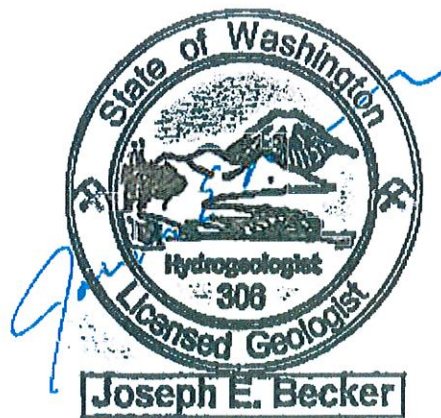


ROSS-SIMMONS HARDWOOD
250 INDUSTRIAL WAY
LONGVIEW, WASHINGTON
SUBSURFACE CHARACTERIZATION AND
PRELIMINARY REMEDIAL INVESTIGATION
SEPTEMBER 14, 2018

by



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Environmental Services Manager



Ross-Simmons Hardwood
250 Industrial Way, Longview, Washington
Subsurface Characterization and
Preliminary Remedial Investigation
September 14, 2018

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1.0 Introduction and Purpose

Robinson Noble, Inc. is pleased to present this letter report regarding site characterization activities for the property located at 250 Industrial Way in Longview, Washington. Work completed for this study was completed in accordance with our proposal dated March 18, 2018.

2.0 Physical Setting and Background

2.1 Physical Setting

The subject is located the southwest of the Cowlitz River at 250 Industrial Way in Longview, Washington (Figures 1 and 2). Cowlitz County Assessor records note the subject property is identified as parcel number 10138. The parcel is located within Township 7 North, Range 2 West, Section 3, relative to the Willamette Meridian.

The subject property is at an elevation of approximately 15 feet above sea level. The parcel is located in a heavy industrial zone in Longview, approximately 1,100 feet southwest of the Cowlitz River, which is a tributary of the Columbia River.

Phillips, W. M. (1987) maps the surface geology of the subject and surrounding area as Quaternary alluvium (Qal). These sediments are generally composed of sand, silt, gravel, and cobbles. This unit is generally permeable. Soils in the area of the subject have been classified as Caples silty clay loam by the web soil survey (2018). These soils are generally associated with floodplains and are derived from alluvium. These soils are typically poorly drained.

There is no surface water on the subject. The nearest surface water body is a log pond, which is located approximately 900 feet south of the subject property. This pond drains into the Columbia River, approximately 2,000 feet to the southwest.

2.2 Background

The site was formerly occupied by a sawmill company, Ross Simmons Hardwood, and is currently vacant. Freight-hauling trucks and other vehicles were fueled on site at a fueling island on the southeast side of the property. From 1989 through 1990, five underground storage tanks (USTs) were removed and soil sampling at that time indicated no contaminant concentrations above state cleanup levels. In 1991, approximately 110 cubic yards of petroleum-contaminated soils was removed adjacent to the truck shop. Five test pits were completed in 1997 on the south and west sides of the truck shop and an area of approximately 4,500 square feet was estimated to be contaminated. In 1999, sampling in the previously identified area of contamination found heavy petroleum and groundwater contamination near a septic tank. Copies of investigative reports, previously completed by others, are located in Appendix C.

3.0 Field Activities and Sampling

Field activities took place between May 1 and May 7, 2018. Utility-location services were completed by Applied Professional Services, Inc. (APS) to determine acceptable locations for placing the proposed borings and monitoring wells in areas less likely to impact critical utilities.

Following utility locating, we completed a series of 22 soil borings across the site using direct-push drilling equipment operated by Holt Services, Inc. The borings were placed, as shown on the attached map (Figure 3), in locations intended to further delineate the boundaries of contamination identified in previous information we reviewed. Each boring was completed to approximately 20 feet in depth. Soils were sampled and geologically logged continuously across the depth of each boring. Soils encountered during drilling generally consist of between gray silty fine sand and grey silty clay. Additionally, visual and olfactory field screening, as well as a hand-held photoionization detector (PID) screening, was conducted for each boring location. We also collected groundwater samples using a peristaltic pump to draw groundwater from a temporary well screen. Groundwater was generally encountered at depths of between six and eight feet. Groundwater was purged for approximately five minutes to reduce sediment, and then a sample was collected under low-flow conditions. Soil and water samples were not taken at boring location B14, and boring location B15 did not have enough water for full sampling. Six borings, B17-B22, were converted to monitor wells.

Samples were submitted to an accredited laboratory, Libby Environmental, Inc. (Libby), who provided an on-site mobile laboratory for analysis of the samples for gasoline-, diesel-, and oil-range petroleum hydrocarbons and volatile-organic compounds (MCTA VOC). Following receipt of results from the mobile laboratory, additional samples were analyzed for other contaminants at Libby's fixed-base laboratory.

Six two-inch diameter groundwater monitoring wells (MW-1 through MW-6) were constructed with ten feet of pre-packed screen to depths of approximately 15 to 20 feet. The geologic logs for the borings and construction details for the monitoring wells are shown on Figures 4 through 13 (Appendix A). Following their construction, the newly installed monitoring wells were then purged and developed.

On May 7, groundwater samples collected from designated monitoring wells were collected using a bladder pump and low-flow sampling techniques. New pump tubing was used at each monitoring well, and the bladder pump was disassembled and decontaminated with a solution of Alconox soap and rinsed with distilled water at each sampling location. Groundwater was drawn from each well utilizing under low-flow protocols. Samples were collected after at least three well volumes of water were purged from each well and field measurement of temperature, conductivity, pH, oxidation-reduction potential, and dissolved oxygen had stabilized. The samples were placed into laboratory-supplied containers and stored in a cooler chilled with ice packs for the duration of the site work and transport to the laboratory. Field data sheets for this project are presented in Appendix A. Samples were then submitted to Libby's fixed-base laboratory for analysis.

4.0 Laboratory Analytical Results and Discussion

As noted above, laboratory analysis was performed by Libby Environmental, Inc. of Olympia Washington, for analysis. Libby is accredited in the State of Washington to perform all of the

analyses listed. A review of field and laboratory quality assurance and quality control data does not indicate any issues warranting qualification or modification of laboratory results. Copies of laboratory analytical reports are located in Appendix B.

4.1 Soil Analytical Data

Table 1: Soil Analytical Data-Borings (mg/kg)

Sam- ple	Sam- ple Depth (feet)	Diesel	Gasoline	Oil	Ben- zene	Tolu- ene	Ethyl- ben- zene	Total Xylene	Total Naph- tha- lenes
B1	4.5 and 17.5	nd	nd	nd	nd	nd	nd	nd	nd
B2	16 and 20	nd	nd	nd	nd	nd	nd	nd	nd
B3	1.5	nd	nd	21,700	nd	nd	nd	0.29	2.3
B3	20	nd	nd	nd	nd	nd	nd	nd	nd
B4	13.5 and 20	nd	nd	nd	nd	nd	nd	nd	nd
B5	14 and 19	nd	nd	nd	nd	nd	nd	nd	nd
B6	15 and 20	nd	nd	nd	nd	nd	nd	nd	nd
B7	13	nd	nd	353	nd	nd	nd	nd	nd
B7	20	nd	nd	nd	nd	nd	nd	nd	nd
B8	1.5	nd	nd	19,100	nd	nd	nd	0.29	2.5
B8	20	nd	nd	nd	nd	nd	nd	nd	nd
B9	5	nd	nd	21,600	nd	nd	nd	0.31	0.54
B9	20	nd	nd	nd	nd	nd	nd	nd	nd
B10	5	nd	nd	1,180	nd	nd	nd	0.39	1.1
B10	20	nd	nd	nd	nd	nd	nd	nd	nd
B11	2.5	nd	nd	5,040	nd	nd	nd	0.2	0.61
B11	20	nd	nd	nd	nd	nd	nd	nd	nd
B12	3	nd	nd	10,300	nd	nd	nd	nd	nd
B12	20	nd	nd	nd	nd	nd	nd	nd	nd
B13	6 and 20	nd	nd	nd	nd	nd	nd	nd	nd
B14	-	-	-	-	-	-	-	-	-
B15	4	nd	nd	52,400	nd	nd	nd	nd	nd
B15	15 and 20	nd	nd	nd	nd	nd	nd	nd	nd
B16	7.5 and 20	nd	nd	nd	nd	nd	nd	nd	nd
B17	5.5	nd	nd	nd	nd	nd	nd	nd	0.5

B17	20	nd	nd	nd	nd	nd	nd	nd	nd
B18	9.5	nd	nd	450	nd	nd	nd	nd	0.28
B18	17.5	nd	nd	5,880	nd	nd	nd	nd	nd
B19	5.5	nd	nd	2,560	nd	nd	nd	0.31	3.8
B19	20	nd	nd	nd	nd	nd	nd	nd	nd
B20	2.5	nd	nd	14,800	nd	nd	0.072	1.2	5.1
B20	17.5	nd	nd	nd	nd	nd	nd	nd	nd
B21	3 and 18	nd	nd	nd	nd	nd	nd	nd	nd
B22	13 and 19	nd	nd	nd	nd	nd	nd	nd	nd
MTCA Method A		2,000	100	2,000	0.03	7	6	9	5

Bold indicates sample concentration above the MTCA Method A level for Soil

As shown on the preceding table, soil impacts are generally present in two distinct zones. The first zone starts at approximately one and one-half feet below ground surface and it generally extends to the water table at a depth of between six and eight feet. The second zone occurs within the saturated zone extending from approximately around 16 feet to 20 feet below ground surface. Figure 18, (Appendix A) describes the location of analytical results for compounds detected above laboratory detection limits.

In addition to the above data, we also analyzed two samples for extractable petroleum hydrocarbons (EPH). These samples were B11-2.5 and B3-1.5. The analytical results were evaluated using Washington State Department of Ecology (Ecology) tools for the calculation of Method B cleanup levels. The Method B and Method C calculated concentrations for protection of direct contact are shown on the table below.

Table 2: Method B and Method C Direct-Contact Cleanup Levels (mg/kg)

Sample ID	TPH Oil	Method B	Method C
B3-1.5	21,700	2,744	34,184
B11-2.5	5,040	3,181	38,643

Because the target analytes did not include polycyclic aromatic hydrocarbons (PAHs), these calculations should be considered preliminary.

