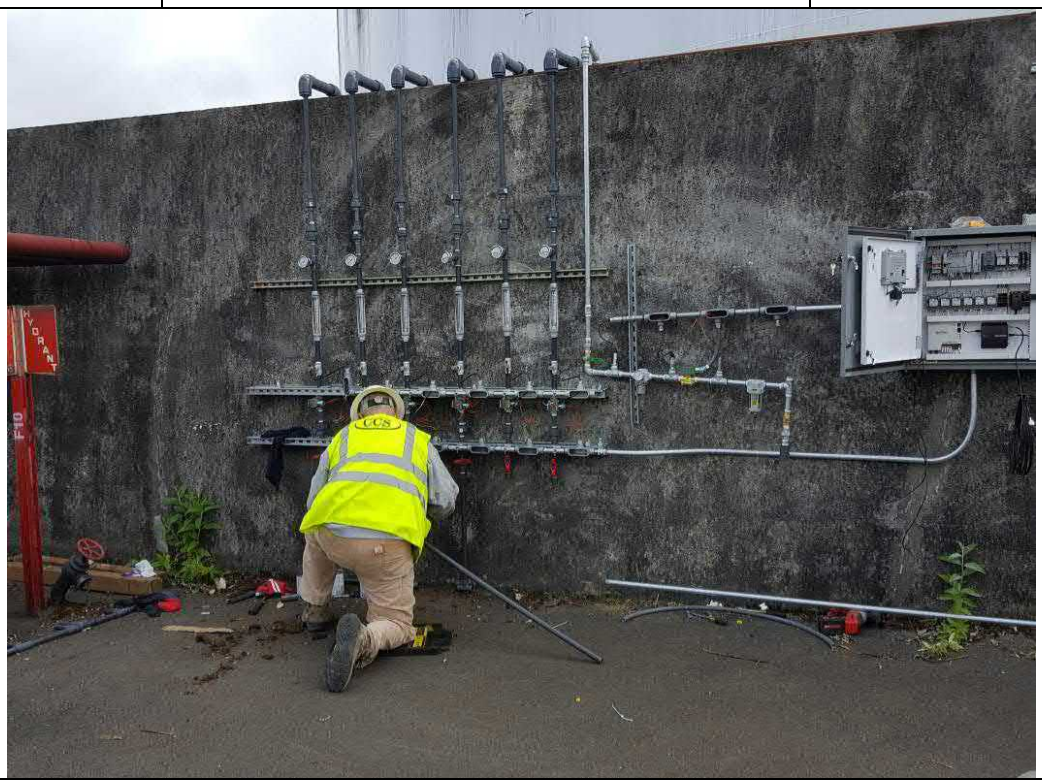


Photo No.	Date:
4	4/26/2017

Direction Photo Taken:

East

Description:

View of the installation of the Programmable Logic Controller for the bio-sparging system manifold components on the exterior west wall of the Main Tank Farm within the Manifold Area.

AECOM

Field Photographic Log

Client Name:	Project:	AECOM Project No.
Shell (Equilon)	Bio-Sparging System Installation Shell Harbor Island	60561813

Photo No.	Date:
5	5/15/17

Direction Photo Taken:

N/A

Description:

View of the completed bio-sparging system manifold on the exterior west wall of the Main Tank Farm within the Manifold Area.

Photo No.	Date:
6	5/15/2017

Direction Photo Taken:

East

Description:

View of the completed bio-sparging system manifold and Programmable Logic Controller junction box on the exterior west wall of the Main Tank Farm within the Manifold Area.

AECOM

Field Photographic Log

Client Name:	Project:	AECOM Project No.
Shell (Equilon)	Bio-Sparging System Installation Shell Harbor Island	60561813

Photo No.	Date:
7	4/17/2017

Direction Photo Taken:

West

Description:

View within the City parking lot.

The subcontractor is removing pieces of sawcut asphalt and concrete from the City walkway. This will become the trench to accommodate trunklines AS-1 and AS-2 of the bio-sparging system.

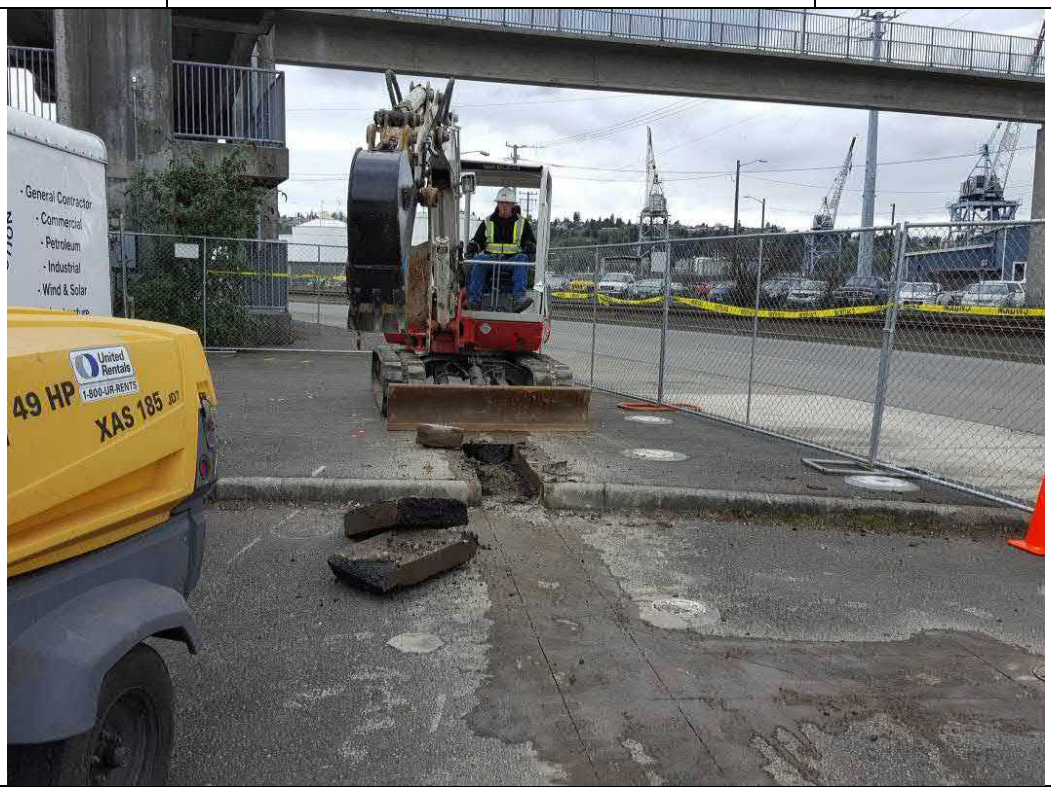


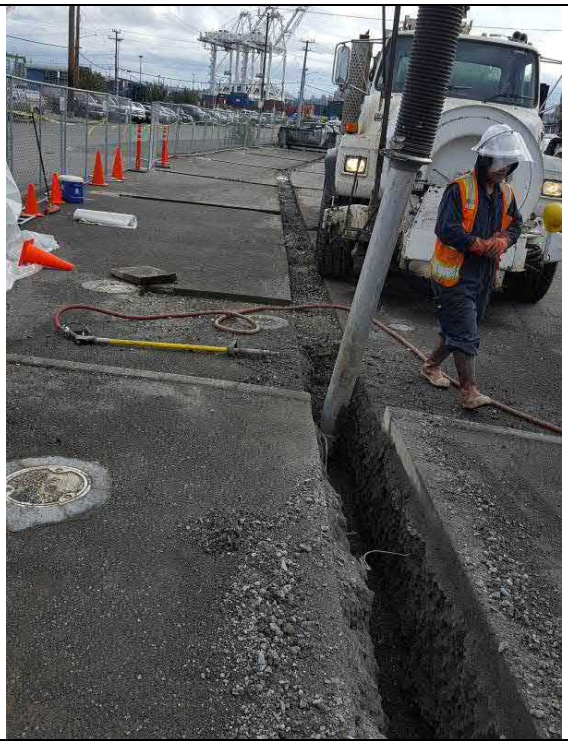
Photo No.	Date:
8	4/18/2017

Direction Photo Taken:

East

Description:

View within the City parking lot of the vacuum excavation process from BSW-12 to BSW-11.



AECOM

Field Photographic Log

Client Name:	Project:	AECOM Project No.
Shell (Equilon)	Bio-Sparging System Installation Shell Harbor Island	60561813

Photo No.	Date:
9	4/21/2017

Direction Photo Taken:

East

Description:

View of subcontractor laying down the PVC piping for trunklines AS-1 and AS-2 in the City parking lot.

