Memorandum

To:	Abigail Cermak, Bureau of Environmental Services Systems Development and Kaitlin Lovell, Bureau of Environmental Services Watershed Services City of Portland
From:	Mike Peebles, PE - Otak
Copies:	Wade Johns - Alamo Manhattan Jeancarlo Saenz- HLR Architects Shaney Mullen - WDG Architects Linda Tycher - LTA Landscape Design Josh Owens, Keith Buisman - Otak
Date:	January 6, 2020
Subject:	Case File: LU 19-225732 SOWA Alamo Manhattan Blocks Otak Responses to Land Use Review Comments dated November 21, 2019

Otak Project No.:19050.100

The following responses are provided to address Land Use Review Comments from the Portland Bureau of Environmental comments dated November 21, 2019. The responses provide specific information to address comments and/or outlines the strategy to address review comments with additional submittal materials to be provided under separate cover or through a Design Review resubmittal.

BUREAU OF ENVIRONMENTAL SERVICES (BES)

[…]
C. STORMWATER MANAGEMENT
[…]

3. Private Property Stormwater Management
[…]
a. Blocks 41, 42, 44, & 45 (Design Review)
1) *The stormwater report Figures 2.1 – 2.4 (exhibits C.124, C.125, C.126, C.127) as well as the Stormwater Plan figures (exhibits C. 116, C.117, C.118, C.119) provided in the design review package show ecoroof coverage for each building which is inconsistent with the stormwater report narrative. Ecoroofs are required on new buildings in the Central City Plan District (Portland City Code 33.510.243) and should be accounted for in the stormwater management plan.*

RESPONSE:
A revised Design Review Conceptual Stormwater Management Plan will be resubmitted to show consistency between the report and the updated building/greenway plans. Note, as discussed with City BDS Planning staff, the project team is resubmitting the DR application under Title 33 code that went into effect on March 1, 2017. This eliminates the code requirement for ecoroofs that were provided in the original submittal. The reduction of ecoroofs on the project will impact the stormwater strategy in that we will utilize (and try to maximize) raised flow-through planters at intermediate roof levels and ground level for specific areas of non-ecoroof runoff. We will continue to use flow through planters at ground-level plaza and pedestrian access areas as the site design allows. We will incorporate stormfilter catch basins/vaults/downspouts (mechanical treatment) within each block for water quality treatment of areas not treated by vegetated facilities. These are typically at plaza areas that cannot accommodate the depth of required LIDA facilities (planters) due to conflicts with garage structure below plaza areas. Our proposed stormwater treatment design considers contributing

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areas, collection locations, depth of facilities, outlet locations, and conveyance to storm laterals to the public storm system in adjacent streets.
We have attached preliminary exhibits for each Block that show stormwater treatment areas and facilities proposed for the four blocks. A revised Design Review Conceptual Stormwater Management Plan will be submitted to support the revised stormwater strategy for the project.

2) *Figures 2.1 – 2.4 of the stormwater report indicate the lined flow-through planters are managing non-ecoroof areas only and this is inconsistent with the narrative. Therefore, it is unclear if the applicant intends to only manage stormwater with lined flow-through planters or if stormwater will also be managed by ecoroofs. This information should be provided as changes to the size and location of the lined-planters could impact the design and layout of the site.*

RESPONSE:
See response to 3.a.1 above. The amount of ecoroof will be reduced with the Design Review resubmittal. The use of conventional roofs on this project will increase the impervious area to managed on-site and a revised Design Review Conceptual Stormwater Management Plan will show the use of raised flow-through planters, ground level lined flow-through planters, and stormfilters to meet the stormwater treatment requirements on each block. The design will utilize raised flow-through planters at intermediate roof levels and ground levels to treat specific areas of impervious roof runoff.

3) *Also, it should be noted that the Landscape Plan figures (exhibit C.90, C.92) in the design review package are inconsistent with the Stormwater Plan figures in both the design review package and the stormwater report.*

RESPONSE:
The Landscape Plan and Stormwater Plan figures will be revised prior to resubmittal to confirm consistency with the Design Review and Greenway Review package as well as the revised Design Review Conceptual Stormwater Management Plan.

b. Greenway Tracts (Greenway Review)

[…]

1) The Landscape – Greenway Development Plan figures show filter strips for managing stormwater and this is not consistent with the other Greenway Site Plan figures or the stormwater plan narrative. Please clarify the facility type and locations.

RESPONSE:
The initial design for stormwater management within the Greenway incorporated the use of filter strips and vegetated swales, but due to stormwater collection, grading, and conveyance challenges, we revised stormwater management strategy to use linear sand filters along the trail alignment. This was not reflected on the Landscape Greenway Development Plan figures.
The resubmittal of the DR/GR package will have a revised Greenway design based on comments from staff and the Design Review hearing. The design team will be resubmitting greenway plans that will clarify facility type and locations. The revised design will place the two trails closer together and in parallel to allow for vegetated planters/swales to collect the runoff from the impervious trail areas. The trails will be graded/sloped for each to drain to these stormwater management areas between the trails. The Abernethy Overlook is also being eliminated which simplifies stormwater management in that area.

The Greenway adjacent to Block 41 (north) contains approximately 8,200 sf of impervious trail and plaza area, which will require approximately 160 sf of vegetated planter area for treatment. The greenway adjacent to Block 44 (south) contains approximately 11,100 sf of impervious trail and plaza area, which will require approximately 220 sf of vegetated planter area for treatment. The impervious

area runoff will be directed towards the landscaped area between the trails where shallow surface conveyance will direct the water into lined flow through vegetated planters. The landscaped area between the trails are approximately 2,800 sf and 2,900 sf for the north and south greenways respectively, providing adequate area for the planters. The planters will be plumbed to discharge into the existing storm system and outfall directly into the Willamette River to the south of the site.

2) *Figure 2.1(exhibit C.124) and Figure 2.3 (exhibit C.126) from the stormwater plan show the location of the sand filters as described in the narrative of the report. However, the Greenway Site Plan figures (exhibits GR2.1, GR2.2) indicate that the sand filter locations are retaining walls with guardrails. These same figures mark the locations of vegetated swales as well. Please clarify the facility type and locations.*

RESPONSE:
The Greenway Site Plan figures had incorrect callouts/keynotes for the sand filters and retaining walls. See response to 3.b.1 above for the proposed greenway stormwater management approach.

3) *Also, on the Greenway Site Plan figures, the drainage arrows for the upper path appear to be draining away from the sand filter that runs along the northern side. Please provide information on how stormwater is routed from impervious surfaces to the stormwater facilities.*

RESPONSE:
The Greenway Site Plan figures had inconsistencies in the drainage arrow labels.
Per response to 3.b.1 above, the resubmittal of the DR/GR package will have a revised Greenway design based on comments from staff and the Design Review hearing. The design team will be resubmitting greenway plans that will clarify facility type and locations. The revised design will place the two trails closer together and in parallel to allow for filter strips and vegetated swales to collect the runoff from the impervious trail areas. The trails will be graded/sloped for each to drain to these stormwater management areas between the trails.

4) *Although the stormwater narrative states the plaza and overlook areas will be managed by the filter strips, due to the inconsistencies between the plans, it is unclear if filter strips will adequately manage these areas. The utility plan or drainage plan should indicate where stormwater from these areas is being directed.*

RESPONSE:
Per response to 3.b.1 above, the resubmittal of the DR/GR package will have a revised Greenway design based on comments from staff and the Design Review hearing. The design team will be resubmitting greenway plans that will clarify facility type and locations, including conveyance routes from greenway stormwater management facilities to public storm connections. Note, the Abernethy Overlook is also being eliminated which simplifies stormwater management in that area.

c. Public Works Permit

[…]

1) *It should be noted that the Composite Utility Plan (sheet PW-11) reviewed under the Public Works Permit shows stormwater connections on the east side of the buildings for Blocks 41 and 44 that cross onto the Greenway Tracts prior to connecting to the storm lines in SW Lane St and SW Lowell St respectively. This appears to be inconsistent with the Composite Utility Plan (exhibit C.103) submitted with the design review package. The applicant should ensure that the information BES Development Engineering is reviewing through the Public Works Permit is consistent with the information provided during review of the building permits.*

RESPONSE:
The evolving Design Review/Greenway Review package will be coordinated with the Public Works Permit (PWP) set to provide consistency between the BDS Development Engineering (private on-site

utilities) and the PWP Design Development submittal. The two design/permitting documents will be aligned prior to building permit submittal.

D. SITE RECOMMENDATIONS AND CONSIDERATIONS

1. 100-Year Floodplain

[…]

a. Currently the proposal includes nearly 6,000 cubic yards of fill, only 4,300 is offset, leaving a net fill of 1,700 cubic yards in the greenway. Note that it is a policy of the City to encourage the use of the cut-and-fill ratios described in the National Marine Fisheries Service Biological Opinion to FEMA (found on pg. 279 of the Biological Opinion). The use of those ratios is less likely to result in harm to wildlife, including threatened and endangered species, and to structures and their inhabitants. Please consider incorporating them into your design.

RESPONSE:

The greenway includes areas that are both inside and outside of the delineated 100-yr floodplain/floodway. The area within the floodplain/floodway consists almost entirely of the bank stabilization and enhancement portion of the floodway, which will result in a net cut of 5,260 cubic yards (from 5,430 cubic yards of cut and 170 cubic yards of fill). Areas of fill within the greenway are largely outside of the floodplain/floodway and includes areas of fill for the trails and to meet grade requirements on the west side of the greenway where it will transition to the building and plaza grading. Bank stabilization design will require permits from the USACE for work below Ordinary High Water and will meet NMFS biological opinion requirements.

b. The overlook appears to occur in the regulated floodway which could cause mortality and stranding of federally protected endangered salmon and steelhead during high water events such as the 1996 flood event when this area was submerged.

RESPONSE:

The Abernethy Overlook is also being eliminated. There will be no proposed structures within the regulated floodway. A no-rise analysis has been completed for the regulated floodway area along the project's riverfront area and it shows no impact to floodway.

A no-rise analysis was done that includes the Abernathy Overlook for the design presented in the original, allowing the design to proceed without CLOMR/LOMR review. For the proposed Design Review/Greenway Review resubmittal, the Abernathy Overlook has been eliminated and the bank laid back further at that location so there are no obstructions that could endanger federally protected endangered salmon and steelhead. The no-rise analysis that includes the Abernathy Overlook is attached to this response. The analysis will be updated with revised grading when required for permit issuance. Since the revised grading no longer has the overlook and the bank has been laid back further there should not be any issues with floodplain rise for the revised bank grading.

2. Natural Resource Inventory

… To protect the natural functions provided by these resources, BES recommends that the applicant minimize site disturbance and replant disturbed areas with native vegetation. Doing so will help minimize erosion, protect slope stability, and restore lost functions.

RESPONSE:

While the existing bank condition provides some natural functions, it is largely limited to shallow mildly sloped alcove areas (4H:1V) that exist at the north and south end of the sites below elevation 10 ft. Below elevation 10 ft the existing bank slopes are typically 2H:1V or flatter, while above this elevation the bank is much steeper. The existing bank material consists largely of miscellaneous fill, including large concrete rubble and asphalt pavement. Finer materials are present within the existing alcove

areas that can provide shallow water habitat. Existing vegetation consists of a row of shore pines at the top of existing bank, with ivy and blackberry. Vegetation below the existing top of bank is comprised largely of ivy and blackberry that has grown down from the top of bank. There are also a number of derelict piles along the bank.

The bank will be laid back and stabilized to protect against erosion from high water flood events and from wave and wake damage that can occur during low water periods. For this reason, the bank stabilization must extend below ordinary low water to prevent the bank stabilization measures (riprap) from being undermined. Due to the height of the bank with very steep existing slopes (approximately 22 ft height from elevation 10 ft to elevation 32 ft) and the limited greenway width that must also provide additional uses (e.g. trails) laying the bank back to a slope flat enough to not require engineered stabilization measures (riprap) is not feasible. Therefore, riprap will be used to stabilize the bank below ordinary high water (elevation 18.22) at a maximum 2H:1V slope while incorporating engineered large woody debris to provide high flow refuge and shelter for fish species. Where riprap is used below ordinary high water to stabilize existing mild slopes the riprap will be overlain with clean river rock and sediment to provide enhanced shallow water habitat. To allow for flatter vegetated slopes above ordinary high water, retaining walls must be used to make up the height to the trail elevation. Retaining walls have been located near the trail and as high up the slope as possible to minimize the inundation duration. The area below the retaining walls will be vegetated with native trees and shrubs that will provide a slow moving flow fringe during high water events adjacent to the retaining wall.

While the bank cannot be completely naturalized due to site constraints, including tall, steep existing banks, matching grades to the adjacent properties, and providing user trail space, the bank design does incorporate the following enhancement features:

- Existing slopes 2H:1V or flatter will be preserved, and the riprap will be overlain with large river rock
- The existing slopes 4H:1V or flatter in the two alcove areas will be preserved and the riprap will be overlain with fine river rock and sediment, similar to what exists at those areas now.
- Derelict piles within the work area will be removed
- Engineered large woody debris will be incorporated into the riprap below proposed ordinary high water to provide refugia and shelter and meet NMFS SLOPES V requirements
- Engineered large woody debris within the planting requirements of subarea 1 will be configured to maximize retention of fine sediment to create planting pockets
- Engineered large wood debris below the planting requirements of subarea 1 will be configured to maximize refugia and shelter for fish
- Above ordinary high water the slopes will be a maximum of 3H:1V and stabilized with native vegetation. Vegetation stabilization is adequate for these slopes above ordinary high water because the duration of exposure to wave and wake damage is much less than below ordinary high water.
- Bank enhancement and stabilization grading will result in a net cut of 5,260 cubic yards of cut and material removal (1,030 cubic yards below OHW)

The bank design will also be reviewed and permitted by the USACE and OR-DSL.

