Development Services

From Concept to Construction

Phone: 503-823-7300 Email: bds@portlandoregon.gov 1900 SW 4th Ave, Portland, OR 97201
More Contact Info (http://www.portlandoregon.gov//bds/article/519984)

APPEAL SUMMARY

Status: Decision Rendered

Appeal ID: 23448	**Project Address:** Willamette River Mile 12.2
Hearing Date: 2/5/20	**Appellant Name:** Bob Wyatt
Case No.: B-021	**Appellant Phone:** 503-226-4211 x5425
Appeal Type: Building	**Plans Examiner/Inspector:** Jason Butler-Brown, Ian LaVielle
Project Type: lur	**Stories:** NA **Occupancy:** NA **Construction Type:** Sediment remediation (debris removal, dredging and
Building/Business Name: NA	**Fire Sprinklers:** No
Appeal Involves: other: variance to CCS 24.50.070	**LUR or Permit Application No.:** Exempt Review; PR18-257210ERC
Plan Submitted Option: mail [File 1]	**Proposed use:** There are no structures proposed as part of the sediment remedy, but fill material will be placed in

APPEAL INFORMATION SHEET

Appeal item 1

Code Section	24.50.060(F)(8)
Requires	NOTE: *The acknowledgment of the statement affirming authority to summit the appeal was made by the responding workgroup to the appeal w/in BDS in order to enter the appeal into the system. This acknowledgment was not made by the applicant and in no way implies or affirms that the applicant has acknowledged or agreed to the aforementioned statement. Per 24.50.060(F)(8)(a) -- to qualify as offset to a proposed fill below OHWM, the excavation may not be filled with water during non-storm winter conditions.
Code Modification or Alternate Requested	NW Natural is proposing to conduct a sediment remediation in the Willamette River, featuring a combination of dredging and capping. NW Natural requests a variance under City Code Section 24.50.070 to allow the cut and fill balance requirements to be met through excavation in-place (e.g., for the contaminated sediment dredging to balance the fill placement required for capping, with both dredging and capping occurring below the ordinary high water mark [OHWM]).
Proposed Design	The proposed project at the PGM site will include excavation and fill in the same locality, as defined in DEQ's Record of Decision (ROD) for the Former Portland Gas Manufacturing (PGM) Site, issued in June 2017, and as shown in the figures provided. The proposed cut and fill volumes are balanced as noted in the application materials provided to the City of Portland for the purposes of the exempt review.
Reason for alternative	

The proposed project is a sediment remedial action in the Willamette River, located near the Steel Bridge at river mile 12.2 west. This project has been designed by NW Natural in accordance with the terms of DEQ's selected remedial action as described in its ROD for the PGM site. Removal (dredging or excavation) of contaminated sediments and placement of sand cover, granular activated carbon (GAC) treatment caps, and rock armor are key components of the remediation. The locations for excavation and fill are identified based on the presence and distribution of contaminated sediments, as well as the need to protect the structural stability of the City of Portland's seawall.

The proposed project has been designed to achieve balance in the cut and fill volumes to avoid impacts to flood storage capacity within this reach of the Willamette River while ensuring that the sediment remedy appropriately addresses the risk posed by contaminated sediments. Table 1 shows the volume of dredging and cap (fill) placement distributed across each sediment decision unit (SDU), with a total dredge volume of 5,572 cubic yards and a total fill placement of 5,569 cubic yards. These quantities are based on the specifications of the Final (100%) Design documents, including construction contingencies. Different volumes may result during construction due to conditions encountered in the field; cut and fill quantity monitoring will occur during construction.

Further detail is included in pp. 6-10 of the appeal submitted January 29, 2020.

APPEAL DECISION

Allow cut and fill balance requirements to be met through excavation in place: Granted as proposed.

The Administrative Appeal Board finds that the information submitted by the appellant demonstrates that the approved modifications or alternate methods are consistent with the intent of the code; do not lessen health, safety, accessibility, life, fire safety or structural requirements; and that special conditions unique to this project make strict application of those code sections impractical.

Pursuant to City Code Chapter 24.10, you may appeal this decision to the Building Code Board of Appeal within 90 calendar days of the date this decision is published. For information on the appeals process, go to www.portlandoregon.gov/bds/appealsinfo, call (503) 823-7300 or come in to the Development Services Center.

P L G

PEARL LEGAL GROUP PC

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Via hand delivery

January 29, 2020

Appeal Board
City of Portland
Bureau of Development Services
1900 SW 4th Avenue, Suite 5000
Portland, Oregon 97201

Re: Appeal for Variance under City Code Section 24.50.070
NW Natural, PGM Site Remediation

To Whom It May Concern:

On behalf of NW Natural, I am submitting the enclosed Building Code Appeal Form, which includes attached figures and a technical memorandum prepared by NW Natural's consultant, Anchor QEA, dated June 5, 2019. These materials have undergone a preliminary review by Jason Butler-Brown and Ian LaVielle in the BDS Site Development Section.

If you have any questions or require additional information, please do not hesitate to contact me directly at the number or email address above. You may also contact Bob Wyatt of NW Natural, identified as the appellant on the application, though he is out of the office this week and therefore may not be able to immediately respond.

Sincerely,

Rachel L. Melissa

6720 SW Macadam Avenue, Suite 125
Portland, Oregon 97219
503.670.1108

ANCHOR QEA

January 29, 2020

City of Portland Permits and Inspections: Appeal Form

***Type of Appeal:**

☒ Building

☐ Plumbing

☐ Mechanical

☐ Electrical

☐ Fire View Instructions

***Project Type:**

☐ One & Two Family Residential

☐ Commercial

☒ LUR

***This appeal involves:**

☐ Erection of a new structure

☐ Alteration of an existing structure

☐ Addition to an existing structure

☐ Correction of a violation

☐ Reconsideration of appeal ID# Click or tap here to enter text.

☐ Change of Occupancy: From: Click or tap here to enter text. To: Click or tap here to enter text.

☒ Other (specify): NW Natural is proposing to conduct a sediment remediation in the Willamette River, featuring a combination of dredging and capping. NW Natural requests a variance under City Code Section 24.50.070 to allow the cut and fill balance requirements to be met through excavation

in-place (e.g., for the contaminated sediment dredging to balance the fill placement required for capping, with both dredging and capping occurring below the ordinary high water mark [OHWM]).

***Proposed Use of Structure:**

There are no structures proposed as part of the sediment remedy, but fill material will be placed in the Willamette River below the OHWM as part of the sediment remedy approved by the Oregon Department of Environmental Quality (DEQ).

Building/Business Name:

Not Applicable

***Project Address:**

*Street Address: NW Everett Street and SR 99 West (Steel Bridge); Willamette River Mile 12.2

Legal Description – Lot: Tax Map No. 889; T1N01ES34db

Block: Not Applicable

Addition: Not Applicable

*~~Owner's~~ *Applicant's*[1] Name: NW Natural

*~~Owner's~~ *Applicant's* Address: 220 NW Second Avenue, Portland, Oregon 97209

***Please provide one of the following choices below:**

☐ Permit No: Click or tap here to enter text.

☐ LUR No: Click or tap here to enter text.

☐ Preliminary

☒ Other: Exempt Review; PR18-257210ERC

***Number of Stories**

[1] NW Natural is not the owner of the submerged land that is the subject of this project. That land is owned by the State of Oregon, Department of State Lands. The upland property adjacent to the project site is owned by the City of Portland. For these reasons, the language of this application has been changed from "Owner" to "Applicant."

Not Applicable

***Occupancy Group:**

Not Applicable

***Construction Type:**

Sediment remediation (debris removal, dredging and capping)

***Fire Sprinklers**

☒ No

☐ Yes: Location: Click or tap here to enter text.

***Plans Examiner/Inspector:**

Jason Butler-Brown

***Payment Options: Please refer to the BDS Fee Payment or Fire Fee Payment instructions.**

☐ Payment by Mail

☐ Online Payment

☒ Payment in Person

***Plan Submittal Options:**

☐ Mail

☒ Attach PDF

~~**I am the property owner, or the property owner's agent.**~~[2] **In accordance with City Code Section 24.10.075, I am authorized to submit an appeal for an alternative material, design or method of construction or equipment or a modification to the strict interpretation of the Building Code as adopted by the City of Portland as outlined in the attached information. I hereby acknowledge that the City is not liable for any damages that result from or relate to any formal decision rendered by the City with respect to this appeal.**

* ☒ **Agreed and acknowledged**

*Appellant Name: Bob Wyatt

Firm Name: NW Natural

*Appellant Address: 220 NW Second Avenue

*City: Portland

*State: Oregon

*ZIP Code: 97209

*Appellant Phone: 503-226-4211 x5425

*Email Address: rjw@nwnatural.com

*Code Section: 24.50.060(F)(8)

Appellant Signature_____ **Date** 1/29/2020

***Requirements:**

Please describe the requirements of the code section listed above.

[2] As noted in footnote 1, NW Natural is not the owner of the submerged land that is the subject of this project. That land is owned by the State of Oregon. The upland property adjacent to the project site is owned by the City of Portland. NW Natural's corporate predecessors formerly owned and operated a manufactured gas plant on several upland parcels adjacent to this project site from approximately 1860 to 1913. NW Natural has designed this sediment remediation project in collaboration with the Oregon Department of Environmental Quality (DEQ) and in conformance with DEQ's Record of Decision, which presents the State's selected in-water remedial action for the site.

Per 24.50.060(F)(8)(a) -- to qualify as offset to a proposed fill below OHWM, the excavation may not be filled with water during non-storm winter conditions.

***Proposed Design:**

Describe the alternate methods and/or materials of construction to be used or that exist. (Be as specific and detailed as possible). If this is a Reconsideration of an appeal, enter the original appeal text, followed by a section titled "Reconsideration Text" along with new language.

The proposed project at the PGM site will include excavation and fill in the same locality, as defined in DEQ's Record of Decision (ROD) for the Former Portland Gas Manufacturing (PGM) Site, issued in June 2017, and as shown in the figures provided. The proposed cut and fill volumes are balanced as noted in the application materials provided to the City of Portland for the purposes of the exempt review.

***Reason for Alternative:**

Describe why the alternate is required and how it will provide equivalent health, accessibility, structural capacity, energy conservation, life safety or fire protection to what the code requires. If this is a Reconsideration of an appeal, enter the original appeal text, followed by a section titled "Reconsideration Text" along with new language.

The proposed project is a sediment remedial action in the Willamette River, located near the Steel Bridge at river mile 12.2 west. This project has been designed by NW Natural in accordance with the terms of DEQ's selected remedial action as described in its ROD for the PGM site. Removal (dredging or excavation) of contaminated sediments and placement of sand cover, granular activated carbon (GAC) treatment caps, and rock armor are key components of the remediation. The locations for excavation and fill are identified based on the presence and distribution of contaminated sediments, as well as the need to protect the structural stability of the City of Portland's seawall.

The proposed project has been designed to achieve balance in the cut and fill volumes to avoid impacts to flood storage capacity within this reach of the Willamette River while ensuring that the sediment remedy appropriately addresses the risk posed by contaminated sediments. Table 1 shows the volume of dredging and cap (fill) placement distributed across each sediment decision unit (SDU), with a total dredge volume of 5,572 cubic yards and a total fill placement of 5,569 cubic yards. These quantities are based on the specifications of the Final (100%) Design documents, including construction contingencies. Different volumes may result during construction due to conditions encountered in the field; cut and fill quantity monitoring will occur during construction.

Table 1
Remedial Actions, Cut, and Fill Summary by Sediment Decision Unit

SDU Name	SDU Area	Remedial Technology	Dredge Area	Total Dredge Volume[1]	Cap and Cover Area	Total Cap and Cover Volume[2]		
						Sand	Sand and GAC	Armor
A	9,669 sf	GAC-Amended Treatment Cover	4,356 sf	461 cy	9,669 sf	--	535 cy	--
B2	4,909 sf	EMNR	--	--	4,909 sf	256 cy	--	--
C1	17,382 sf	Partial Dredge and Armored Treatment Cap	17,382 sf	3,062 cy	15,926 sf	--	859 cy	1,036 cy
C3	5,393 sf	EMNR	--	--	5,393 sf	303 cy	--	--
D	4,489 sf	GAC-Amended Treatment Cover	--	--	4,489 sf	--	226 cy	--
E	11,085 sf	Surface Product Removal with Armored Treatment Cap	11,085 sf	1,735 cy	10,014 sf	--	546 cy	657 cy
F1	7,749 sf	EMNR	--	--	7,749 sf	404 cy	--	--
G	2,739 sf	Dredge and Dredge Residual Cover	2,739 sf	314 cy	2,317 sf	133 cy	--	--
H	11,923 sf	Dredge Residual Cover	--	--	11,923 sf	63 cy	--	--
Total Area	**105,438 sf**	**Total Cut/Fill**	**35,562 sf**	**5,572 cy**	**72,389 sf**	**1,712 cy**	**2,165 cy**	**1,692 cy**
						5,569 cy		

Notes:
These figures are estimates based on the most recent design and include a 10% margin of error.
1. Total dredge volumes include overdredge allowance.
2. Total fill volumes include overplacement allowance and dredge residuals cover.

--: not applicable
cy: cubic yard
EMNR: enhanced monitored natural recovery
GAC: granular activated carbon
sf: square foot

Although the PGM project involves excavation and subsequent placement of fill in an area filled with water during non-storm conditions, and therefore does not strictly satisfy the specific terms of City Code 24.50.060(F)(8)(a), the project does meet the overall objectives of this code provision in that it is designed to achieve balanced cut and fill volumes in place. It has further been confirmed through site-specific hydraulic modeling (as presented in the memorandum "No Rise Hydraulic Modeling Evaluation," dated December 3, 2019, and submitted to BDS under separate cover on December 6, 2019, to address compliance with City Code 24.50.060.D), that the anticipated flood rise associated with project construction will be well below the no-rise criterion, and therefore insignificant. The

design provides for sediment volumes that will be equivalent to current conditions and will not yield any negative impact on public health and safety or the structural capacity of the river, and implementation of the remedial action will provide a significant overall environmental improvement. Finally, given the location of the PGM site adjacent to the seawall fronting Tom McCall Waterfront Park, co-located upland areas are not available for excavation per the terms of City Code 24.50.060(F)(8)(a).

Portland City Code 24.50.070.B additionally instructs applicants to consider a specified list of "relevant factors and standards" in requests for a variance. The text of the Code's variance criteria is listed below in bold and italicized font; each criterion is followed by NW Natural's response as pertaining to the PGM project.

1. The danger that materials may be swept into other lands to the injury of others.

The PGM remediation site is fully submerged and subject to the flows and erosive forces of the Willamette River. As described in the Revised Final Design Report (Version 2), prepared by Anchor QEA and submitted to DEQ in September 2019, the PGM sediment remedy was designed to withstand extreme flood events, wave erosion, and vessel propwash forces (primarily during Rose Festival Fleet Week) to ensure protection of ecological receptors and human health. Further, a moonpool containment system, bedload baffle, and other engineering controls and best management practices will be implemented, along with a rigorous water quality monitoring program, to ensure there are no significant releases of materials during construction. Therefore, NW Natural does not anticipate that material from the PGM remedy would be transported downstream in any quantities that would cause injury to others (either humans or wildlife), as required by the remedial action objectives that DEQ has specified for this project (see also response to variance criterion #4).

2. The danger to life and property due to flooding or erosion damage.

As explained in the December 3, 2019 memorandum from Anchor QEA (John Verduin, Nathan Holliday, and Matt Henderson) to the City of Portland (Jason Butler-Brown, Ian LaVielle, and Stacy Castleberry) entitled "No-Rise Hydraulic Modeling Evaluation, Former Portland Gas Manufacturing Site," the results from Anchor QEA's hydraulic analysis indicate that the remedial action proposed for the PGM site is not expected to have any measurable impact on 100-year flood water surface elevations within the regulatory floodway or the 100-year floodplain in and around the PGM site (hydraulic model results of the post-project condition indicate a maximum water surface elevation rise of 0.001 ft., which is well below the allowable no-rise criterion of 0.005 ft.). Therefore, no known or anticipated danger to life or property exists due to flooding as a result of this project.

The Revised Final Design Report (Version 2), which was prepared by Anchor QEA and submitted to DEQ in September 2019, indicates that the remedial action incorporates armor stone specifications designed to resist erosion by propwash, wave and river scour to provide long-term protection of the sediment remedy. A cap erosion protection evaluation is provided in Appendix D of the Revised

Final Design Report. Accordingly, no known or anticipated danger to life or property exists due to erosion as a result of the PGM project.