4.2 Groundwater Analytical Data

Table 3: Groundwater Analytical Data-Borings (µg/l)

Sample	Diesel	Gasoline	Oil	Benzene	Toluene	Ethylbenzene	Total Xylene	Total Naphthalenes
B1	nd	nd	4,090	nd	nd	nd	nd	nd
B2	nd	nd	nd	nd	nd	nd	nd	nd
B3	nd	nd	nd	nd	nd	nd	nd	nd
B4	nd	nd	nd	nd	nd	nd	nd	nd
B5	nd	nd	nd	nd	nd	nd	nd	nd

B6	nd	nd	nd	nd	nd	nd	nd	nd
B7	nd	nd	nd	nd	nd	nd	nd	nd
B8	nd	nd	nd	nd	nd	nd	nd	nd
B9	nd	nd	nd	nd	nd	nd	nd	nd
B10	nd	nd	nd	nd	nd	nd	nd	nd
B11	nd	nd	nd	nd	nd	nd	nd	nd
B12	nd	nd	1,940	nd	nd	nd	nd	nd
B13	nd	nd	nd	nd	nd	nd	nd	nd
B14	-	-	-	-	-	-	-	-
B15	nd	-	-	nd	nd	nd	nd	nd
B16	nd	nd	nd	nd	nd	nd	nd	nd
B17 (MW-1)	nd	nd	nd	nd	nd	nd	nd	nd
B18 (MW-2)	nd	nd	nd	nd	nd	nd	nd	nd
B19 (MW-3)	nd	nd	nd	nd	nd	nd	nd	nd
B20 (MW-4)	nd	nd	nd	nd	nd	nd	nd	nd
B21 (MW-5)	nd	nd	nd	nd	nd	nd	nd	nd
B22 (MW-6)	nd	nd	nd	nd	nd	nd	nd	nd
MTCA Method A	500	800	500	5	1,000	700	1,000	160

Bold indicates sample concentration above the MTCA Method A level for Groundwater

Table 4 Groundwater Analytical Data-Monitoring Wells (µg/l)

Sample	Diesel	Gasoline	Oil	Benzene	Toluene	Ethylbenzene	Total Xylene	Total Naphthalenes
MW-1	nd	nd	nd	nd	nd	nd	nd	nd
MW-2	nd	nd	nd	nd	nd	nd	nd	nd
MW-3	nd	nd	nd	nd	nd	nd	nd	nd
MW-4	nd	nd	nd	nd	nd	nd	nd	nd
MW-5	nd	nd	nd	nd	nd	nd	nd	nd
MW-6	nd	nd	nd	nd	nd	nd	nd	nd
MTCA Method A	500	800	500	5	1,000	700	1,000	160

Bold indicates sample concentration above the MTCA Method A level for Groundwater

Groundwater contaminant concentrations in samples collected from groundwater monitoring wells were not detected above laboratory reporting limits. Two reconnaissance groundwater sample collected from borings B12, and B3 were found to exceed MTCA Method A limits. The location and concentrations detected are shown on Figure 19 (Appendix A)

5.0 Conceptual Site Model and Exposure Pathways

Contaminants consist of oil-range petroleum hydrocarbons identified chromatographically as residual-range fuel oil (i.e. Bunker C). While xylenes and naphthalenes were detected, they are well below Washington Model Toxics Control Act (MTCA) Method A cleanup guidelines.

5.1 Soil

The bulk of the soil impacts extend from approximately two feet below grade to the water table at approximately seven feet in depth (shallow). An additional smaller amount of impacted material is located with a saturated zone extending from about 16 feet deep to 20 feet deep. The shallow zone covers an approximate area of 128 feet by 100 feet. Using a thickness of seven feet this equates to an estimated 3,320 cubic yards of impacted soil. The deep zone occupies an estimated area of 36 feet by 22 feet. The average thickness of this contaminated soil zone is estimated at four feet. The estimated quantity of contaminated soil is around 117 cubic yards.

The impacted soils are contained in fine-grained over-bank deposits of generally low permeability. The residual-range hydrocarbons are likely highly adsorbed to these particles and that, combined with their low solubility and low mobility, are unlikely to migrate beyond their current limits. Although the exact boundaries of these zones have not been completely determined, Figures 14-17, and 22 depict the estimated extents based on current information. Additional data collection is recommended to refine the boundaries and quantities of contaminants remaining.

5.2 Groundwater

Groundwater does not appear to be significantly impacted in spite of the contaminant concentrations measured in the soil. Two reconnaissance groundwater samples collected from a temporary screen placed in borings B1, and B12 yield a reported concentration of 4,090 µg/L, and 1,940 µg/L of bunker oil. However, groundwater samples collected from the groundwater monitoring wells, did not contain target analytes above laboratory detection limits. As discussed in Section 5.1, above, this is likely due to a combination of the low-solubility of the bunker C, its high organic-carbon partition coefficient (k_{oc}), and the fine-grain sediments present on site.

As shown on Figure 21, groundwater flows to the northwest. However the gradient is relatively flat and it is likely to vary seasonally with precipitation patterns.

5.3 Surface Water

Surface water impacts have not been identified. Surface water features are not present on site and migration beyond the current footprint of contamination is not likely to occur.

5.4 Air (Inhalation)

Based on the vacant and industrial nature of the site, the identified contaminants and the industrial nature of the surrounding area the inhalation pathway is likely incomplete at this time. Additional assessment may be needed if redevelopment occurs. However, since any redevelopment will be industrial, any potential risks are likely to be low. If warranted, they can be easily mitigated as part of construction.

5.5 Exposure Pathways

5.5.1 Soil (Direct Contact)

As noted in Table 2, Section 4.1 of this report, we generated two sets of site-specific cleanup levels [2,744 mg/kg (Method B) and 34,184 mg/kg (Method C)]. If Method C cleanup levels are used, the direct contact pathway is essentially incomplete as nearly all of the reported soil concentrations of oil-range hydrocarbons are below the calculated Method C number. If Method B standards are applied, the pathway is potentially complete.

5.5.2 Groundwater

The absence of groundwater contaminant detections above laboratory reporting limits indicates that the groundwater pathway may be incomplete. Further groundwater monitoring is needed to conclusively determine the completeness of this pathway.

5.5.3 Vapor (Air)

Considering the industrial nature of the site and the composition of the contaminants, vapor intrusion is not likely to be an issue. The vapor (air) pathway is likely not complete.

6.0 Recommendations for Additional Investigation

Additional characterization is needed. This additional characterization includes further delineation of the areal extents of soil contamination, further evaluation of groundwater flow direction, and further investigation into the presence or absence of groundwater contamination is warranted.

We recommend additional soil borings and groundwater monitoring wells, as shown on Figure 22. The additional soil borings will allow for further delineation of the soil contaminant plumes and the additional groundwater monitoring wells will provide the data needed to complete groundwater characterization. We also recommend completing at least three additional rounds of groundwater monitoring to evaluate seasonal variations in groundwater contaminant levels and groundwater flow directions.

We suggest that prior to this additional work being completed that the site be entered into the Washington Department of Ecology's Voluntary Cleanup Program (VCP). Ecology should be asked to review the assessment work to date and provide their comments on the planned additional investigation. Ecology comments can be incorporated into the planned additional investigation and a final remedial investigation and feasibility study (RI/FS) can be completed.

7.0 Preliminary Cleanup Action Plan Discussion

Assuming that groundwater contaminant levels are stable and remain at the current levels, it is likely that the closure and no-further-action (NFA) status can be achieved using a variety of different methods. If the complete removal of contaminants above unrestricted land-use is desired, excavation of the identified contamination is likely the most effective. The rough-order-of-magnitude (ROM) cost for this is between \$500,000 and \$600,000. If this excavation was completed as part of site redevelopment, there is a potential for cost savings ranging from 15 to 35 percent.

Considering the industrial nature of the site and likely future industrial use, a NFA status might also be achieved through a combination of targeted excavation of near-surface hotspots and institutional controls, including: prohibitions against using near surface water, controlling precipitation infiltration, and long-term groundwater monitoring.

Other options, such as in-situ treatment, while technically feasible, are not likely to be significantly cheaper. Along with the RI/FS noted above, a final cleanup action plan (CAP) should be prepared. This will allow for more accurate analysis of cleanup costs.