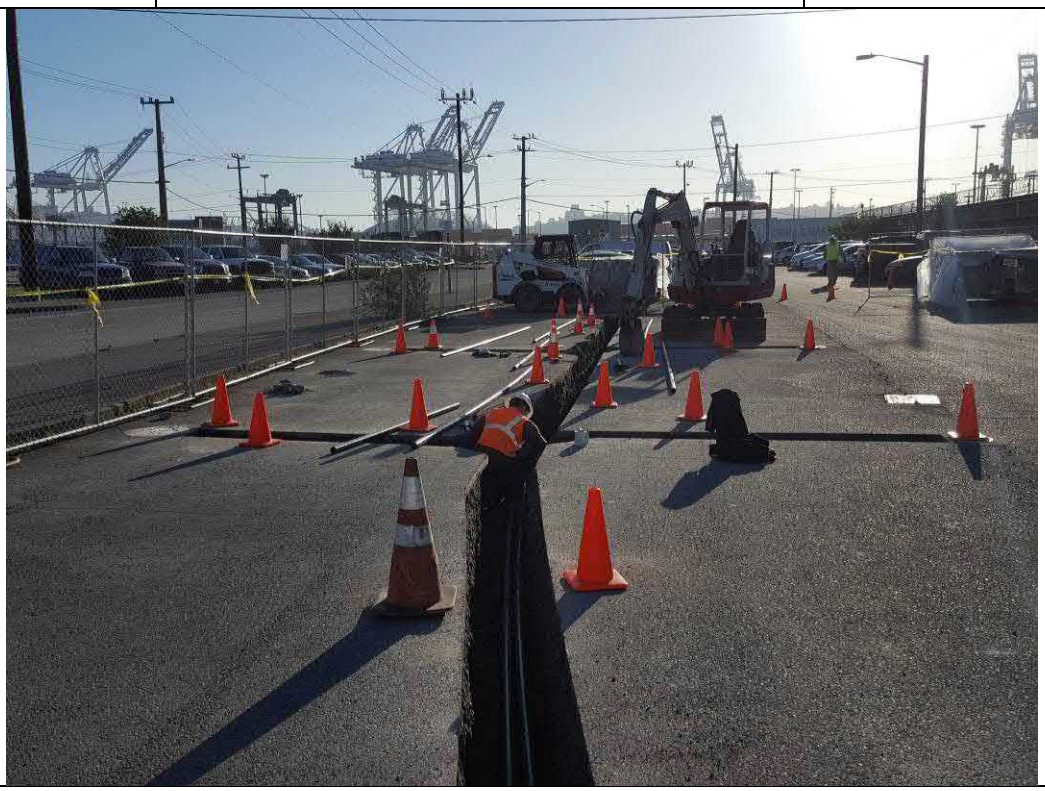


Photo No.	Date:
10	4/21/2017

Direction Photo Taken:

East

Description:

View within the City parking lot of trunklines AS-1 and AS-2 at the junction to BSW-6 and BSW-5, respectively.

AECOM

Field Photographic Log

Client Name:	Project:	AECOM Project No.
Shell (Equilon)	Bio-Sparging System Installation Shell Harbor Island	60561813

Photo No.	Date:
11	4/21/2017

Direction Photo Taken:

Southeast

Description:

In the foreground is a typical lateral connection from trunkline AS-3 to BSW-13 along the north exterior wall of the Main Tank Farm within the City parking lot.

Photo No.	Date:
12	4/21/2017

Direction Photo Taken:

N/A

Description:

View of lateral connection from trunkline AS-3 to BSW-17 along the north exterior wall of the Main Tank Farm in the City parking lot.

AECOM

Field Photographic Log

Client Name:	Project:	AECOM Project No.
Shell (Equilon)	Bio-Sparging System Installation Shell Harbor Island	60561813

Photo No.	Date:
13	5/10/2017

Direction Photo Taken:

Southeast

Description:

View of trunklines AS-4 through AS-6 and bio-sparging wells inside the north end of the Main Tank Farm.

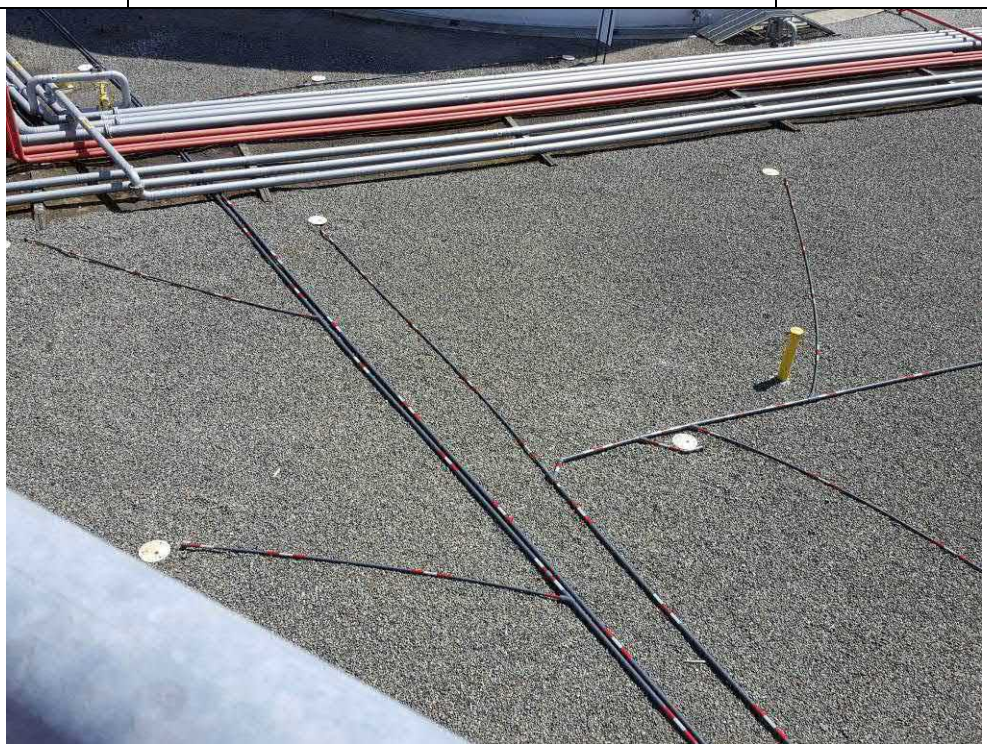


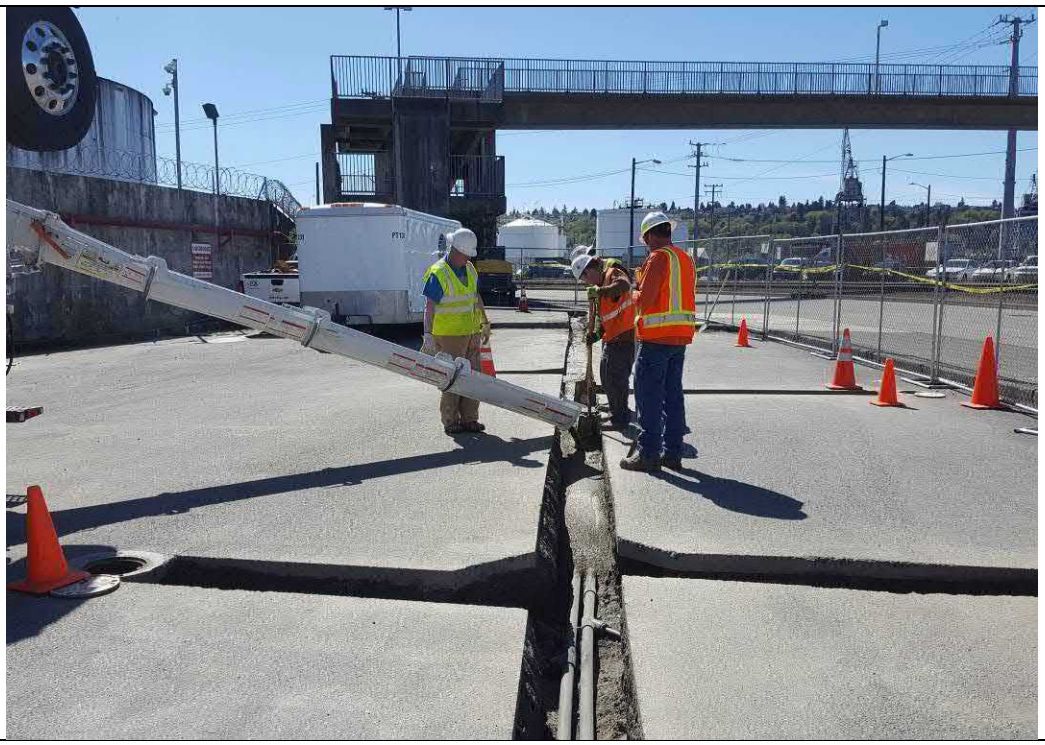
Photo No.	Date:
14	4/21/2017

Direction Photo Taken:

West

Description:

View of the bio-sparging system trenches being backfilled in with controlled density fill in the City parking lot.



AECOM

Field Photographic Log

Client Name:	Project:	AECOM Project No.
Shell (Equilon)	Bio-Sparging System Installation Shell Harbor Island	60561813

Photo No.	Date:
15	5/2/2017

Direction Photo Taken:

East

Description:

View of the asphalt resurfacing and patching of the bio-sparging system within the City parking lot.