3. The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner.

The PGM remediation site is fully submerged; riverbed elevations at the site range from -16 feet City of Portland datum (COP) along the base of the seawall to -43 feet COP on the outer boundary of the site. Flooding is unlikely to have a damaging effect on the proposed remediation. As Anchor QEA explained in its Revised Final Design Report, during extreme flood events, sediment scour at the PGM site is unlikely to disturb sediments below the surficial bioturbation zone. Based on a calibrated hydrodynamic model of the Willamette River developed to support the draft feasibility study for Portland Harbor (Anchor QEA 2012), the maximum scour depth during the 1996 flood was estimated at 2 to 8 cm (approximately 1 to 3 inches) in the reach of the river containing the PGM site. The SDUs associated with MNR and EMNR are in areas that are not likely to be affected by significant propwash forces. In addition, the site is located on the depositional side of the river (i.e., on the inside bend of a leftward meander), so any minor scour that might occur would likely be quickly infilled. Accordingly, NW Natural does not anticipate damage to the PGM remedy in the event of a flood. This will be verified with regularly scheduled bathymetric surveys during long-term monitoring.

4. The importance of the services provided by the proposed facility to the community.

The importance of the PGM remedial project to protect human health and the environment and achieve acceptable levels of risk is explained by DEQ in its ROD: "*The selected remedy will address the potential for ecological and human receptors in the river to be exposed to site-related contamination in sediment and porewater through either direct contact or bioaccumulation through the food chain. Treatment caps will also address contaminant migration from the adjacent upland via groundwater-to-surface water discharge*." The ROD further specifies the following Remedial Action Objectives (RAOs) for the PGM sediment remediation project:

- Assure protection of ecological receptors (i.e., fish and invertebrates) and humans from risks associated with contaminated sediment, TZW [transition zone water], and SW [surface water], through the achievement of acceptable risk levels as defined in OAR 340-122-0115. The primary risk pathways that will be controlled as part of this remedial action include the following:
    - Direct risk to benthic organisms from surface sediment and TZW (via direct contact and ingestion) for PAHs, TPH, and, to a lesser degree, target metals and free cyanide;
    - Bioaccumulation risk to fish from PAHs in sediment; and
    - Bioaccumulation risk to humans from PAHs in sediment and, to a lesser degree, SW.
- Prevent or minimize future releases and migration of COCs in subsurface sediment and groundwater into the zone of exposure for ecological and human receptors. TZW contamination derived from both local impacted sediments and from upland groundwater sources may be commingled and will be addressed at the point of discharge through the in-water remedy.

- Remove or treat hot spots of contamination if feasible.
- Ensure protection is maintained over time through long-term monitoring, maintenance, and periodic review as appropriate of the selected remedy elements (DEQ 2017).

5. The necessity to the facility of a waterfront location, where applicable.

The contamination to be addressed by DEQ's selected remedial action is located in the Willamette River sediment between river miles 12.1 and 12.3. By necessity, the contamination dictates the location of the remediation project.

6. The availability of alternative locations, not subject to flooding or erosion damage.

As explained in #5, this inquiry is not applicable.

7. The compatibility of the proposed use with existing anticipated development.

The contamination to be addressed is located in the Willamette River sediment between river miles 12.1 and 12.3. NW Natural is not aware of any anticipated development for this area. Development on the adjacent uplands is precluded by Waterfront Park.

8. The relationship of the proposed use to the Comprehensive Plan and Floodplain Management Program for that area.

The contamination to be addressed is located in the Willamette River sediment between river miles 12.1 and 12.3, on fully submerged land. The proposed remedy is designed to preserve or enhance the existing beneficial uses of the area, including preservation of navigation to allow continued docking of visiting military vessels during Fleet Week, and enhancement of environmental quality as a result site remediation. This area of the river is zoned for open space, and the remedial action will have no impact on that designation.

9. The safety of access to the property in times of flood for ordinary and emergency vehicles.

The PGM project is located on fully submerged land, with no possibility of land-based vehicular traffic under any circumstances. Continued river-side access by marine vessels will be unaffected by the project.

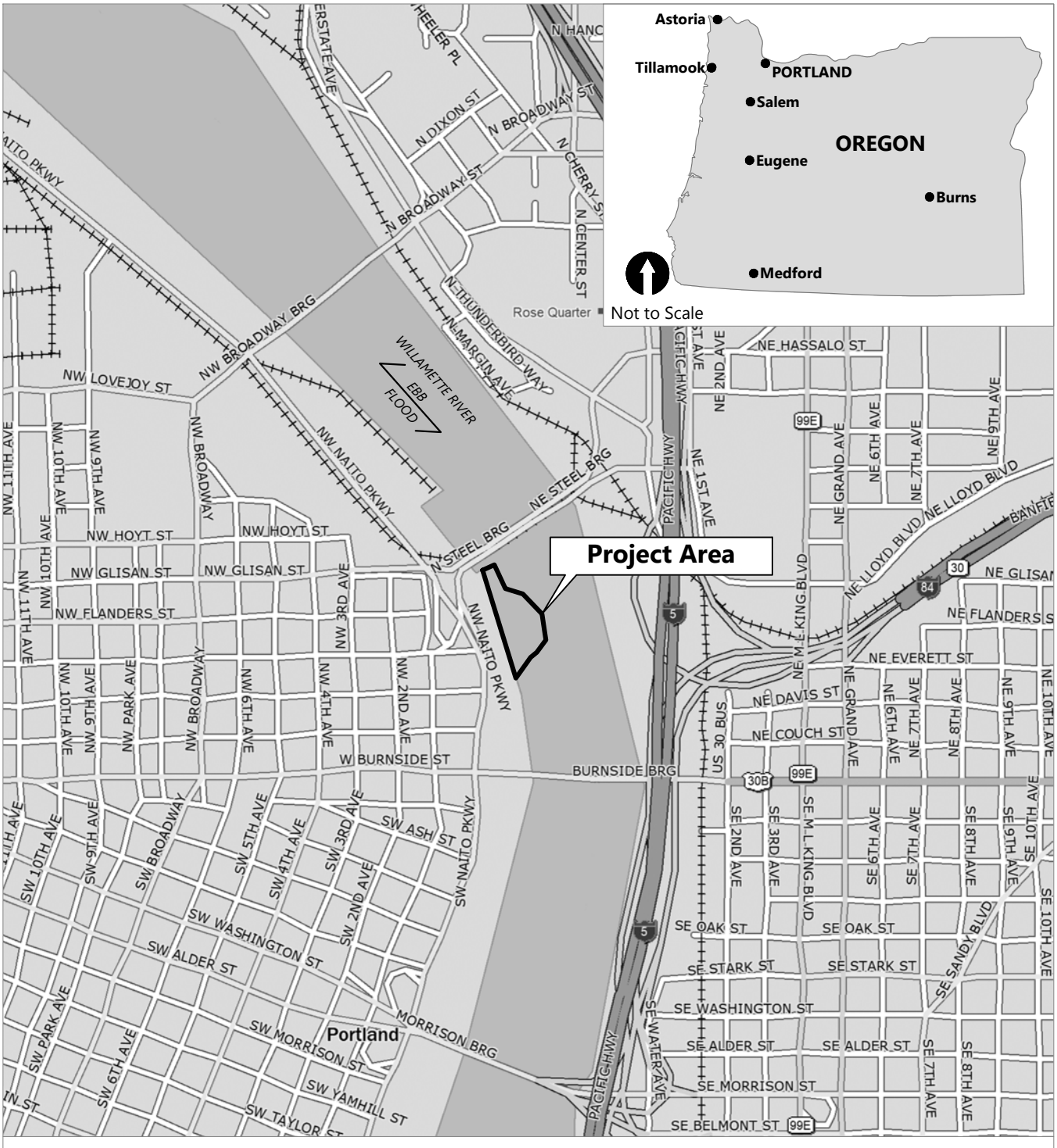
10. The expected heights, velocity, duration, rate of rise, and sediment transport of the flood waters and the effects of wave action, if applicable, expected at the site.

As described in the December 3, 2019 memorandum from Anchor QEA (John Verduin, Nathan Holliday, and Matt Henderson) to the City of Portland (Jason Butler-Brown, Ian LaVielle, and Stacy Castleberry) entitled "No-Rise Hydraulic Modeling Evaluation, Former Portland Gas Manufacturing Site," the results from Anchor QEA's hydraulic analysis indicate that the remedial action proposed for the PGM site is not expected to have any measurable impact on 100-year flood water surface elevations within the regulatory floodway or the 100-year floodplain in and around the PGM site (hydraulic model results of the post-project condition indicate a maximum water surface elevation rise of 0.001 ft., which is well below the allowable no-rise criterion of 0.005 ft.). Impacts to flood

velocities, durations, rates of rise, and sediment transport are similarly expected to be negligible. As described in the PGM Cap Erosion Protection Evaluation (Appendix D to the Revised Final Design Report (Version 2), dated September 2019), capped areas will be armored with 3" to 4" rock to protect the sediment remedy from erosive forces during 100-year floods as well as critical wave and vessel propwash conditions. As described in Anchor QEA, 2012, the maximum scour depth expected in unarmored MNR and EMNR areas during a 100-year flood (as represented by the 1996 flood) is only 2 to 8 cm (approximately 1 to 3 inches); in addition, a majority of the project area is net depositional and will be quickly infilled following a flood event. This is well within the depth range of normal biological mixing processes in riverbed sediments. Therefore, no significant erosion or sediment transport is expected to occur even during extreme flood events and other critical conditions.

11. The costs of providing governmental services during and after flood conditions including maintenance and repair of public utilities and facilities such as sewer, gas, electrical, and water systems, and streets and bridges; Upon consideration of the factors listed above and the purposes of this Chapter, such conditions may be attached to the granting of variances as deemed necessary.

Not applicable.



SOURCE: ©DeLorme, Topo USA®.

Latitude: N45° 31.5724'
Longitude: W122° 40.1662'
Section-Township-Range: S34-T1N-R1E

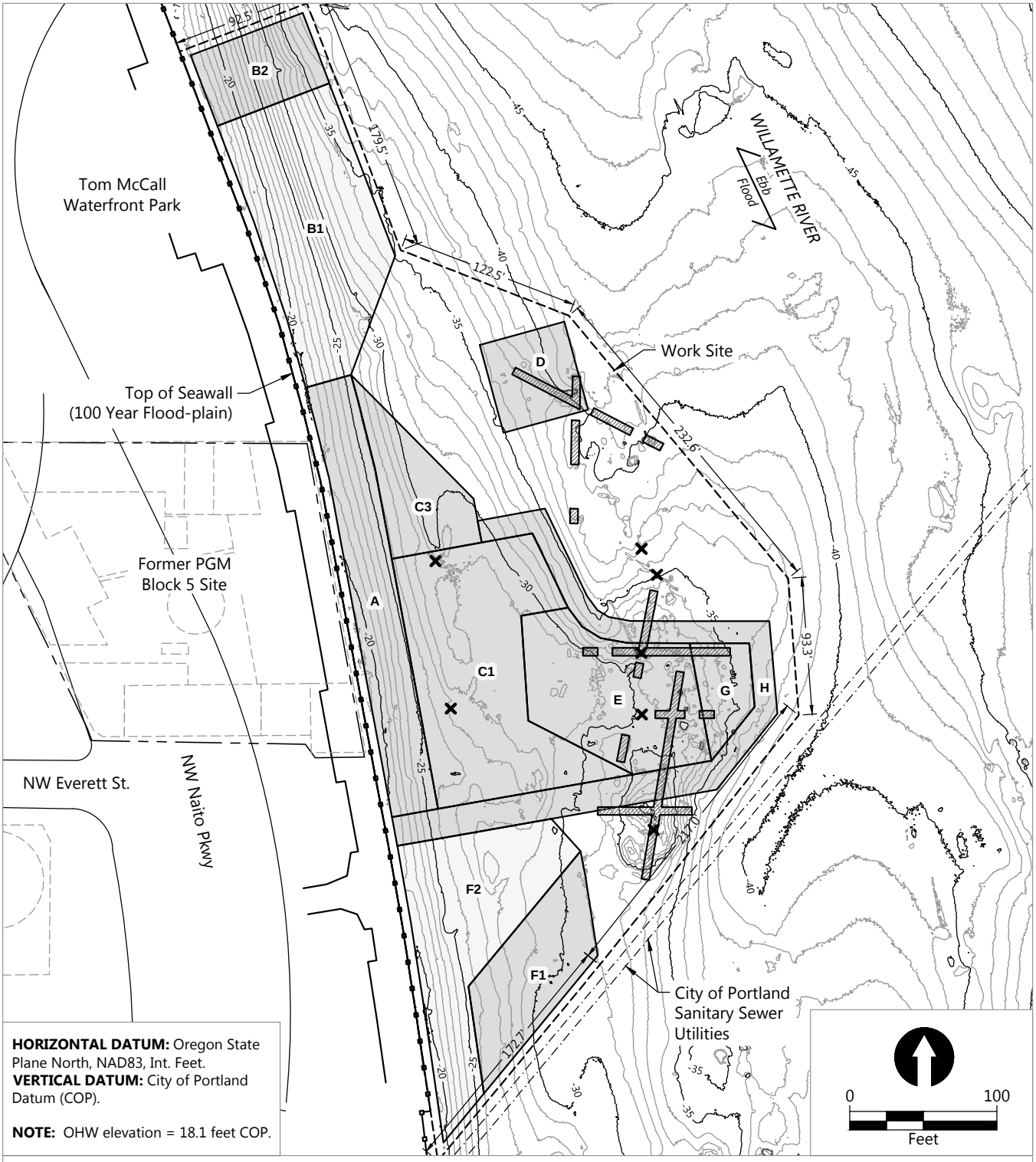
Publish Date: 2018/10/19 12:04 PM | User: mpratschner
Filepath: K:\Projects\0029-NW Natural Gas Co\Portland Gas Manufacturing Site\Permitting\0029-PM-009 (Vicinity Map-JPA).dwg FIG1

Date: August 2018

ANCHOR QEA

Figure 1
Vicinity Map

Joint Permit Application
NW Natural - Former Portland Gas Manufacturing Site Remediation
Portland, Oregon



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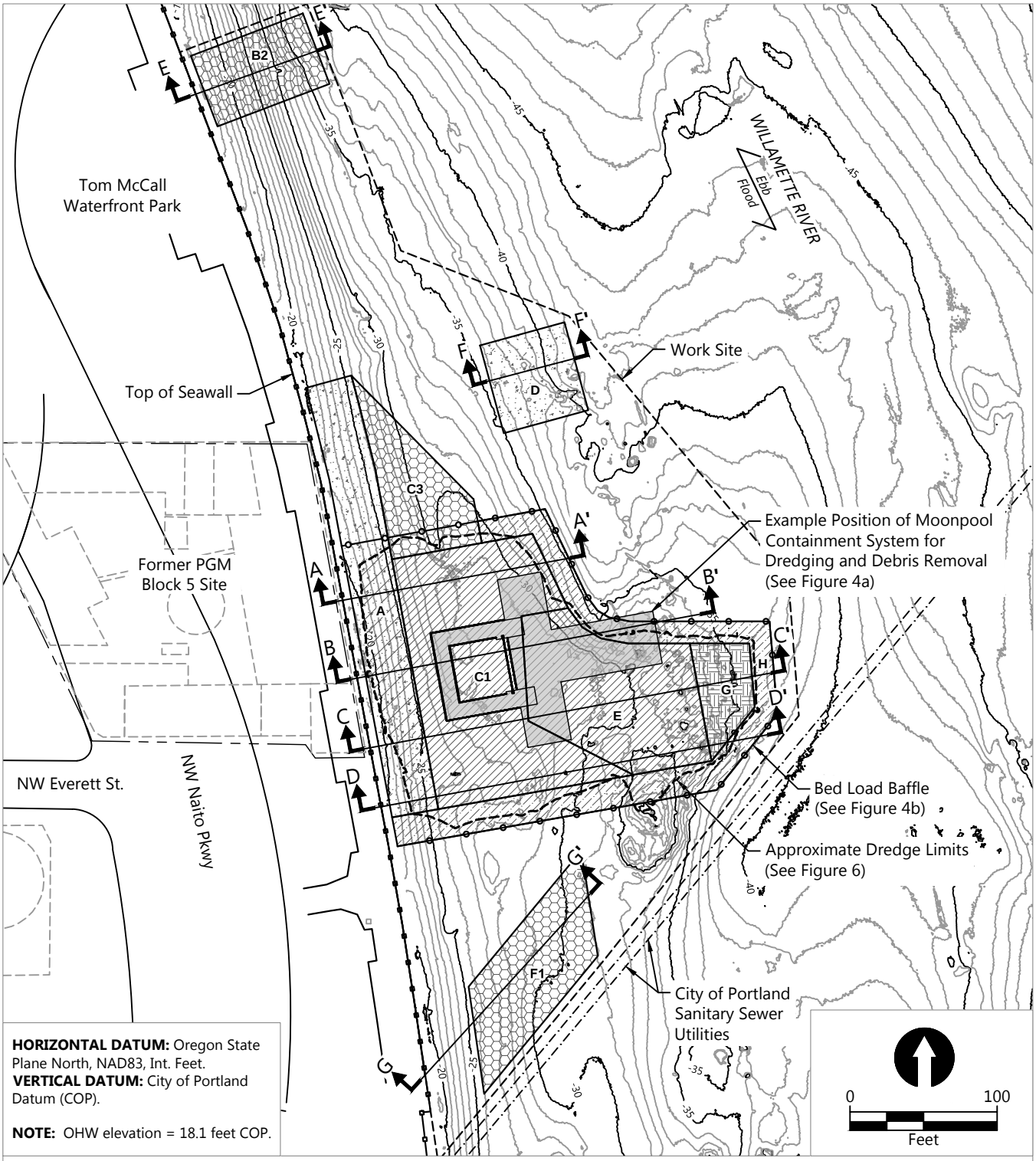
Date: August 2018