[…]

3. Special Habitat Area

[…]

4. Shoreline and Floodplain Habitat

[…]

5. South Waterfront Greenway Review

…This proposal does not meet those approval criteria for the following reasons:…

a. *The proposal maintains a steep slope of 2:1 or 3:1 at all areas below top of bank (Sheet C2.2, C.110). This slope will require additional riprap and reinforcement. All decreases in slope appear to occur above ordinary high water (Sheet C2.2). Stable, naturalized riverbanks throughout the Willamette River are a minimum of 5:1 or shallower to 7:1 in order to allow native plantings to survive, provide adequate cover and slow moving margins for salmon to rest and rear, and to provide additional areas to escape high flows and predators. Notably, the areas of Ross Island are a 10:1 slope, Zidell was a 10:1 to a 5:1 slope in most areas, and Cottonwood bay is similarly a 6:1 to 7:1 slope below top of bank.*

RESPONSE:

The updated Greenway Review submitted is being revised to remove lawn, move the trails to the west, and create more space for bank re-grading and natural vegetation areas. Below ordinary high water the revised proposal calls for slopes between 2H:1V and 4H:1V, above ordinary high water it calls for slopes between 3H:1V and 5H:1V with some retaining wall required to prevent steeper slopes. Flatter slopes that would be required to fully naturalize the bank are not feasible due to the height of the existing steep bank and the available greenway width that must also accommodate other uses. Decreases in slope occur both below and above ordinary high water. Existing mild slopes are preserved, especially in flatter existing alcove areas at the north and south of the site (see attached plans)

Riprap is required for bank stability to protect against erosion from river flow and waves and wake. To provide cover, slow moving margins, and refuge for salmon as the water level rises, engineered large woody debris structures will be incorporated into the riprap slope. Below elevation 10 the large woody debris will be placed to create refuge and shelter, above elevation 10 large woody debris will be placed to create planting pockets for vegetation establishment because vegetation survival below elevation 10 is low even on mild naturalized slopes such as Ross Island and Cottonwood Bay. The established vegetation will provide the refuge and shelter functions. This approach is consistent with requirements of NMFS in their SLOPES V biological opinion.

b. *There are few if any examples in the Willamette River where rip rapped slopes greater than 3:1 have any vegetation survival. Mortality rates of vegetation in riprap are extremely high and therefore there should be no assumption that the proposed shrubs and plantings below top of bank will survive to replace or enhance functions and values. Notably just to the north, the City experimented with vaults in order to ensure plant survival, and while the plants have survived, they have also not provided rearing or refuge areas for salmon and steelhead because of the need to use vaults*

RESPONSE:

Engineered Large Woody Debris (LWD) is being incorporated into the riprap slope to provide many of the ecological functions that would be provided by vegetation in a natural bank setting with flatter slopes. Unfortunately, due to the tall and steep existing bank, flatter slopes that would be required to eliminate the need for engineering bank stability are not feasible. The LWD provides a roughened surface that creates turbulent and eddies during high flows that allows fish to more easily navigate to refuge and shelter areas that are also provided by the large woody debris. Multiple types of LWD structures are provided to provide complexity and diversity, see attached plan for structure types, overall layout is still being revised. LWD structures will be installed along the entire bank between ordinary high water and a few feet below ordinary low water. Native natural area plantings will be provided above ordinary high water.

While the majority of the bank is over-steepened with miscellaneous fill and rubble, there are two existing mildly sloped alcove areas with fine sediment that exist near ordinary low water to approximately elevation 10 ft. These existing grades will be preserved with riprap overlain with fine sediment installed. The fine sediment will provide habitat for benthic invertebrates' shallow water

rearing. These alcove areas will also provide slower moving water refuge areas for fish that use the site.

c. *The use of riprap increases sheer forces for salmon and can cause mortality in juvenile salmon, especially with high wakes.*

RESPONSE:

Incorporating Large Woody Debris (LWD) into the riprap will reduce the sheer forces by providing turbulence and eddies that allow for fish to more easily navigate to refuge and shelter areas that are also provided by the large woody debris and vegetation where established. The bank slopes will not be uniform, there is variation in the bank with alcoves and points that also provide flow complexity.

d. *The proposal calls for disconnecting the river from the riverbank in areas where the concrete retaining wall will remain, and where new retaining walls are created down to the top of bank.*

RESPONSE:

The proposed trail alignment redesign will provide more area for the bank stabilization and enhancement and has allowed the revised proposal to reduce the retaining wall area from 1,800 square feet to 950 square feet. The maximum height of the retaining wall at the central portion of the site is 5 ft. The maximum height of the retaining wall at the south portion of the site is 8 ft. This higher wall is required to tie into the steep bank and existing concrete wall/pier at this location. The retaining wall is located close to the trail to allow for it to be as far away from the river as possible, with the toe of the wall being at least 4 ft above ordinary high water, this minimizes the duration that flow will interface with the wall. The walls are required to allow the area above ordinary high water to have 3H:1V or flatter slopes to support natural area plantings, therefore the area in front of the wall (water side of the wall) will be planted with trees and shrubs that will likely be similar height to the wall, providing the slow moving fringes and flow variability to benefit fish. The retaining walls allow for the river to connect to more natural vegetation while still providing trail and use access in the remainder of the greenway.

e. *It is unclear what the application is referring to as a "naturalized bank" if it is reliant on heavy rip rap, geogrid, and small shrubs that are unlikely to survive.*

RESPONSE:

The term "naturalized bank" was used generically in application material, but will be revised in future submittals to better represent the proposed bank stabilization and planting. Native trees and shrubs will be planted above ordinary high water (subarea 2) according to the plant list and density provided by the City of Portland. Below ordinary high water riprap is required for bank stability and erosion protection. Even on mild natural slopes vegetation is not present below an elevation of approximately 10. Above this elevation and below ordinary high water engineered large woody debris will be incorporated to create pockets of fine sediment to for plantings.

f. *The proposal removes over 40 existing trees that are at or below top of bank that are currently providing some function. It is unclear, given the engineered riverbank, how newly planted trees will survive. There is some reference to LWD but in this river system, large woody debris will need to be highly engineered. BES strongly supports the use of large wood as bank stabilization but would require engineered drawings to review for stability and durability.*

RESPONSE:

The existing trees are at the top of bank and largely outside of the 100-year floodplain, so they provide little ecological function for the river. The proposed bank stabilization and enhancement will lay back the bank, requiring removal of the trees. The bank slopes will allow for natural vegetation above ordinary high water that will interface with the river on a regular basis. Below ordinary high water engineered large woody debris will be incorporated to provide ecological function. Where possible the engineered large woody debris will support planting pockets to provide vegetation below ordinary high water. Engineered large woody debris details are provided in the attached plan set,

however the overall layout has not been revised yet, and will be revised to distribute more large woody debris near ordinary high water to support plantings.

[…]

6. Recommendations

This site provides extensive opportunities for fish and wildlife habitat enhancement and result in a net gain of biological productivity. Many of these opportunities are included generally in the Willamette River Central Reach Natural Resources Protection Plan. However, some specific recommendations include:

a. Remove the derelict pilings and structures in the shallow water habitat. Lay back the bank where possible to a minimum 5:1 slope or shallower up to Ordinary High Water.

RESPONSE:

Derelict pilings will be removed within the work area and along the fringe of the work area. Some clusters will remain to match the aesthetic of the adjacent properties and honor the history of the area. Due to site constraints, mainly the steepness of the existing bank, it is not possible to lay back the bank to a 5H:1V slope entirely below ordinary high water. We are taking advantage of existing areas with mild bank slopes to stabilize and rebuild alcove areas where finer sediment can persist to support benthic invertebrates and rearing habitat. Engineered Large Woody Debris will be incorporated into the slope below ordinary high water to provide improved ecological function.

b. Plant with native trees and shrubs to provide food, shade, microclimate, structure, rearing and refuge.

RESPONSE:

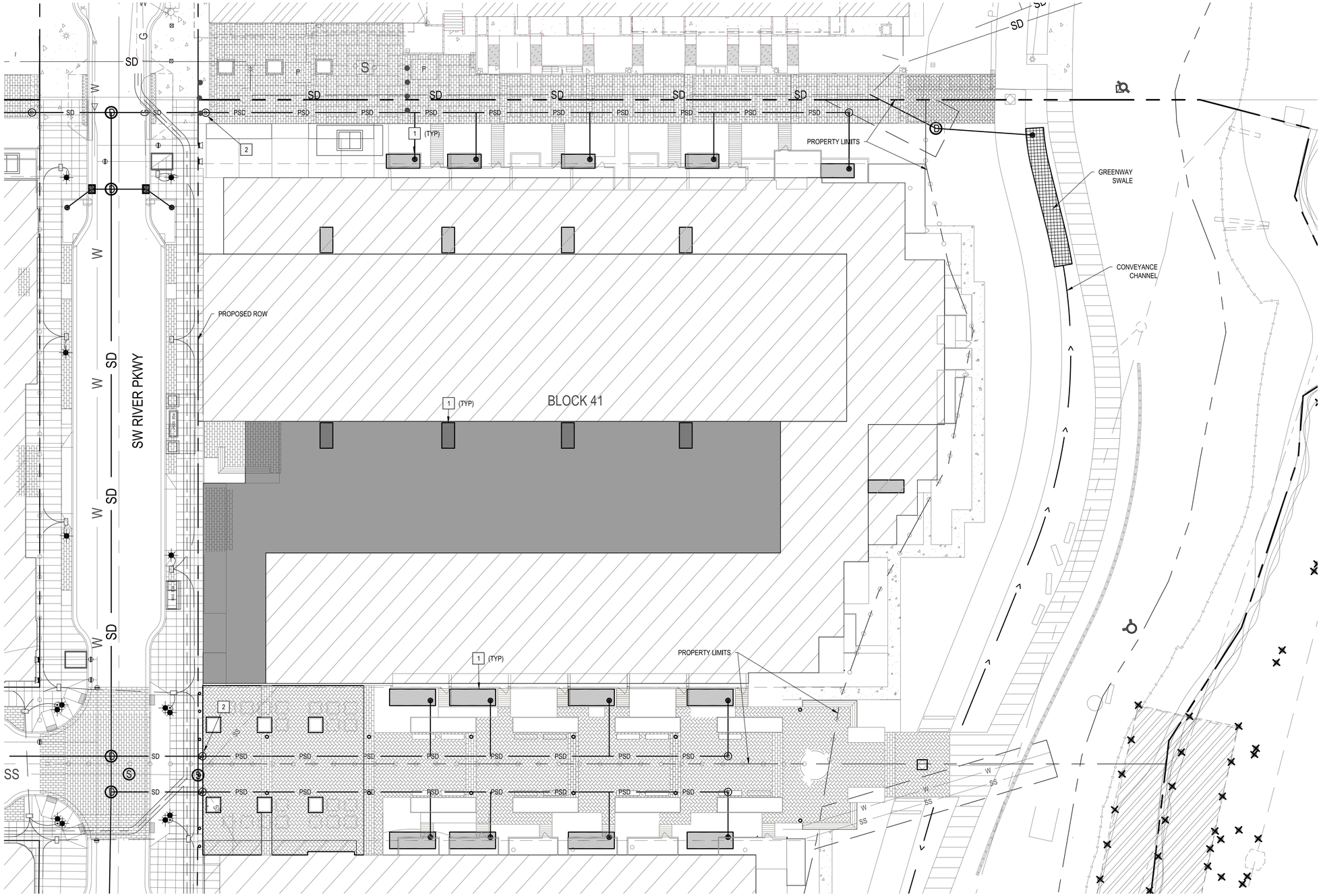
Native trees and shrubs will be planted above ordinary high water (subarea 2) according to the plant list and density provided by the City of Portland. Below ordinary high water riprap is required for bank stability and erosion protection. Even on mild natural slopes vegetation is not present below an elevation of approximately 10. Above this elevation and below ordinary high water engineered large woody debris will be incorporated to create pockets of fine sediment to for plantings.

Attachments:

1) Stormwater Area Exhibit(s): B41, B42, B44, B45 (shows proposed treatment areas and facilities)
2) Bank Stabilization Plans: C0.0-0.1, C1.0-1.1, C2.0-C2.5, C2.0-C3.*3 (current design plans dated 1/6/2020, updated plans will be provided to BES as permitting progresses governing regulatory agencies)*
3) Bank Stabilization Cut/Fill Exhibit
4) Technical Memorandum: Otak, Inc, “Blocks 41, 42, 44, and 45; No Rise Analysis” dated January 6, 2020.

Future Submittal Materials:

1) Design Review Conceptual Stormwater Management Plan: B41, B42, B44, B45, Greenway
2) Design Review Resubmittal: B41, B42, B44, B45 Utility Plan Exhibits, Landscape Exhibits
3) Greenway Review Resubmittal: Greenway Exhibits



STORMWATER NOTES

1. PROPOSED PRIVATE STORMWATER PLANTER.
2. PROPOSED STORMWATER LATERAL CONNECTION.

STORMWATER NARRATIVE

THE PROPOSED STORMWATER MANAGEMENT SYSTEM, DESIGNED IN ACCORDANCE WITH THE CITY OF PORTLAND'S STORMWATER MANAGEMENT MANUAL AND SEWER AND DRAINAGE FACILITIES DESIGN MANUAL, WILL INCLUDE LOW IMPACT DEVELOPMENT (LID) PLANTERS AND STORMFILTER MECHANICAL TREATMENT FOR WATER QUALITY TREATMENT. A PIPED CONVEYANCE SYSTEM WILL CONNECT TO AN EXISTING STORM SEWER IMMEDIATELY SOUTH OF SW LOWELL STREET. LID FLOW-THROUGH PLANTERS WERE SIZED USING THE CITY'S PRESUMPTIVE APPROACH CALCULATOR (PAC) TOOL MEET POLLUTION REDUCTION REQUIREMENTS BY FILTERING STORM WATER THROUGH THE TOPSOIL MIX SPECIFIED BY BES. THE PROPOSED IMPROVEMENTS MEET THE CRITERIA FOR EXEMPTION FROM FLOW CONTROL RUNOFF, PER SECTION 1.3.4 OF THE STORMWATER MANAGEMENT MANUAL, AS THE STORM LINE DISCHARGES DIRECTLY TO THE WILLAMETTE RIVER THROUGH THE EXISTING SW LOWELL STREET OUTFALL. THE STORMWATER CONVEYANCE SYSTEM HAS BEEN SIZED TO CONVEY AND CONTAIN THE 10-YEAR, 5-MINUTE EVENT WITHOUT SURCHARGING AND THE 25-YEAR, 5-MINUTE STORM EVENT WITH AT LEAST 6 INCHES OF FREEBOARD.