8.0 Closing

9.0 References

Federal, State, and Local Agency Records

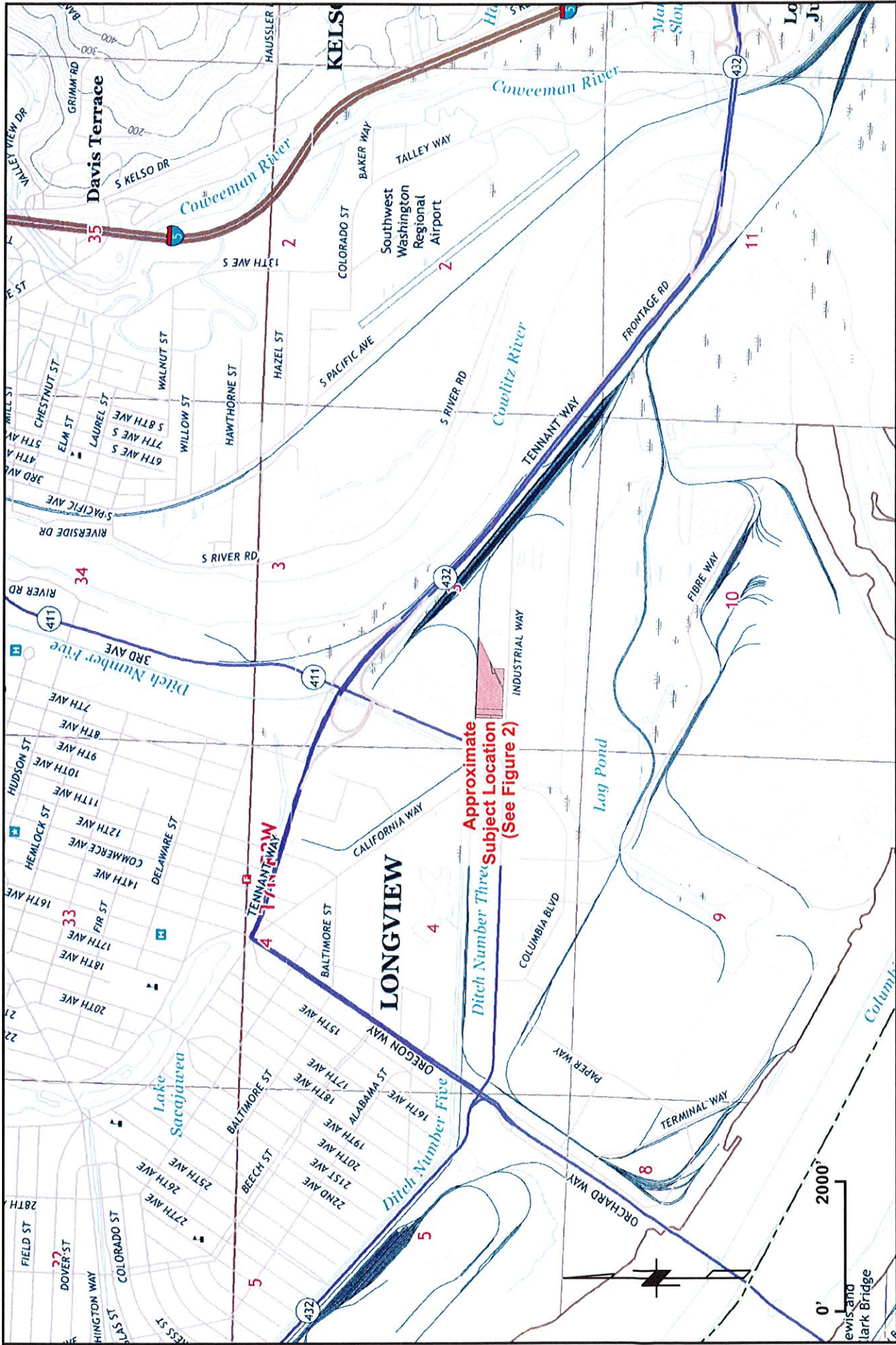
U.S. Geological Survey - 7.5 - Minute Series - Rainier quadrangle

Washington State Department of Ecology, 2013, Model Toxics Control Act Statute and Regulation, compiled by the Washington State Department of Ecology Toxics Cleanup Program, Publication No. 94-06

Washington State Department of Ecology, 2015, Cleanup Levels and Risk Calculations—database of cleanup levels for chemicals and respective media, available online at <https://fortress.wa.gov/ecy/clarc/CLARHome.aspx>

The statements, conclusions, and recommendations provided in this report are to be exclusively used within the context of this document. They are based upon generally accepted environmental and hydrogeologic practices and are the result of analysis by Robinson Noble, Inc. staff. This report, and any attachments to it, is for the exclusive use of Ross-Simmons Hardwoods, its successors and assigns. Unless specifically stated in the document, no warranty, expressed or implied, is made.

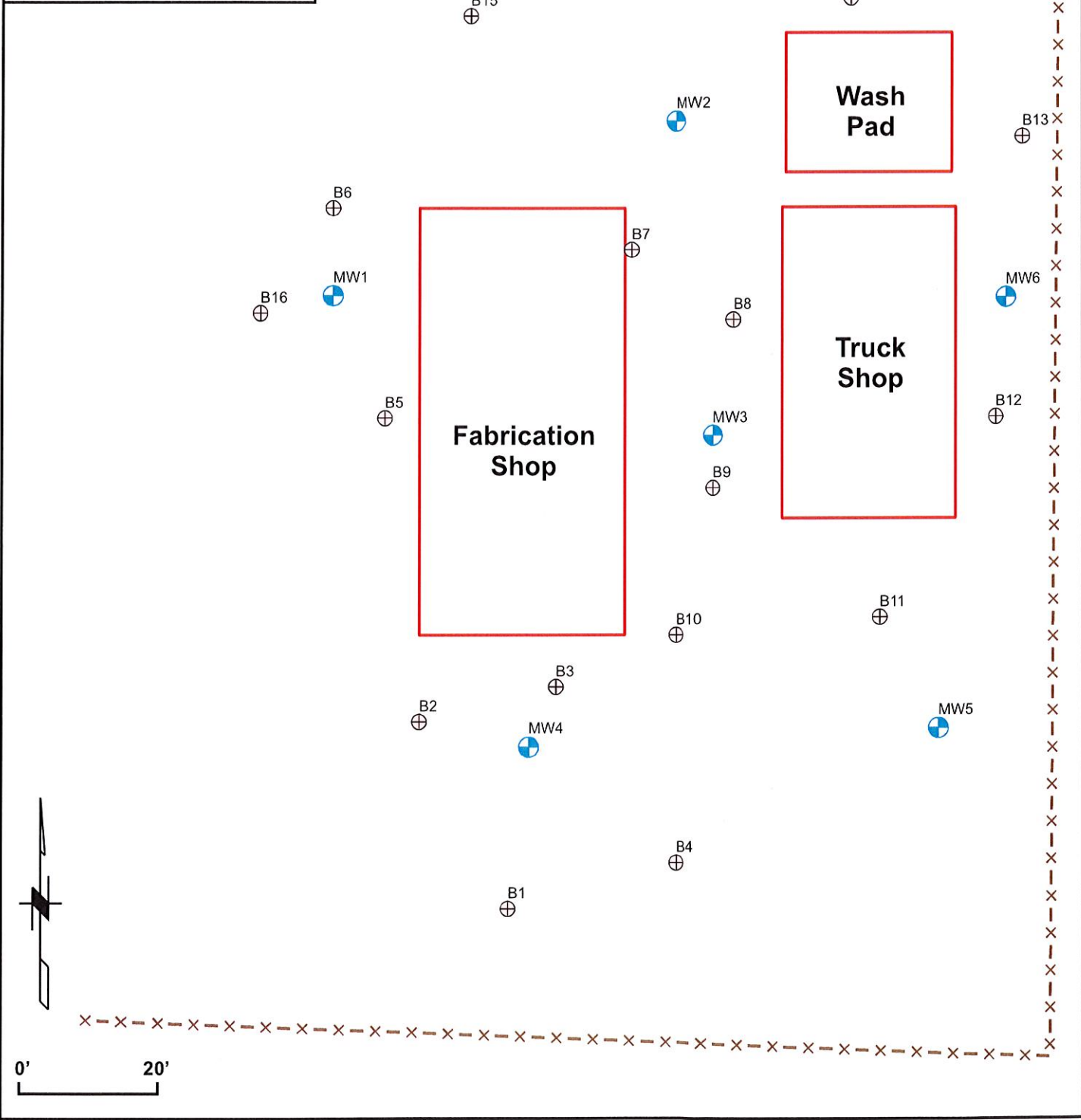
APPENDIX A



 <p>ROBINSON NOBLE</p>	<p>Note: Basemap taken from USGS Kelso and Rainier Quadrangles</p>	<p>PM: JFH September 2018 3283-001A</p>	<p>Cowlitz County T 07 N/R 02 W - 03 Scale 1" = 2000'</p>	<p>Figure 1 Vicinity Map Ross-Simmon Hardwood: 250 Industrial Way Longview</p>
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Legend

- ⊕ Boring Location
- ⊕ Monitoring Well Location
- x - x - Fence Line
- ▭ Building Footprints

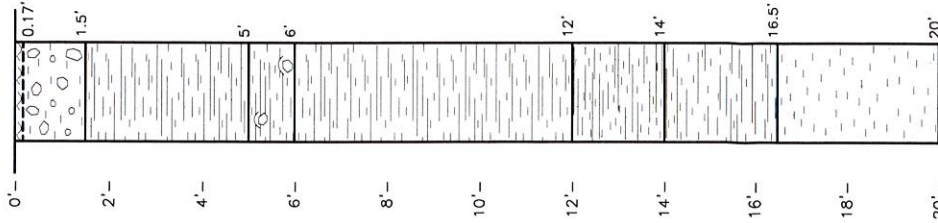


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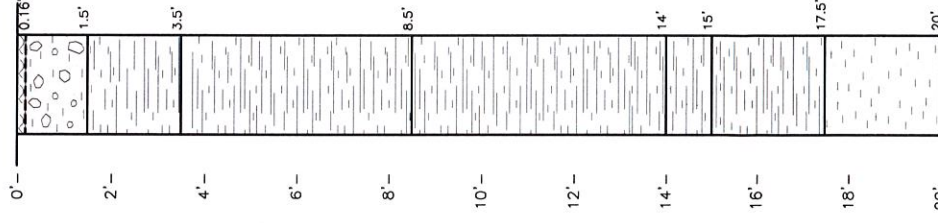
Cowlitz County
T 07 N/R 02 W - 03
Scale 1" = 20'

Figure 3
Boring and Monitoring Well Location Map
Ross-Simmon Hardwood: 250 Industrial Way Longview

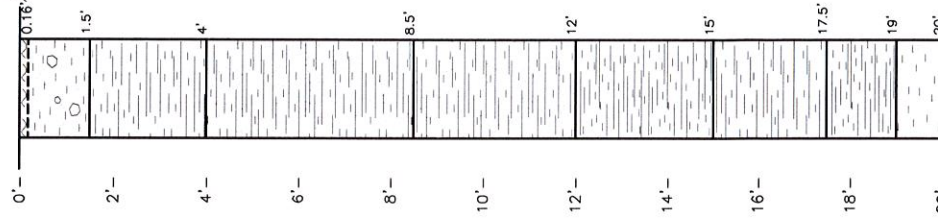
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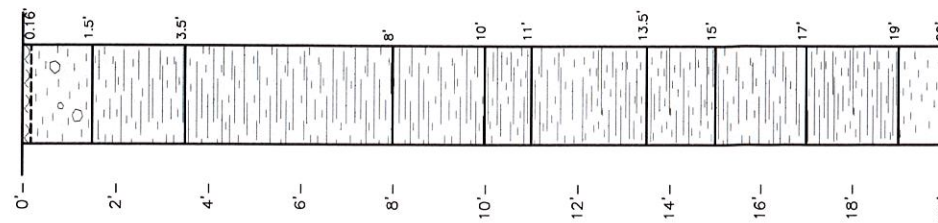
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B3