ANCHOR QEA

Figure 2
Site Map

Joint Permit Application
NW Natural - Former Portland Gas Manufacturing Site Remediation
Portland, Oregon



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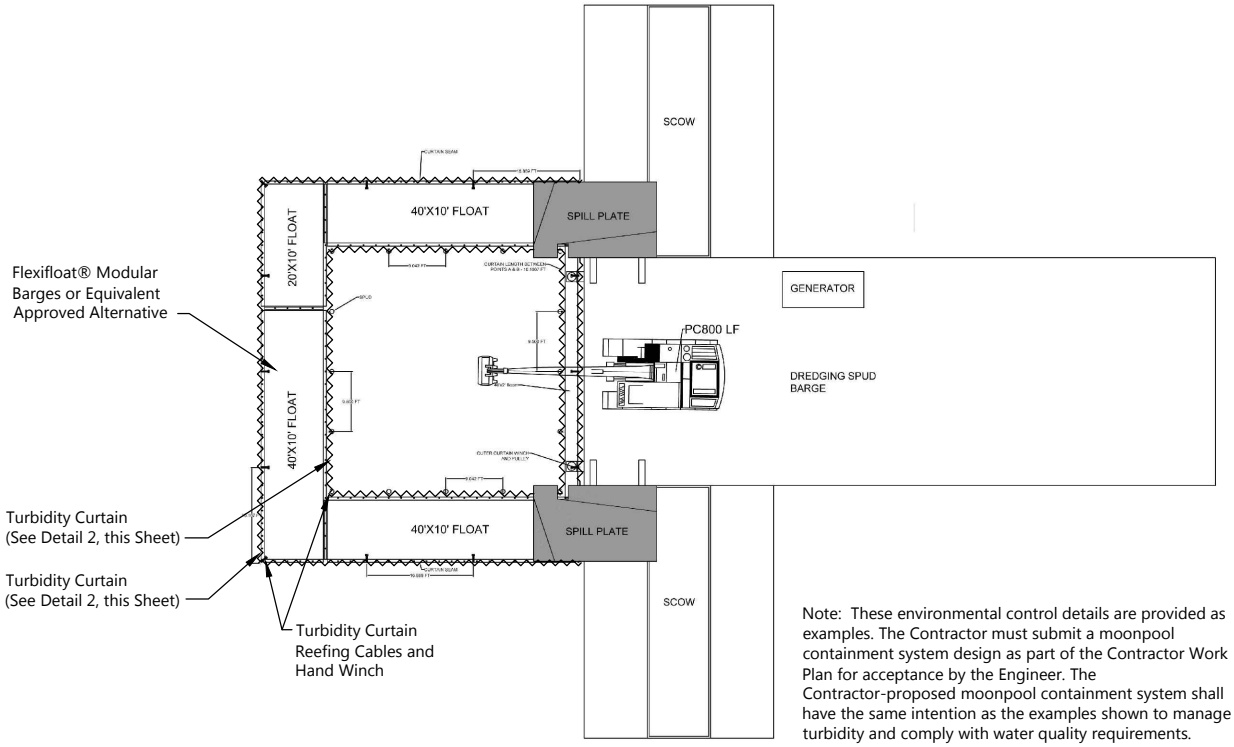
Date: August 2018

ANCHOR QEA

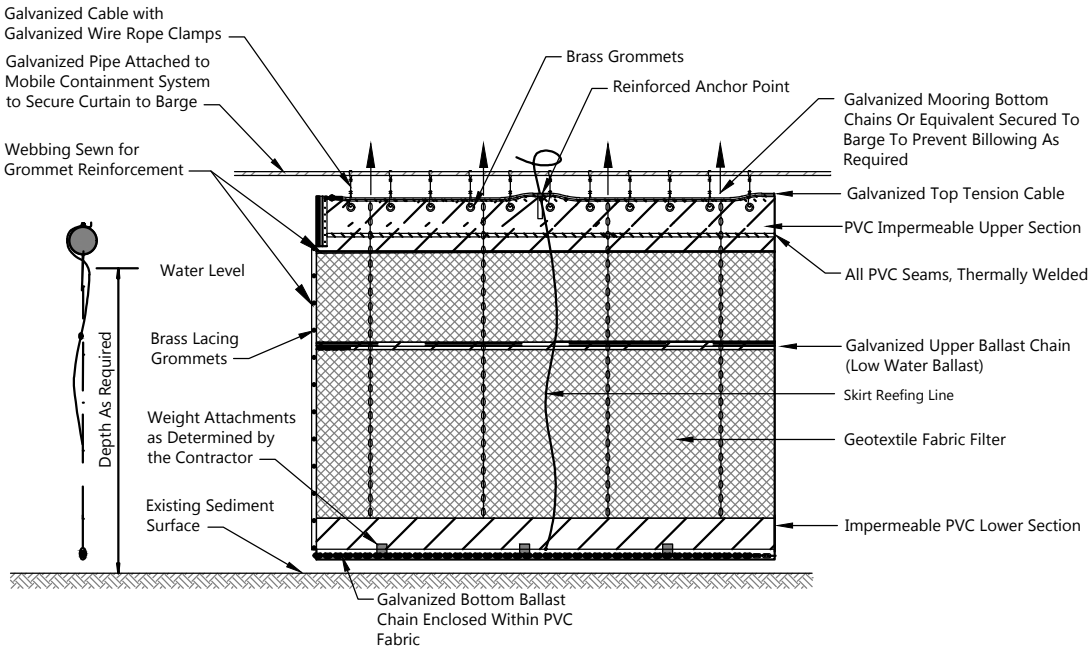
Figure 3
Overview of Work and Environmental Controls

Joint Permit Application
NW Natural - Former Portland Gas Manufacturing Site Remediation
Portland, Oregon



Note: These environmental control details are provided as examples. The Contractor must submit a moonpool containment system design as part of the Contractor Work Plan for acceptance by the Engineer. The Contractor-proposed moonpool containment system shall have the same intention as the examples shown to manage turbidity and comply with water quality requirements.

Detail 1 - Example Moonpool Containment System Plan Details



Notes:

1. Permeable turbidity curtains included in the mobile turbidity curtain system.
2. Contractor shall maintain the bottom of the turbidity curtain approximately 2 feet above the sediment surface.

Detail 2 - Example Turbidity Curtain

Not to Scale

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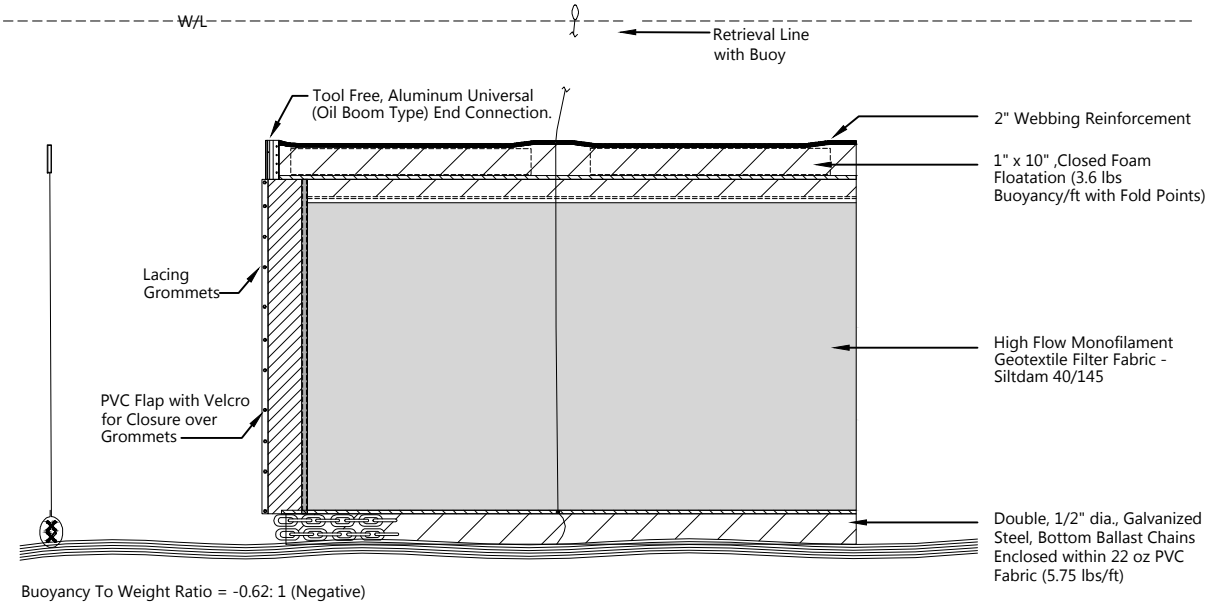
Date: August 2018

ANCHOR QEA

Figure 4a
Environmental Controls Details for Dredging and Debris Removal

Joint Permit Application
NW Natural - Former Portland Gas Manufacturing Site Remediation
Portland, Oregon



Detail 3 - Example Bed Load Baffle

Not to Scale

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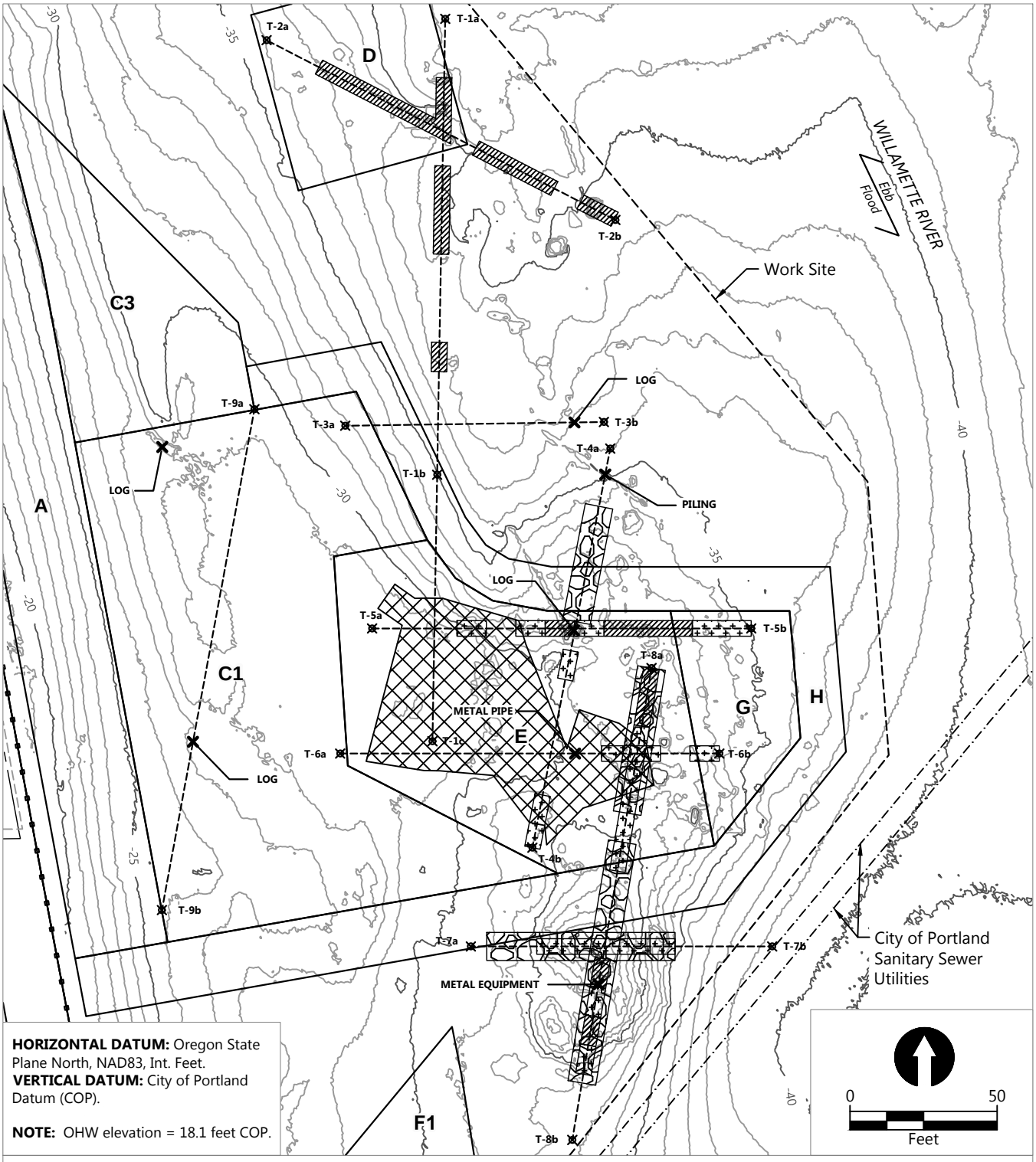
Date: August 2018

ANCHOR QEA

Figure 4b
Environmental Controls Details for Dredging and Debris Removal

Joint Permit Application
NW Natural - Former Portland Gas Manufacturing Site Remediation
Portland, Oregon



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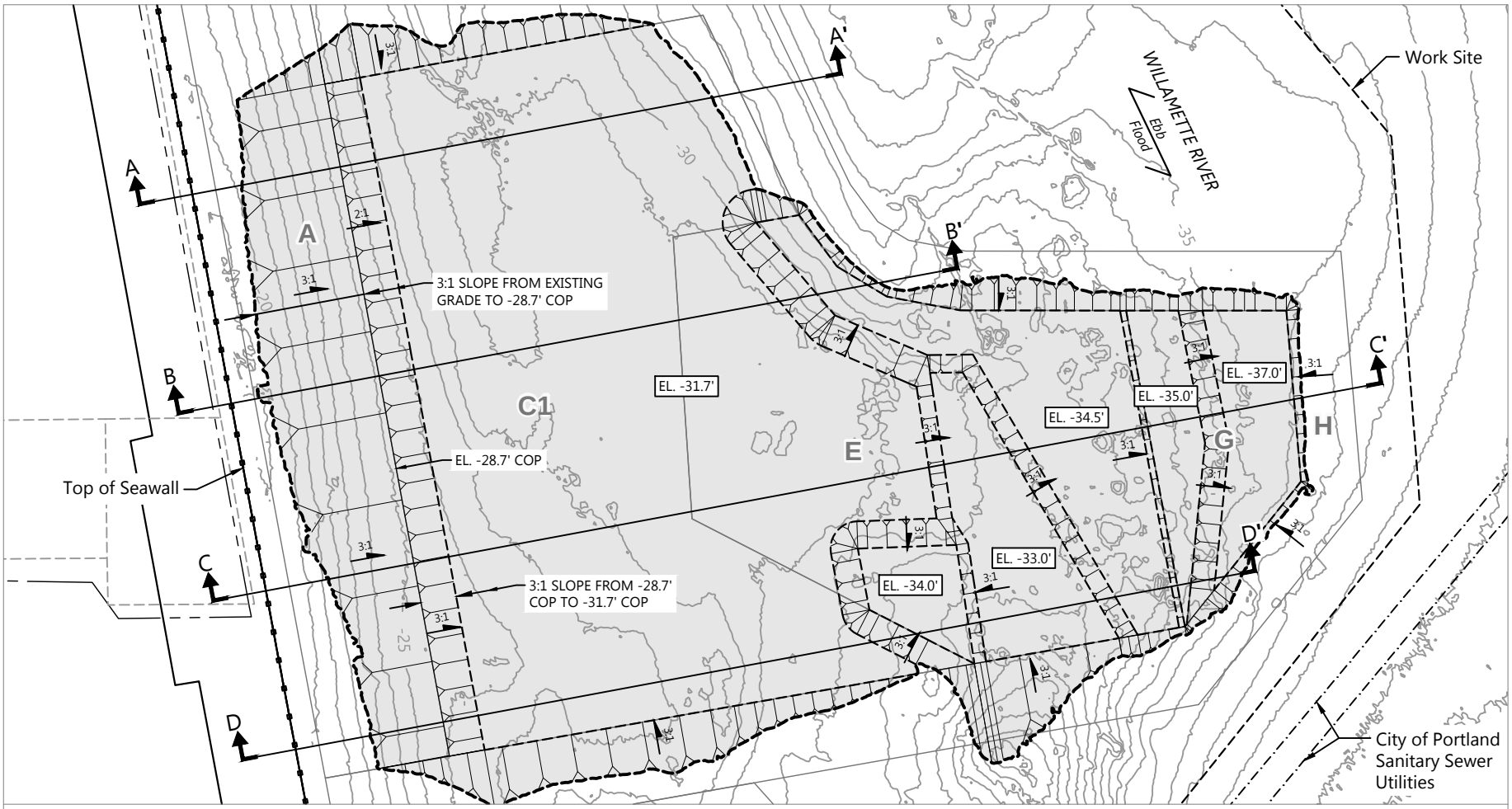
Date: August 2018

ANCHOR QEA

Figure 5
Identified Debris Plan

Joint Permit Application
NW Natural - Former Portland Gas Manufacturing Site Remediation
Portland, Oregon



HORIZONTAL DATUM: Oregon State Plane North, NAD83, Int. Feet.
VERTICAL DATUM: City of Portland Datum (COP).