LEGEND

- BUILDING IMPERVIOUS AREA (TO STORMFILTER)
- BUILDING IMPERVIOUS AREA (TO PLANTER)
- PRIVATE STORMWATER PLANTER
- PROPOSED SWALE

20' 0' 20' 40'
SCALE IN FEET

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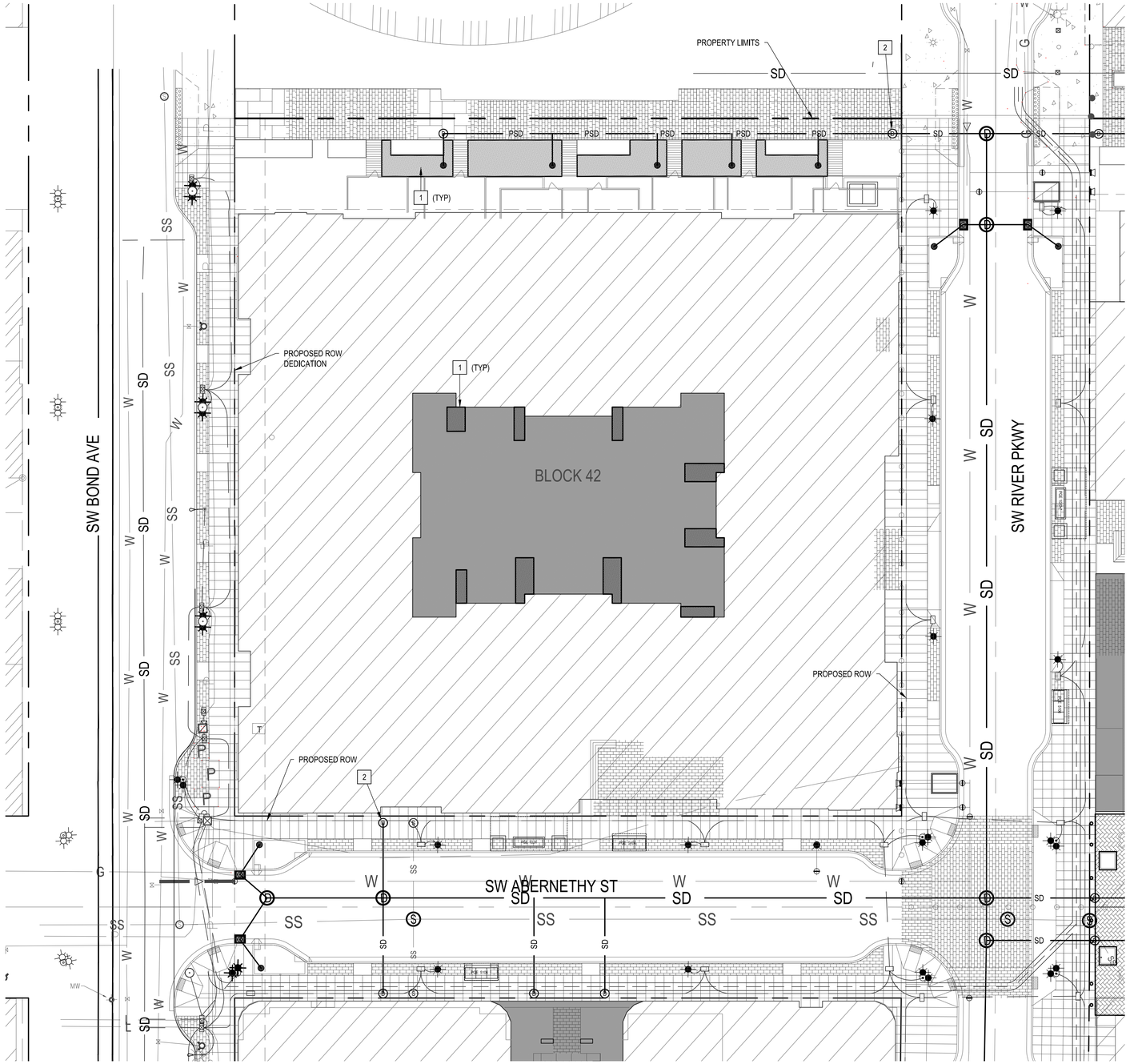
BLOCK 41 STORMWATER PLAN

LAND USE REVIEW# (LU-19-225732 DZM GW) EXHIBIT C.124



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LEGEND

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- BUILDING IMPERVIOUS AREA (TO PLANTER)
- PRIVATE STORMWATER PLANTER

20' 0' 20' 40'
SCALE IN FEET

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BLOCK 42 STORMWATER PLAN

LAND USE REVIEW# (LU-19-225732 DZM GW) EXHIBIT C.125

STORMWATER NOTES

1. PROPOSED PRIVATE STORMWATER PLANTER.
2. PROPOSED STORMWATER LATERAL CONNECTION.

STORMWATER NARRATIVE

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- PROPOSED SWALE

20' 0' 20' 40'
SCALE IN FEET

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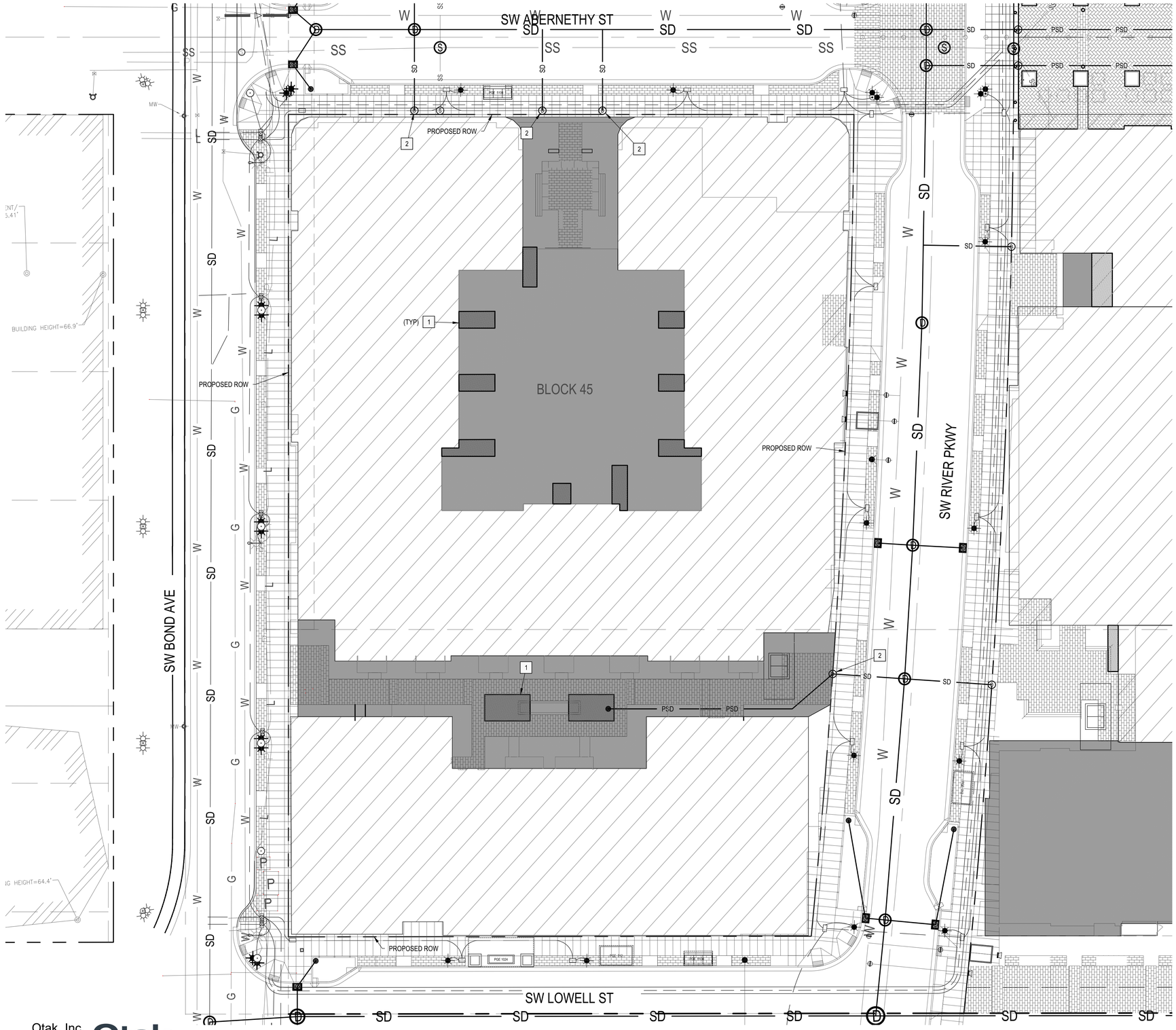
BLOCK 44 STORMWATER PLAN

LAND USE REVIEW# (LU-19-225732 DZM GW) EXHIBIT C.126



STORMWATER NOTES

1. PROPOSED PRIVATE STORMWATER PLANTER.
2. PROPOSED STORMWATER LATERAL CONNECTION.

STORMWATER NARRATIVE

THE PROPOSED STORMWATER MANAGEMENT SYSTEM, DESIGNED IN ACCORDANCE WITH THE CITY OF PORTLAND'S STORMWATER MANAGEMENT MANUAL AND SEWER AND DRAINAGE FACILITIES DESIGN MANUAL, WILL INCLUDE LOW IMPACT DEVELOPMENT (LID) PLANTERS AND STORMFILTER MECHANICAL TREATMENT FOR WATER QUALITY TREATMENT. A PIPED CONVEYANCE SYSTEM WILL CONNECT TO AN EXISTING STORM SEWER IMMEDIATELY SOUTH OF SW LOWELL STREET. LID FLOW-THROUGH PLANTERS WERE SIZED USING THE CITY'S PRESUMPTIVE APPROACH CALCULATOR (PAC) TOOL MEET POLLUTION REDUCTION REQUIREMENTS BY FILTERING STORM WATER THROUGH THE TOPSOIL MIX SPECIFIED BY BES. THE PROPOSED IMPROVEMENTS MEET THE CRITERIA FOR EXEMPTION FROM FLOW CONTROL RUNOFF, PER SECTION 1.3.4 OF THE STORMWATER MANAGEMENT MANUAL, AS THE STORM LINE DISCHARGES DIRECTLY TO THE WILLAMETTE RIVER THROUGH THE EXISTING SW LOWELL STREET OUTFALL. THE STORMWATER CONVEYANCE SYSTEM HAS BEEN SIZED TO CONVEY AND CONTAIN THE 10-YEAR, 5-MINUTE EVENT WITHOUT SURCHARGING AND THE 25-YEAR, 5-MINUTE STORM EVENT WITH AT LEAST 6 INCHES OF FREEBOARD.

LEGEND

BUILDING IMPERVIOUS AREA (TO STORMFILTER)

BUILDING IMPERVIOUS AREA (TO PLANTER)

PRIVATE STORMWATER PLANTER

Otak, Inc.
808 SW Third Avenue, Ste. 300
Portland, OR 97204
503. 287. 6825
www.otak.com

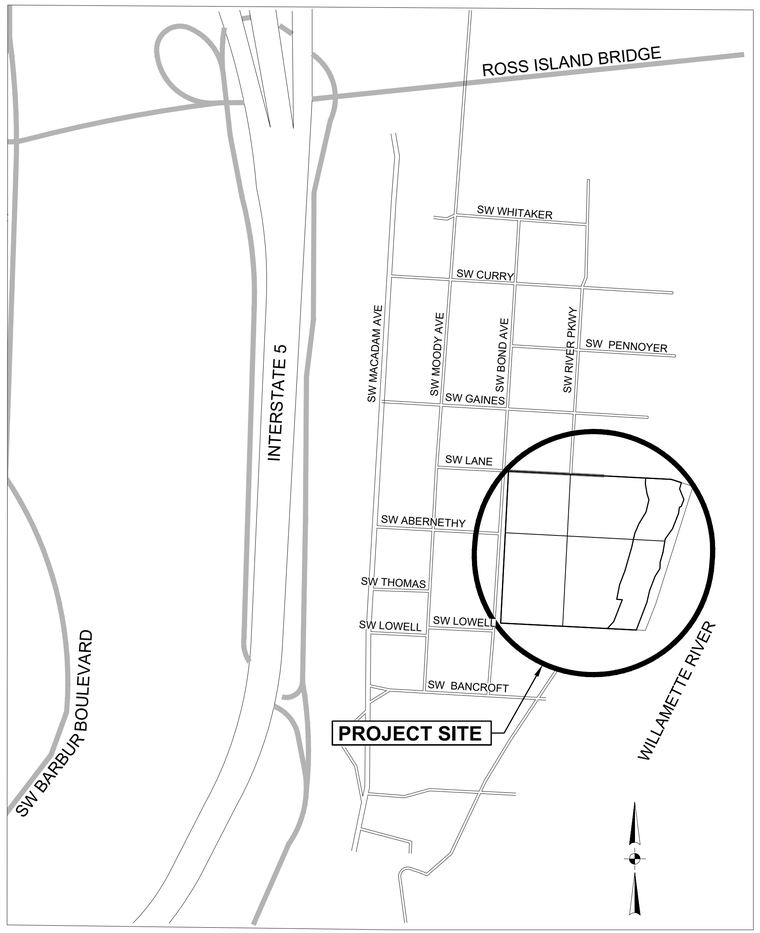
BLOCK 45 STORMWATER PLAN

LAND USE REVIEW# (LU-19-225732 DZM GW) EXHIBIT C.127

ALAMO MANHATTAN BANK STABILIZATION

PRELIMINARY DESIGN

PORTLAND, OREGON



VICINITY MAP

SCALE: NTS

PROJECT MAP

SCALE: NTS

SITE INFORMATION:

MULTNOMAH COUNTY, OREGON
1S1E10DB TL 300 (7.68 ACRES)
1S1E10DB TL 400 (2.15 ACRES)
CITY OF PORTLAND ZONING: CX-CENTRAL
PROPOSED USE: HIGH-RISE COMMERCIAL MIXED-USE

BENCHMARK:

ALL ELEVATIONS SHOWN ON THE PLANS ARE CITY OF PORTLAND DATUM USING BENCHMARK NO.1514, ELEVATION=36.182, LOCATED AT THE INTERSECTION OF SW MOODY AVE AND SW GIBBS ST AT THE SW CORNER AND BENCHMARK NO. 1519, ELEVATION =33.576, LOCATED AT SW BOND AVE AND SW CURRY ST AT THE EAST CURB. THIS DATUM HAS ITS ZERO ELEVATION EQUIVALENT TO 1.375 FEET BELOW MEAN SEA LEVEL AS SET BY THE US COAST AND GEODETIC SURVEY, 1947 ADJUSTMENT.

SHEET INDEX

APPLICANT/DEVELOPER

Name:	Alamo Manhattan
Contact:	Wade Johns
Phone:	(469) 941-4515
Email:	Wade.Johns@alamomanhattan.com

CIVIL ENGINEER/SURVEYOR

Name:	Otak, Inc.
Engineer:	Joshua Owens, PE
Surveyor:	Mike Spelts
Phone:	(503) 287-6825
Email:	joshua.owens@otak.com

ENVIRONMENTAL CONSULTANT

Name:	Pacific Habitat Services, Inc.
Contact:	John van Staveren
Phone:	(503) 570-0820
Email:	jvs@pacifichabitat.com

GEOTECHNICAL CONSULTANT

Name:	GeoDesign, Inc.
Contact:	Nick Paveglio
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Email:	npaveglio@geodesign.com

NOT FOR CONSTRUCTION

FILE: C:\19050-C0.0.DWG ### 1/6/2020 9:08:17 AM - LEAHB

NO.	DATE	DESCRIPTION	APPD.

REVISIONS

CONSTRUCTED BY
PROJECT COMPLETED
MAP CORRECTED BY
CHECKED BY

FINAL MAP DATA

DESIGNED BY	DATE APPROVED
CAD BY	SECTION ENGR
CHECKED BY	BES REVIEWER
	PBOT REVIEWER

CITY OF PORTLAND OREGON 1851

Otak, Inc.
808 SW Third Avenue, Ste. 300
Portland, OR 97204
503. 287. 6825
www.otak.com

OTAK PROJECT NUMBER
19050.2

ALAMO MANHATTAN
BANK STABILIZATION
PORTLAND, OR
COVER SHEET

SHEET NO.
C0.0
OF

GENERAL

1. ERRORS AND OMISSIONS ARE THE RESPONSIBILITY OF THE "ENGINEER OF RECORD". IF ERRORS OR OMISSIONS ARE FOUND AFTER THE PERMIT HAS BEEN ISSUED, THE PERMITTEE OR ITS CONTRACTOR SHALL CONTACT THE ENGINEER OF RECORD (JOSHUA OWENS, PE OF OTAK, INC. AT 503-287-6825) TO HAVE THE CORRECTIONS MADE. ALL CHANGES WILL REQUIRE THE APPROVAL OF THE CITY ENGINEER PRIOR TO THE WORK BEGINNING.

2. THE CONTRACTOR SHALL HAVE AT ALL TIMES ON-SITE, THE APPROVED CONSTRUCTION DRAWINGS & SPECIAL SPECIFICATIONS, CITY OF PORTLAND STANDARD SPECIFICATIONS & STANDARD DRAWINGS, AND ALL OTHER APPLICABLE SPECIFICATIONS BOOKS AND MANUALS. ELECTRONIC EQUIVALENT ARE ACCEPTABLE.