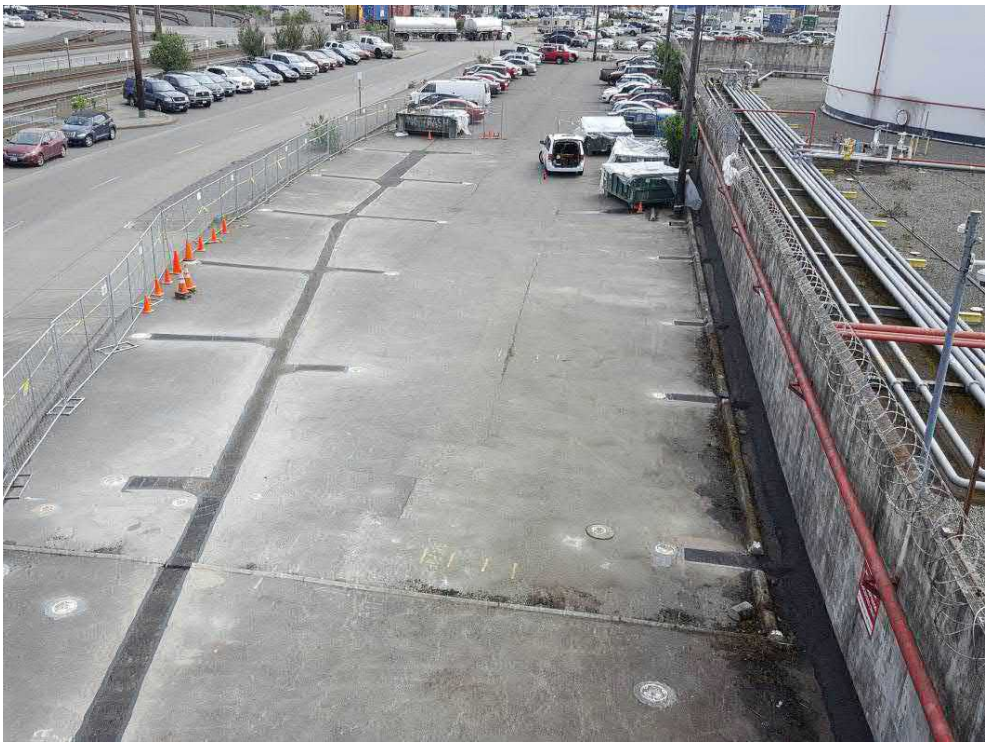


Photo No.	Date:
16	12/3/2017

Direction Photo Taken:

East

Description:

View of the completed asphalt rollover that covers daylighted trunklines AS-1 and AS-2. Photo taken of City walkway outside of the Main Tank Farm.

Attachment E
Operation and Maintenance Schedule

Attachment E
Bio-Sparging System Equipment List and Inspection Schedule
Shell Harbor Island Terminal
Seattle, Washington

System Component	Part Description	Location	Expected Reading	Inspection Frequency	Maintenance Inspections and Actions	Inspection Documentation
Sensaphone Monitoring System	Sensaphone Sentinel Monitoring System PN: SCD-1200	Manifold	NA	Monthly	Download all system data from the following website: www.sensaphone.net	Save downloaded sensaphone data files to the Project File and update graphs.
Air Compressor	Existing compressor at Seattle Terminal Atlas Copco, Oil-injected Rotary Screw Compressor, 15 hp PN: GX 7-11 EL	Manifold	NA	Monthly	Routine maintenance is conducted by Shell Terminal Maintenance Staff. Inquire monthly to determine if any mechanical downtime occurred during the month.	Record downtime on field form and save to project file.
Pressure Regulator	Pneumatic Plus 3/4" NPT, Air Regulator with 0-160 PSI Gauge PN: SAR4000M-N06BG	Manifold	4 - 7 PSI	Monthly	Visually inspect the pressure regulator for damage and verify proper operation.	Note any deficiencies on field form and save to project file.
			4 - 7 PSI	Semi-Annually	Inspect diaphram. Clean or replace if needed.	Note any deficiencies on field form and save to project file.
Pressure Transmitters (Pre Valve)	Dwyer Series 628 Pressure Transmitter, 0-200 psi, 4-20 ma output. PN: 628-12GH-P1-E1-S1	Manifold	Approximately 200 PSI	Monthly	Review transmitter data from sensaphone download to verify the outlet pressure is below 4 PSI.	Save downloaded sensaphone file to the Project File.
Pressure Transmitters (Post Valve)	Dwyer Series 628 Pressure Transmitter, 0-30 psi, 4-20 ma output. PN: 628-08GH-P1-E3-S1	Manifold	Approximately 5 PSI	Monthly		
Air Velocity Transmitter	Dwyer High Accuracy Series Air Velocity Transmitter, 1/2-inch NPT with LED Display, 4-20 ma output PN: 641-6	Manifold	2,000 to 3,000 CFM	Monthly	Visually inspect air velocity meter for damage and ensure that digital readout matches data logged via sensaphone.	Record approximate velocity reading on field form and save to project file.
Temperature Gauge	Grainger Analog Panel Mount Thermometer, 0 to 160 degrees F	Manifold	30 - 60 degrees F	Semi-Annually	Visually inspect to verify the thermometer is operating in accordance with the manufacturer's specifications.	Note any deficiencies on field form and save to project file. Record approximate temperature on field form and save to project file.
In-Line Air Filter	PneumaticPlus SAF Series Particulate Filter, 3/4" NPT with Bracket PN: SAF4000	Manifold	NA	Semi-Annually	Visually inspect filter and filter housing for damage. Replace particulate filter annually.	Note any deficiencies on field form and save to project file.
Manifold Piping	Schedule 80 PVC pipe, 3/4-inch	Manifold	NA	Monthly	Visually inspect to ensure that piping is not broken or damaged.	Note any deficiencies on field form and save to project file.
Pressure Relief Valve	pneumaticsPlus, Adjustable Relief Valve	Manifold	NA	Monthly	Actuate valve to ensure proper function.	Note any deficiencies on field form and save to project file.
Solenoid Valves	Redhat, Aluminum Body Solenoid Valve 3/4-inch NPT, Normally Closed, 4-20 ma output.	Bio-sparging lines	NA	Semi-Annually	Visually inspect each solenoid valve to verify the valve is operating in accordance to the manufacturer's specifications. Repair as needed.	Note any deficiencies on field form and save to project file.
Ball Valve	Nibco PVC Schedule 80 Ball Valve 3/4" True Union	Bio-sparging lines	NA	Monthly	Visually inspect ball valves for damage and manually cycle valves to ensure proper function.	Note any deficiencies on field form and save to project file.
Air Flow Meter/ Rotameter	Blue-White Industries, LTD. Variable Area Flow Meter, 3/4 inch, 4-38 LPM / 0-45 CFM PN: F410N	Bio-sparging lines	5 - 20 CFM	Monthly	Visually inspect flow meters on each line for damage and ensure that flow meters are functioning in accordance with the manufacturers specifications.	Note any deficiencies on field form and save to project file. Record flow readings on field form and save to project file.
Pressure Gauges	WIKA Low Pressure Gauge, Liquid-Filled, Stainless Steel 316L Wetted Parts, 4" Dial, 0-30" WC Range, +/-1.5% Accuracy, 1/2" Male NPT Connection, Bottom Mount PN: 9804315	Bio-sparging lines	4 - 7 PSI	Monthly	Visually inspect gauges for damage and ensure proper function.	Note any deficiencies on field form and save to project file. Record pressure readings from each line on field form and save to project file.
Check Valves	Plast-O-Matic, PVC Check Valve	Bio-sparging lines	NA	Monthly	Visually inspect for damage. Verify that valve opens/allows flow.	Note any deficiencies on field form and save to project file.
Flow Switches	Dwyer Flotect® Mini-Size Flow Switch PN: Series V10	Bio-sparging lines	NA	Monthly	Visually inspect for damage and verify coverings are in place to protect internals.	Note any deficiencies on field form and save to project file.
System Distribution Piping	Schedule 80 PVC pipe, variable sizes	Bio-sparging lines	NA	Monthly	Walk the length of the system piping and check for leaks. Repair as needed.	Note any deficiencies on field form and save to project file.
City Walkway Roll-Over Curb	Cold-Patch Asphalt	City walkway	NA	Monthly	Walk the length of the applied cold-patch at the roll-over curb and along the terminal wall. Record any deficiencies. Repair as needed.	Note any deficiencies on field form and save to project file.

Notes:
F = fahrenheit
hp = horsepower
LED = light-emitting diode
ma = milliamps
NA - not applicable
NPT = National Pipe Thread
PN = Product number
PSI = Pounds per square inch
PVC = polychlorinated vinyl chloride
SCFM = standard cubic feet per minute

Attachment F
Investigation-Derived Waste Disposal Manifests

print or type
Designed for use on elite (12-pitch) typewriter.)

NON-HAZARDOUS WASTE MANIFEST	1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number
	WAD001684688	1	888-423-0316	8517139-01

5. Generator's Name and Mailing Address: Shell Oil Harbor Is. Terminal, 20945 S Wilmington Ave, Carson, CA U.S.A.

Generator's Site Address (if different than mailing address): 2555 13th Ave SW, Seattle, WA 98134-1013 U.S.A.