B4



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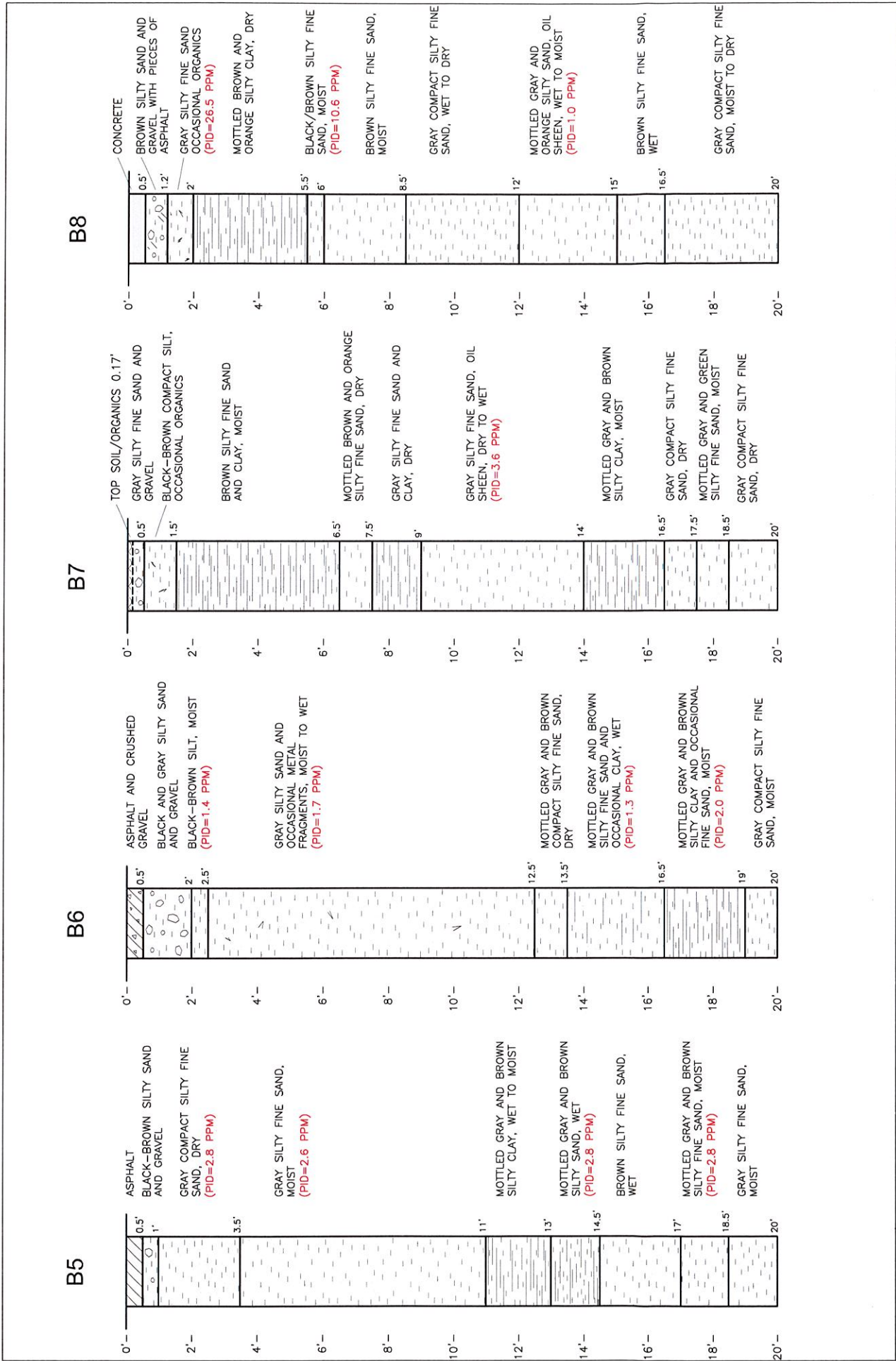
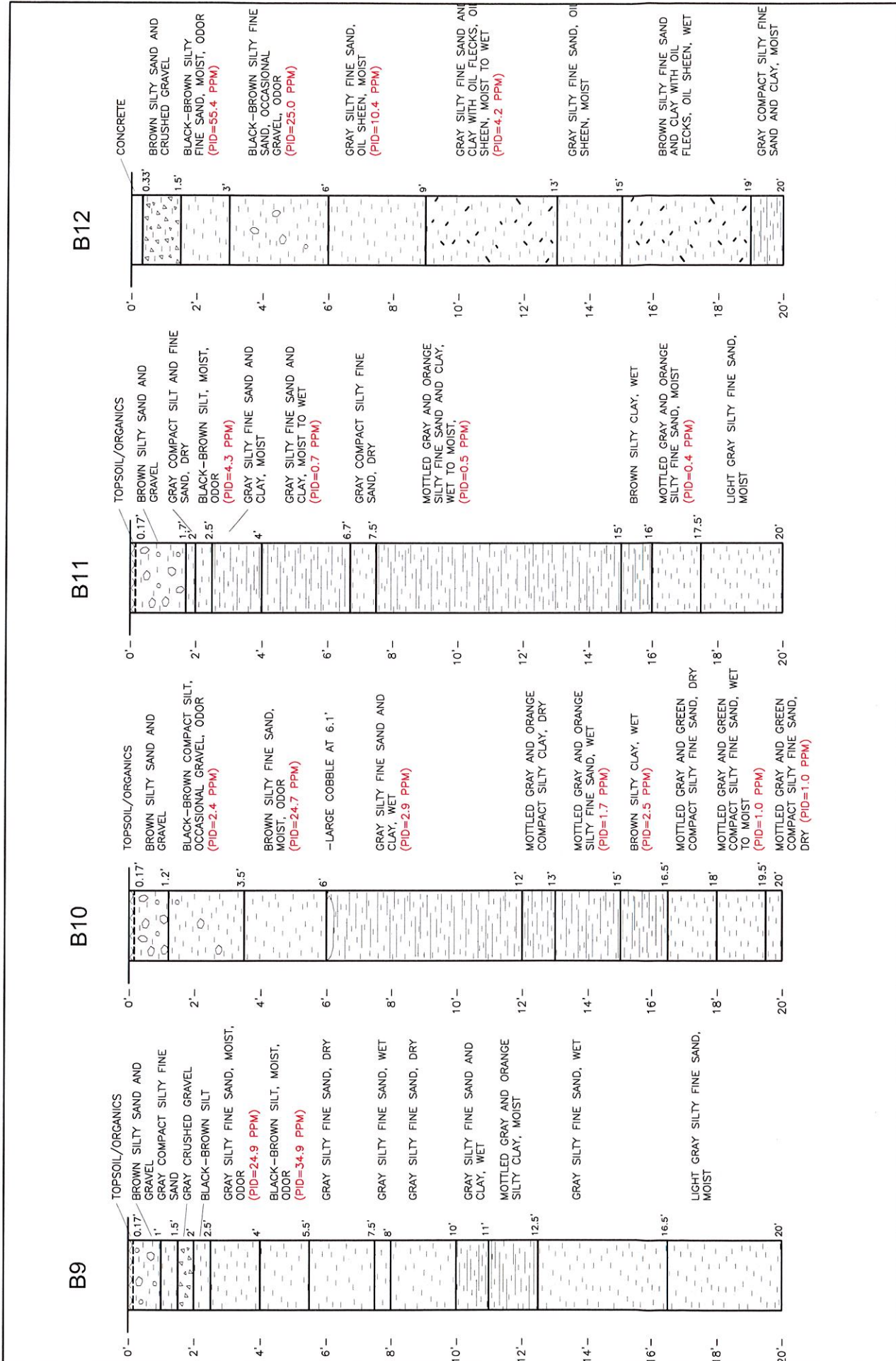


Figure 5
 Geologic Logs; Boreholes B5 through B8
 Ross-Simmons Hardwood Lumber: 250 Industrial Way Remediation Invest