3. THE CONTRACTOR IS RESPONSIBLE FOR COMPLIANCE WITH ALL PERMIT CONDITIONS, LAWS, ORDINANCES, CODES AND/OR REGULATIONS APPLICABLE FOR PROJECT IMPLEMENTATION, WHICH INCLUDES BUT NOT LIMITED TO: OREGON DSL REMOVAL/FILL PERMIT, U.S. ARMY CORPS OF ENGINEERS SECTION 404 PERMIT, DEQ 1200-C PERMIT, ODFW FISH PASSAGE WAIVER APPROVAL, NATIONAL MARINE FISHERIES SERVICE BIOLOGICAL OPINION AMENDMENT, AND MULTNOMAH COUNTY FLOODPLAIN PERMIT.

4. ALL CONSTRUCTION METHODS AND MATERIALS SHALL CONFORM TO THESE DRAWINGS AND THE APPLICABLE REQUIREMENTS OF THE 2010 EDITION OF THE CITY OF PORTLAND STANDARD CONSTRUCTION SPECIFICATIONS AND ALL REVISIONS AND SPECIAL SPECIFICATIONS.

5. ELEVATIONS ARE BASED ON CITY OF PORTLAND DATUM FROM BENCH MARK NO. 1514, ELEVATION = 36.182, LOCATED AT THE INTERSECTION OF SW MOODY AVE AND SW GIBBS ST AT THE ST CORNER AND BENCHMARK NO. 1519, ELEVATION = 33.576, LOCATED AT SW BOND AVE AND SW CURRY ST AT THE EAST CURB.

6. ATTENTION EXCAVATORS: OREGON LAW REQUIRES YOU TO FOLLOW RULES ADOPTED BY THE OREGON UTILITY NOTIFICATION CENTER. THOSE RULES ARE SET FORTH IN OAR 952-001-0010 THROUGH OAR 952-001-0090. YOU MAY OBTAIN COPIES OF THESE RULES FROM THE CENTER BY CALLING [503.232.1987]. IF YOU HAVE ANY QUESTIONS ABOUT THE RULES, YOU MAY CONTACT THE CALL CENTER. YOU MUST NOTIFY THE CENTER AT LEAST 2 BUSINESS DAYS, BUT NOT MORE THAN 10 BUSINESS DAYS, BEFORE COMMENCING AN EXCAVATION. CALL [811 OR 1-800-332-2344].

7. UTILITIES SHOWN ON THESE PLANS ARE FOR INFORMATION AND COORDINATION PURPOSES ONLY AND ARE NOT AUTHORIZED FOR INSTALLATION UNDER THE PUBLIC STREET IMPROVEMENT PERMIT. PRIVATE AND PUBLIC UTILITY COMPANIES ARE REQUIRED TO SECURE SEPARATE UTILITY PERMITS FROM THE PBOT FOR ALL WORK WITHIN THE PUBLIC RIGHT-OF-WAY.

8. FOR PLUGGING OF ABANDONED SEWER PIPES AND FILLING ABANDONED PIPES, SEE SECTIONS 00490.43 AND 00490.44 RESPECTIVELY OF THE STANDARD SPECIFICATION.

UNANTICIPATED CONTAMINATED MATERIAL

9. FOR UNANTICIPATED CONTAMINATED MEDIA ENCOUNTERED, THE PERMITTEE/APPLICANT OR ITS AGENT SHALL BE RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH THE MANAGEMENT, AND DISPOSAL OF CONTAMINATED MEDIA ENCOUNTERED. THE PERMITTEE IS ALSO RESPONSIBLE FOR ALL RESULTANT DELAYS.

10. THE PERMITTEE OR ITS AGENT SHALL PROVIDE THE CITY (ENGINEERING AND INSPECTION) WITH COPIES OF ALL DISPOSAL PERMITS FROM THE PERMITTED DISPOSAL FACILITY, ANALYTICAL RESULTS USED TO GAIN ACCEPTANCE OF THE CONTAMINATED MEDIA, AND DISPOSAL RECEIPTS/DAILY WEIGH SLIPS. DAILY WEIGH SLIP AMOUNTS SHALL BE CHECKED AGAINST INSPECTOR'S DAILY REPORTS. THE PERMITTEE MUST USE AN OREGON FACILITY FOR DISPOSAL OF THE CONTAMINATED MEDIA.

TREES

11. ALL TREE REMOVAL SHALL COMPLY WITH THE FEDERAL MIGRATORY BIRD TREATY ACT. SEE THE SPECIAL PROVISIONS FOR REQUIREMENTS PRIOR TO CUTTING OF ANY TREE.

12. ALL GROUND DISTURBANCES NEAR TREES REQUIRES ROOT INSPECTION!! CONTACT URBAN FORESTRY (URBAN FORESTRY AT 503-823-8733; FOR ROOT INSPECTIONS PRESS 3) PRIOR TO ALL EXCAVATIONS ADJACENT TO TREES. CONSULTATION WITH THE URBAN FORESTER IS REQUIRED BEFORE CUTTING OF ROOTS.

13. FOR ALTERNATE TREE SPECIES OR ALTERNATE TREE PLANTING LOCATION APPROVAL (PRIOR TO PLANTING), CONTACT URBAN FORESTRY AT 503-823-8733; TO LEAVE A MESSAGE FOR THE TREE INSPECTOR PRESS 5.

EROSION CONTROL

14. EROSION/SEDIMENT CONTROL (ESC) IS REQUIRED ON THIS PROJECT. IMPLEMENTATION OF THE ESC AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPGRADING OF THESE FACILITIES IS THE RESPONSIBILITY OF THE PERMITTEE OR ITS AGENT UNTIL ALL CONSTRUCTION IS COMPLETED AND APPROVED. THE PERMITTEE OR ITS AGENT SHALL PROVIDE INLET PROTECTION TO DOWNSTREAM INLETS FROM THE SITE PER THE EROSION CONTROL MANUAL (MARCH 2008).

15. CONTRACTOR SHALL AVOID DISTURBING AREAS OUTSIDE OF THE EXTENTS SHOWN IN THE PLANS.

16. ESTABLISH STAGING AND STOCKPILE AREAS FOR STORAGE OF CONSTRUCTION EQUIPMENT, VEHICLE PARKING, EARTHWORK MATERIAL, LOGS, ROCK, PLANTING MATERIALS, FUELING, SERVICING, AND HAZARDOUS MATERIALS. MINIMIZE CLEARING AND GRUBBING ACTIVITIES WHEN PREPARING STAGING AND STOCKPILE AREAS.

FOR GRADING PERMITS AND STRUCTURAL FILLS

17. THE PERMITTEE OR IT'S AGENT SHALL RETAIN THE SERVICES OF A GEOTECHNICAL ENGINEER TO MAKE ALL INSPECTIONS, TO PROVIDE MATERIAL TESTING SERVICES, AND TO CERTIFY THAT THE PLACED STRUCTURAL FILLS MEET THE EMBANKMENT SPECIFICATION RECOMMENDED IN THE GEOTECHNICAL REPORT, AND SECTION 00330 - "EARTHWORK" OF THE STANDARD CONSTRUCTION SPECIFICATION.

18. THE PERMITTEE OR IT'S AGENT SHALL ADHERE TO THE RECOMMENDATIONS GIVEN IN THE GEOTECHNICAL REPORT PREPARED BY GEODESIGN DATED DECEMBER XX, 2019.

19. THE GEOTECHNICAL ENGINEER SHALL SEND TEST AND INSPECTION RESULTS TO:

TODD LILES, BUREAU OF TRANSPORTATION
1120 SW 5TH AVENUE, SUITE 800
PORTLAND, OR 97204-1971
OR VIA EMAIL TO: TODD.LILES@PORTLANDOREGON.GOV

EQUIPMENT

20. THE SIZE AND CAPABILITY OF HEAVY EQUIPMENT WILL BE COMMENSURATE WITH THE PROJECT.

21. EXCAVATOR(S), AND ANY OTHER EQUIPMENT PERFORMING WORK BELOW ORDINARY HIGH WATER (EL=18.22), SHALL USE BIODEGRADABLE HYDRAULIC FLUIDS BASED UPON RAPESEED (CANOLA) VEGETABLE OIL. ALL EQUIPMENT WILL BE IN GOOD WORKING ORDER AND FREE OF FUEL, OIL, LUBRICATION, OR OTHER FLUID LEAKS. WASH AND REMOVE EXTERNAL OIL AND GREASE, ALONG WITH DIRT AND MUD PRIOR TO MOBILIZING EQUIPMENT ONTO THE CONSTRUCTION SITE. ALL CONSTRUCTION EQUIPMENT WORKING WITHIN 50 FEET OF JURISDICTIONAL WETLANDS OR WATERS SHALL BE DIAPERED WITH PETROLEUM ABSORBENT MATERIAL IN ACCORDANCE WITH ODOT STANDARD SPECIFICATION SECTION 00290 AND ALL APPLICABLE JPA OR DEQ CONDITIONS.

22. INSPECT EQUIPMENT DAILY FOR LEAKS OR ACCUMULATIONS OF GREASE, AND FIX ANY IDENTIFIED PROBLEMS BEFORE ENTERING RIVER OR AREAS THAT DRAIN DIRECTLY TO THE RIVER. ALL EQUIPMENT SERVICING AND MAINTENANCE, INCLUDING FUELING, OIL CHANGE AND LUBRICATION, WILL OCCUR OUTSIDE OF THE RIPARIAN ZONE AND WITHIN THE LIMITS OF THE DESIGNATED STAGING AREA. ALL WASTE MATERIALS ASSOCIATED WITH THESE OPERATIONS INCLUDING OIL, LUBRICANTS, HYDRAULIC FLUIDS AND TRASH, WILL BE DISPOSED OF OFF-SITE IN AN ENVIRONMENTALLY SOUND MANNER. WHEN NOT IN USE, VEHICLES SHALL BE STORED IN THE STAGING AREA AS IDENTIFIED IN THE PLANS.

23. EXISTING ROADWAYS OR TRAVEL PATHS WILL BE USED WHENEVER REASONABLE. MINIMIZE THE NUMBER OF NEW ACCESS PATHS TO MINIMIZE IMPACTS TO RIPARIAN VEGETATION AND FUNCTIONS. BELOW ORDINARY HIGH WATER, HEAVY EQUIPMENT SHALL NOT BE OPERATED OUTSIDE OF TURBIDLY CURTAIN.

IN-WATER WORK ISOLATION

24. THE ODFW APPROVED IN-WATER WORK WINDOW IS JULY 1 - OCTOBER 31.

25. ESC MEASURMENTS SHALL BE IMPLEMENTED TO PREVENT SEDIMENT AND DEBRI FROM LEAVING THE WORK AREA, INCLUDING IN WATER WORK AREAS FOR ALL WATER LEVELS

EARTHWORK

26. EARTHWORK GENERAL NOTES:
- THE CONTRACTOR SHALL LIMIT GROUND DISTURBANCE TO THE EXTENT NECESSARY TO COMPLETE THE WORK.
- THE ENGINEER MAY ADJUST GRADING IN THE FIELD TO MEET SPECIFIC FIELD CONDITIONS.
- EXCESS CUT MATERIAL SHALL BE EXPORTED TO AN APPROVED EARTHWORK HAUL SITE TO BE IDENTIFIED BY THE CONTRACTOR.
- UNSUITABLE SUBGRADE MATERIAL SHALL BE OVEREXCAVATED AND REPLACED BY SUITABLE FILL.

30. GRADING TOLERANCES SHALL BE AS FOLLOWS: WITHIN 0.1 FEET OF DESIGN ELEVATIONS FOR EARTHWORK, ROCK, AND LARGE WOOD STRUCTURES.

31. EARTHWORK QUANTITIES ARE MEASURED BY THE VOLUME OF MATERIAL IN TERMS OF BANK CUBIC YARDS (BCY), WHICH IS DEFINED AS THE "NEATLINE" IN-PLACE VOLUME OF THE MATERIAL TO BE EXCAVATED BETWEEN EXISTING AND FINISHED GRADES. NOTE THAT NO EXPANSION FACTORS HAVE BEEN APPLIED TO THE ESTIMATED BANK CUBIC YARD VOLUME PROVIDED BY THE ENGINEER. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IF THE EXISTING CONDITIONS APPEAR TO SIGNIFICANTLY VARY FROM THE SURVEYED TOPOGRAPHY SHOWN ON THE PLANS. EXCAVATED QUANTITIES FOR STRUCTURES AND PLANTINGS WILL NOT BE MEASURED AND PAID FOR SEPARATELY, BUT WILL BE INCLUDED IN THE COST OF THE ITEMS.

32. DURING CONSTRUCTION, THE CONTRACTOR IS RESPONSIBLE FOR TRACKING QUANTITIES OF IMPORTED AND EXPORTED MATERIAL USING A METHOD APPROVED BY THE ENGINEER (I.E., KEEPING A RUNNING, DAILY LOG OF THE NUMBER OF HAUL TRUCKS). IF NECESSARY, THE CONTRACTOR IS RESPONSIBLE FOR DOCUMENTING OVEREXCAVATED SOIL QUANTITIES. WHEN GRADING IS PARTIALLY COMPLETE AND THE ENGINEER HAS APPROVED THE WORK, THE CONTRACTOR SHALL ESTIMATE THE VOLUME (BCY) OF EXCAVATION IN A METHOD APPROVED BY THE ENGINEER FOR PARTIAL PAYMENT. FINAL PAY QUANTITIES AND VERIFICATION OF GRADING ACCURACY WILL BE BASED ON A POST-CONSTRUCTION AS-BUILT SURVEY AT EACH SITE. THE AS-BUILT SURVEY WILL BE PERFORMED BY OTAK.

ROCK

33. STONE FOR RIPRAP, FILTER BLANKET, AND RIVER ROCK SHALL BE HARD, DURABLE, RESISTANT TO WEATHERING, FREE FROM OVERBURDEN, SPOIL, SHALE, STRUCTURAL DEFECTS, AND ORGANIC MATERIAL, AND SHALL MEET THE SIZE CLASS SPECIFIED. NEITHER BREADTH NOR THICKNESS OF A SINGLE STONE SHALL BE LESS THAN ONE-THIRD ITS LENGTH. RIVER ROCK SHALL BE ROUNDED TO SUBROUNDED, WITH DIAMETERS AS SPECIFIED IN THE PLANS. RIPRAP AND FILTER BLANKET ROCK MATERIALS AND SHALL BE ANGULAR.