Generator's Phone: 816-468-8824-19

6. Transporter 1 Company Name: Waste Management — U.S. EPA ID Number:

7. Transporter 2 Company Name — U.S. EPA ID Number:

8. Designated Facility Name and Site Address: Columbia Ridge Landfill, 18177 Cedar Springs Lane, Arlington, OR 97812 USA — U.S. EPA ID Number:

Facility's Phone: 541-454-2030

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
	1. Material Not Regulated By D.O.T. (Petroleum Impacted Soils)	1	CM		T	
	2.					
	3.					
	4.					

13. Special Handling Instructions and Additional Information

WM Approval# 124296OR — CCS Job/PO# 8517139 — Truck ID # 4752

Scale Ticket # — DOE Cleanup Site ID# 5051

14. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name — Signature — Month — Day — Year

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:

Transporter Signature (for exports only): Date leaving U.S.:

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name — Signature — Month — Day — Year

Transporter 2 Printed/Typed Name — Signature — Month — Day — Year

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator) — U.S. EPA ID Number

Facility's Phone:

17c. Signature of Alternate Facility (or Generator) — Month — Day — Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name — Signature — Month — Day — Year

GENERATOR'S/SHIPPER'S INITIAL COPY

Print or type.
Designed for use on elite (12-pitch) typewriter.

NON-HAZARDOUS WASTE MANIFEST	1. Generator ID Number WAD001684588	2. Page 1 of 1	3. Emergency Response Phone 888-423-6318	4. Waste Tracking Number 8517139-02

5. Generator's Name and Mailing Address: Shell Oil Harbor Is. Terminal, 20945 S.Wilmington Ave, Carson, CA U.S.A.
Generator's Phone: 815-468-8824-19
Generator's Site Address (if different than mailing address): 2555 13th Ave SW, Seattle, WA 98134-1013 U.S.A.

6. Transporter 1 Company Name: Waste Management — U.S. EPA ID Number:

7. Transporter 2 Company Name — U.S. EPA ID Number:

8. Designated Facility Name and Site Address: Columbia Ridge Landfill, 18177 Cedar Springs Lane, Arlington, OR 97812 USA — U.S. EPA ID Number:
Facility's Phone: 541-454-2030

GM	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
	1. Material Not Regulated By D.O.T. (Petroleum Impacted Soils)	1	CM		T	
	2.					
	3.					
	4.					

13. Special Handling Instructions and Additional Information
WM Approval# 1242960R CCG Job/PO# 8517139 Truck ID# 4111043
Scale Ticket # DOE Cleanup Site ID# 5051

14. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name — Signature — Month 5 Day 11 Year 17

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name — Signature — Month Day Year

Transporter 2 Printed/Typed Name — Signature — Month Day Year

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator) — U.S. EPA ID Number
Facility's Phone:

17c. Signature of Alternate Facility (or Generator) — Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name — Signature — Month Day Year

C Labels • Printed in the USA 1-800-997-6966

GENERATOR'S/SHIPPER'S INITIAL COPY

Reorder Part# MANIFEST-C6NHWC 913-097-6966

NON-HAZARDOUS WASTE MANIFEST	1. Generator ID Number WAD001684588	2. Page 1 of 1	3. Emergency Response Phone 888-423-6316	4. Waste Tracking Number 8517139-03

5. Generator's Name and Mailing Address: Shell Oil Harbor Is. Terminal, 20945 S.Wilmington Ave, Carson, CA U.S.A.
Generator's Phone: 815-468-8824-19
Generator's Site Address (if different than mailing address): 2555 13th Ave SW, Seattle, WA 98134-1013 U.S.A.

6. Transporter 1 Company Name: Waste Management — U.S. EPA ID Number:

7. Transporter 2 Company Name — U.S. EPA ID Number:

8. Designated Facility Name and Site Address: Columbia Ridge Landfill, 18177 Cedar Springs Lane, Arlington, OR 97812 USA — U.S. EPA ID Number:
Facility's Phone: 541-454-2030

HM	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
	1. Material Not Regulated By D.O.T. (Petroleum Impacted Soils)	1	CM		T	
	2.					
	3.					
	4.					

13. Special Handling Instructions and Additional Information
VM Approval# 124296OR
CCS Job/PO# 8517139
Truck ID # 41643
Scale Ticket #
DOE Cleanup Site ID# 5051

14. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name — Signature — Month Day Year

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name — Signature — Month Day Year

Transporter 2 Printed/Typed Name — Signature — Month Day Year

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator) — U.S. EPA ID Number:
Facility's Phone:

17c. Signature of Alternate Facility (or Generator) — Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name — Signature — Month Day Year

GENERATOR'S/SHIPPER'S INITIAL COPY

Print or type
Designed for use on elite (12-pitch typewriter)

NON-HAZARDOUS WASTE MANIFEST	1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number
	WAD001684688	1	858-423-6310	8517139-04

5. Generator's Name and Mailing Address
Shell Oil Harbor Is. Terminal
20945 S.Wilmington Ave
Carson, CA U.S.A.
Generator's Phone: 815-468-8824-19

Generator's Site Address (if different than mailing address)
2555 13th Ave SW
Seattle, WA 98134-1013 U.S.A.

6. Transporter 1 Company Name: Waste Management — U.S. EPA ID Number:

7. Transporter 2 Company Name — U.S. EPA ID Number:

8. Designated Facility Name and Site Address
Columbia Ridge Landfill
18177 Cedar Springs Lane
Arlington, OR 97812 USA
Facility's Phone: 541-454-2030

U.S. EPA ID Number:

HM	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
	1. Material Not Regulated By D.O.T. (Petroleum Impacted Soils)	1	CM		T	
	2.					
	3.					
	4.					

13. Special Handling Instructions and Additional Information
WM Approval# 1242980R
CCS Job/PO# 8517139
Truck ID #
Scale Ticket #
DOE Cleanup Site ID# 5051

14. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name | Signature | Month | Day | Year

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name | Signature | Month | Day | Year

Transporter 2 Printed/Typed Name | Signature | Month | Day | Year

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator) — U.S. EPA ID Number

Facility's Phone:

17c. Signature of Alternate Facility (or Generator) | Month | Day | Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name | Signature | Month | Day | Year

GENERATOR'S/SHIPPER'S INITIAL COPY

Total Ticket

Signature

WASTE MANAGEMENT

8th Ave Reload
7400 8th Ave S
Seattle, WA, 98108

Original
Ticket# 4087

Ph: 206-694-0600

Customer Name COWLITZ CLEAN SWEEP ETS COWLI
Ticket Date 05/05/2017
Payment Type Credit Account
Manual Ticket#
Route
Hauling Ticket#
Destination
PO# 124296ORD

Carrier SELF SELF
Vehicle# 414042
Container
Driver DONALD SWANSTROM
Check#
Billing# 0000058
Grid

Volume

	Time	Scale	Operator	Inbound		
In	05/05/2017 11:06:15	Scale 1	kfunk2		Gross	62100 lb
Out	05/05/2017 11:21:09	Scale 1	kfunk2		Tare	31920 lb
					Net	30180 lb
					Tons	15.09

Comments WM-KF MAN# 8517139-04

	Product	LDX	Qty	UOM	Rate	Tax	Amount	Origin
1	Daily Cover-PCS-Tons-Pet	100	15.09	Tons				KING
2	GOND TON-GONDOLA PER TON	100	15.09	Tons				KING

Don

203 WM

WASTE MANAGEMENT

Alaska Street
70 S Alaska Street
Seattle, WA, 98134 Ph: 206 763 5025

Original
Ticket# 135070

Customer Name COWLITZ CLEAN SWEEP COWLITZ C
Ticket Date 05/08/2017
Payment Type Credit Account
Manual Ticket#
Route AK
Hauling Ticket#
Destination
PO# 1242960R

Carrier SELF HAULER *
Vehicle# 412522
Container
Driver MIKE ORNDORFF
Check#
Billing# 0000003
Grid

Volume

	Time	Scale	Operator	Inbound
In	05/08/2017 13:11:21	SCALE 1	Imercer	
Out	05/08/2017 13:22:01	SCALE 1	Imercer	
		* Manual Weight		

Gross	81200 lb*
Tare	53380 lb*
Net	27820 lb
Tons	13.91

Comments WM - SF (8517139-01)

	Product	LD%	Qty	UOM	Rate	Tax	Amount	Origin
1	Daily Cover-PCS-Tons-Pet	100	13.91	Tons				KING
2	GONDOLA T-GONDOLA TON	100	13.91	Tons				

Driver's Signature

Total Tax
Total Ticket

WASTE MANAGEMENT

Alaska Street
70 S Alaska Street
Seattle, WA, 98134

Original
Ticket# 135132

Ph: 206 753 5025

Customer Name COWLITZ CLEAN SWEEP COWLITZ C
Ticket Date 05/11/2017
Payment Type Credit Account
Manual Ticket#
Route AK
Hauling Ticket#
Destination
PO# 1242960R

Carrier SELF HAULER *
Vehicle# 414043
Container
Driver PJ
Check#
Billing# 0000003
Grid

Volume

	Time	Scale	Operator	Inbound		
In	05/11/2017 09:10:47	SCALE 1	lmercer		Gross	56240 lb
Out	05/11/2017 09:20:35	SCALE 1	lmercer		Tare	32960 lb
					Net	23280 lb
					Tons	11.64