NOTES:

1. OHW elevation = 18.1 feet COP.
2. Target volume of removal = 3,694 cy.

LEGEND:

- Work Site
- A — Sediment Decision Unit Areas
- 2017 Bathymetric Contours (1-Foot Intervals)
- Approximate Limits of Dredging
- Proposed Elevation of Cut Internal Boundary
- Proposed Slope/Grading Line
- 3:1 — Slope and Direction
- EL. -31.7' — Required Dredge Elevation (COP)

0 40 Feet

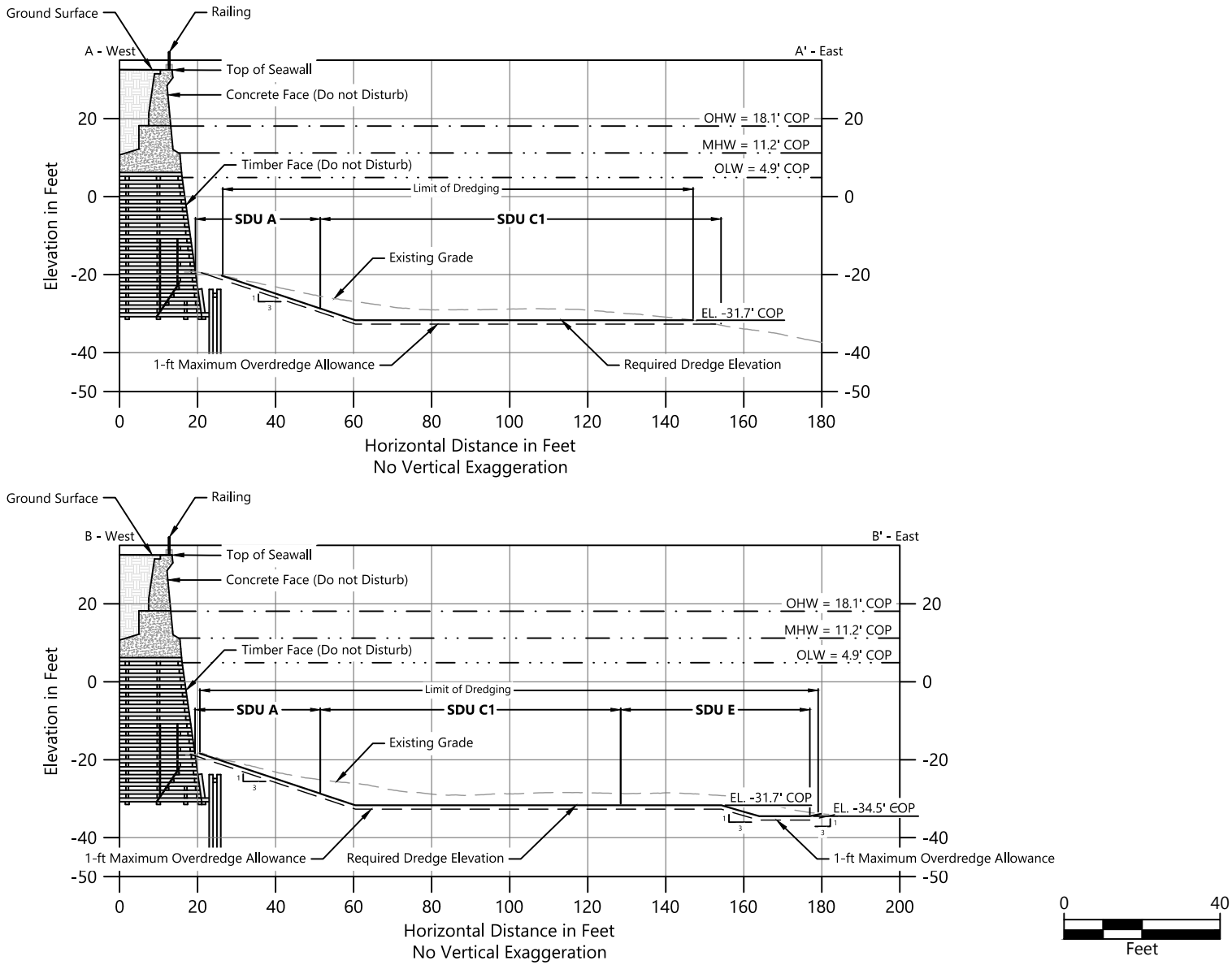
Publish Date: 2018/10/19 12:04 PM | User: mpratschner
Filepath: K:\Projects\0029-NW Natural Gas Co\Portland Gas Manufacturing Site\Permitting\0029-PM-014 (Dredge-Plan-JPA).dwg FIG6

Date: August 2018

ANCHOR QEA

Figure 6
Dredge Plan

Joint Permit Application
NW Natural - Former Portland Gas Manufacturing Site Remediation
Portland, Oregon



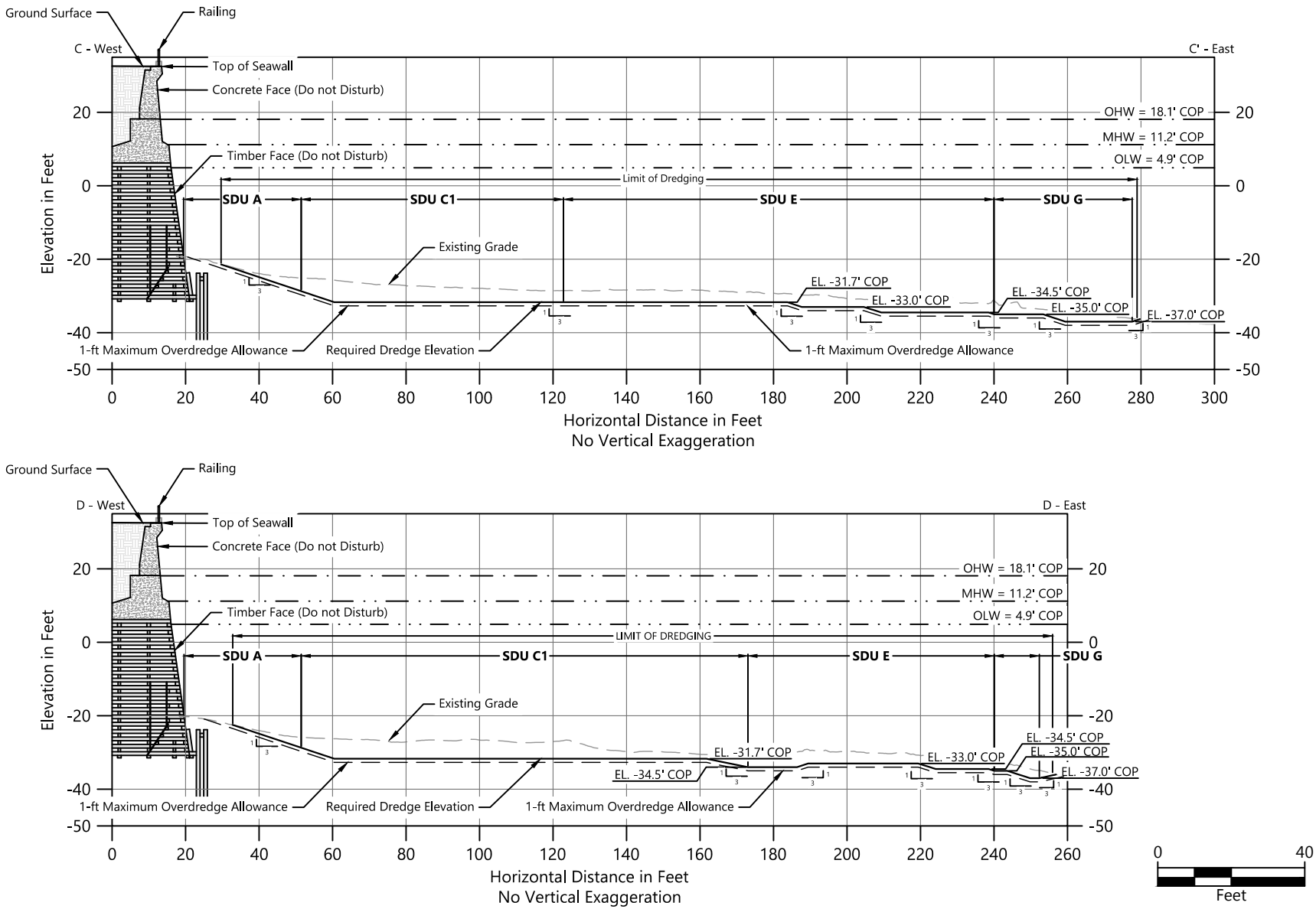
Publish Date: 2018/10/19 12:05 PM | User: mpratschner
Filepath: K:\Projects\0029-NW Natural Gas Co\Portland Gas Manufacturing Site\Permitting\0029-PM-020 (Dredge Sections-JPA).dwg FIG7

Date: August 2018

ANCHOR QEA

Figure 7
Dredge Cross Sections A-A' and B-B'

Joint Permit Application
NW Natural - Former Portland Gas Manufacturing Site Remediation
Portland, Oregon



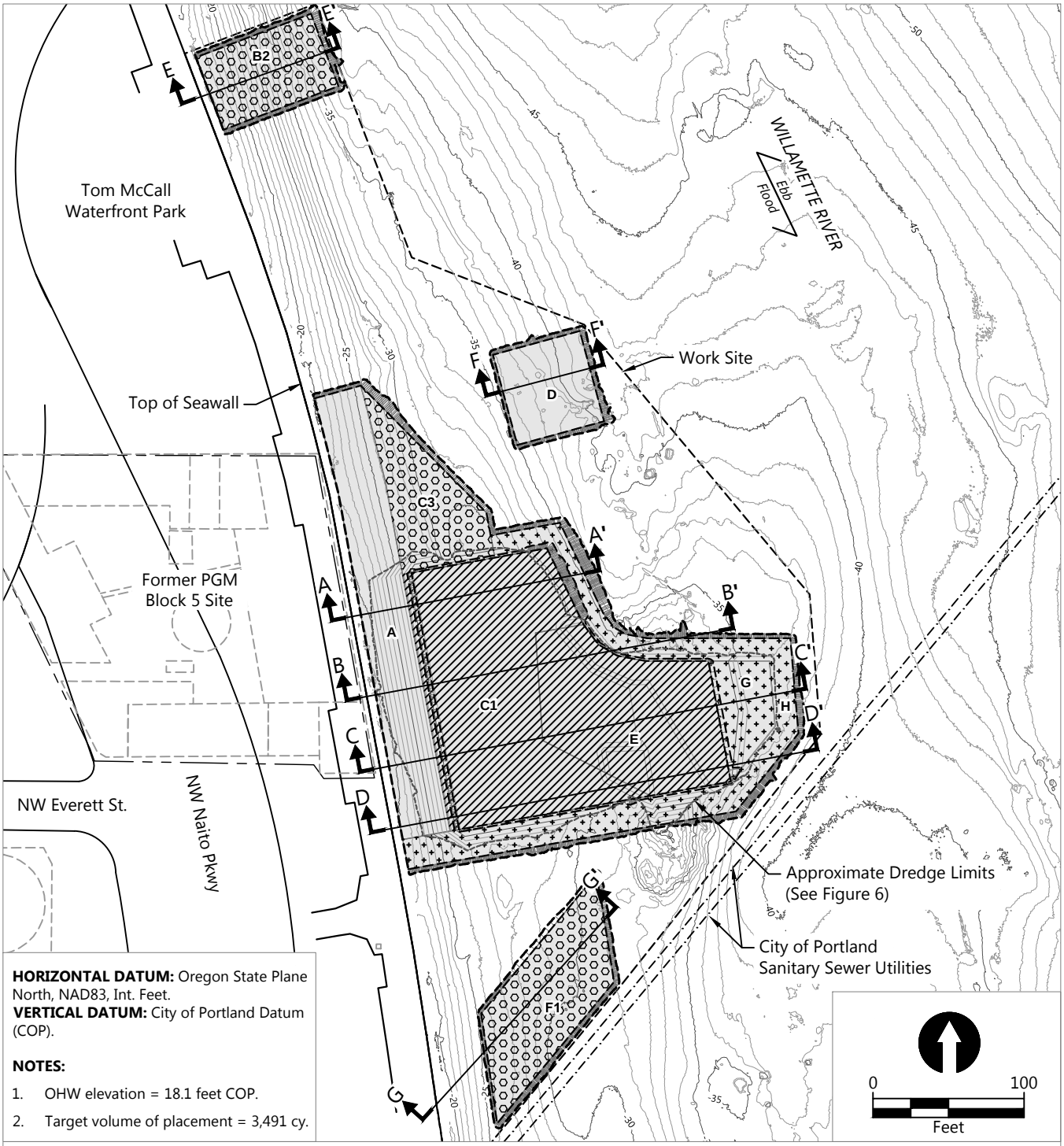
Publish Date: 2018/10/19 12:05 PM | User: mpratschner
Filepath: K:\Projects\0029-NW Natural Gas Co\Portland Gas Manufacturing Site\Permitting\0029-PM-020 (Dredge Sections-JPA).dwg FIG8

Date: August 2018

ANCHOR QEA

Figure 8
Dredge Cross Sections C-C' and D-D'

Joint Permit Application
NW Natural - Former Portland Gas Manufacturing Site Remediation
Portland, Oregon



HORIZONTAL DATUM: Oregon State Plane North, NAD83, Int. Feet.
VERTICAL DATUM: City of Portland Datum (COP).