34. THE RIPRAP, FILTER BLANKET, AND RIVER ROCK SHALL BE CONSTRUCTED TO THE LIMITS SHOWN ON THE PLANS.

LARGE WOOD STRUCTURES

35. LARGE WOOD MATERIALS: SPECIES OF WOOD FOR USE IN LARGE WOOD STRUCTURES SHALL BE DOUGLAS-FIR, WESTERN RED CEDAR, OR SITKA SPRUCE. SIZE OF LARGE WOOD MATERIAL SHALL BE PER DRAWINGS AND SPECIFICATIONS. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IF A SPECIFIED LOG SIZE IS NOT AVAILABLE. WOOD MATERIAL SHALL BE FREE OF CRACKS, DECAY, OR OTHER STRUCTURAL DEFICIENCIES, AND SHALL BE FREE OF DISEASE AND PARASITIC INSECTS. LARGE WOOD MATERIAL FOR STRUCTURES SHALL BE SECURED FROM THE FOLLOWING SOURCES:
- SALVAGED TREES AND EXISTING LOGS REMOVED DURING CONSTRUCTION GRADING ACTIVITIES, AS APPROVED BY THE ENGINEER (LIMITED QUANTITY AVAILABLE)
- IMPORTED LARGE WOOD FROM AN OFF-SITE SOURCE (PROCURED AND HAULED TO SITE BY CONTRACTOR)

36. THE CONTRACTOR SHALL PROVIDE A LIST OF THE LOGS THAT ARE AVAILABLE (ONSITE AND OFFSITE) TO BE USED FOR THE PROJECT. FOR EACH LOG, THE LIST SHALL DESCRIBE THE TREE SPECIES, DIAMETER (DBH), LENGTH, AND ROOTWAD DIAMETER. THE LARGE WOOD STRUCTURE CONFIGURATIONS AND MATERIAL SCHEDULES SHOWN IN THE PLANS ARE CONSIDERED PRELIMINARY, AND ARE SUBJECT TO REVISION BY THE ENGINEER UPON RECEIPT OF THE LIST OF LOG MATERIAL.

37. SPECIFIED DIAMETER OF LOGS SHALL BE MEASURED AT BREAST HEIGHT (DBH). LENGTHS OF LOGS SHALL INCLUDE THE ROOTWAD PORTIONS OF THE LOG, IF ROOTWAD IS PRESENT. LOG SIZE SHALL BE WITHIN THE SPECIFIED RANGE OF DIAMETERS SHOWN ON THE PLANS. ROOTWAD DIAMETER SHALL TYPICALLY BE A MINIMUM OF 3 TIMES THE DBH OF THE LOG, UNLESS OTHERWISE APPROVED BY THE ENGINEER.

38. GENERAL LARGE WOOD STRUCTURE INSTALLATION NOTES:
- THE ENGINEER WILL PROVIDE FIELD GUIDANCE DURING THE FIRST INSTALLATION OF EACH TYPE OF STRUCTURE, PROVIDE MINIMUM OF 3 WORKING DAY NOTICE
- THE LOCATION AND CONFIGURATION OF LARGE WOOD STRUCTURES MAY VARY IN FIELD DUE TO SITE CONDITIONS, AND THE FINAL LOCATION OF THESE STRUCTURES WILL BE FLAGGED BY THE ENGINEER DURING CONSTRUCTION.
- THE CONTRACTOR SHALL TAKE CARE TO PROTECT THE ROOTWADS FROM DAMAGE DURING HANDLING OF LARGE WOOD MATERIAL.
- BURIAL DEPTH AND PERCENT BURIAL SHALL MATCH OR EXCEED SPECIFIED DIMENSIONS. BOTH DIMENSIONS ARE MEASURED FROM THE TOP OF THE LOG. THE TILT ANGLE OF THE LOG IS PROVIDED ONLY AS A RECOMMENDATION. FINAL TILT ANGLES MAY VARY FROM PLANS PROVIDED THE LOGS HAVE THE REQUIRED BURIAL DEPTHS AND BURIAL LENGTHS.
- LIMIT TRENCH WIDTHS ASSOCIATED WITH LOG INSTALLATION TO THE LOG DIAMETER PLUS 2 FEET AND MINIMIZE BANK DISTURBANCE. FOLLOWING CONSTRUCTION, THE CONTRACTOR SHALL STABILIZE THE DISTURBED BANKS BY METHODS NOTED ON THESE PLANS.
- BACKFILL LOG TRENCHES WITH NATIVE ALLUVIUM AND SOILS, MACHINE PACKING BY TRACKING OVER THE LOGS AND PATTING THE SOILS WITH THE BUCKET OF THE EXCAVATOR PER SOIL COMPACTION SPECIFICATIONS.
- IF MULTIPLE ROOTWADS OR STRUCTURES ARE INSTALLED TO PROTECT A BANK FROM EROSION, POSITION THE LOGS SO THE ROOTWADS OVERLAP SLIGHTLY TO AVOID WATER JETTING BETWEEN LOGS.
- SALVAGE SMALLER WOOD MATERIAL (<4 INCH DBH) THAT IS REMOVED DURING SITE CLEARING TO RE-USE AS SLASH DEBRIS IN VOID SPACE BETWEEN LOGS.

POST-CONSTRUCTION SITE STABILIZATION

SEE AND PLANT ACCORDING TO LANDSCAPE PLANS BY LINDA TYCHER & ASSOCIATES

LEGEND

STORM DRAIN MANHOLE
STORM DRAIN DRY WELL
STORM DRAIN CLEAN OUT
STORM DRAIN CATCH BASIN
STORM DRAIN DROP INLET
STORM DRAIN AREA DRAIN
STORM DRAIN MAIN — SD —
STORM DRAIN LATERAL — SD — SD —
LIDA PLANTERS
SANITARY SEWER MANHOLE
SANITARY SEWER CLEAN OUT
SANITARY SEWER MAIN — SS —
SANITARY SEWER LATERAL — SS — SS —
WATER VALVE
WATER BLOW-OFF
WATER METER (VAULT)
WATER MAIN — W —
WATER MAIN (BY PWB)
FIRE HYDRANT
FIRE DEPT. CONNECTION
POST INDICATOR VALVE
DOUBLE CHECK VALVE — DCVA —
FIRE WATER MAIN — FW — FW —
ELECTRIC JUNCTION BOX
UTILITY POLE & GUY
UTILITY POLE WITH LIGHT
ELECTRIC LINE — P —
UNDERGROUND UTILITY TRENCH
GAS VALVE
GAS BLOW OFF
GAS METER
GAS LINE — G —
TELEPHONE MANHOLE
TELEPHONE RISER
TELEPHONE POLE
UNDERGROUND TELEPHONE — T —
OVERHEAD LINES — OHL —
CABLE RISER
UNDERGROUND CABLE TV — TV —
UNDERGROUND COMM — COM —
STREET LIGHT POLE
STREET LIGHT JUNCTION BOX
STREET LIGHT CONTROLLER
UNDERGROUND CONDUIT

ABBREVIATIONS

A.C.	ASPHALTIC CONCRETE	PT	POINT OF TANGENCY
BZ	BUILDING ZONE	PVI	POINT OF VERTICAL INTERSECTION
DWY	DRIVEWAY	PZ	PEDESTRIAN ZONE
ELEV	ELEVATION	R.O.W.	RIGHT OF WAY
EZ	ENTRY ZONE	STA	STATION
FB	FACE OF BUILDING	SW	SIDEWALK
FL	FLOW LINE	TC	TOP OF CURB
FZ	FURNISHING ZONE	TCD	TOP OF CHECK DAM
IE	INVERT ELEVATION	TP	TOP OF PLANTER
LF	LINEAL FEET	TPB	TOP OF PLANTER BOX CURB
MWMAC	MINOR WARM MIX ASPHALTIC CONCRETE	TS	TOP OF SIDEWALK
		TYP	TYPICAL
N/A	NOT APPLICABLE		
PC	POINT OF CURVATURE		
PL	PROPERTY LINE		
PRC	POINT OF REVERSE CURVATURE		

NOT FOR CONSTRUCTION

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NO.	DATE	DESCRIPTION	APPD.

REVISIONS

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OTAK PROJECT NUMBER
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ALAMO MANHATTAN
BANK STABILIZATION
PORTLAND, OR
GENERAL NOTES AND LEGEND

SHEET NO.
C0.1
OF

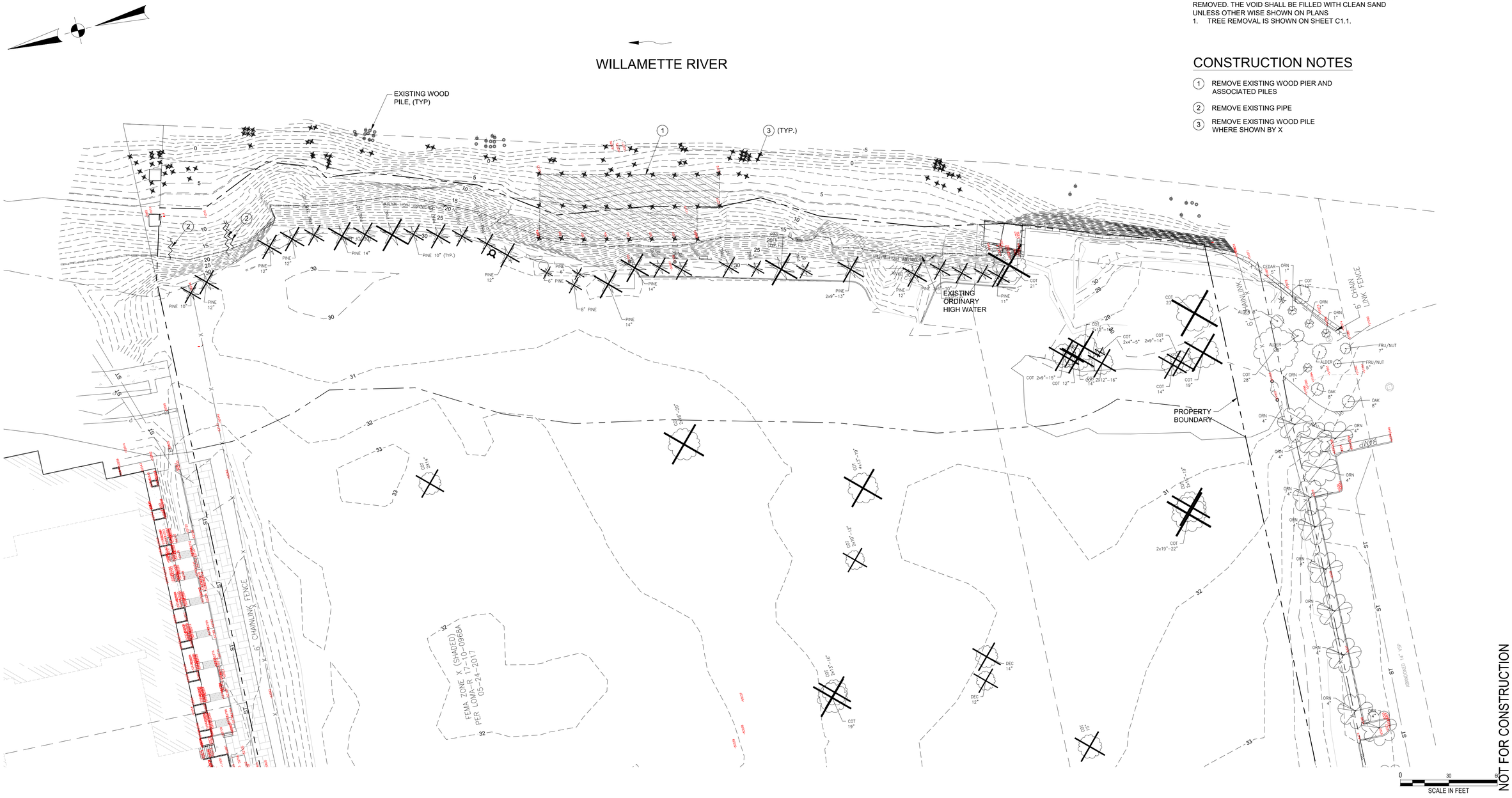
DEMOLITION GENERAL NOTES:

THE WOOD PILES SHOWN TO BE REMOVED SHALL BE FULLY REMOVED. THE VOID SHALL BE FILLED WITH CLEAN SAND UNLESS OTHER WISE SHOWN ON PLANS

1. TREE REMOVAL IS SHOWN ON SHEET C1.1.

CONSTRUCTION NOTES

1. REMOVE EXISTING WOOD PIER AND ASSOCIATED PILES
2. REMOVE EXISTING PIPE
3. REMOVE EXISTING WOOD PILE WHERE SHOWN BY X



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CITY OF PORTLAND OREGON 1851

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OTAK PROJECT NUMBER
19050.2

ALAMO MANHATTAN BANK STABILIZATION
PORTLAND, OR
EXISTING CONDITIONS AND DEMOLITION

SHEET NO.
C1.0
OF

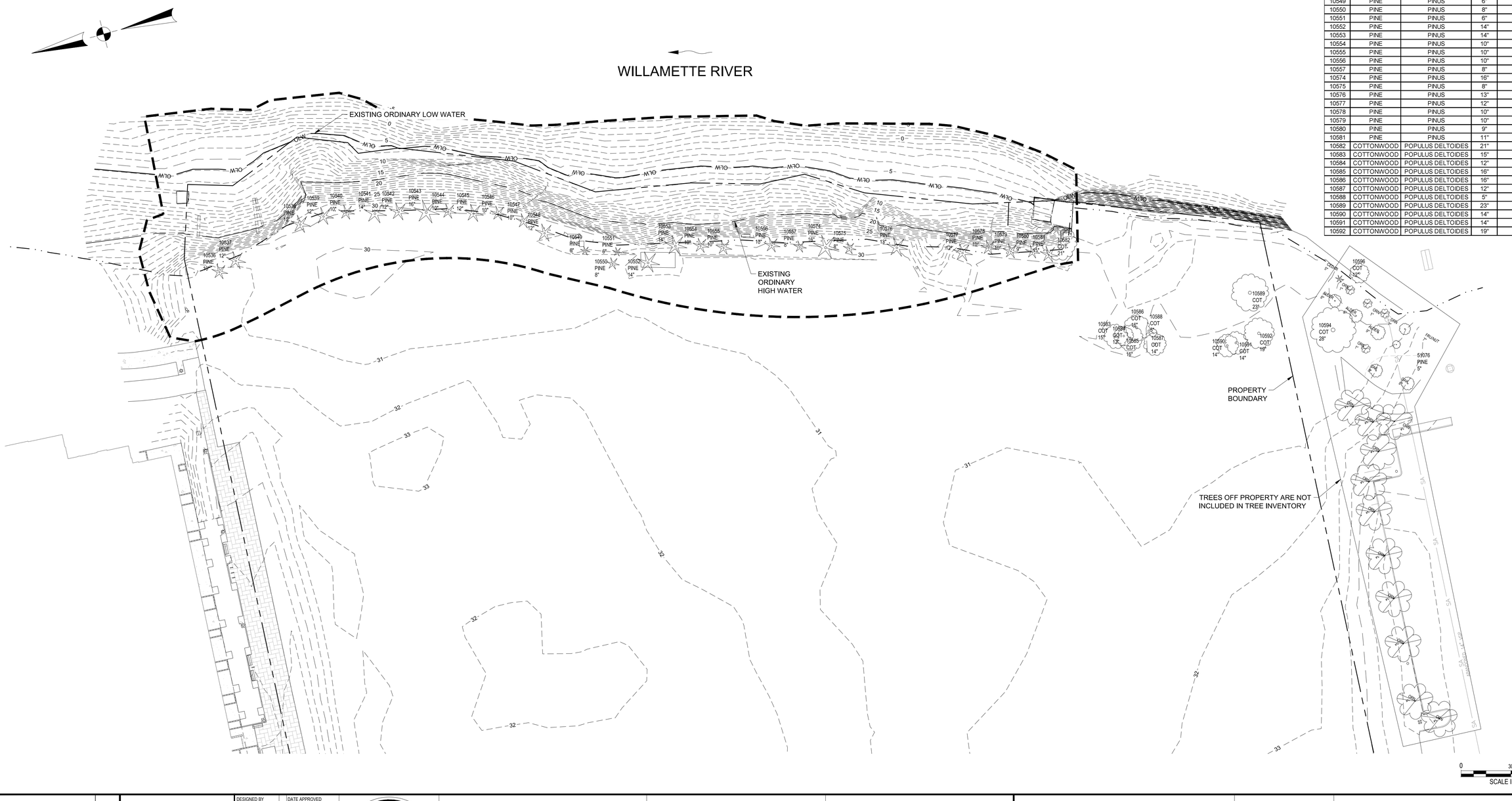
FILE: C19050.C1.0.DWG ### 1/6/2020 9:08:39 AM - LEAHB

CONSTRUCTION NOTES

(1) REMOVE TREES AS SHOWN IN "TREE INVENTORY TABLE."