Comments WM - LM (8517139-02)

	Product	LD%	Qty	UOM	Rate	Tax	Amount	Origin
1	Daily Cover-PCS-Tons-Pet	100	11.64	Tons				KING
2	GONDOLA T-GONDOLA TON	100	11.64	Tons				KING

Total Tax
Total Ticket

Driver's Signature

203 WM

WASTE MANAGEMENT

Alaska Street
70 S Alaska Street
Seattle, WA, 98134

Original
Ticket# 135159

Ph: 206 763 5025

Customer Name COWLITZ CLEAN SWEEP COWLITZ C
Ticket Date 05/11/2017
Payment Type Credit Account
Manual Ticket#
Route AK
Hauling Ticket#
Destination
PO# 12425608

Carrier SELF HAULER *
Vehicle# 414043
Container
Driver PJ
Check#
Billing# 0000003
Grid

Volume

	Time	Scale	Operator	Inbound		
In	05/11/2017 11:38:25	SCALE 1	lwercer		Gross	45340 lb
Out	05/11/2017 11:49:13	SCALE 1	lwercer		Tare	31960 lb
					Net	13380 lb
					Tons	6.69

Comments WM - LM (8517139-03)

	Product	LDX	Qty	UOM	Rate	Tax	Amount	Origin
1	Daily Cover-PCS-Tons-Pet	100	6.69	Tons				KING
2	GONDOLA T-GONDOLA TON	100	6.69	Tons				KING

Total Tax
Total Ticket

Driver's Signature

203 WM

***24 HOUR EMERGENCY RESPONSE, CALL (877) 577-2669 ***

Stericycle®
Environmental Solutions

SHIPPING PAPER

Lading Manifest: 324491-16

DELIVERY DATE	JOB # 2573408
SHIPPER / CUSTOMER: EQUILON ENT LLC/DBA SHELL OIL TERMINAL	POINT OF CONTACT: Brian Coble
ADDRESS: 2555 13TH AVE SW	PHONE #: (513)942-4750
CITY, STATE, ZIP: SEATTLE WA 98134-0000	
CARRIER / TRANSPORTER: BURLINGTON ENVIRONMENTAL, LLC	PHONE #: (253)383-3044
CONSIGNEE / FACILITY: BURLINGTON ENVIRONMENTAL, LLC.	POINT OF CONTACT
ADDRESS: 20245 77th Avenue South	PHONE #: (253)872-8030
CITY, STATE, ZIP: KENT , WA 98032	

HM	US DOT Description *(Including Proper Shipping Name, Hazard Class, and ID Number)*	Containers No.	Containers Type	Total Quantity	UOM
A	MATERIAL NOT REGULATED BY DOT	2	DM	650	P
B E1461	MATERIAL NOT REGULATED BY DOT	31	DM	11,200	P
C					
D					

Special Handling Instruction and Additional Information:

a) 821111-00 - DECON WATER - WAT05 (5) b) 821112-00 - PETROLEUM CONTAMINATED SOIL - LF07 (6)

RWR #9524 RWR #9377

Placards Provided YES_____ NO_____ GHD Emergency Hotline: 866-812-9565

SHIPPER'S CERTIFICATION: "I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations." I also certify that all times listed above are true and correct.

		MONTH	DAY	YEAR
(SHIPPER) PRINT OR TYPE NAME: Larry Brown employed by AECOM on X behalf of Shell Oil Products US	SIGNATURE X	12	21	16
(CARRIER/TRANSPORTER) PRINT OR TYPE NAME: X Nathan Thompson	SIGNATURE X Nathan L. Thompson	12	21	16
(CONSIGNEE/FACILITY) PRINT OR TYPE NAME: X Cassandra Gallegos	SIGNATURE X	12	26	16

CONSIGNEE

'16 DEC 26 PM 7:24

***24 HOUR EMERGENCY RESPONSE, CALL (877) 577-2669 ***

Stericycle
Environmental Solutions

SHIPPING PAPER

Lading Manifest: 359837-17

DELIVERY DATE	JOB 2573408

SHIPPER / CUSTOMER EQUILON ENT LLC/DBA SHELL OIL TERMINAL	POINT OF CONTACT Brian Coble
ADDRESS 2555 13TH AVE SW	PHONE # (513)942-4750
CITY, STATE, ZIP SEATTLE WA 98134-0000	
CARRIER / TRANSPORTER BURLINGTON ENVIRONMENTAL, LLC	PHONE # (253)383-3044
CONSIGNEE / FACILITY BURLINGTON ENVIRONMENTAL, LLC.	POINT OF CONTACT
ADDRESS 20245 77th Avenue South	PHONE # (253)872-8030
CITY, STATE, ZIP KENT , WA 98032	

HM	US DOT Description *(Including Proper Shipping Name, Hazard Class, and ID Number)*	Containers No.	Containers Type	Total Quantity	UOM
A	MATERIAL NOT REGULATED BY DOT	1	CM	2,200	P
B	E2738				
C					
D					

Special Handling Instruction and Additional Information:

a) 821112-00 - PETROLEUM CONTAMINATED SOIL - LF07 LFB07 (7)
RWR 9377

Placards Provided YES_____ NO X GHD Hotline : 866-812-9565 9130 P

SHIPPER'S CERTIFICATION: "I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations." I also certify that all times listed above are true and correct.

		MONTH	DAY	YEAR
(SHIPPER) PRINT OR TYPE NAME X Harry Brown Employed by AECOM on Behalf of Shell Oil Products US	SIGNATURE X	01	23	17
(CARRIER/TRANSPORTER) PRINT OR TYPE NAME X NATHAN THOMPSON	SIGNATURE X Nathan L. Thompson	01	23	17
(CONSIGNEE/FACILITY) PRINT OR TYPE NAME X Cassandra Gallegos	SIGNATURE X CONSIGNEE	1	27	17

'17 JAN 27 AM 7:24

QUALITY CARRIERS

19929 77th Avenue S. Kent, WA 98032 253-872-8925

GROSS BY _____ DATE ____/____/_____

TARE BY _____ DATE ____/____/_____

G 42180 lb
T 0 lb
N 42180 lb HEAVY

- 27730 LIGHT

14,450

- 5320 BOX TARE

9,130 PRODUCT

CUSTOMER SHELL	B/L NO. 359837-17
DESTINATION KENT	DRIVER
CARRIER STERICYCLE	TRUCK NUMBER 9027
COMMODITY	~~TRAILER~~ BOX# NUMBER 4473
REMARKS Box# 4473	

Attachment G
Bio-Sparging System Survey

GRAPHIC SCALE
10 0 10 20 40
1 INCH = 20 FEET

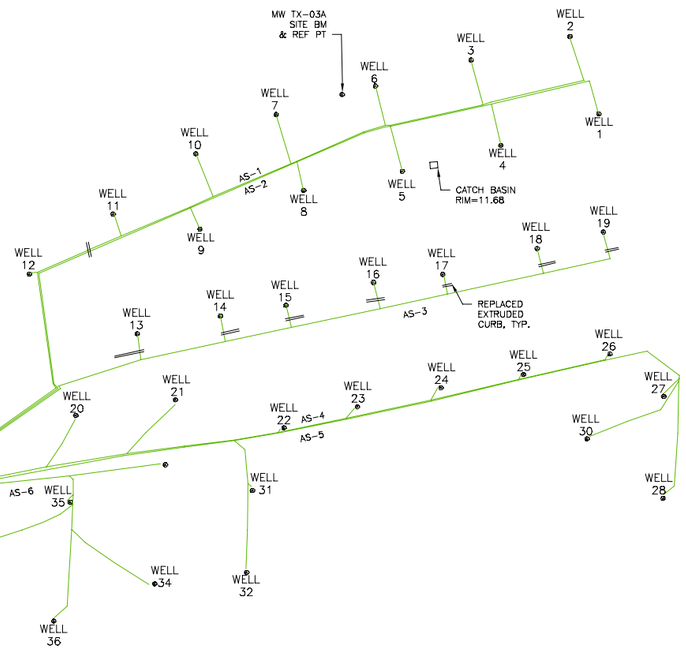
N13°23'35"E 1320.32'

N77°49'23"E 724.73'

FOUND MONUMENT IN CASE
AT 16TH AVE SW AND
SW FLORIDA ST

N1°06'29"E 949.83'