NOTES:

1. OHW elevation = 18.1 feet COP.
2. Target volume of placement = 3,491 cy.

LEGEND:

- Work Site
- A — Sediment Decision Unit Areas
- Existing/Post-dredge Bathymetric Contours (1-Foot Intervals)
- Approximate Limits of Cap
- Internal Cap Slope Boundary
- Proposed Slope/Grading Line

SDU CAP/COVER AREA:

- C1, E — Armored Treatment Cap: 1' Min. Armor over 1-ft Min. GAC-Amended Sand
- A, D — In-situ Treatment: 1-ft Min. GAC-Amended Sand Cover
- B2, C3, F1 — EMNR: 1-ft Min. Sand Cover
- G, H — Residual Cover: 0.5-ft Min. Sand Cover

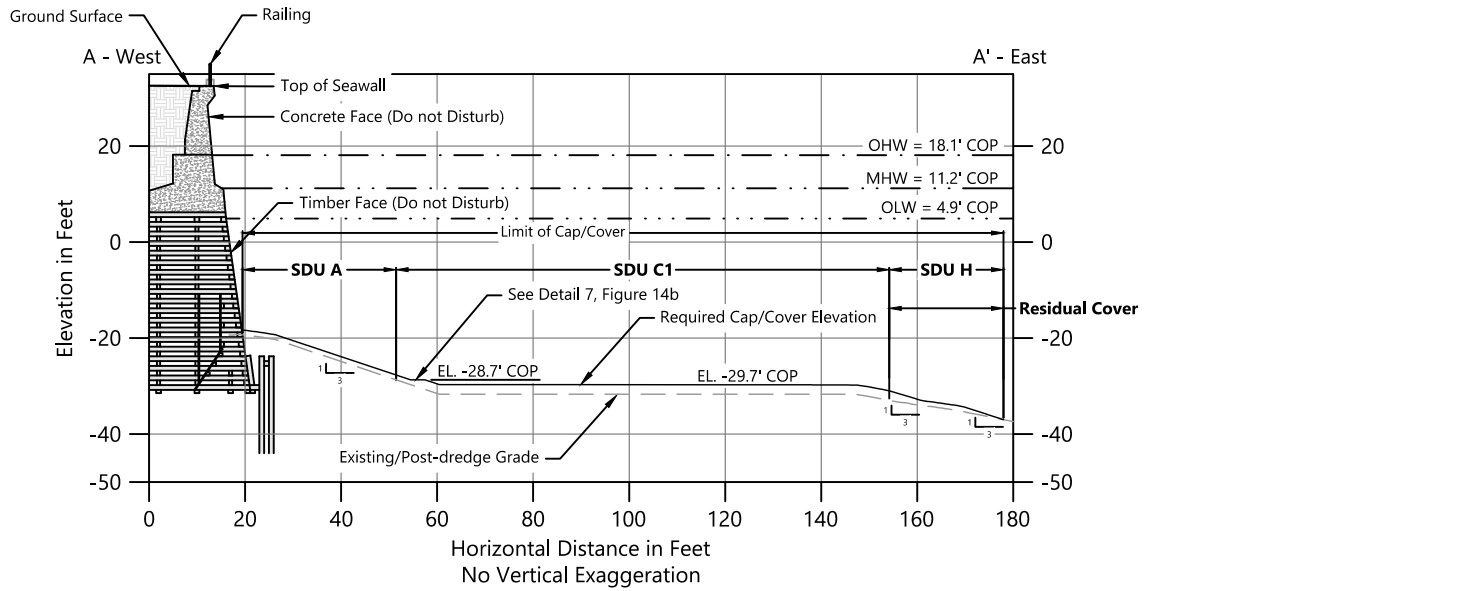
Publish Date: 2018/10/19 12:05 PM | User: mpratschner
Filepath: K:\Projects\0029-NW Natural Gas Co\Portland Gas Manufacturing Site\Permitting\0029-PM-016 (Cap-Cover Plan-JPA).dwg FIG9

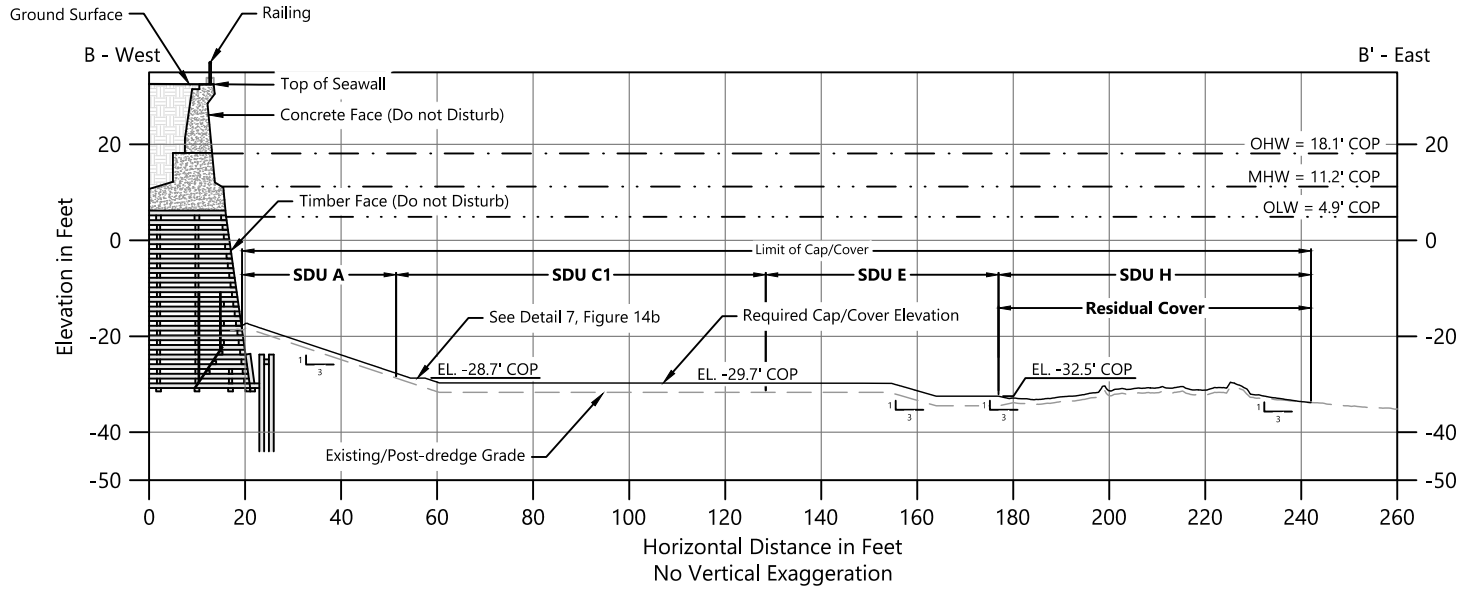
Date: August 2018

ANCHOR QEA

Figure 9
Cap and Cover Plan

Joint Permit Application
NW Natural - Former Portland Gas Manufacturing Site Remediation
Portland, Oregon





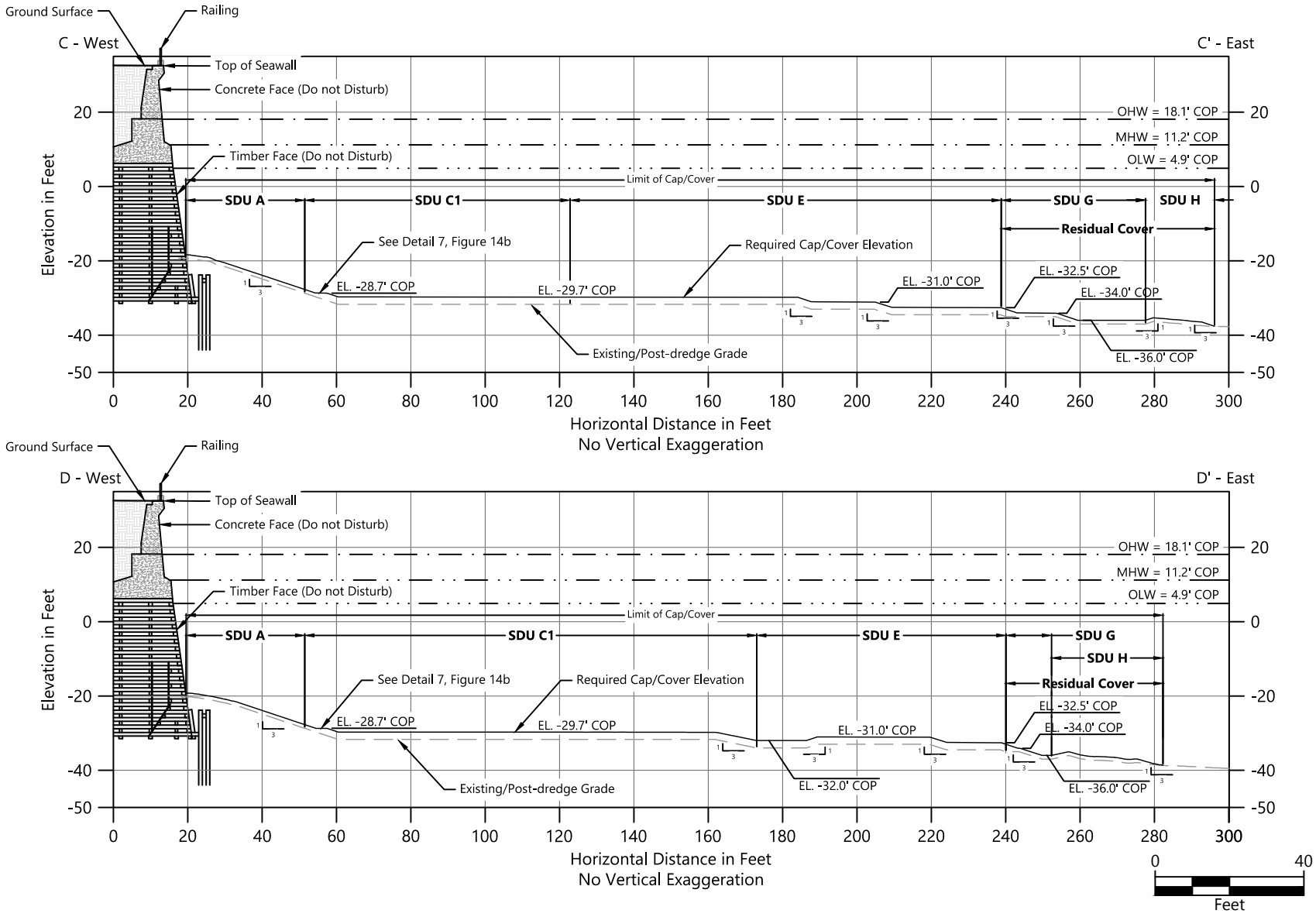
Publish Date: 2018/10/19 12:05 PM | User: mpratschner
Filepath: K:\Projects\0029-NW Natural Gas Co\Portland Gas Manufacturing Site\Permitting\0029-PM-021 (Cap-Cover Sections-JPA).dwg FIG10

Date: August 2018

ANCHOR QEA

Figure 10
Cap and Cover Cross Sections A-A' and B-B'

Joint Permit Application
NW Natural - Former Portland Gas Manufacturing Site Remediation
Portland, Oregon



Publish Date: 2018/10/19 12:05 PM | User: mpratschner
Filepath: K:\Projects\0029-NW Natural Gas Co\Portland Gas Manufacturing Site\Permitting\0029-PM-021 (Cap-Cover Sections-JPA).dwg FIG11

Date: August 2018

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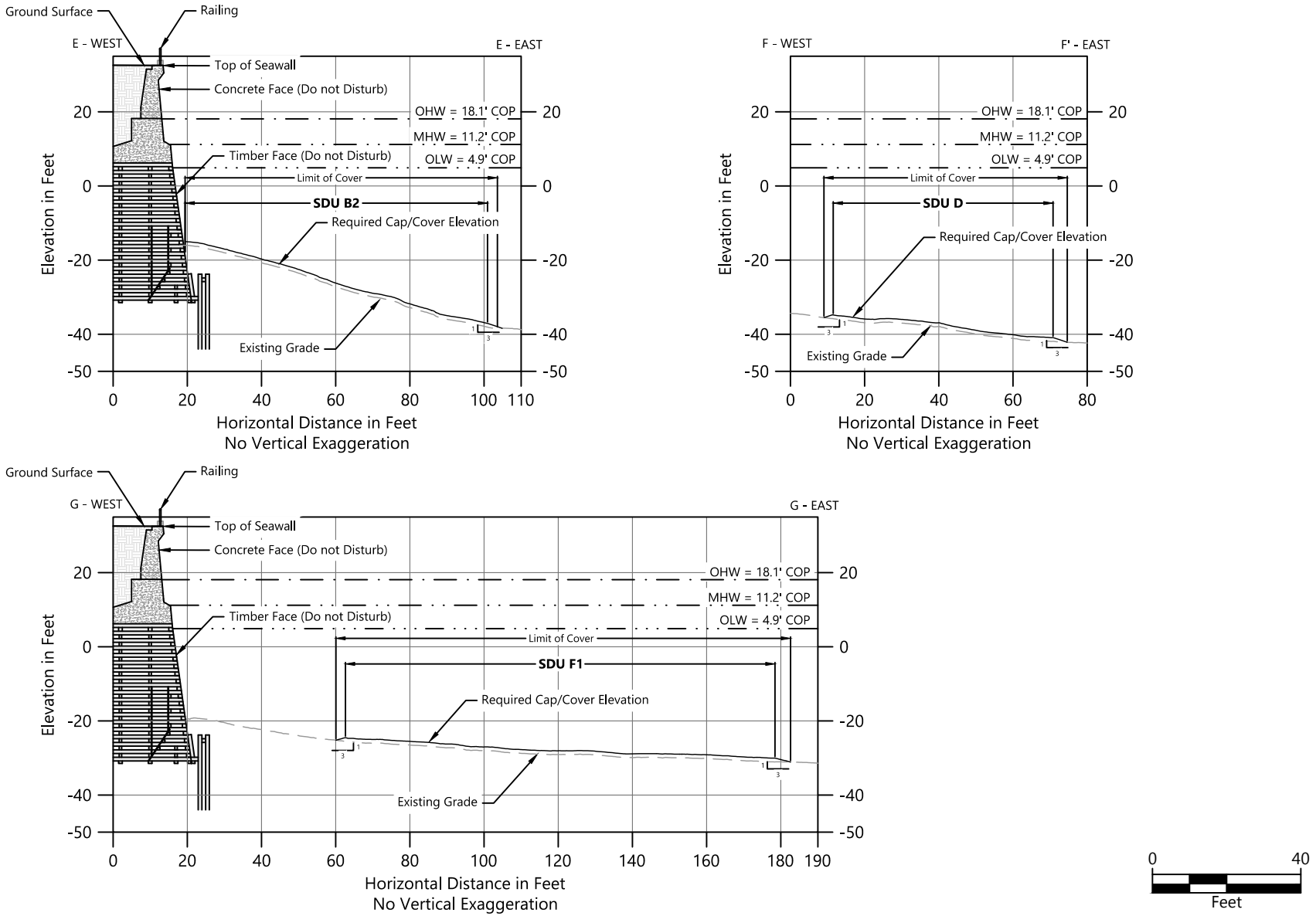
Figure 11
Cap and Cover Cross Sections C-C' and D-D'

Joint Permit Application
NW Natural - Former Portland Gas Manufacturing Site Remediation
Portland, Oregon



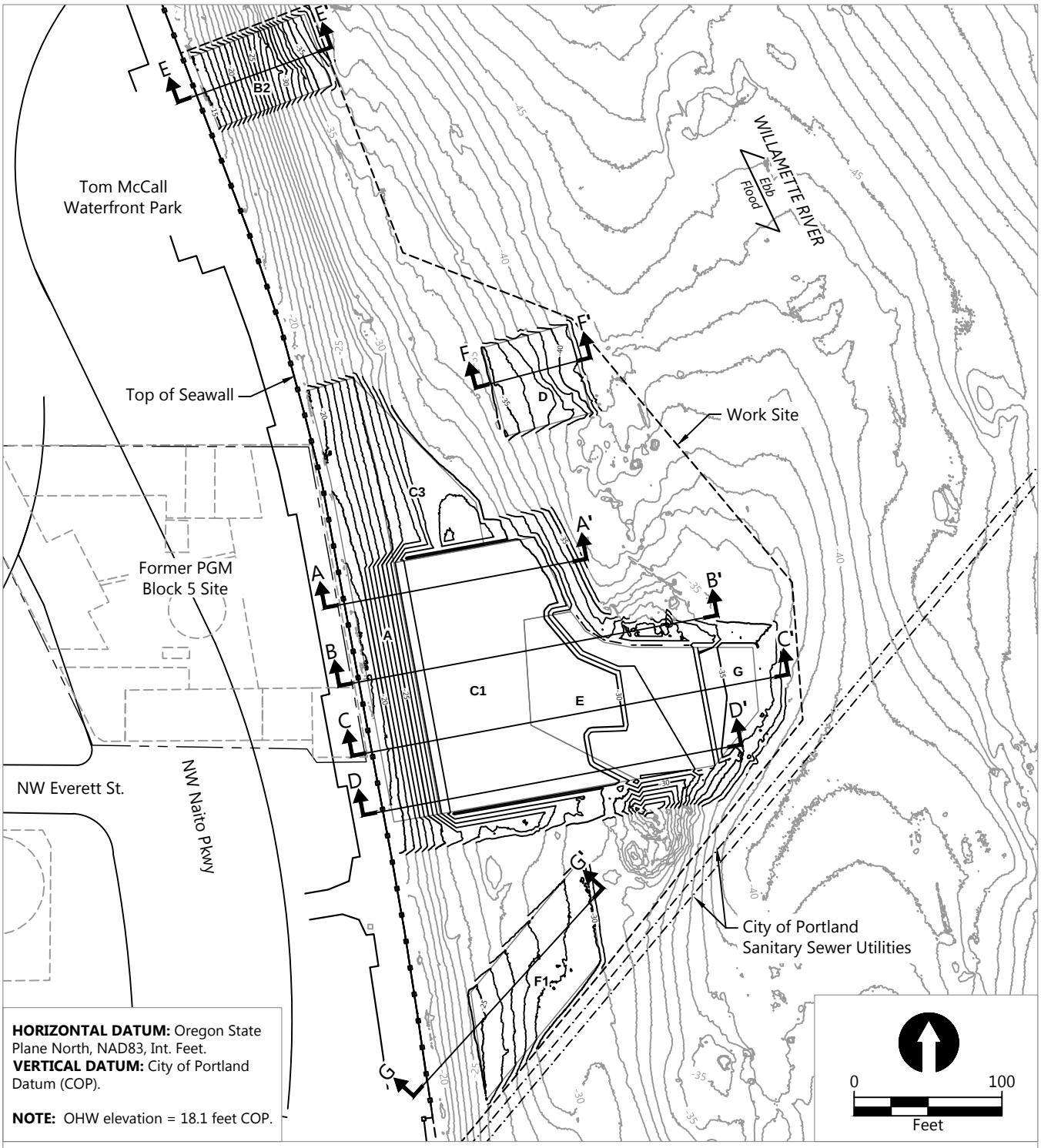
Publish Date: 2018/10/19 12:05 PM | User: mpratschner
Filepath: K:\Projects\0029-NW Natural Gas Co\Portland Gas Manufacturing Site\Permitting\0029-PM-021 (Cap-Cover Sections-JPA).dwg FIG12

Date: August 2018

ANCHOR QEA

Figure 12
Cap and Cover Cross Sections E-E', F-F', and G-G'

Joint Permit Application
NW Natural - Former Portland Gas Manufacturing Site Remediation
Portland, Oregon



HORIZONTAL DATUM: Oregon State Plane North, NAD83, Int. Feet.
VERTICAL DATUM: City of Portland Datum (COP).