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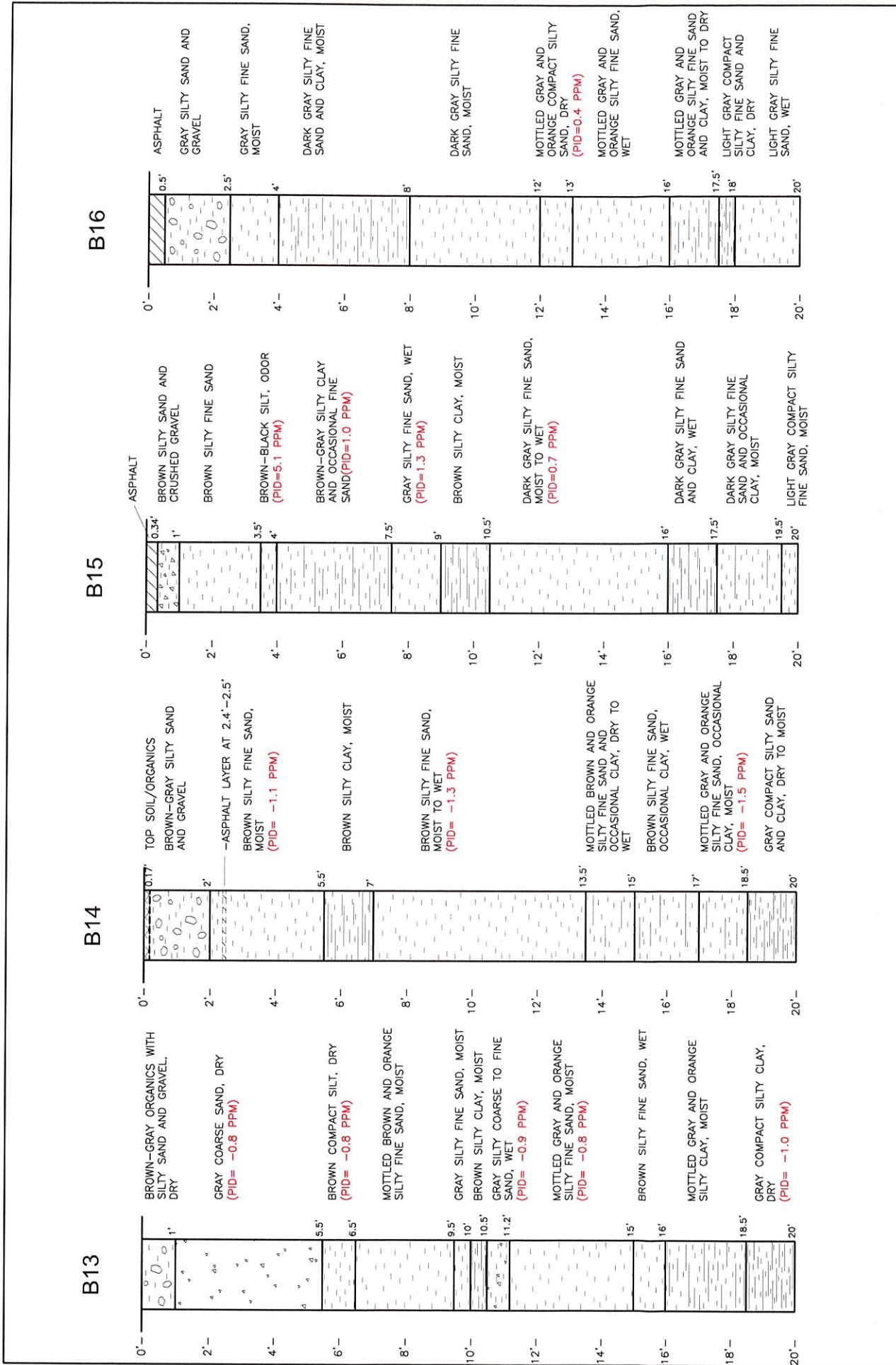
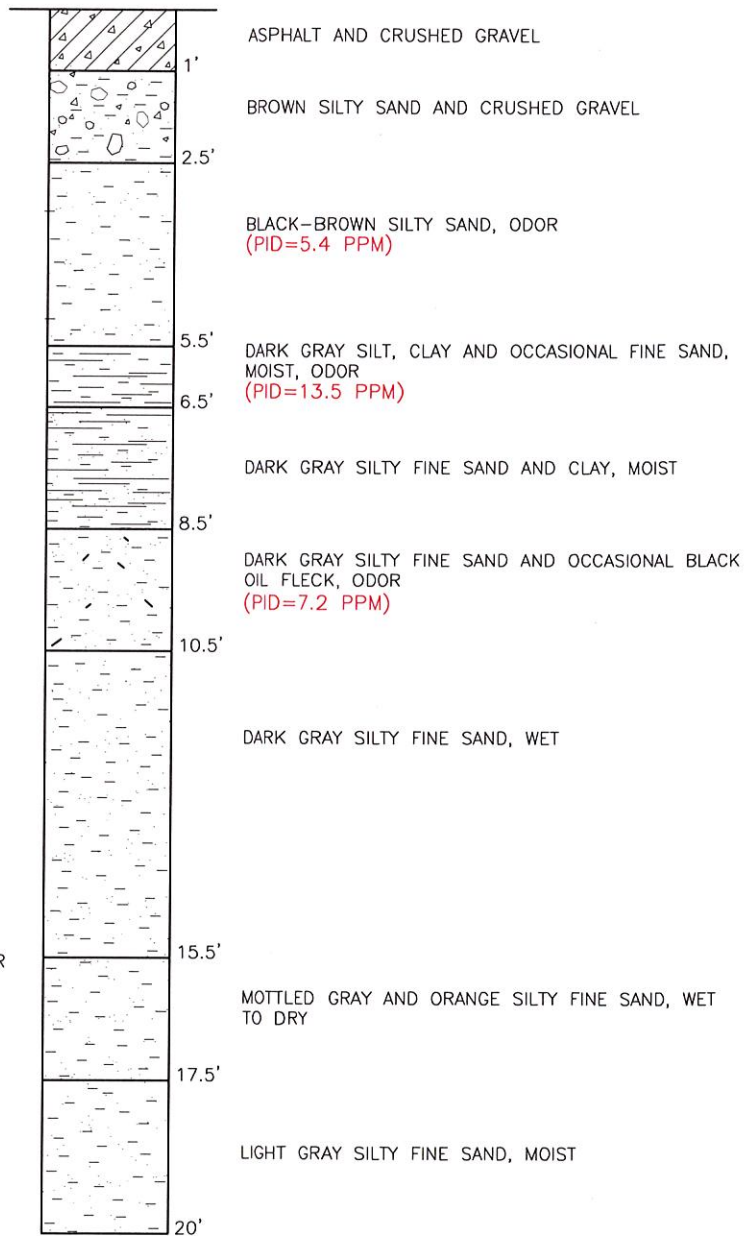
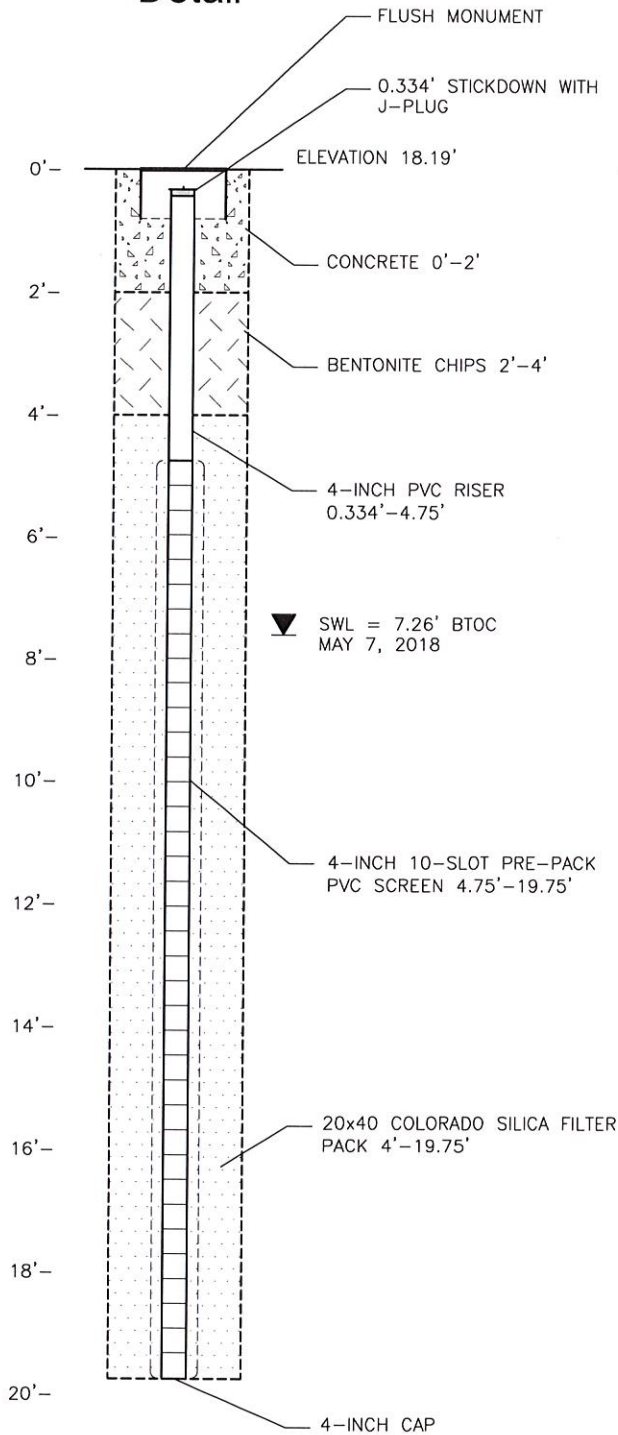


Figure 7
 Geologic Logs; Boreholes B13 through B16
 Ross-Simmons Hardwood Lumber: 250 Industrial Way Remediation Invest

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	ROBINSON NOBLE	

Construction Detail

Geologic Log



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T 07 N/R 02 W - 03
Well ID: BKL341