FOUND MONUMENT IN CASE
AT 13TH AVE SW AND
SW MASSACHUSETTS ST



VICINITY MAP
NTS

WELL TABLE

TRUNK LINE	WELL	LID ELEVATION (FEET)	PIPE ELEVATION (FEET)
AS-2	1	12.13	11.61
AS-1	2	12.23	11.72
AS-1	3	12.21	11.74
AS-2	4	11.86	11.65
AS-2	5	11.76	11.56
AS-1	6	12.21	11.78
AS-1	7	12.25	11.95
AS-2	8	11.99	11.55
AS-2	9	12.40	12.01
AS-1	10	12.36	12.15
AS-1	11	12.65	12.19
AS-1	12	13.39	13.09
AS-3	13	12.47	12.09
AS-3	14	12.32	12.03
AS-3	15	12.32	12.07
AS-3	16	12.23	12.04
AS-3	17	12.24	11.82
AS-3	18	12.45	12.06
AS-3	19	12.49	12.00
AS-4	20	12.96	12.50
AS-4	21	12.57	12.04
AS-4	22	11.86	11.45
AS-4	23	11.98	11.60
AS-4	24	11.89	11.54
AS-4	25	11.77	11.39
AS-4	26	12.52	12.12
AS-5	27	12.56	12.15
AS-5	28	12.74	12.37
AS-5	30	12.53	11.98
AS-5	31	12.54	12.11
AS-5	32	12.94	12.56
AS-6	33	12.84	12.31
AS-6	34	12.80	12.29
AS-6	35	12.65	12.15
AS-6	36	12.71	12.16
AS-6	37	12.45	11.68

SURVEY NOTES

1. INSTRUMENTATION FOR THIS SURVEY WAS A 3-SECOND LEICA VIVA TS15 SMART POLE TOTAL STATION/RTK GPS.
2. PROCEDURES USED IN THIS SURVEY MEET OR EXCEED STANDARDS SET BY WAC 332-130-090. SURVEY WAS COMPLETED BY A FIELD TRAVERSE.
3. THE INFORMATION ON THIS MAP REPRESENTS THE RESULTS OF A SURVEY MADE IN MAY 2017 AND CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITIONS EXISTING AT THAT TIME.
4. ALL MONUMENTS OTHER FEATURES WERE LOCATED DURING THIS SURVEY UNLESS OTHERWISE NOTED.
5. ALL SURVEYING WAS COMPLETED UNDER THE DIRECTION OF MARK X. PLOG, PE, PLS WASHINGTON STATE LICENSED LAND SURVEYOR LS31976.
6. WELL TX-03A WAS HELD FOR BOTH LOCATION AND ELEVATION USING A NORTHING OF 216716.636892, AN EASTING OF 1265260.25838 (NADB3) ND AN ELEVATION OF 12.26 (NAVD88).
7. THE COMPLETED SURVEY IS ACCURATE TO WITHIN 0.05 FEET OR GREATER HORIZONTALLY AND VERTICALLY.
8. ONLY ONE CONTROL POINT WAS SPECIFIED FOR THE PROJECT IN THE NOTES. THAT POINT WAS HELD FOR LOCATION AND PROVIDED CONTROL POINTS 040-024 AND 087-013 WERE USED FOR ROTATION.

MARK X. PLOG
STATE OF WASHINGTON
31976
REGISTERED
PROFESSIONAL LAND SURVEYOR

PLOG CONSULTING
Survey - Civil - Structural
5628 Airport Way S
Suite 144
Seattle, WA 98108
P (206) 420-7130
F (206) 457-4469
plogconsulting.com

CSS/PNE

BIO-SPARGING SYSTEM AS-BUILTS

SHELL HARBOR ISLAND

TX-03 AREA

PROJECT NO.:	REVISION DATE	REVISION NO.:	SHEET
087-16	05/30/2017	0	1 OF 1

	Location ID	Northing (NAD83)	Easting (NAD83)	Elevation (NAVD88)
1	PKS	216381.9283	1264958.052	12.353
2		216299.7129	1264954.213	12.372
3	PKS	216403.0049	1265185.662	14.469
4	X SCRIBED	216653.7904	1265259.318	11.647
5	PKS	216386.3139	1265076.616	15.368
7	PKS	217076.1637	1265620.775	13.868
8	PKS	216751.5857	1264910.349	13.106
9	MIC 13TH N MASS	217810.7772	1265612.822	11.502
10	PKWF DOWLCNTRL	216606.184	1265087.297	13.277
11	MIC 16TH N FLRDA	216708.0944	1264885.928	12.083
12	PKF	216812.1899	1264762.924	13.455
13	PKF	216812.4092	1264762.323	13.448
14	PKF	216809.3688	1264763.117	13.454
1000	AS-6	216511.7272	1265057.754	12.091
1001	AS-5	216512.6365	1265057.749	12.076
1002	AS-4	216513.6523	1265057.796	12.12
1003	AS-3	216514.6904	1265057.84	12.115
1004	AS-2	216515.7919	1265057.878	12.131
1005	AS-1	216516.638	1265057.896	12.116
1006	AS-2	216515.9346	1265058.295	12.183
1007	AS-3	216514.7121	1265058.642	12.153
1008	AS-4	216513.6639	1265058.943	12.205
1009	AS-5	216512.6225	1265059.142	12.197
1010	AS-6	216511.6906	1265059.31	12.227
1011	AS-6	216547.1548	1265060.712	12.252
1012	AS-5	216547.2005	1265060.356	12.261
1013	AS-4	216547.6894	1265060.154	12.263
1014	AS-3	216547.9675	1265059.966	12.267
1015	AS-2	216548.086	1265059.658	12.245
1016	AS-1	216548.2338	1265059.301	12.156
1017	AS-1	216584.1825	1265108.321	12.77
1018	AS-2	216583.9767	1265108.506	12.75
1019	AS-3	216583.78	1265108.644	12.738
1020	AS-4	216583.5543	1265108.803	12.737
1021	AS-5	216583.2693	1265108.969	12.748
1022	AS-6	216583.0009	1265109.121	12.733
1023	AS-6	216611.007	1265147.699	13.13
1024	AS-5	216611.2275	1265147.243	13.141
1025	AS-4	216611.5179	1265147.242	13.146
1026	AS-3	216611.884	1265146.968	13.152
1027	AS-2	216612.0417	1265146.85	13.189
1028	AS-1	216612.1636	1265146.705	13.21
1029	AS-1	216639.3739	1265184.939	13.245
1030	AS-2	216639.1451	1265185.509	13.398
1031	AS-3	216639.2	1265186.09	13.374
1032	AS-3	216639.8805	1265185.646	12.225

	Location ID	Northing (NAD83)	Easting (NAD83)	Elevation (NAVD88)
1033	AS-2	216639.5785	1265185.275	12.326
1034	AS-6	216613.8159	1265166.977	12.856
1035	AS-6	216615.1891	1265189.451	12.627
1036	AS-6 TO 33	216616.1456	1265188.392	12.668
1037	LINE TO 33 END	216619.2903	1265212.526	12.636
1038	WELL 33	216619.1412	1265214.091	12.307
1039	WELL CASE 33	216619.6341	1265213.761	12.841
1040	AS-6 TO 35	216611.1815	1265189.457	12.573
1041	LINE TO 35	216609.7196	1265188.005	12.607
1042	LINE TO 35 END	216608.784	1265187.996	12.593
1043	WELL 35	216609.3287	1265189.088	12.148
1044	WELL CASE 35	216609.723	1265188.748	12.65
1045	WELL CASE 37	216597.3673	1265161.16	12.45
1046	WELL 37	216596.8527	1265161.204	11.678
1047	LINE TO 37 END	216597.5122	1265162.367	12.411
1048	LINE TO 37	216601.9435	1265176.035	12.609
1049	LINE TO 37	216603.8889	1265181.475	12.648
1050	LINE TO 37	216606.0407	1265186.01	12.601
1051	A-6 TO 37	216608.5044	1265189.397	12.696
1052	A-6 TO 34	216601.9461	1265189.078	12.765
1053	LINE TO 34	216598.5113	1265192.746	12.71
1054	LINE TO 34	216593.1616	1265200.419	12.754
1055	LINE TO 34 END	216587.5236	1265209.549	12.712
1056	WELL CASE 34	216588.2315	1265210.961	12.803
1057	WELL 34	216587.8098	1265211.138	12.291
1058	WELL 36	216577.6469	1265184.377	12.158
1059	WELL CASE 36	216578.3694	1265184.342	12.707
1060	LINE TO 36 END	216578.7095	1265184.39	12.62
1061	A-6 LINE TO 36	216581.7926	1265187.825	12.746
1062	A-4 LINE TO 20	216618.4897	1265182.44	12.658
1063	LINE TO 20	216624.6866	1265186.575	12.616
1064	LINE TO 20 END	216631.0967	1265190.024	12.859
1065	WELL CASE 20	216632.6246	1265190.126	12.962
1066	WELL 20	216632.5468	1265190.227	12.504
1067	WELL 21	216636.6412	1265216.557	12.043
1068	WELL CASE 21	216636.8136	1265216.424	12.572
1069	LINE TO 21 END	216634.9512	1265216.474	12.56
1070	LINE TO 21	216627.6724	1265208.668	12.604
1071	A-4 LINE TO 21	216621.9746	1265203.665	12.635
1072	A-5	216621.4319	1265202.659	12.603
1073	A-5	216623.6848	1265218.835	12.471
1074	A-4	216624.0139	1265218.84	12.447
1075	A-4	216625.6702	1265231.973	12.061
1076	A-5 LINETO 31 32	216625.4126	1265231.98	12.063
1077	LINE TO 31 32	216623.1103	1265234.87	12.087
1078	LINE TO 31 32	216614.1871	1265235.63	12.375