NOTE: OHW elevation = 18.1 feet COP.

LEGEND:

- Work Site
- A — Sediment Decision Unit Areas
- Existing/Post-dredge Bathymetric Contours (1-Foot Intervals)
- Proposed Final Grade Contours (1-foot Intervals)

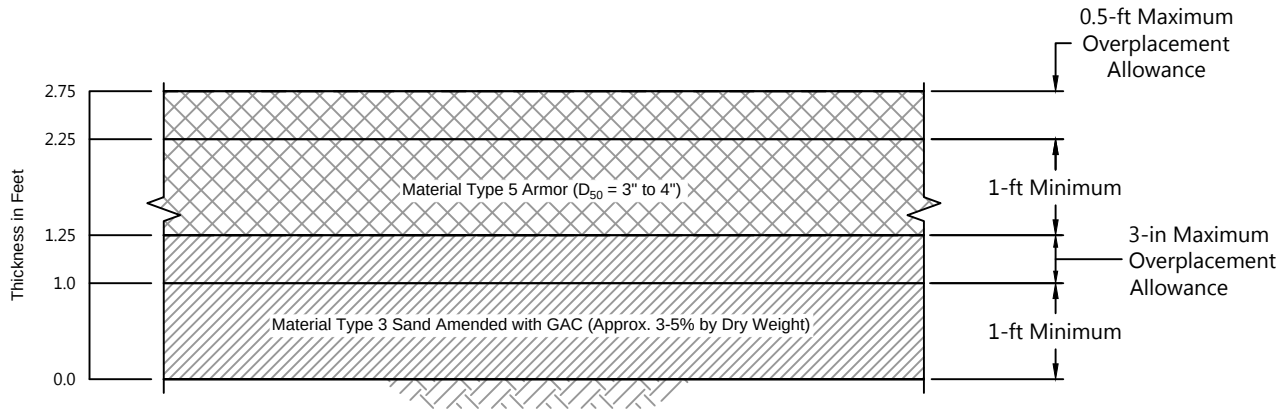
Publish Date: 2018/10/19 12:05 PM | User: mpratschner
Filepath: K:\Projects\0029-NW Natural Gas Co\Portland Gas Manufacturing Site\Permitting\0029-PM-017 (Final-Grade-JPA).dwg FIG13

Date: August 2018

ANCHOR QEA

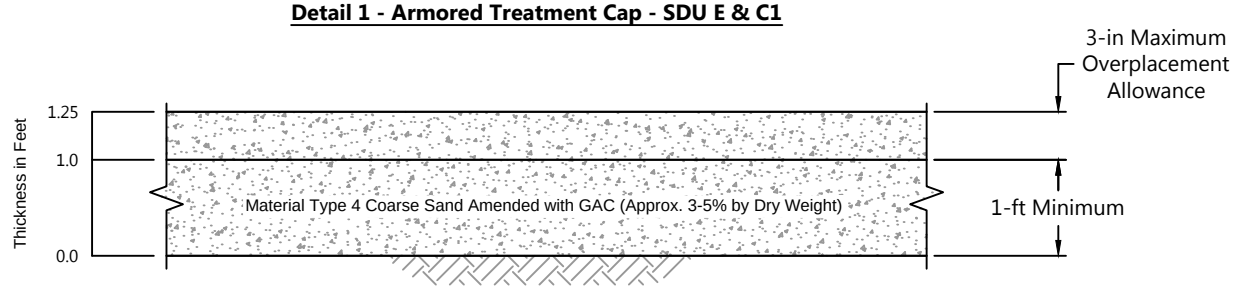
Figure 13
Proposed Final Grade

Joint Permit Application
NW Natural - Former Portland Gas Manufacturing Site Remediation
Portland, Oregon

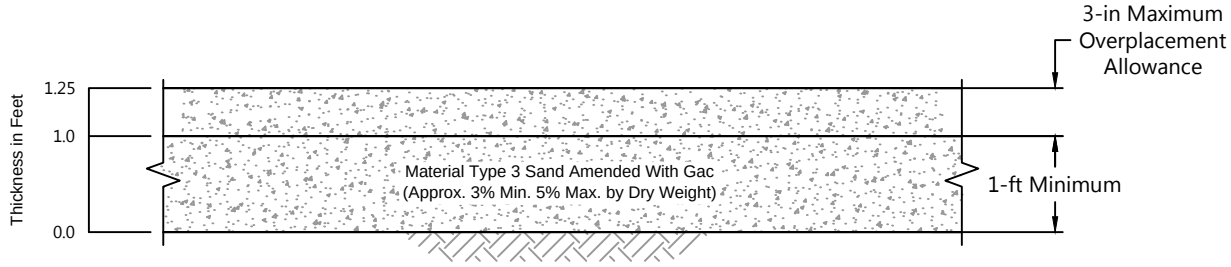


Note: The elevation of the top of the Armor layer will be 2 feet below the target navigation elevation of -26.7 ft. COP.

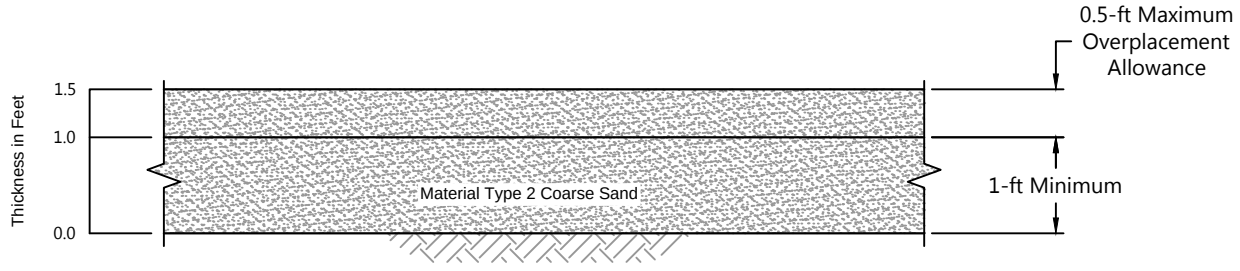
Detail 1 - Armored Treatment Cap - SDU E & C1



Detail 2 - GAC-Amended Treatment Cover - SDU A



Detail 3 - GAC-Amended Treatment Cover - SDU D



Detail 4 - EMNR SDU B2

Not to Scale

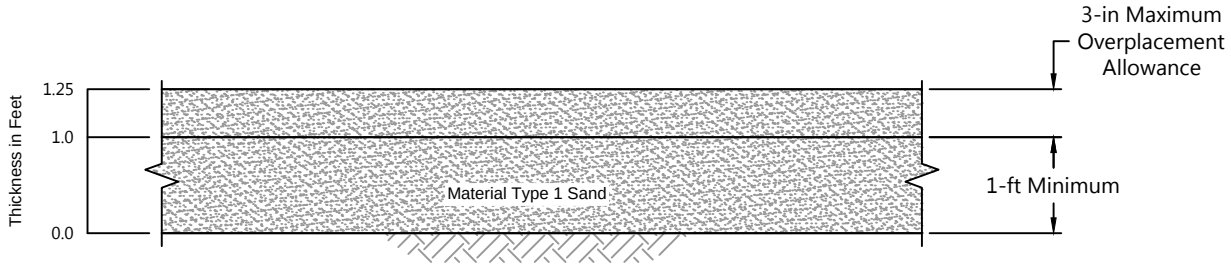
Publish Date: 2018/10/19 12:05 PM | User: mpratschner
Filepath: K:\Projects\0029-NW Natural Gas Co\Portland Gas Manufacturing Site\Permitting\0029-PM-018 (Cap-Details-JPA).dwg FIG14a

Date: August 2018

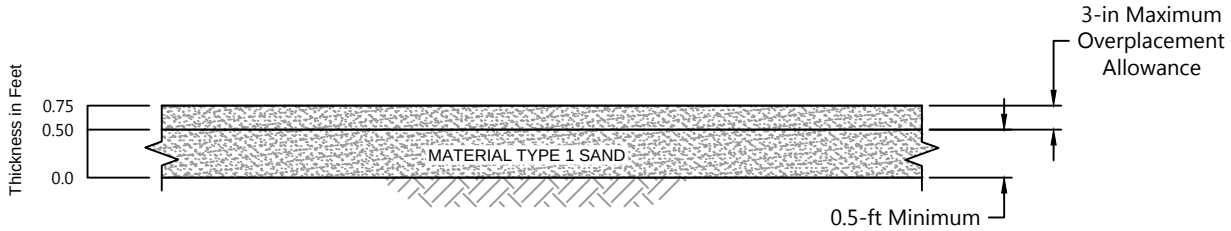
ANCHOR QEA

Figure 14a
Cap and Cover Details

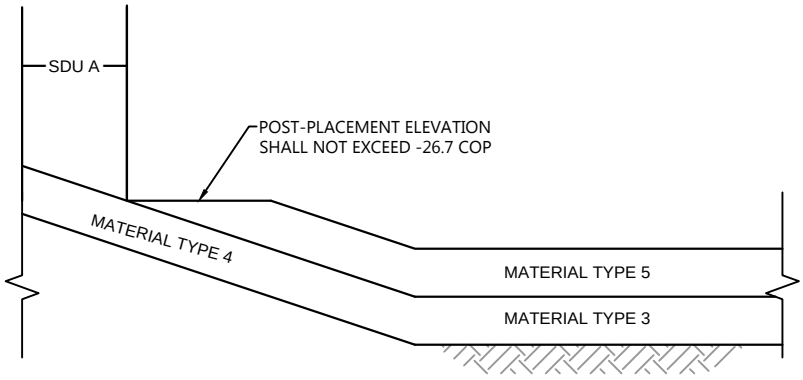
Joint Permit Application
NW Natural - Former Portland Gas Manufacturing Site Remediation
Portland, Oregon



Detail 5 - EMNR - SDU C3 and F1



Detail 6 - Residual Sand Cover - SDU G, H, and Perimeter of Dredge Area



Detail 7 - SDU A to C1 Cover to Cap: SDU A and SDU C1 Transition Detail

Not to Scale

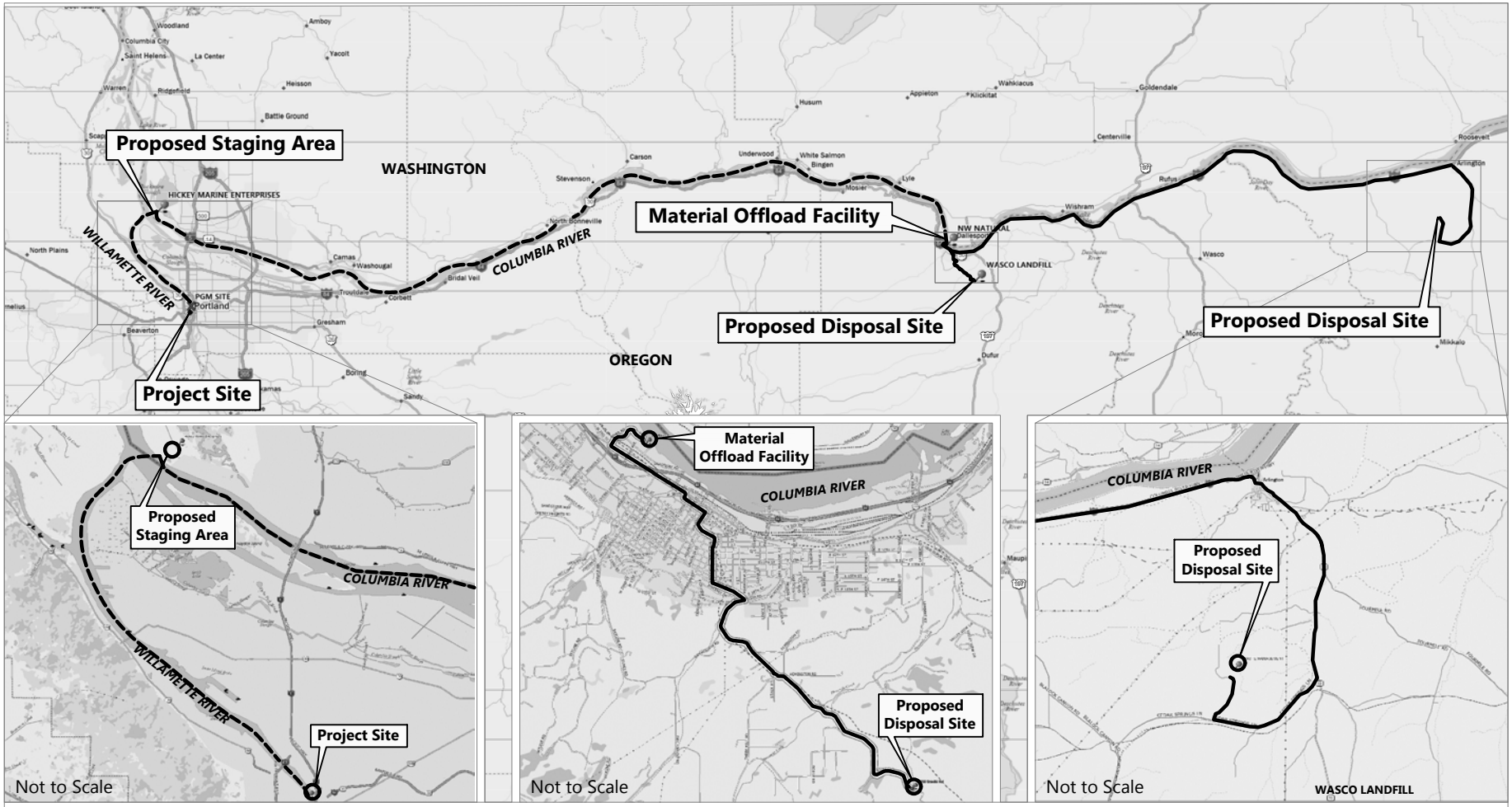
Publish Date: 2018/10/19 12:05 PM | User: mpratschner
Filepath: K:\Projects\0029-NW Natural Gas Co\Portland Gas Manufacturing Site\Permitting\0029-PM-018 (Cap-Details-JPA).dwg FIG14b

Date: August 2018

ANCHOR QEA

Figure 14b
Cap and Cover Details

Joint Permit Application
NW Natural - Former Portland Gas Manufacturing Site Remediation
Portland, Oregon



SOURCE: ©DeLorme, Topo USA®.

NOTES:

1. Boat route site to landfill (103 miles).
2. Boat route staging area to site (13 miles).
3. Truck route (71 miles).

LEGEND:

Boat Route

Truck Route

0 15

Miles

Publish Date: 2018/10/19 12:05 PM | User: mpratschner
Filepath: K:\Projects\0029-NW Natural Gas Co\Portland Gas Manufacturing Site\Permitting\0029-PM-019 (Staging-Landfill-JPA).dwg FIG15

Date: August 2018

ANCHOR QEA

Figure 15
Staging Area and Disposal Site Map

Joint Permit Application
NW Natural - Former Portland Gas Manufacturing Site Remediation
Portland, Oregon

6720 SW Macadam Avenue, Suite 125
Portland, Oregon 97219
503.670.1108

ANCHOR QEA

Memorandum

June 5, 2019

To: Jason Butler-Brown, PE, GE, Ian LaVielle, and Stacey Castleberry, City of Portland

From: John Verduin, PE, Todd Thornburg, PhD, RG, and Kendra Skellenger, PE; Anchor QEA, LLC

cc: Bob Wyatt, NW Natural; Valerie Oster, Anchor QEA, LLC

ECSI No. 1138

Re: Detailed Accounting of Estimated Cut and Fill Volumes
Former Portland Gas Manufacturing Site

EXPIRATION DATE: 6/30/20

Digitally Signed (10 pages total)

Introduction

On behalf of NW Natural, Anchor QEA, LLC, prepared remedial design documents for the proposed sediment remediation project at the former Portland Gas Manufacturing (PGM) site on the west bank of the Willamette River at river mile (RM) 12.2, as selected and overseen by the Oregon Department of Environmental Quality and described in the *Revised Final Design Report* (Anchor QEA 2019). This memorandum provides a detailed accounting of estimated cut and fill volumes associated with the project in response to an email request from Jason Butler-Brown, City of Portland, to Rachel Melissa, Pearl Legal Group, on May 13, 2019 (Butler-Brown 2019). This analysis supports NW Natural's variance request to address the balanced cut and fill requirements of City Code 24.50.060(F)(8)(a).