TREE INVENTORY TABLE

ID #	COMMON NAME	BOTANICAL NAME	OBH (IN)	REMOVAL Y/N
10536	PINE	PINUS	10"	Y
10537	PINE	PINUS	12"	Y
10538	PINE	PINUS	12"	Y
10539	PINE	PINUS	12"	Y
10540	PINE	PINUS	10"	Y
10541	PINE	PINUS	14"	Y
10542	PINE	PINUS	12"	Y
10543	PINE	PINUS	16"	Y
10544	PINE	PINUS	10"	Y
10545	PINE	PINUS	12"	Y
10546	PINE	PINUS	10"	Y
10547	PINE	PINUS	10"	Y
10548	PINE	PINUS	12"	Y
10549	PINE	PINUS	6"	Y
10550	PINE	PINUS	8"	Y
10551	PINE	PINUS	6"	Y
10552	PINE	PINUS	14"	Y
10553	PINE	PINUS	14"	Y
10554	PINE	PINUS	10"	Y
10555	PINE	PINUS	10"	Y
10556	PINE	PINUS	10"	Y
10557	PINE	PINUS	8"	Y
10574	PINE	PINUS	16"	Y
10575	PINE	PINUS	8"	Y
10576	PINE	PINUS	13"	Y
10577	PINE	PINUS	12"	Y
10578	PINE	PINUS	10"	Y
10579	PINE	PINUS	10"	Y
10580	PINE	PINUS	9"	Y
10581	PINE	PINUS	11"	Y
10582	COTTONWOOD	POPULUS DELTOIDES	21"	Y
10583	COTTONWOOD	POPULUS DELTOIDES	15"	N
10584	COTTONWOOD	POPULUS DELTOIDES	12"	N
10585	COTTONWOOD	POPULUS DELTOIDES	16"	N
10586	COTTONWOOD	POPULUS DELTOIDES	16"	N
10587	COTTONWOOD	POPULUS DELTOIDES	12"	N
10588	COTTONWOOD	POPULUS DELTOIDES	5"	N
10589	COTTONWOOD	POPULUS DELTOIDES	23"	N
10590	COTTONWOOD	POPULUS DELTOIDES	14"	N
10591	COTTONWOOD	POPULUS DELTOIDES	14"	N
10592	COTTONWOOD	POPULUS DELTOIDES	19"	N



NO.	DATE	DESCRIPTION	APPD.

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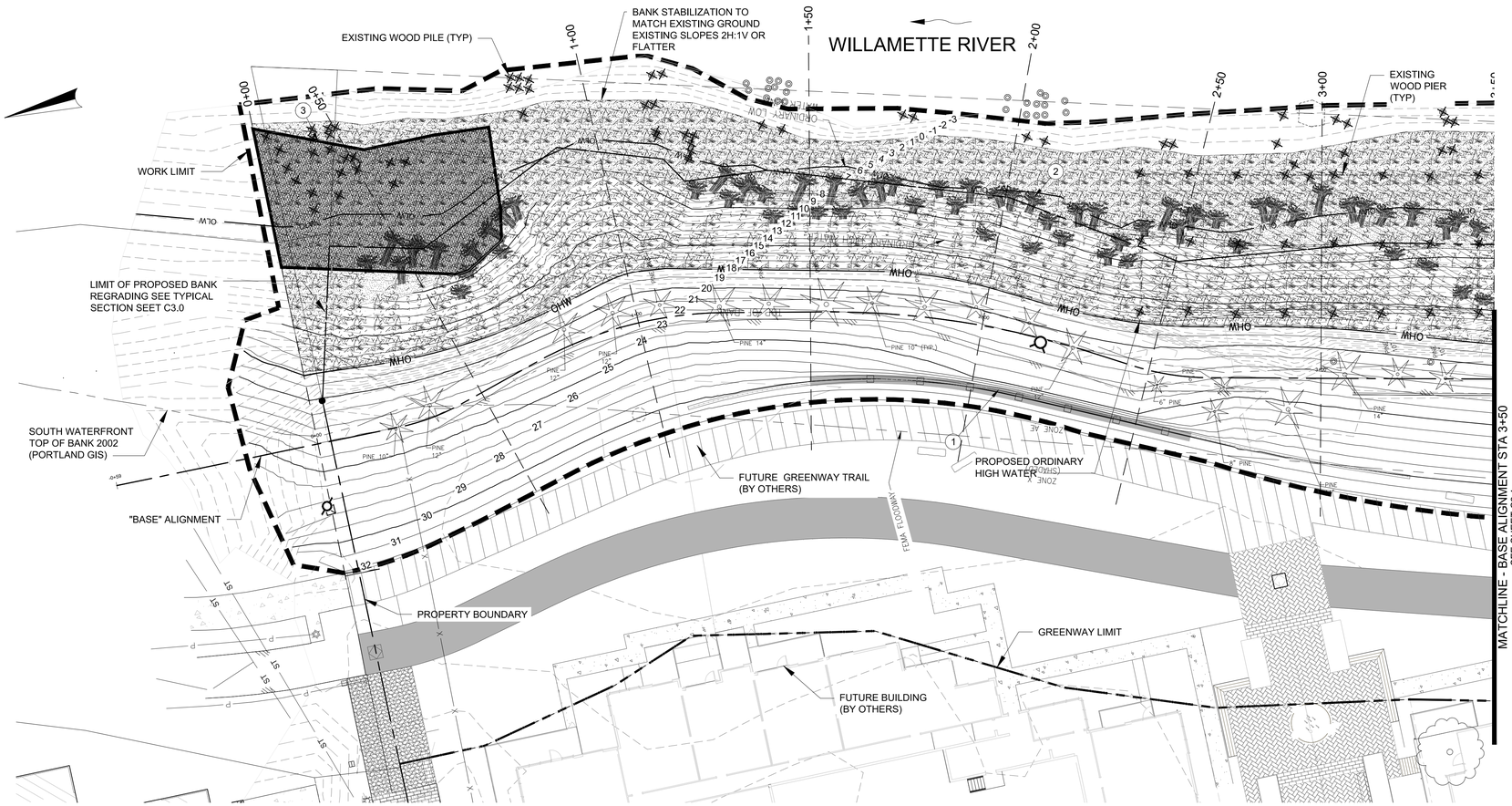
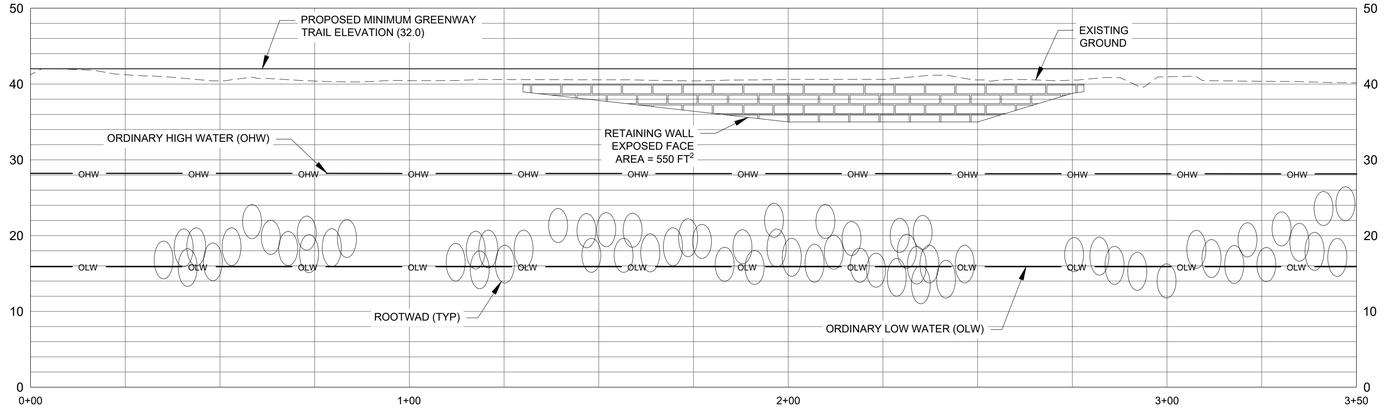
OTAK PROJECT NUMBER
19050.2

ALAMO MANHATTAN BANK STABILIZATION
PORTLAND, OR
TREE INVENTORY AND PROTECTION

SHEET NO.
C1.1
OF

FILE: C19050-C1.1.DWG ### 1/6/2020 9:09:01 AM - LEAHB





BASE ALIGNMENT PROFILE: STA 0+00 TO STA 3+50
Horiz. Scale: 1"=20'
Vert. Scale: 1"=10'

GENERAL NOTES:

1. BANK SECTIONS ARE SHOWN ON SHEETS C2.2 - C2.5.

CONSTRUCTION NOTES

1. CONSTRUCT RETAINING WALL AND FENCE, SEE SHEET C3.X FOR DETAILS
2. CONSTRUCT LARGE WOOD STRUCTURES PER SHEET C3.1
3. EXISTING SHALLOW WATER ALCOVE TO REMAIN, SLOPES 4:1 OR FLATTER SEE SHEET C 3.0 SECTIONS

LEGEND

- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- PROPOSED 1' CONTOUR
- PROPOSED 5' CONTOUR
- ORDINARY HIGH WATER (OHW ELEV 18.22')
- ORDINARY LOW WATER (OHW ELEV 5.90')
- SOUTH WATER FRONT TOP OF BANK (2002, PORTLAND GIS)
- BASE ALIGNMENT (FOR HORIZONTAL REFERENCE)
- PROPOSED FENCE

0 20 40
SCALE IN FEET

NOT FOR CONSTRUCTION

NO.	DATE	DESCRIPTION	APPD.

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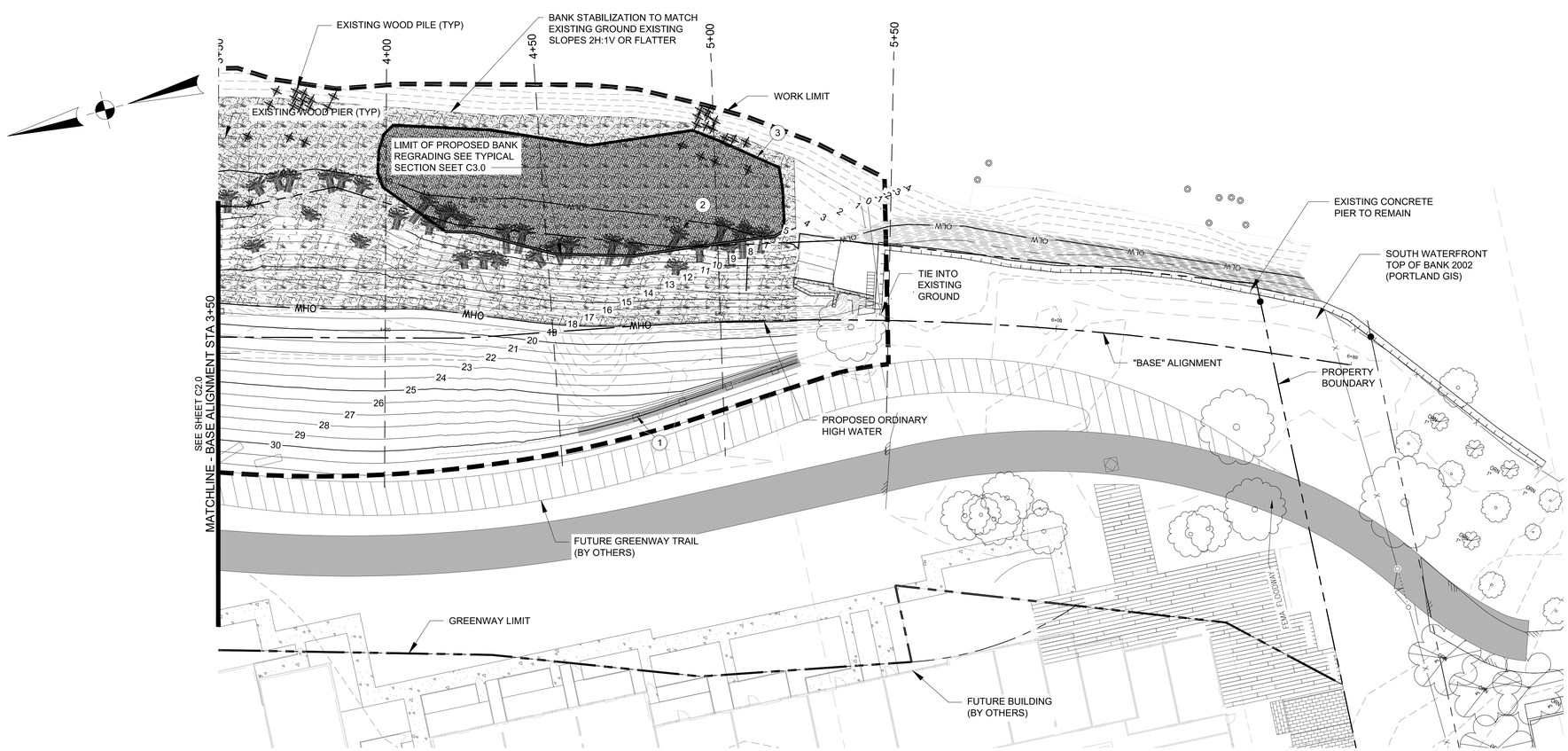
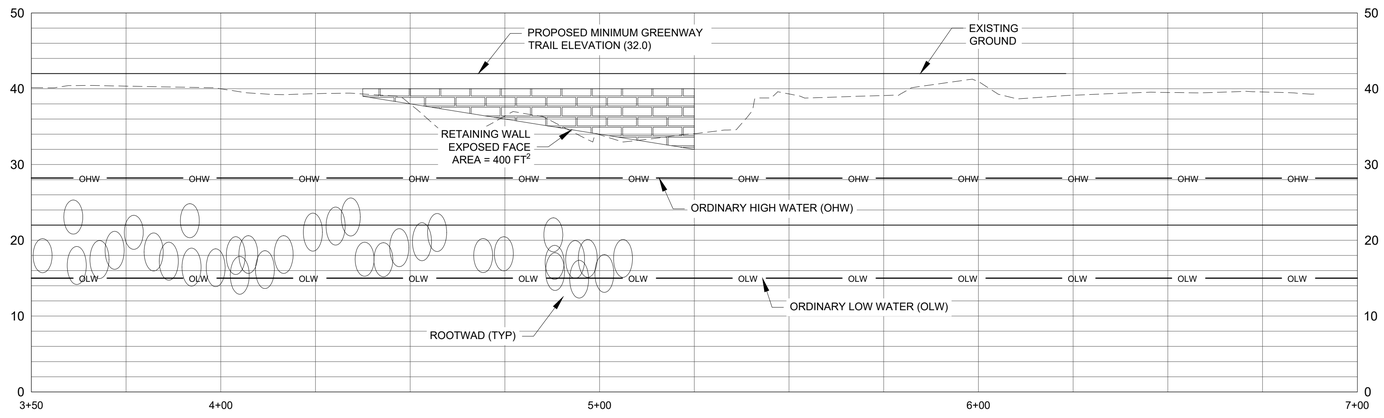
ALAMO MANHATTAN
BANK STABILIZATION
PORTLAND, OR