	Location ID	Northing (NAD83)	Easting (NAD83)	Elevation (NAVD88)
1079	LINE TO 31 END	216613.3988	1265236.498	12.388
1080	LINE TO 32 END	216591.5856	1265235.113	12.844
1081	LINE TO 32	216601.8989	1265235.498	12.538
1082	WELL CASE 32	216591.2318	1265235.251	12.943
1083	WELL CASE 31	216612.8456	1265236.769	12.541
1084	WELL 31	216612.1517	1265236.834	12.109
1085	WELL 32	216590.5512	1265235.205	12.557
1086	A-5	216627.4396	1265243.669	11.949
1087	A-5	216631.0683	1265261.554	11.984
1088	A-5	216635.941	1265283.971	11.866
1089	A-5	216641.4209	1265307.128	11.735
1090	A-5	216646.6613	1265329.925	12.286
1091	A-5	216649.1076	1265340.996	12.419
1092	A-5	216642.6791	1265349.433	12.432
1093	A-4 LINE TO 22	216627.6747	1265243.607	11.931
1094	LINE TO 22 END	216628.5517	1265244.185	11.895
1095	WELL CASE 22	216629.4093	1265245.072	11.857
1096	WELL 22	216628.7844	1265245.463	11.45
1097	WELL 23	216634.4076	1265264.756	11.595
1098	WELL CASE 23	216634.9204	1265264.452	11.977
1099	LINE TO 23 END	216633.997	1265263.774	11.793
1100	A-4 LINE TO 23	216631.3064	1265261.495	11.987
1101	A-4 LINE TO 24	216636.1785	1265283.923	11.877
1102	A-4 LINE TO 25	216641.6694	1265307.06	11.756
1103	A-4 LINE TO 26	216646.8594	1265329.842	12.338
1104	LINE TO 24 END	216639.4228	1265285.708	11.715
1105	LINE TO 25 END	216642.7332	1265307.668	11.71
1106	LINE TO 26 END	216648.0478	1265330.568	12.314
1107	WELL CASE 24	216639.9821	1265286.574	11.892
1108	WELL CASE 25	216643.4906	1265308.32	11.765
1109	WELL CASE 26	216648.87	1265331.14	12.516
1110	WELL 24	216639.5325	1265286.833	11.542
1111	WELL 25	216642.9837	1265308.671	11.387
1112	WELL 26	216648.5288	1265331.523	12.121
1113	A-5 LINE TO 27	216641.9356	1265349.512	12.61
1114	A-5 LINE TO 30	216641.2305	1265349.347	12.617
1115	LINE TO 27 END	216637.9985	1265345.477	12.559
1116	LINE TO 28 END	216611.1495	1265345.386	12.677
1117	LINE TO 30 END	216626.586	1265325.732	12.461
1118	LINE TO 30	216630.4812	1265335.702	12.337
1119	LINE TO 30	216633.5658	1265344.553	12.543
1120	A-5	216627.324	1265349.139	12.495
1121	A-5 LINE TO 28	216613.4957	1265348.202	12.599
1122	WELL CASE 27	216637.7108	1265345.356	12.507
1123	WELL CASE 28	216610.7476	1265345.182	12.736
1124	WELL CASE 30	216626.4912	1265325.125	12.532

	Location ID	Northing (NAD83)	Easting (NAD83)	Elevation (NAVD88)
1125	WELL 27	216636.9662	1265345.438	12.145
1126	WELL 28	216610.0929	1265345.202	12.367
1127	WELL 30	216625.8721	1265325.005	11.98
1128	AIR TERM TIE-IN	216282.0962	1265053.768	12.324
1129	XING TO BREAKER	216094.9978	1265049.346	12.567
1130	AS-3	216640.6023	1265184.617	13.784
1131	AS-2	216640.4651	1265184.402	14.118
1132	AS-1	216640.4824	1265184.182	13.967
1133	AS-1 AS-2	216669.8801	1265180.071	13.574
1134	AS-1 AS-2	216675.5892	1265193.154	13.296
1135	AS-1 AS-2	216676.0253	1265194.061	12.853
1136	AS-1 TO 11 AS-2	216679.4381	1265202.121	12.676
1137	AS-2 TO 9 AS-1	216687.0732	1265220.349	12.427
1138	AS-1 TO 10 AS-2	216689.8561	1265226.419	12.331
1139	AS-1 TO 7 AS-2	216698.5741	1265246.925	12.068
1140	AS-2 TO 8 AS-1	216699.2394	1265248.565	12.03
1141	AS-1 AS-2	216706.9724	1265266.175	11.882
1142	AS-1 TO 6 AS-2	216708.6628	1265271.865	11.878
1143	AS-2 TO 5 AS-1	216708.6889	1265273.173	11.894
1144	AS-2 TO 4 AS-1	216714.8159	1265299.707	11.916
1145	AS-1 TO 3 AS-2	216714.2172	1265297.672	11.918
1146	AS-1 TO 2 AS-2	216720.5052	1265324.231	12.017
1147	AS-2 TO 1 AS-1	216720.6801	1265325.696	12.057
1148	AS-3 TO 13	216646.7515	1265207.374	12.666
1149	AS-3 TO 14	216651.5523	1265229.594	12.713
1150	AS-3 TO 15	216655.2841	1265247.03	12.799
1151	AS-3 TO 16	216660.2949	1265270.5	12.759
1152	AS-3 TO 17	216664.1784	1265288.224	12.734
1153	AS-3 TO 18	216669.5907	1265313.663	12.952
1154	AS-3 TO 19	216673.4354	1265331.255	13.289
1155	WELL CASE 19	216681.0536	1265329.434	12.485
1156	WELL 19	216680.3199	1265329.348	11.998
1157	WELL 18	216676.398	1265311.866	12.064
1158	WELL CASE 18	216676.7212	1265311.955	12.453
1159	WELL CASE 17	216669.8702	1265287.031	12.235
1160	WELL 17	216669.5965	1265287.212	11.821
1161	WELL 16	216667.4879	1265268.694	12.044
1162	WELL CASE 16	216667.7756	1265268.73	12.226
1163	WELL CASE 15	216661.7458	1265245.643	12.316
1164	WELL 15	216661.4634	1265245.667	12.074
1165	WELL 14	216658.705	1265228.331	12.034
1166	WELL CASE 14	216658.8743	1265228.286	12.324
1167	WELL CASE 13	216654.2221	1265206.356	12.47
1168	WELL 13	216653.9828	1265206.378	12.092
1169	WELL 12	216669.7644	1265177.962	13.085
1170	WELL CASE 12	216669.9668	1265177.894	13.388

	Location ID	Northing (NAD83)	Easting (NAD83)	Elevation (NAVD88)
1171	WELL CASE 11	216685.812	1265199.998	12.648
1172	WELL 11	216685.6092	1265200.098	12.188
1173	WELL 10	216701.4765	1265221.815	12.147
1174	WELL CASE 10	216701.6947	1265221.817	12.359
1175	WELL CASE 9	216681.8478	1265222.895	12.398
1176	WELL 9	216681.1644	1265222.95	12.006
1177	WELL 8	216691.3404	1265250.31	11.548
1178	WELL CASE 8	216692.0661	1265250.269	11.99
1179	WELL 6	216719.3885	1265269.207	11.776
1180	WELL 5	216696.4084	1265276.413	11.558
1181	WELL 4	216703.3117	1265302.467	11.646
1182	WELL 3	216726.0397	1265294.356	11.74
1183	WELL 2	216732.2842	1265320.476	11.723
1184	WELL 1	216711.7422	1265328.144	11.609
1185	WELL CASE 1	216712.2097	1265328.252	12.127
1186	WELL CASE 2	216732.7066	1265320.629	12.228
1187	WELL CASE 3	216726.4731	1265294.487	12.211
1188	WELL CASE 4	216703.9349	1265302.348	11.857
1189	WELL CASE 5	216697.0903	1265276.301	11.761
1190	WELL CASE 6	216719.5828	1265269.226	12.212
1191	WELL CASE 7	216712.0782	1265243.037	12.254
1192	WELL 7	216711.316	1265243.066	11.954
1193	CURB REPAIR ATBK	216677.7618	1265192.997	13.298
1194	CURB REPAIR ATBK	216673.8897	1265193.788	13.268
1195	CURB REPAIR ATBK	216647.3184	1265200.465	13.003
1196	CURB REPAIR ATBK	216648.9705	1265208.198	12.834
1197	CURB REPAIR ATBK	216653.3979	1265228.617	12.813
1198	CURB REPAIR ATBK	216654.4156	1265233.3	12.823
1199	CURB REPAIR ATBK	216657.0729	1265245.576	12.872
1200	CURB REPAIR ATBK	216658.1002	1265250.395	12.877
1201	CURB REPAIR ATBK	216661.9974	1265266.905	12.896
1202	CURB REPAIR ATBK	216662.6696	1265271.74	12.852
1203	CURB REPAIR ATBK	216665.9532	1265287.112	12.837
1204	CURB REPAIR ATBK	216666.4592	1265289.462	12.873
1205	CURB REPAIR ATBK	216671.3997	1265312.419	13.03
1206	CURB REPAIR ATBK	216672.3508	1265316.793	13.166
1207	CURB REPAIR ATBK	216675.204	1265329.997	13.174
1208	CURB REPAIR ATBK	216675.9635	1265333.521	13.159
1214	MW TX-03A	216716.6369	1265260.258	12.26