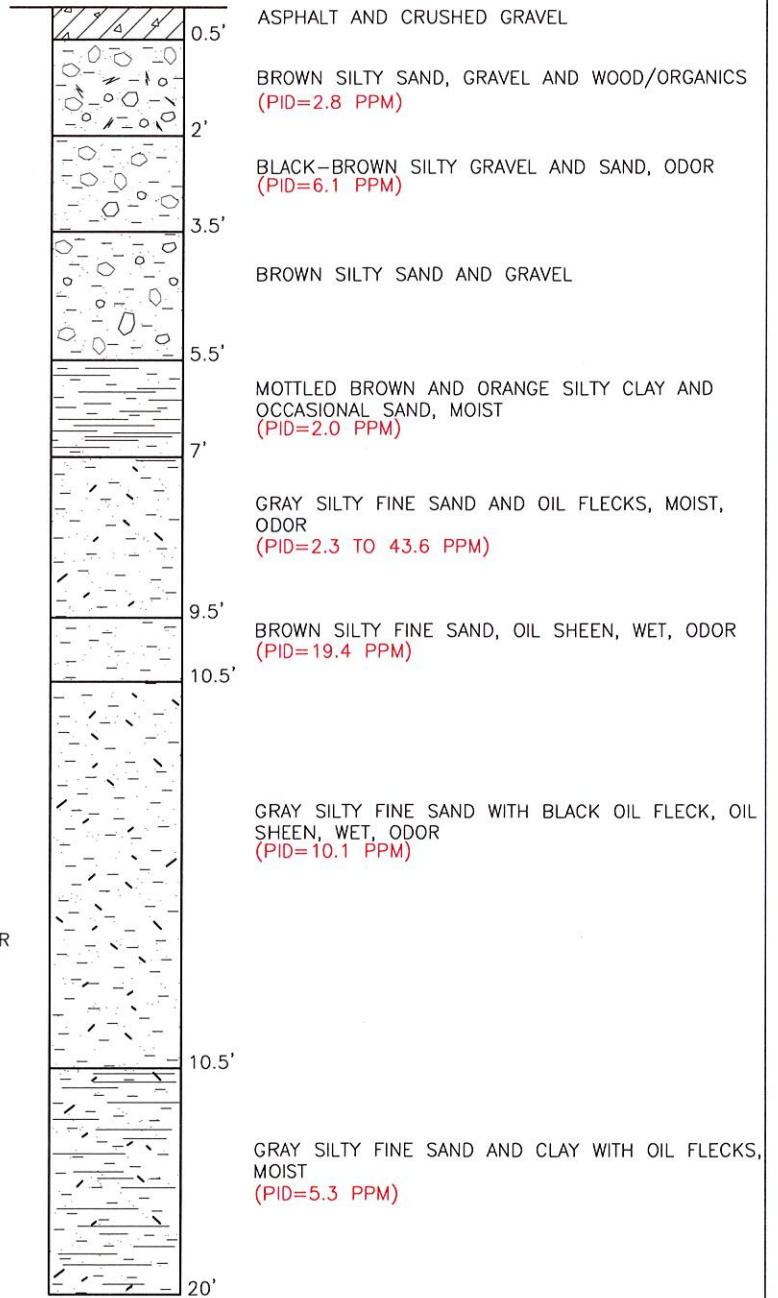
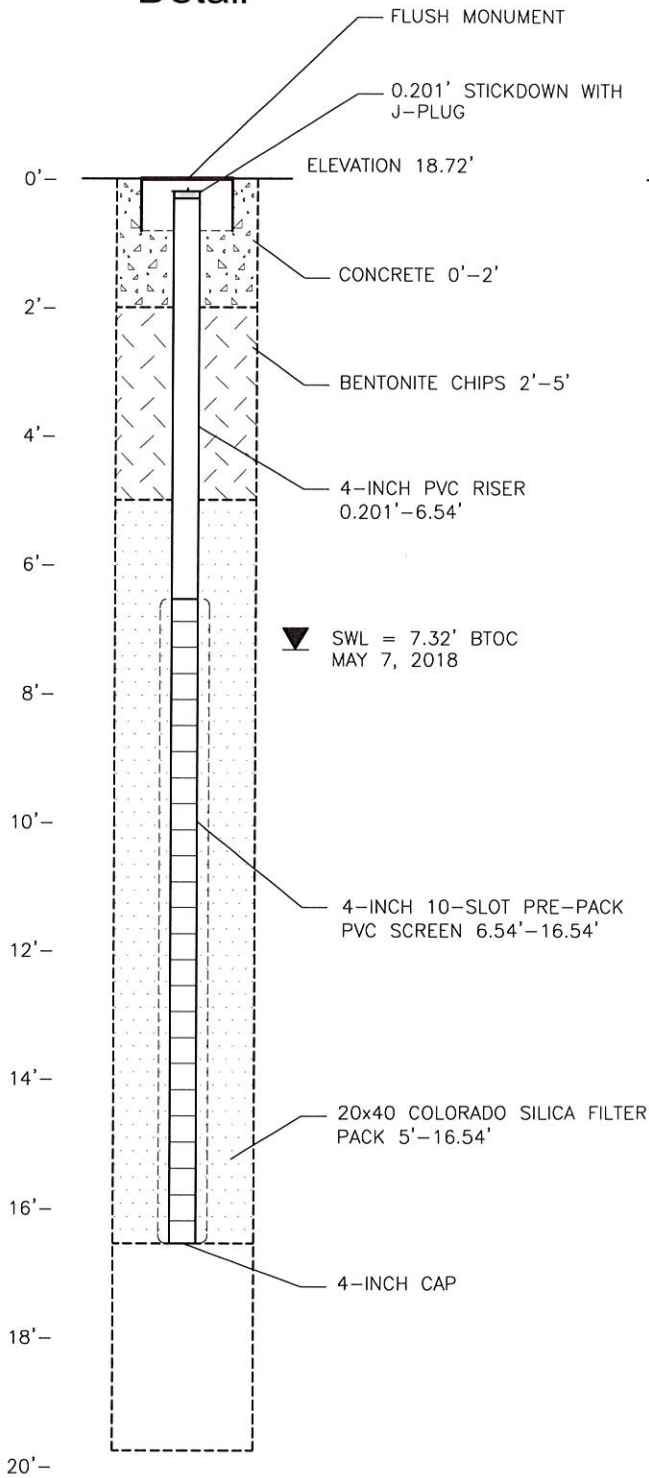
Figure 8

Construction and Geologic Log for Monitor Well 1

Ross-Simmons Hardwood Lumber: 250 Industrial Way Remediation Invest

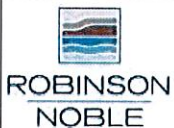
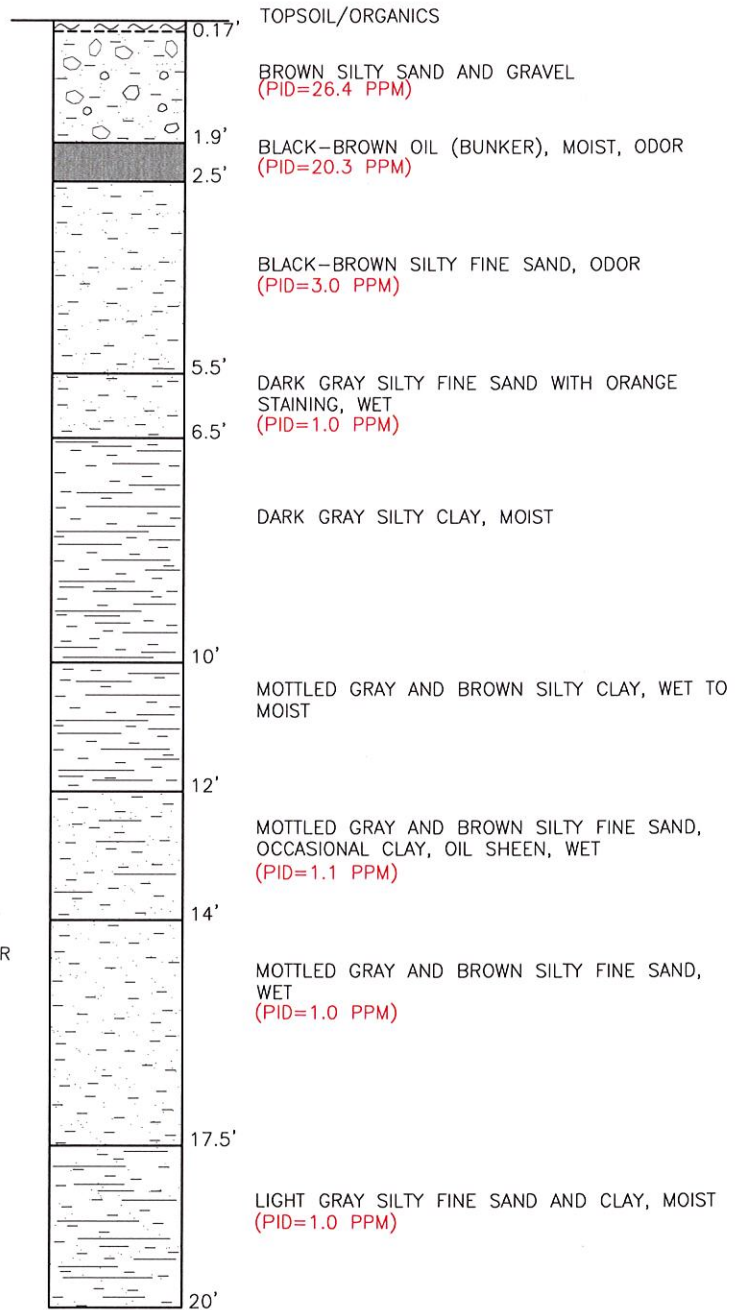
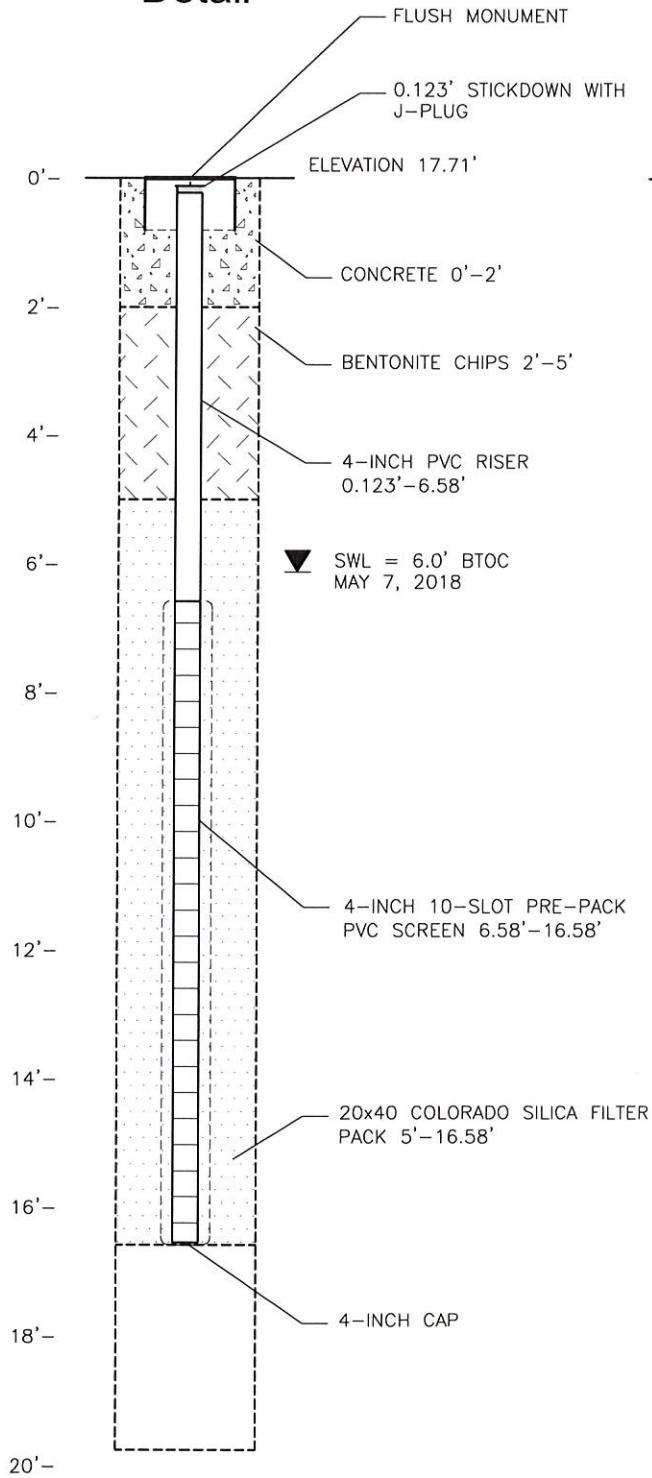
Construction Detail