GRADING PLAN AND PROFILE

SHEET NO.
C2.0
OF

FILE: C19050-C2.0.DWG ### 1/6/2020 9:09:54 AM - LEAHB





BASE ALIGNMENT PROFILE: STA 3+50 TO STA 7+00
Horiz. Scale: 1"=20'
Vert. Scale: 1"=10'

GENERAL NOTES:

1. BANK SECTIONS ARE SHOWN ON SHEETS C2.2 - C2.5.

CONSTRUCTION NOTES

1. CONSTRUCT RETAINING WALL AND FENCE, SEE SHEET C3.X FOR DETAILS
2. CONSTRUCT LARGE WOOD STRUCTURES PER SHEET C3.1
3. EXISTING SHALLOW WATER ALCOVE TO REMAIN, SLOPES 4:1 OR FLATTER SEE SHEET C 3.0 SECTIONS

LEGEND

- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- PROPOSED 1' CONTOUR (1)
- PROPOSED 5' CONTOUR (5)
- ORDINARY HIGH WATER (OHW ELEV 18.22') (OHW)
- ORDINARY LOW WATER (OHW ELEV 5.90') (OLW)
- SOUTH WATER FRONT TOP OF BANK (2002, PORTLAND GIS)
- BASE ALIGNMENT (FOR HORIZONTAL REFERENCE)
- PROPOSED FENCE

0 20 40
SCALE IN FEET

NOT FOR CONSTRUCTION

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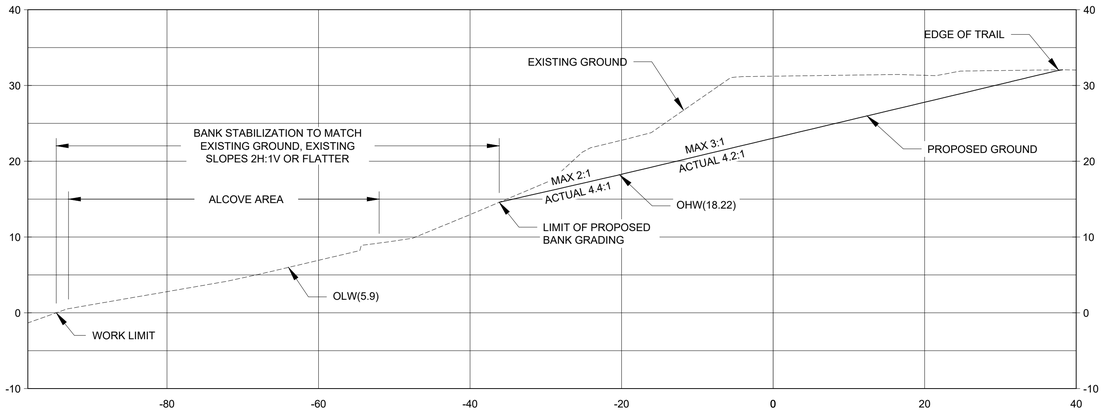
GRADING PLAN AND PROFILE

SHEET NO.
C2.1
OF

FILE: C:\19050-C2.0.DWG ### 1/6/2020 9:10:05 AM - LEAHB



BASE ALIGNMENT SECTION: STA 0+00.00
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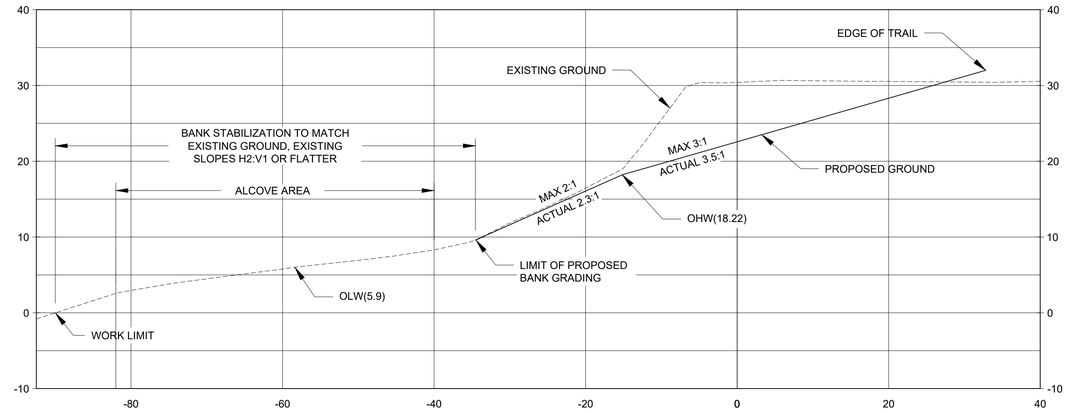
Vert. Scale: 1" =10'



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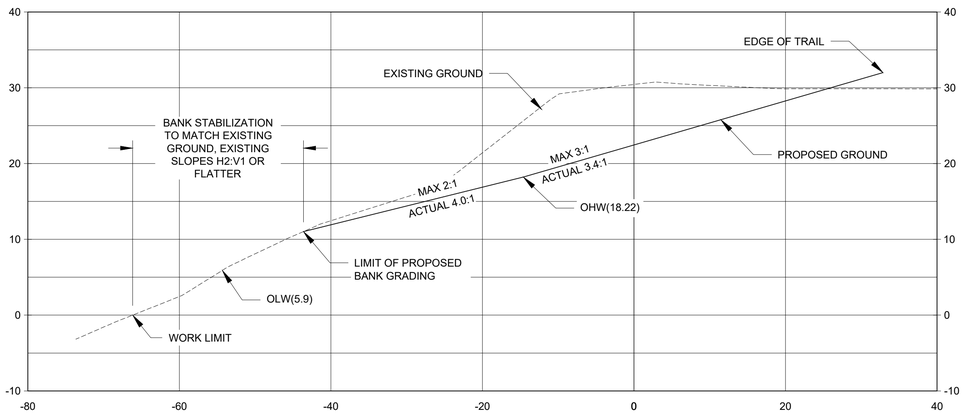

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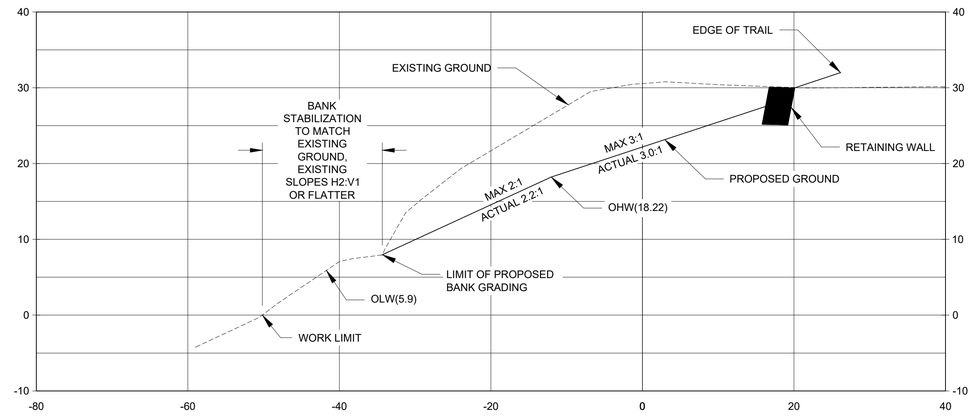

BASE ALIGNMENT SECTION: STA 1+50.00
Horiz. Scale: 1" = 10'
Vert. Scale: 1" =10'

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OTAK PROJECT NUMBER
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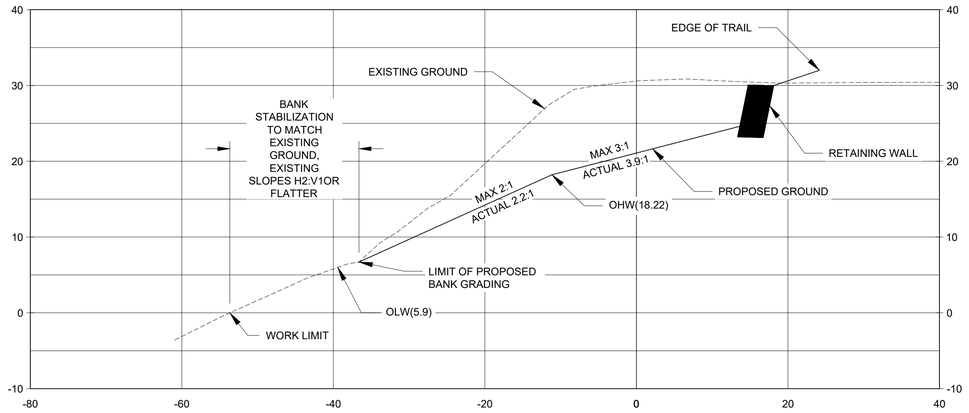
ALAMO MANHATTAN
BANK STABILIZATION
PORTLAND, OR

BANK SECTIONS

SHEET NO.
C2.2
OF

FILE: C19050-C2.2.DWG ### 6/2020 9:10:19 AM - LEAHB



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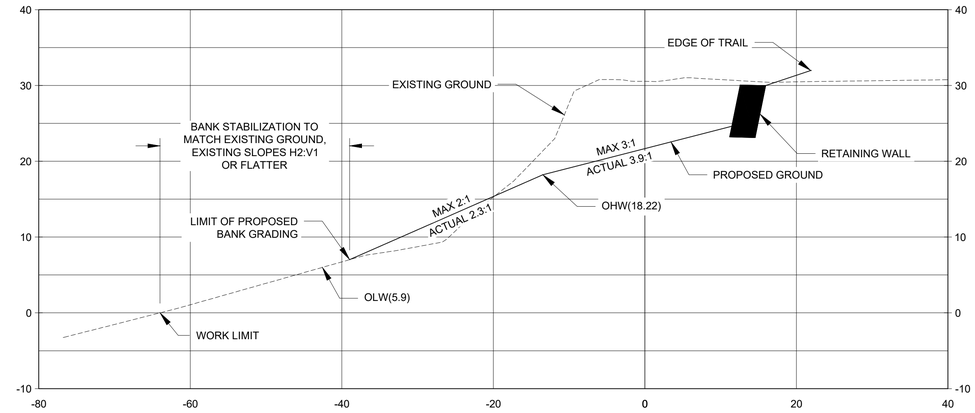

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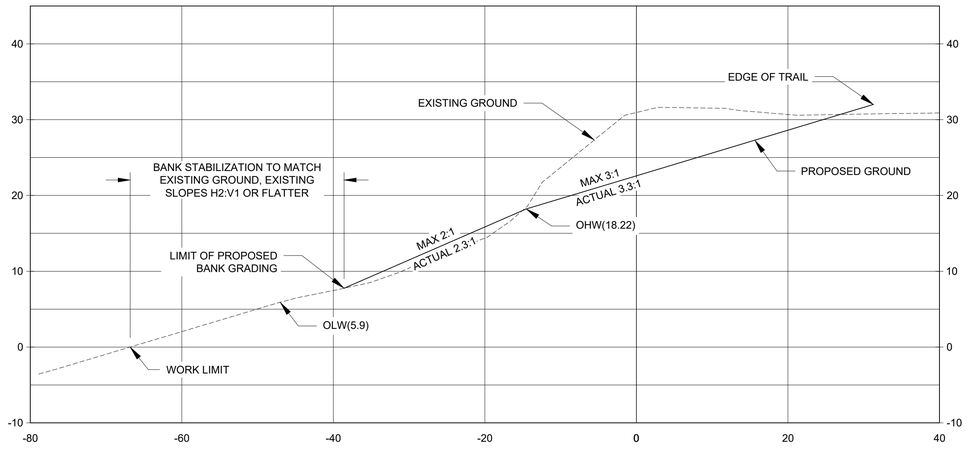

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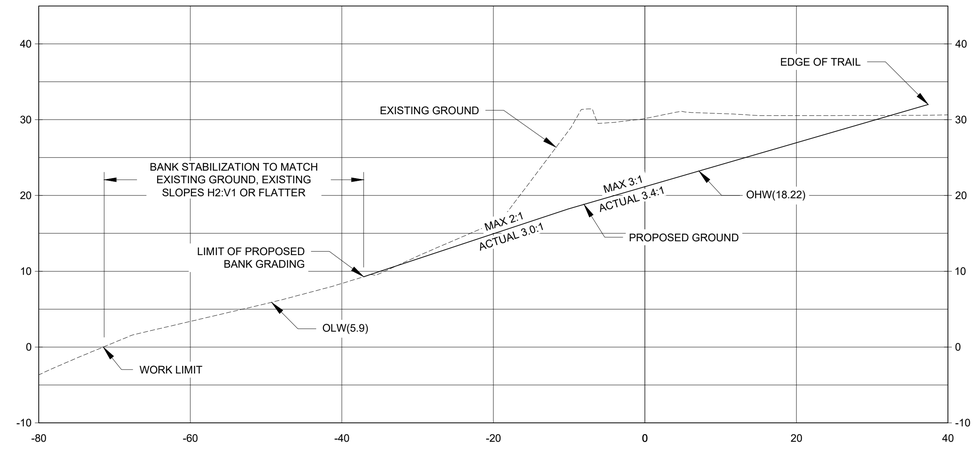

BASE ALIGNMENT SECTION: STA 3+50.00
Horiz. Scale: 1" = 10'
Vert. Scale: 1" =10'

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ALAMO MANHATTAN
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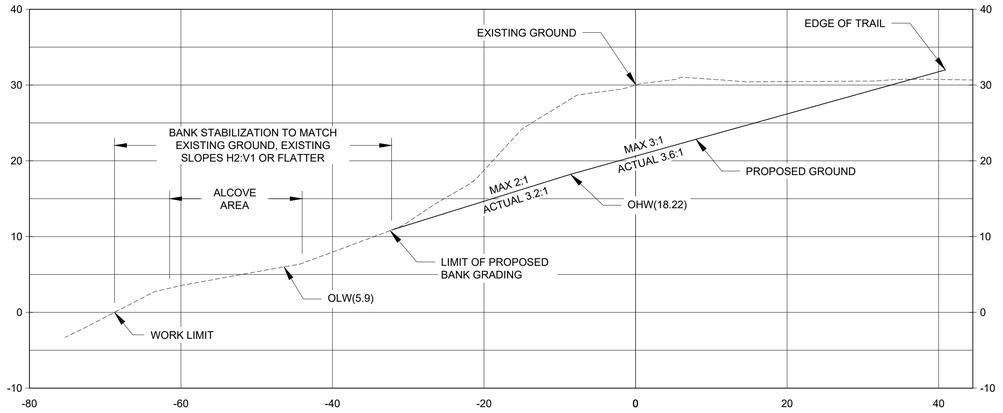
PORTLAND, OR