Attachment H
Template Field Forms

SHELL SEATTLE TERMINAL- BIOSPARGE SYSTEM
MONTHLY INSPECTION/MAINTENANCE RECORD

SITE ADDRESS:
2555 13TH AVENUE SW
SEATTLE, WA

DATE _____

SHELL TERMINAL OPERATIONS: 206-571-9430

INSPECTION/MAINTENANCE CONDUCTED BY _____

AIR COMPRESSOR

HAS COMPRESSOR BEEN SHUT DOWN FOR MAINTENANCE ETC. SINCE LAST VISIT? (*ASK TERMINAL OPS*) (YES/NO)	IF YES, PROVIDE DATES OF DOWN TIME	PLANNED/UPCOMING MAINTENANCE (DATE/S)

BIO-SPARGING EQUIPMENT COMPOUND / MANIFOLD AREA

System Status on Arrival (ON/OFF) _____

System Status on Departure (ON/OFF) _____

CONTROL PANEL

FAULTS/ALARMS PRESENT? (YES/NO) _____

IF YES, DESCRIBE: _____

ALARMS CLEARED? (YES/NO) _____

IF NO EXPLAIN: _____

	ON ARRIVAL (PSI)	ON DEPARTURE (PSI)
PRE VALVE PRESSURE		
POST VALVE PRESSURE		

SPARGE LINE PULSE TIMES	ON ARRIVAL (MINUTES)	ON DEPARTURE (MINUTES)
AS-1		
AS-2		
AS-3		
AS-4		
AS-5		
AS-6		

SHELL SEATTLE TERMINAL- BIOSPARGE SYSTEM
MONTHLY INSPECTION/MAINTENANCE RECORD

MANIFOLD

MANIFOLD BALL VALVE POSITIONS

	ON ARRIVAL (OPEN/CLOSED)	ON DEPARTURE (OPEN/CLOSED)
AS-1		
AS-2		
AS-3		
AS-4		
AS-5		
AS-6		

PRESSURE REGULATOR

FUNCTIONING PROPERLY? (YES/NO)	GAUGE FUNCTIONING PROPERLY? (YES/NO)	DESCRIBE DEFICIENCIES:

MAINTENANCE PERFORMED? (DIAPHRAM CLEANED) (YES/NO)	DIAPHRAM NEEDS REPLACEMENT? (YES/NO)	DIAPHRAM REPLACED? (YES/NO)

Pressure Gauges (Regulator)

P-1 (ON REGULATOR)	P-2 (POST-REGULATOR)	DESCRIBE DEFICIENCIES:
Pressure (PSI)	Pressure (PSI)	

AIR FILTER

AUTO DRAIN FUNCTIONING PROPERLY? (TEST BY MANUALLY ACTUATING) (YES/NO)	H20 IN FILTER HOUSING? (YES/ NO)	QUANTITY OF WATER DRAINED/RECOVERED (mL)	DESCRIBE DEFICIENCIES
FILTER CONDITION	FILTER NEEDS REPLACEMENT? (YES/NO)	FILTER REPLACED? (YES/ NO)	

PRESSURE TRANSMITTERS

FUNCTIONING PROPERLY? (YES/NO)	VISIBLE DAMAGE? (YES/NO)	DESCRIBE DEFICIENCIES:

AIR VELOCITY TRANSMITTER

FUNCTIONING PROPERLY? (YES/ NO)	FPM ON ARRIVAL	FPM ON DEPARTURE

DESCRIBE DEFICIENCIES:

SOLENOID VALVES

FUNCTIONING PROPERLY? (YES/NO?)	DESCRIBE DEFICIENCIES:

SHELL SEATTLE TERMINAL- BIOSPARGE SYSTEM
MONTHLY INSPECTION/MAINTENANCE RECORD

MANIFOLD (CONTINUED)

THERMOMETER

FUNCTIONING PROPERLY? (YES/NO)	TEMP (°F) ON ARRIVAL	TEMP (°F) ON DEPARTURE

DESCRIBE DEFICIENCIES:

MANIFOLD PIPING AND FITTINGS

BREAKS/ DAMAGE/ LEAKS? (DESCRIBE):

ROTAMETERS

	CFM (ON ARRIVAL)	CFM (ON DEPARTURE)	ALL FUNCTIONING PROPERLY (YES/NO?)
AS-1			
AS-2			
AS-3			DESCRIBE DEFICIENCIES:
AS-4			
AS-5			
AS-6			

FLOW SWITCHES

ALL FUNCTIONING PROPERLY? (YES/NO?)	COVERINGS IN PLACE? (YES/NO)?	DESCRIBE DEFICIENCIES:

PRESSURE GAUGES

	INCHES WC (ON ARRIVAL)	INCHES WC (ON DEPARTURE)	ALL FUNCTIONING PROPERLY (YES/NO?)
AS-1			
AS-2			
AS-3			DESCRIBE DEFICIENCIES:
AS-4			
AS-5			
AS-6			

CHECK VALVES

ALL FUNCTIONING PROPERLY (YES/NO?)	DESCRIBE DEFICIENCIES:

SHELL SEATTLE TERMINAL- BIOSPARGE SYSTEM
MONTHLY INSPECTION/MAINTENANCE RECORD

TANK FARM

ELECTRICAL CONDUIT

ANY DAMAGE TO CONDUIT? (YES NO)	DESCRIBE DAMAGE/DEFICIENCIES:

AIR COMPRESSOR LINE

ANY DAMAGE TO LINE? (YES / NO)	DESCRIBE DAMAGE/DEFICIENCIES:

ANY LEAKS FROM FITTINGS? (YES/NO	DESCRIBE LEAKS:

WERE REPAIRS MADE? (YES/NO)	DESCRIBE REPAIRS:

LOW-POINT DRAINS

ALL DRAIN VALVES CLOSED ON ARRIVAL? (YES/NO)	DESCRIBE EXCEPTIONS:

	DRAIN CYCLED? (YES / NO)	ESTIMATED VOLUME H2O DISCHARGED (mL)
DRAIN - S SIDE OF DRIVEWAY		
DRAIN - N SIDE DRIVEWAY		
DRAIN - CROSSING TO MANIFOLD		

ALL DRAIN VALVES CLOSED ON DEPARTURE? (YES/NO)	EXCEPTIONS:

SHELL SEATTLE TERMINAL- BIOSPARGE SYSTEM
MONTHLY INSPECTION/MAINTENANCE RECORD

TANK FARM (CONTINUED)

SYSTEM DISTRIBUTION PIPING

	BREAKS LEAKS IDENTIFIED? (YES/NO)	DESCRIBE:
AS-4 (AND LATERALS TO BSW-20/21/22/23/24/25/26)		
AS-5 (AND LATERALS TO BSW-27/28/29/30/31/32)		
AS-6 (AND LATERALS TO BSW-33/34/35/36/37)		

WERE REPAIRS MADE? (YES/NO)	DESCRIBE REPAIRS:

WELL MONUMENTS

USE "ADDITIONAL COMMENTS/ NOTES:" SECTION BELOW IF NEEDED

DESCRIBE ANY DEFICIENCIES (I.E. DAMAGE/ MISSING BOLTS/ MISSING LIDS/ SETTLING OR SUBSIDENCE):

DESCRIBE ANY REPAIRS MADE:

TRIP HAZARD SIGNAGE AND REFLECTIIVE TAPE

DESCRIBE ANY DEFICIENCIES:

DESCRIBE ANY REPAIRS:

SHELL SEATTLE TERMINAL- BIOSPARGE SYSTEM
MONTHLY INSPECTION/MAINTENANCE RECORD

CITY OF SEATTLE PARKING LOT

	BREAKS/ LEAKS IDENTIFIED? (YES/NO)	DESRIBE:
AS-1 (AND LATERALS TO BSW-1/2/3/4/5/6)		
AS-2 (AND LATERALS TO BSW-7/8/9/10/11)		
AS-3 (AND LATERALS TO BSW-13/14/15/16/17/18/19)		

WERE REPAIRS MADE? (YES/NO)	DESCRIBE REPAIRS:

WELL MONUMENTS

USE "ADDITIONAL COMMENTS/ NOTES:" SECTION BELOW IF NEEDED

DESCRIBE ANY DEFICIENCIES (I.E. DAMAGE/ MISSING BOLTS/ MISSING LIDS/ SETTLEMENT):

DESCRIBE ANY REPAIRS MADE:

ABOVE-GROUND PIPING ASPHALT

PEDESTRIAN WALKOVER BUMP AT W END OF CITY LOT AND BERMS ALONG N TERMINAL WALL

DESCRIBE ANY DEFICIENCIES (I.E. EXCESSIVEL LOOSE OR BROKEN ASPHALT / EXPOSED PIPING:

DESCRIBE ANY REPAIRS MADE:

NO PARKING BARRICADES

DESCRIBE DEFICIENCIES	DEFICIENCIES RESOLVED? DESCRIBE:

ADDITIONAL COMMENTS / NOTES:

Make sure that data has been downloaded from Sensaphone on a monthly basis.