Geologic Log



Construction Detail

Geologic Log



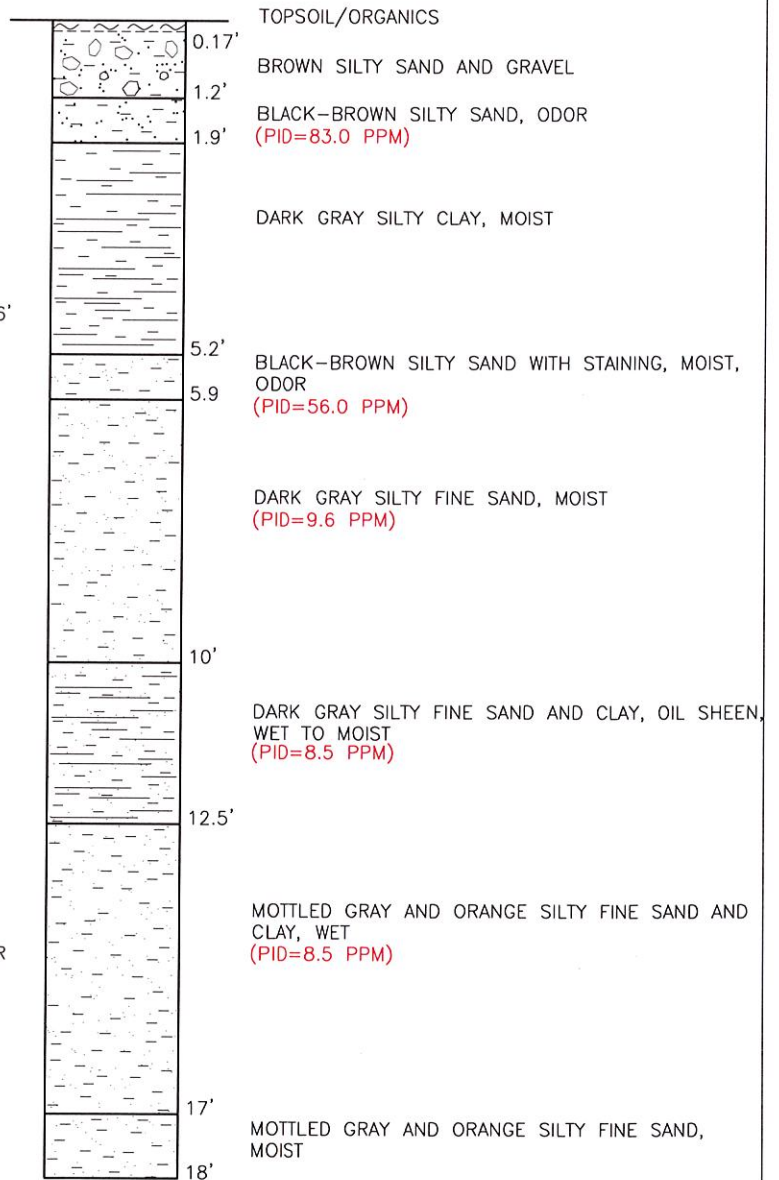
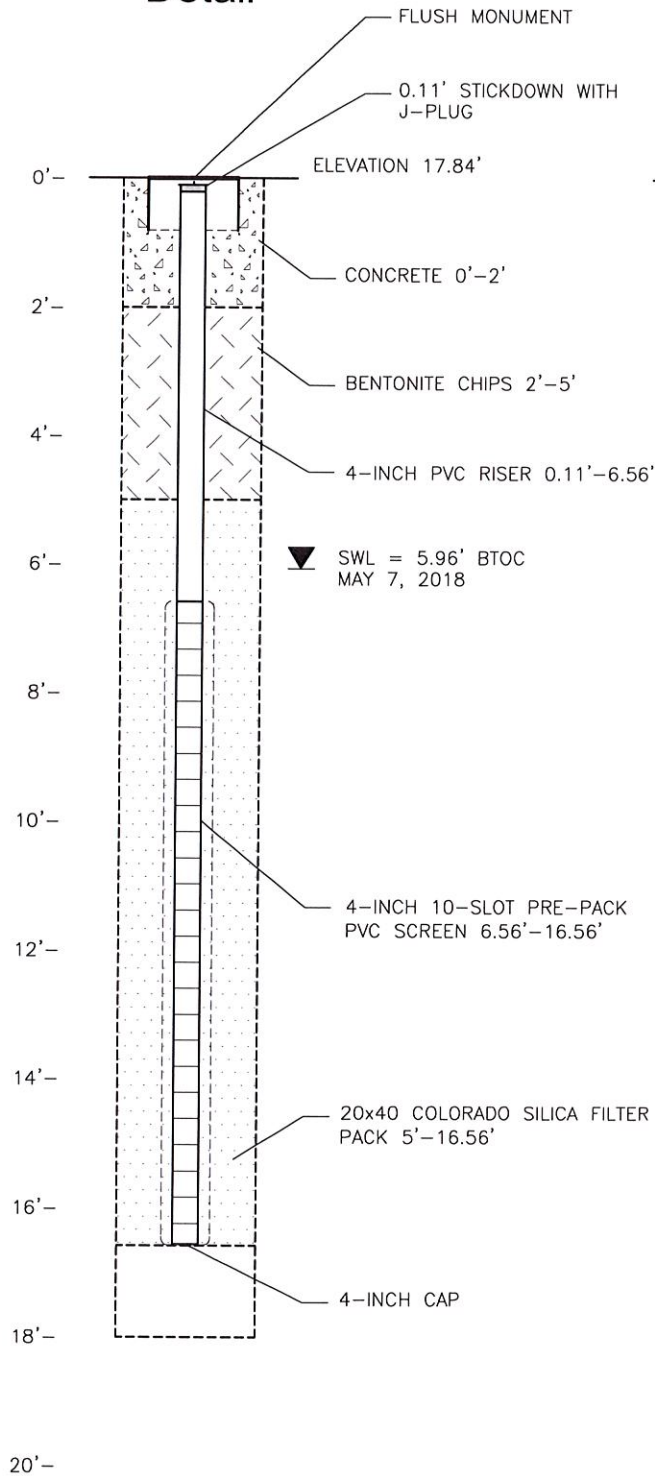
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Well ID: BKL343

Figure 10
Construction and Geologic Log for Monitor Well 3
Ross-Simmons Hardwood Lumber: 250 Industrial Way Remediation Invest

Construction Detail

Geologic Log



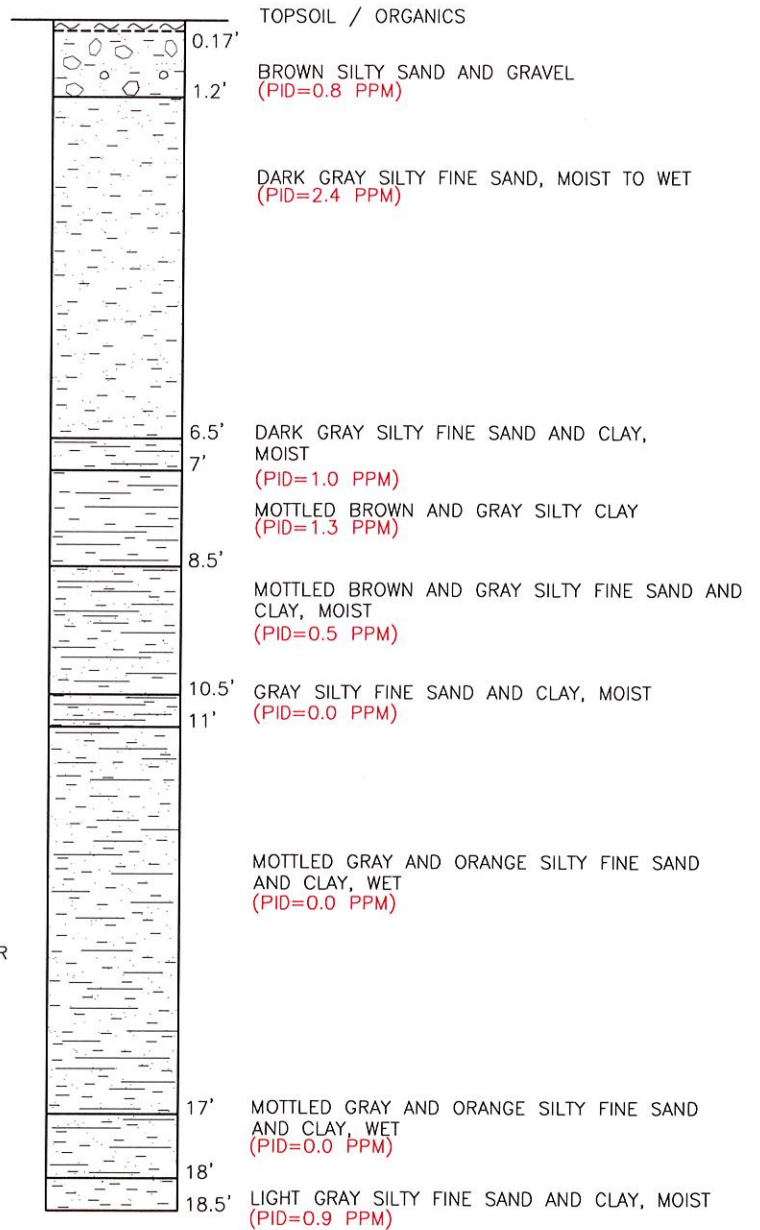
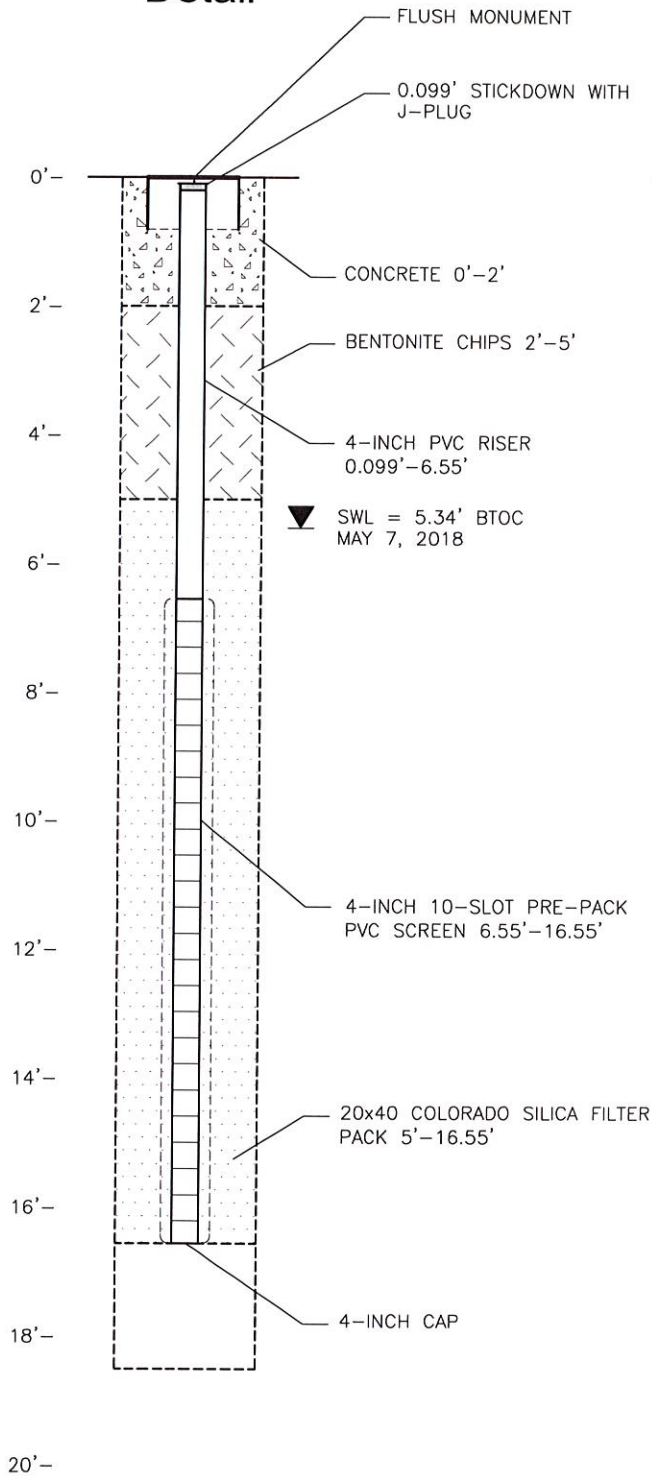
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Cowlitz County
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Well ID: BKL344