Estimated Cut and Fill Volumes

Estimated cut and fill volumes for the PGM remediation project are presented in the *Revised Final Design Report* and are summarized in Tables 1 and 2, respectively (adapted from Tables 4 and 9 of the *Revised Final Design Report*). These tables provide a detailed accounting of estimated cut and fill volumes, including target, overdredge, overplacement, residual cover, and assumed contingency volumes for each sediment decision unit (SDU) in the project area.

Volumes were calculated using dredging and capping design surfaces created in AutoCAD Civil 3D (version 2019). Supporting design figures are attached to this memorandum, including the following:

- Figure 4: Remedial Design and Sediment Decision Units (from the *Revised Final Design Report*)
- Drawing C-05: Dredge Plan
- Drawing C-11: Cap and Cover Details
- Drawing C-12: Target Post-Cap and Cover Contours Plan

Additional design information, including cross sections showing projected dredging and capping surfaces, are provided in the *Revised Final Design Report*.

Volume calculations are based on the footprints of the SDUs delineated in Figure 4, the target dredge elevations shown in Drawing C-05 (including navigation-based dredging in nearshore areas and dredging to remove specific contaminated sediment deposits in offshore areas that are already below navigation depth), the cap and cover materials and thicknesses shown on details in Drawing C-11, and the target post-construction surface shown in Drawing C-12. Considering the contractor's equipment tolerances, the standard overdredging allowance is 12 inches, and the standard average overplacement allowance is 3 inches for sand and gravelly sand, with or without carbon amendment, and 6 inches for armor rock. All dredging and capping surfaces are designed using stable 3-to-1 side slopes extending beyond the SDU boundaries, which are included in the volume estimates.

Contingency Volumes

The estimated removal volume, including the maximum overdredging allowance, is 5,065 cubic yards (cy), and the estimated fill volume, including maximum overplacement allowance, is 4,642 cy, providing an overall excess of removal relative to fill (i.e., excess removal of 423 cy or 9%). Contingency volumes of 10% and 20% were added to the cut and fill volumes, respectively, to account for unexpected field conditions that may be encountered during construction. A larger contingency was applied to fill volumes to allow for the possible need to place interim sand cover layers if visible contamination is uncovered during dredging. With the addition of these contingency volumes, the total estimated removal volume (5,572 cy) and fill volume (5,569 cy) remain balanced. Different volumes may result during construction due to conditions encountered in the field. Ongoing monitoring of cut and fill quantities will occur during construction to track progress.

References

Anchor QEA (Anchor QEA, LLC), 2019. *Revised Final Design Report*. Former Portland Gas Manufacturing Site (ECSI No. 1138). Prepared for NW Natural. May 1, 2019.

Butler-Brown, Jason, 2019. Regarding: PGM Remedial Site, Site Development Response – Exempt Review 18-257210 PR. Email to: Rachel Melissa (Pearl Legal Group). May 13, 2019.

Tables

Table 1
Estimated Dredge Volumes

SDU	Target Dredge Volume[1] (cy)	Target Dredge Daylight Area[1] (sf)	Overdredge Thickness (ft)	Overdredge Volume (cy)	Target + Overdredge Volume[2] (cy)	Contingency Volume[3] (cy)	Total Estimated Dredge Volume[2] (cy)
A[4]	235	4,356	1.0	184	419	42	461
C1[5]	2,122	17,382	1.0	662	2,784	278	3,062
E[6]	1,160	11,085	1.0	417	1,577	158	1,735
G[6]	177	2,739	1.0	108	285	29	314
Total	**3,694**	**35,562**	**--**	**1,371**	**5,065**	**507**	**5,572**

Notes:

1. Based on AutoCAD Civil 3D volume takeoff, as presented in Table 4 of the *Revised Final Engineering Design Report* (Anchor QEA 2019).
2. Total dredge volume does not include potential additional volume for debris.
3. A contingency volume of 10% was added to account for unexpected field conditions.
4. Dredging in SDU A is for 3H:1V side slope grading to meet existing berthing depth in SDU C1.
5. Dredge volume for SDU C1 includes side slope grading volume in SDUs C3 and H.
6. Dredge volumes for SDU E and G include side slope grading volume in SDU H.

--: not applicable
cy: cubic yard
ft: foot
H:V: horizontal to vertical
SDU: Sediment Decision Unit
sf: square foot

Table 2
Estimated Cap and Cover Volumes

SDU	Cap/Cover Area (sf)	Cap/Cover Perimeter (lf)	Target Volume[1]					Overplacement Volume[1]					Target + Overplacement Volume					Contingency Volume[5] (cy)	Total Estimated Cap/Cover Volume[3] (cy)
			Sand[2] (cy)	Gravelly Sand[2] (cy)	Sand & GAC[3] (cy)	Gravelly Sand & GAC[3] (cy)	Armor[4] (cy)	Sand[2] (cy)	Gravelly Sand[2] (cy)	Sand & GAC[3] (cy)	Gravelly Sand & GAC[3] (cy)	Armor[4] (cy)	Sand[2] (cy)	Gravelly Sand[2] (cy)	Sand & GAC[3] (cy)	Gravelly Sand & GAC[3] (cy)	Armor[4] (cy)		
C1	15,926	644	--	--	--	568	568	--	--	--	147	295	--	--	--	715	863	316	1,894
E	10,014	411	--	--	--	362	362	--	--	--	93	185	--	--	--	455	547	200	1,202
A	9,669	673	--	--	--	356	--	--	--	--	90	--	--	--	--	446	--	89	535
D	4,489	280	--	--	147	--	--	--	--	42	--	--	--	--	189	--	--	38	227
B2	4,909	308	--	168	--	--	--	--	45	--	--	--	--	213	--	--	--	43	256
C3	5,393	354	191	--	--	--	--	50	--	--	--	--	241	--	--	--	--	48	289
F1	7,749	412	265	--	--	--	--	72	--	--	--	--	337	--	--	--	--	67	404
G	2,317	212	89	--	--	--	--	21	--	--	--	--	110	--	--	--	--	22	132
H	11,923	1,246	415	--	--	--	--	110	--	--	--	--	525	--	--	--	--	105	630
Subtotal	**--**	**--**	**960**	**168**	**147**	**1,286**	**930**	**253**	**45**	**42**	**330**	**480**	**1,213**	**213**	**189**	**1,616**	**1,410**	**--**	**--**
Total	**72,389**	**--**	**3,491**					**1,150**					**4,641**					**928**	**5,569**

Notes:

1. Based on AutoCAD Civil 3D volume takeoff, as presented in Table 9 of the *Revised Final Design Report* (Anchor QEA 2019).

2. Sand and Gravelly Sand volumes for all SDUs except SDUs G and H are based on 12 inches of minimum thickness, plus 3-inch overplacement allowance. Residual covers in SDUs G and H are based on 6 inches of minimum thickness, plus 3-inch overplacement allowance.

3. Sand & GAC and Gravelly Sand & GAC volumes are based on 12 inches of minimum thickness, plus 3-inch overplacement allowance.

4. Armor volume based on 12 inches of minimum thickness, plus 6-inch overplacement allowance.

5. A contingency volume of 20% was added to account for unexpected field conditions, including possible interim sand cover placement.

--: not applicable

cy: cubic yard

GAC: granular activated carbon

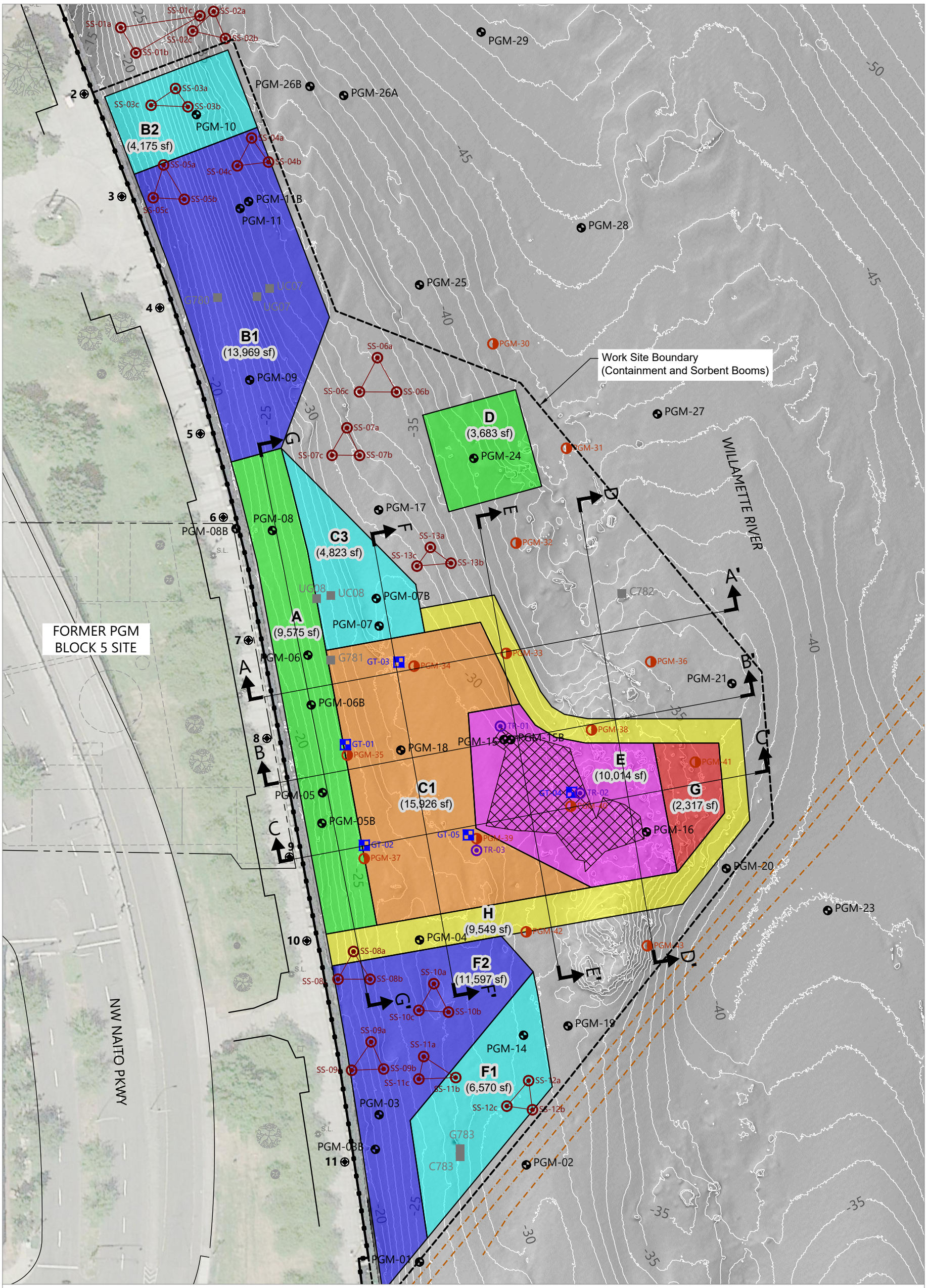
lf: linear foot

SDU: Sediment Decision Unit

sf: square foot

Figure and Drawing Attachments

DRAFT



LEGEND:

- PGM Sediment Core Location
- Historical Sediment Sampling Location
- Surface Tar-Like Material
- City of Portland Sanitary Sewer Utilities (Approximate)
- Sediment Decision Unit Areas
- Work Site Boundary (Containment and Sorbent Booms)
- 2017 Bathymetric Contours (1-Foot Intervals)
- 2017 Surface Sediment Grab Sample – 3-Point Composite (EMNR/MNR Delineation)
- 2017 Sediment Chemistry Boring (Dredge and Cap Delineation)
- 2017 Geotechnical Boring
- 2017 Treatability Boring

REMEDIAL TECHNOLOGIES:

- B1, F2 — Monitored Natural Recovery (MNR)
- B2, C3, F1 — Enhanced MNR (EMNR)
- A, D — GAC-Amended Treatment Cover
- C1 — Partial Dredge and Armored Treatment Cap
- E — Surface Product Removal with Armored Treatment Cap
- G — Full Dredge and Residual Cover
- H — Partial Side Slope Dredge and Residual Cover

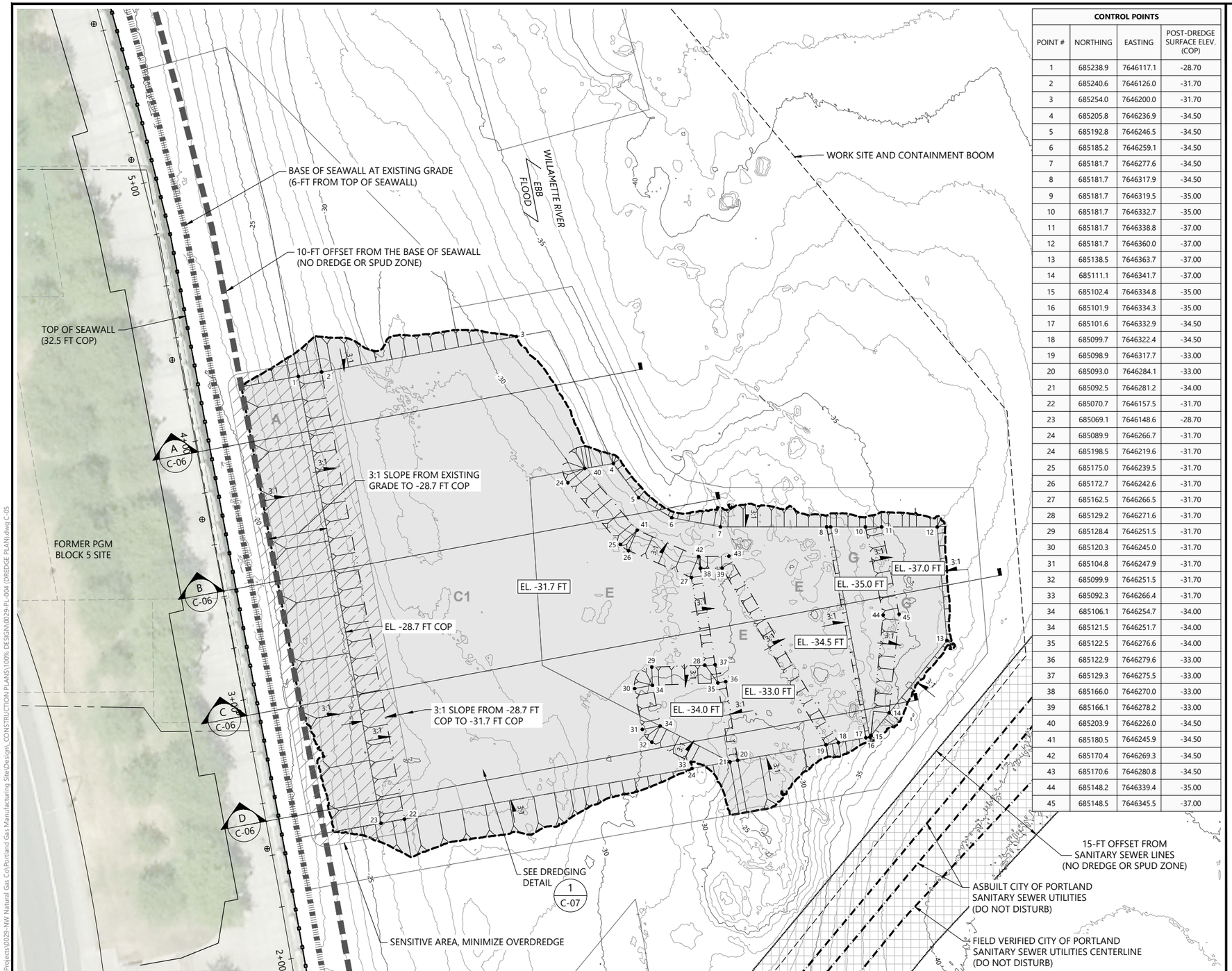
HORIZONTAL DATUM: Oregon State Plane North, NAD83, International Feet
VERTICAL DATUM: City of Portland Datum
NOTE: GAC = Granular Activated Carbon

Publish Date: 2019/04/30 12:46 PM | User: jbigsby Filepath: K:\Projects\0029-NW Natural Gas Co\Portland Gas Manufacturing Site\Design\0029-RP-030 (Rem-Design-Final-Design).dwg FIG4