Figure 11
Construction and Geologic Log for Monitor Well 4
Ross-Simmons Hardwood Lumber: 250 Industrial Way Remediation Invest

Construction Detail

Geologic Log



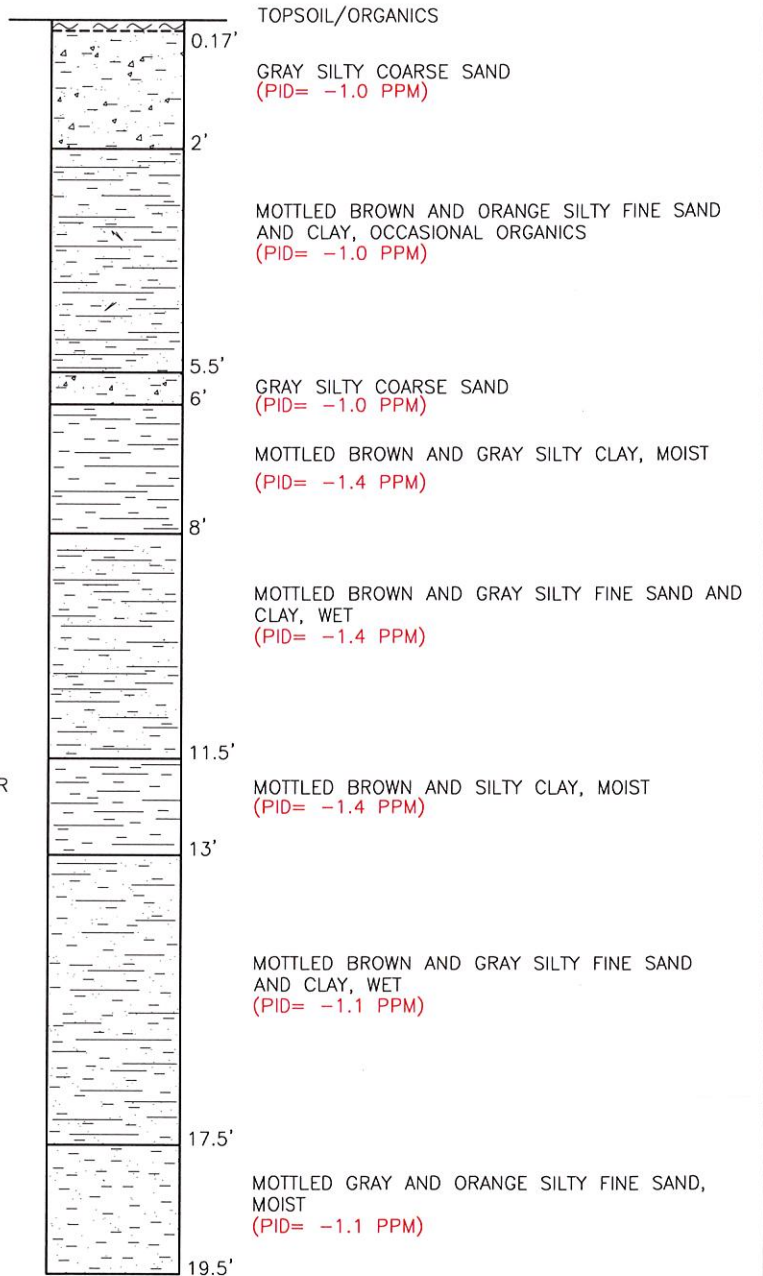
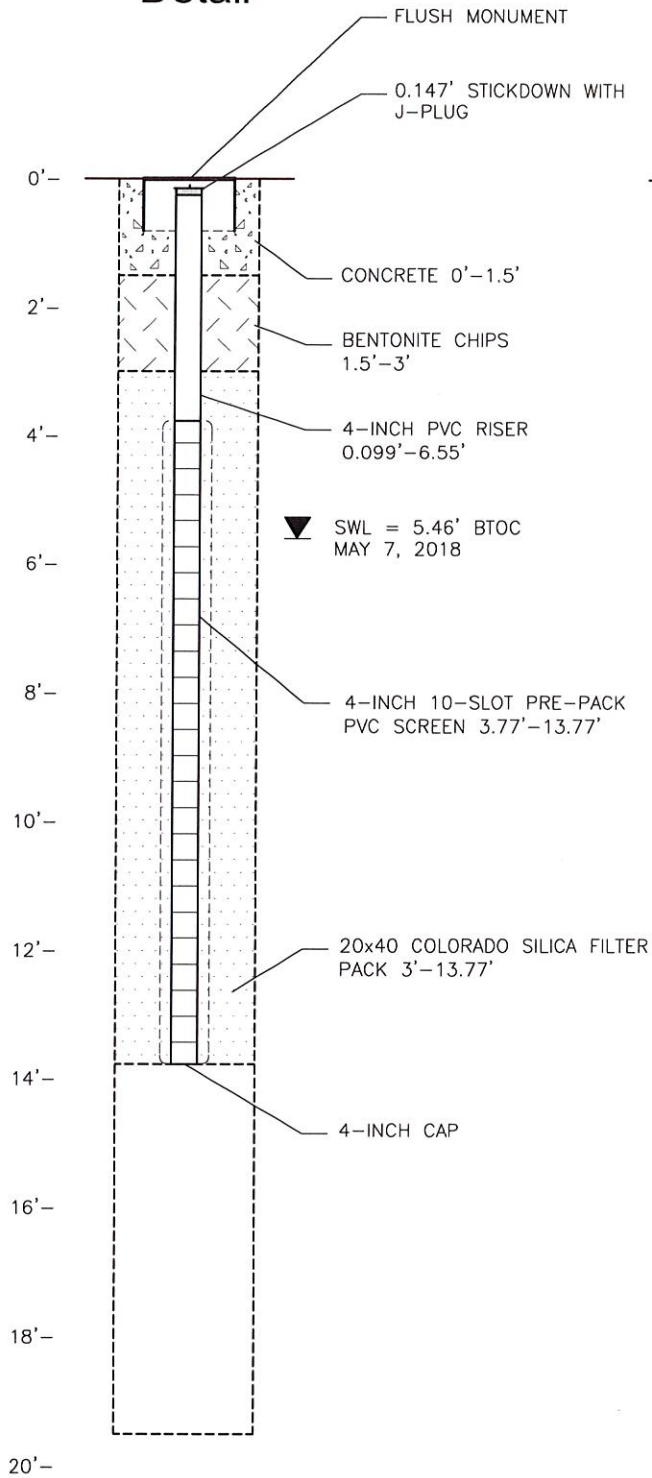
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September 2018
3283-001A

Cowlitz County
T 07 N/R 02 W - 03
Well ID: BKL345

Figure 12
Construction and Geologic Log for Monitor Well 5
Ross-Simmons Hardwood Lumber: 250 Industrial Way Remediation Invest

Construction Detail

Geologic Log



PM: JFH
September 2018
3283-001A

Cowlitz County
T 07 N/R 02 W - 03
Well ID: BKL346

Figure 13
Construction and Geologic Log for Monitor Well 6
Ross-Simmons Hardwood Lumber: 250 Industrial Way Remediation Invest