ANCHOR QEA

Figure 4
Remedial Design and Sediment Decision Units

Revised Final Design Report
Former Portland Gas Manufacturing Site



CONTROL POINTS			
POINT #	NORTHING	EASTING	POST-DREDGE SURFACE ELEV. (COP)
1	685238.9	7646117.1	-28.70
2	685240.6	7646126.0	-31.70
3	685254.0	7646200.0	-31.70
4	685205.8	7646236.9	-34.50
5	685192.8	7646246.5	-34.50
6	685185.2	7646259.1	-34.50
7	685181.7	7646277.6	-34.50
8	685181.7	7646317.9	-34.50
9	685181.7	7646319.5	-35.00
10	685181.7	7646332.7	-35.00
11	685181.7	7646338.8	-37.00
12	685181.7	7646360.0	-37.00
13	685138.5	7646363.7	-37.00
14	685111.1	7646341.7	-37.00
15	685102.4	7646334.8	-35.00
16	685101.9	7646334.3	-35.00
17	685101.6	7646332.9	-34.50
18	685099.7	7646322.4	-34.50
19	685098.9	7646317.7	-33.00
20	685093.0	7646284.1	-33.00
21	685092.5	7646281.2	-34.00
22	685070.7	7646157.5	-31.70
23	685069.1	7646148.6	-28.70
24	685089.9	7646266.7	-31.70
24	685198.5	7646219.6	-31.70
25	685175.0	7646239.5	-31.70
26	685172.7	7646242.6	-31.70
27	685162.5	7646266.5	-31.70
28	685129.2	7646271.6	-31.70
29	685128.4	7646251.5	-31.70
30	685120.3	7646245.0	-31.70
31	685104.8	7646247.9	-31.70
32	685099.9	7646251.5	-31.70
33	685092.3	7646266.4	-31.70
34	685106.1	7646254.7	-34.00
34	685121.5	7646251.7	-34.00
35	685122.5	7646276.6	-34.00
36	685122.9	7646279.6	-33.00
37	685129.3	7646275.5	-33.00
38	685166.0	7646270.0	-33.00
39	685166.1	7646278.2	-33.00
40	685203.9	7646226.0	-34.50
41	685180.5	7646245.9	-34.50
42	685170.4	7646269.3	-34.50
43	685170.6	7646280.8	-34.50
44	685148.2	7646339.4	-35.00
45	685148.5	7646345.5	-37.00

LEGEND:

- APPROXIMATE CITY OF PORTLAND SANITARY SEWER UTILITIES (DO NOT DISTURB)
- C1 — SDU DREDGE AND SLOPE AREAS
- BOLLARD LOCATION
- EXISTING BATHYMETRIC CONTOURS (1-FT INTERVALS, COP DATUM)
- 1+00 — STATIONING
- APPROXIMATE LIMITS OF DREDGING
- SLOPE TRANSITION BOUNDARY
- PROPOSED SLOPE/GRADING LINE
- 3:1 — SLOPE AND DIRECTION
- EL. -31.7 FT — REQUIRED DREDGE ELEVATION (COP)
- CONTROL POINT
- TOP OF SEAWALL (DO NOT DISTURB)
- WORK SITE
- BASE OF SEAWALL AT EXISTING GRADE
- SENSITIVE AREA, MINIMIZE OVERDREDGE
- 15-FOOT SANITARY SEWER OFFSET (NO DREDGE OR SPUD ZONE)

NOTES:

1. HORIZONTAL DATUM: OREGON STATE PLANE NORTH ZONE, NORTH AMERICAN VERTICAL DATUM OF 1983 (NAD83), INTERNATIONAL FEET
2. VERTICAL DATUM: CITY OF PORTLAND DATUM (COP), CONVERTED FROM NAVD88 (-2.10 FT)
3. OHW = 18.1 FT, MHW = 11.2 FT, OLW = 4.9 FT COP
4. AERIAL PHOTOGRAPH FROM OREGON METRO, DATED 10/25/17
5. SEE DRAWING C-04 FOR APPROXIMATE IDENTIFIED DEBRIS LOCATIONS

NORTH

0 20 40
SCALE IN FEET

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

100% DESIGN

ANCHOR QEA

NW Natural

REVISIONS				
REV	DATE	BY	APP'D	DESCRIPTION

DESIGNED BY: R. PICKERING
DRAWN BY: J. BIGSBY
CHECKED BY: K. SKELLENGER
APPROVED BY: J. VERDUIN
SCALE: AS NOTED
DATE: 4/11/2019

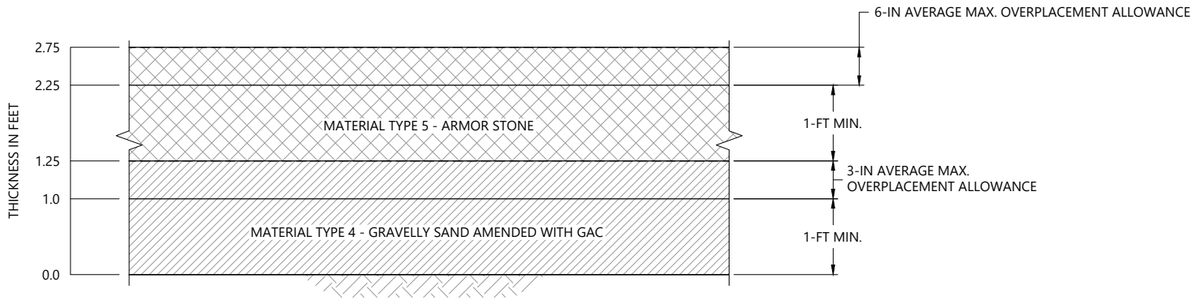
FORMER PORTLAND GAS MANUFACTURING SITE REMEDIATION

DREDGE PLAN

C-05

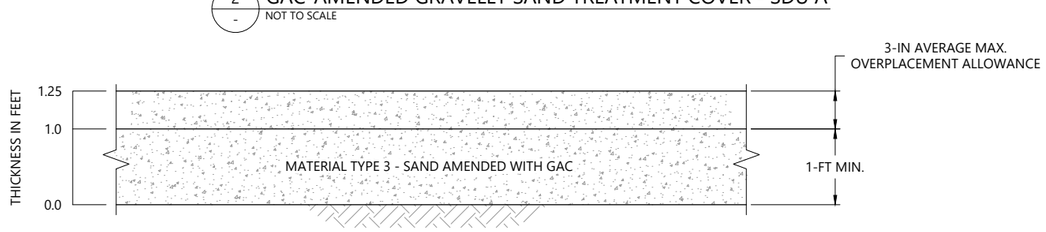
SHEET NO. 7 OF 14

K:\Projects\0029-NW Natural Gas Co\Portland Gas Manufacturing Site\Design_CONSTRUCTION PLANS\100% DESIGN\0029-PL-004 (DREDGE PLAN).dwg C-05
Jun 05, 2019 1:47pm jbigsby

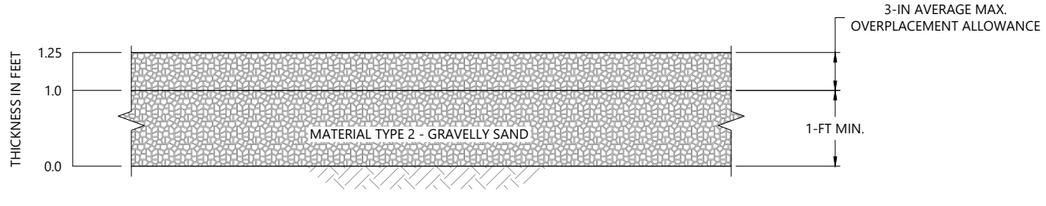


1 - ARMORED TREATMENT CAP - SDU E AND C1
NOT TO SCALE

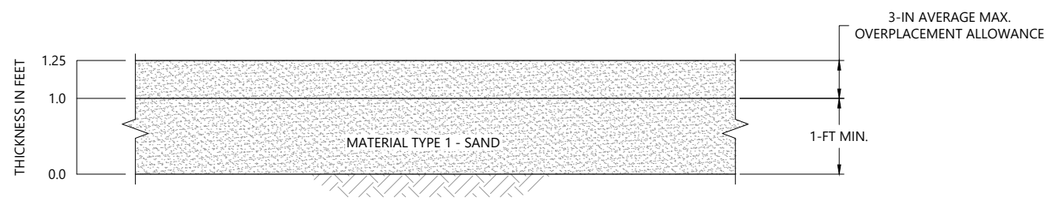
2 - GAC-AMENDED GRAVELLY SAND TREATMENT COVER - SDU A
NOT TO SCALE



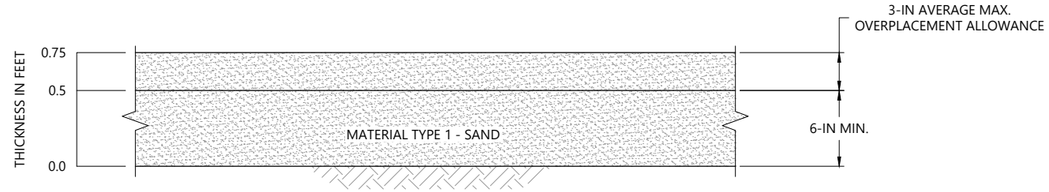
3 - GAC-AMENDED SAND TREATMENT COVER - SDU D
NOT TO SCALE



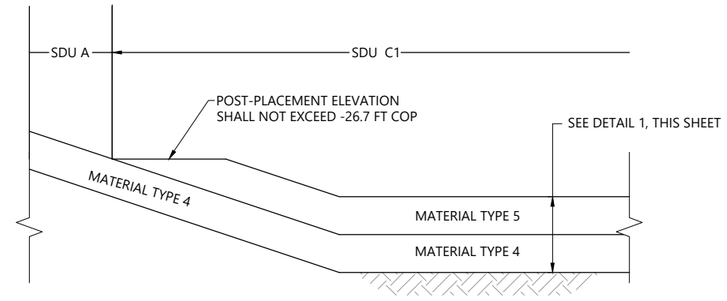
4 - EMNR GRAVELLY SAND COVER - SDU B2
NOT TO SCALE



5 - EMNR SAND COVER - SDU C3 AND F1
NOT TO SCALE



6 - RESIDUAL SAND COVER - SDU G AND H
NOT TO SCALE



7 - SDU A AND C1 TRANSITION DETAIL
NOT TO SCALE

MATERIAL TYPE	DESCRIPTION, SPECIFICATION 35 20 26
1	SAND, 2.03
2	GRAVELLY SAND, 2.04
3	SAND AMENDED WITH GAC, 2.05
4	GRAVELLY SAND AMENDED WITH GAC, 2.06
5	ARMOR STONE, 2.07

ONE INCH
AT FULL SIZE. IF NOT ONE INCH SCALE ACCORDINGLY

100% DESIGN

ANCHOR QEA

NW Natural

REVISIONS

REV	DATE	BY	APP'D	DESCRIPTION

DESIGNED BY: R. PICKERING
DRAWN BY: J. BIGSBY
CHECKED BY: K. SKELLENGER
APPROVED BY: J. VERDUIN
SCALE: AS NOTED
DATE: 4/11/2019

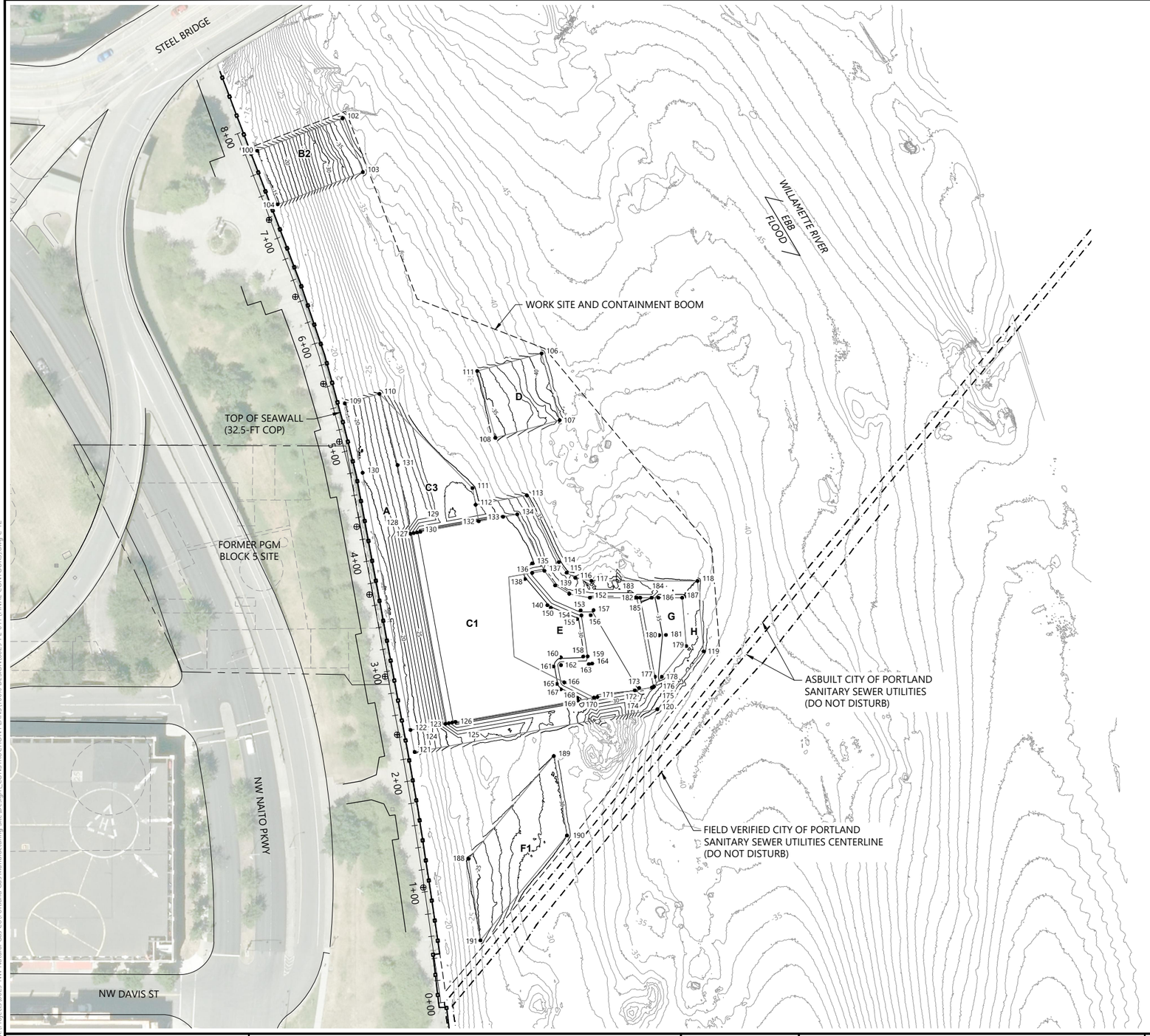
FORMER PORTLAND GAS MANUFACTURING SITE REMEDIATION

CAP AND COVER DETAILS

C-11

SHEET NO. 13 OF 14

K:\Projects\0029-NW Natural Gas Co\Portland Gas Manufacturing Site\Design_CONSTRUCTION PLANS\100% DESIGN\0029-PL-006 (DREDGE_CAP-DETAILS).dwg C-11
Jun 05, 2019 1:49pm jbigsby



LEGEND:

- CITY OF PORTLAND SANITARY SEWER UTILITIES (DO NOT DISTURB)
- WORK SITE
- A — SEDIMENT DECISION UNIT (SDU) AREA
- BOLLARD LOCATION
- EXISTING/POST-DREDGE BATHYMETRIC CONTOURS (1-FT INTERVALS, COP DATUM)
- PROPOSED FINAL GRADE CONTOURS
- STATIONING
- TOP OF SEAWALL (DO NOT DISTURB)
- CONTROL POINT

NOTES:

1. HORIZONTAL DATUM: OREGON STATE PLANE NORTH ZONE, NAD83, INTERNATIONAL FEET.
2. VERTICAL DATUM: CITY OF PORTLAND DATUM (COP), CONVERTED FROM NAVD88 (-2.10-FT).
3. OHW = 18.1-FT, MHW = 11.2-FT, OLW = 4.9-FT (COP).
4. AERIAL PHOTOGRAPH FROM OREGON METRO, DATED 10/25/17.

NORTH

0 50 100
SCALE IN FEET

ONE INCH AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

100% DESIGN

ANCHOR QEA

NW Natural

REVISIONS				
REV	DATE	BY	APP'D	DESCRIPTION

DESIGNED BY: R. PICKERING
DRAWN BY: J. BIGSBY
CHECKED BY: K. SKELLENGER
APPROVED BY: J. VERDUIN
SCALE: AS NOTED
DATE: 4/11/2019

FORMER PORTLAND GAS MANUFACTURING SITE REMEDIATION

TARGET POST-CAP AND COVER CONTOURS PLAN

C-12

SHEET NO. 14 OF 14

K:\Projects\0029-NW Natural Gas\Portland Gas Manufacturing Site\Design_CONSTRUCTION PLANS\100% DESIGN\0029-PL-011 (FINAL-CONTOURS).dwg C-12
Jun 05, 2019 1:51pm jbigsby