BANK SECTIONS

SHEET NO.
C2.3
OF

FILE: C19050.C2.2.DWG ### 1/6/2020 9:10:23 AM - LEAHB



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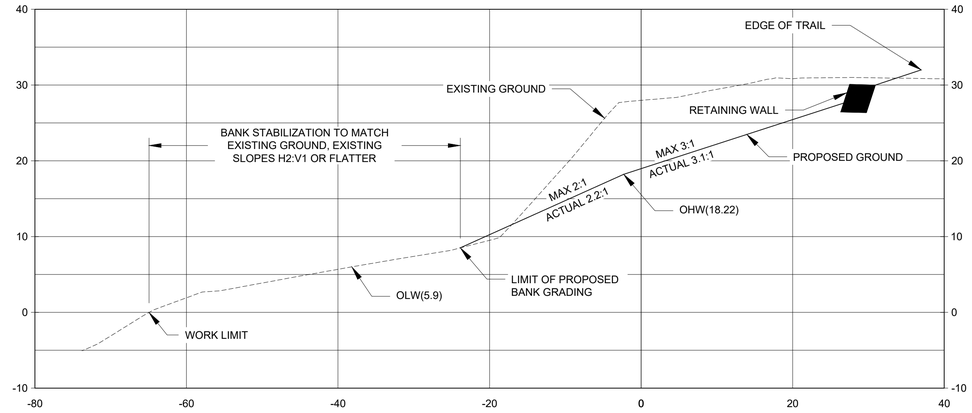

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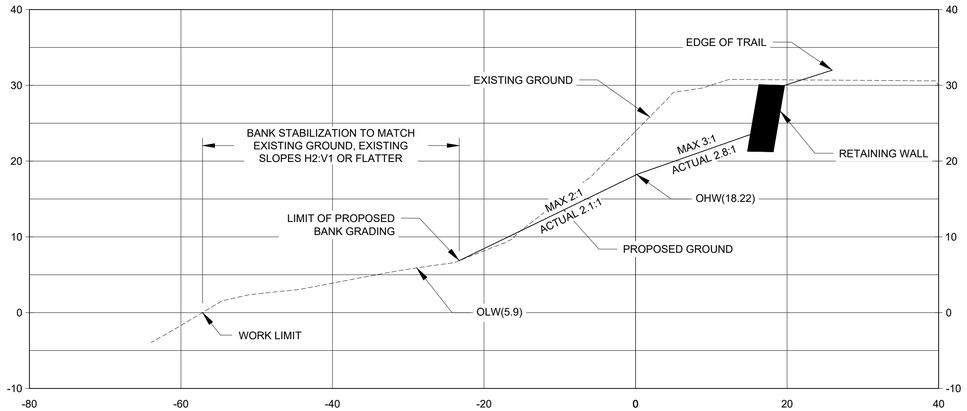

BASE ALIGNMENT SECTION: STA 5+00.00
Horiz. Scale: 1" = 10'
Vert. Scale: 1" =10'

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NO.	DATE	DESCRIPTION	APPD.

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BANK STABILIZATION
PORTLAND, OR

BANK SECTIONS

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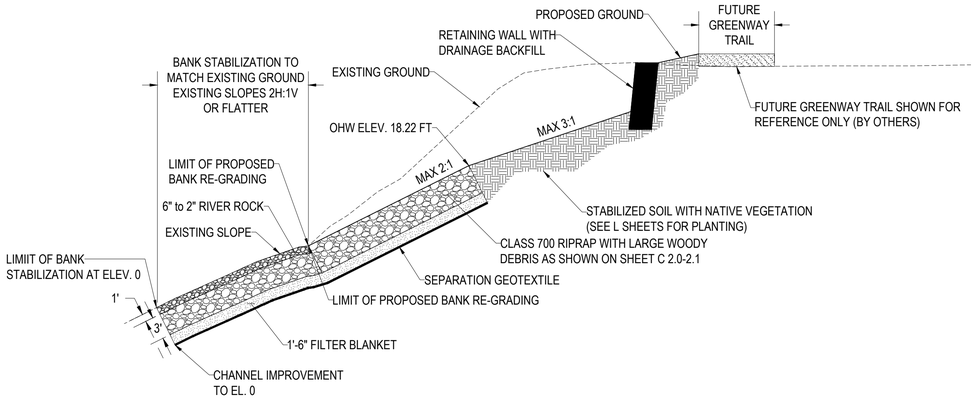
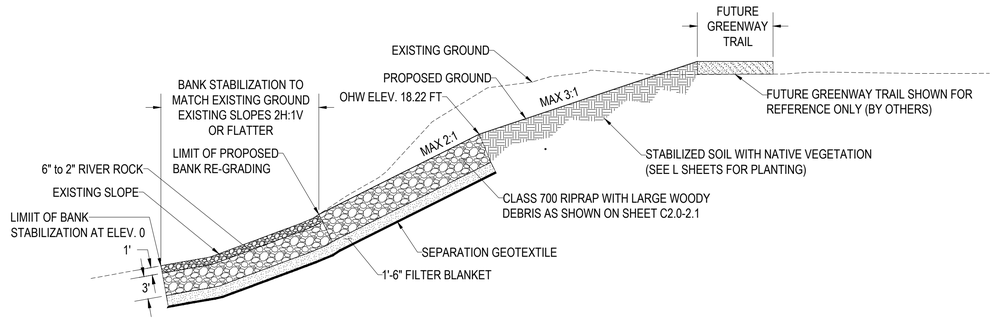
C2.4
OF

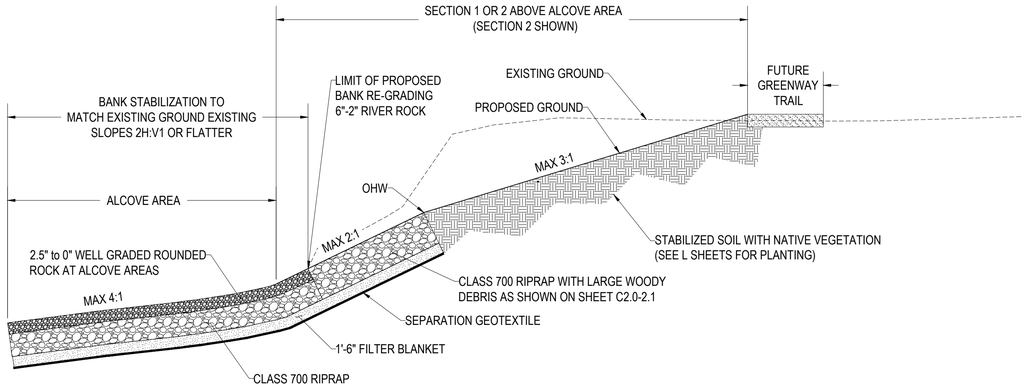
FILE: C:\19050-C2.2.DWG ### 1/6/2020 9:10:28 AM - LEAHB



1 BANK STABILIZATION TYPICAL SECTION WITH WALL: BASE ALIGNMENT STA. 1+73 to 2+85, 4+18 to 5+45
NOT TO SCALE



2 BANK STABILIZATION TYPICAL SECTION: BASE ALIGNMENT STA. 0+00 to 1+73 and 4+21 to 5+50
NOT TO SCALE



3 BANK STABILIZATION TYPICAL SECTION WITH ALCOVE: BASE ALIGNMENT STA. 0+00 to 1+03, 4+21 to 5+43
NOT TO SCALE

NOT FOR CONSTRUCTION

NO.	DATE	DESCRIPTION	APPD.

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ALAMO MANHATTAN
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PORTLAND, OR
CONSTRUCTION DETAILS

SHEET NO.
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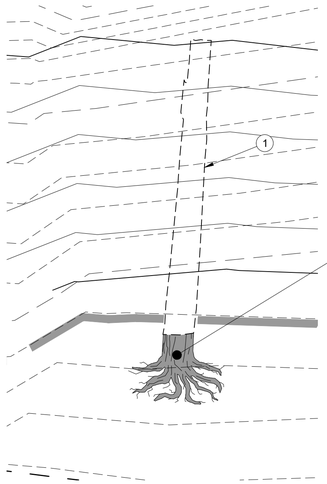
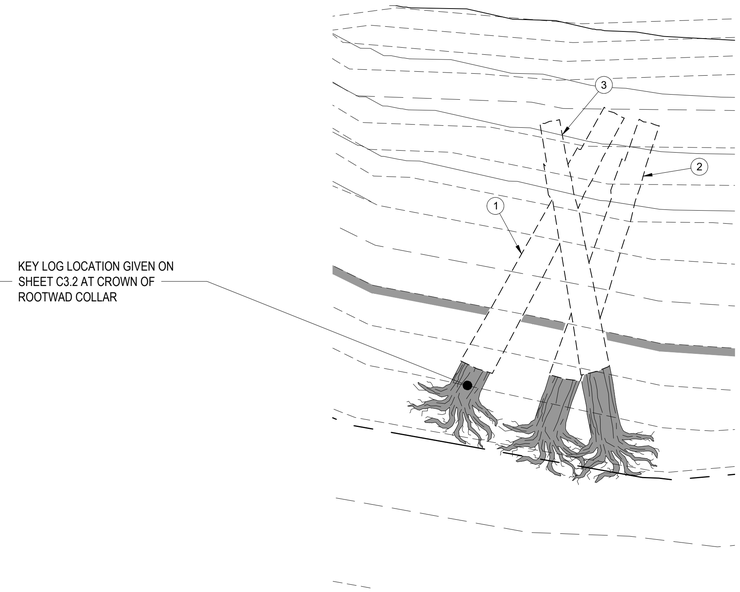
OF

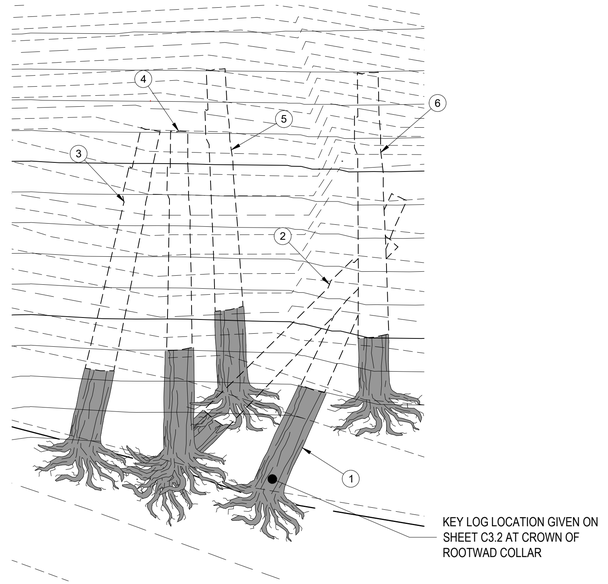
FILE: C19050.C3.0.DWG ### 6/2020 9:10:46 AM - LEAHB



1 TYPE 1 LARGE WOOD STRUCTURE
NOT TO SCALE



2 TYPE 2 LARGE WOOD STRUCTURE
NOT TO SCALE



3 TYPE 3 LARGE WOOD STRUCTURE
NOT TO SCALE

TYPE 1 LARGE WOOD STRUCTURE MATERIAL SCHEDULE

CONST. NOTE	QUANTITY (EA)	DBH (IN)	LENGTH (FT)	ROOTWAD ATTACHED?	MIN. PERCENT OF LOG BURIED	STEM TILT ANGLE β (DEG.)
1	1	18-24	24	YES	74-83%	0-2 DOWN

TYPE 2 LARGE WOOD STRUCTURE MATERIAL SCHEDULE

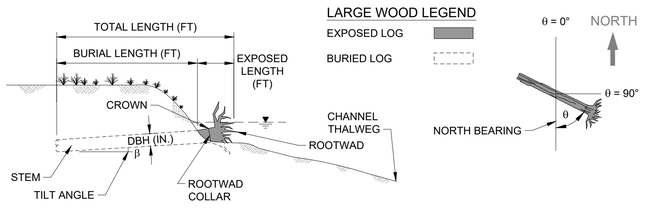
CONST. NOTE	QUANTITY (EA)	DBH (IN)	LENGTH (FT)	ROOTWAD ATTACHED?	MIN. PERCENT OF LOG BURIED	STEM TILT ANGLE (DEG.)
1	1	18-24	24	YES	85%	2.0 DOWN
2	1	18-24	24	YES	78%	2.0 DOWN
3	1	18-24	24	YES	83%	0

TYPE 3 LARGE WOOD STRUCTURE MATERIAL SCHEDULE

CONST. NOTE	QUANTITY (EA)	DBH (IN)	LENGTH (FT)	ROOTWAD ATTACHED?	MIN. PERCENT OF LOG BURIED	STEM TILT ANGLE (DEG.)
1	1	18-24	24	YES	66%	3.0 DOWN
2	1	18-24	24	YES	87%	3.5 UP
3	1	18-24	24	YES	80%	1.0 DOWN
4	1	18-24	24	YES	73%	5.5 DOWN
5	1	18-24	24	YES	78%	2.5 DOWN
6	1	18-24	24	YES	85%	2.0 DOWN

TYPE 1 CONSTRUCTION SEQUENCING:

1. PLACE LOG AT ANGLE AND ELEVATION SPECIFIED ON SHEET C3.2. LOGS SHALL BE INSTALLED FLAT OR AT A STEM TILT ANGLE UP TO 2 DEGREES. LOGS PLACED AT TOE OF BANK-LEVEL MAY BE INSTALLED SUCH THAT UP TO 6 FT OF STEM IS EXPOSED. LOGS ABOVE THE TOE OF BANK BUT BELOW 10 FT MAY HAVE EXPOSED STEM UP TO 2 FT. LOGS INSTALLED ABOVE THE 10 FT ELEVATION SHOULD HAVE EXPOSED STEM 0.5 -1FT MAXIMUM, DECREASING AS ELEVATION INCREASES.



TYPICAL LOG REFERENCE KEY AND LEGEND

TYPE 2 CONSTRUCTION SEQUENCING:

1. PLACE KEY LOG AT ANGLE AND ELEVATION SPECIFIED ON SHEET C3.2, WITH TILT ANGLE AND BURIAL AS SPECIFIED.
2. PLACE SECOND LOG SPACED SUCH THAT ITS ROOTWAD BARELY OVERLAPS WITH KEY LOG ROOTWAD (APPROXIMATELY 6 FEET ON CENTER). DIRECTION OF MEASUREMENT (UPSTREAM OR DOWNSTREAM) VARIES PER PLAN (SHEETS C2.0 - C2.1). PLACE AT AN ELEVATION SUCH THAT CROWN OF ROOT COLLAR IS AT OR SLIGHTLY ABOVE ELEVATION OF KEY LOG ROOT COLLAR CROWN.
3. PLACE THIRD LOG AT A 40° ANGLE WITH THE KEY LOG, POINTING UPSTREAM OR DOWNSTREAM PER PLAN (SHEETS C2.0 - C2.1). TILT ANGLE OF THE THIRD LOG SHOULD BE FLAT OR SLIGHTLY DOWN-ANGLE.

LARGE WOOD MATERIAL SCHEDULE

STRUCTURE TYPE	QUANTITY OF STRUCTURE TYPE	QUANTITY OF KEY LOGS (>18 IN DIA)	
		STEM & ROOTWAD	SUBTOTAL BY STRUCTURE TYPE
TYPE 1	40	1	40
TYPE 2	10	3	30
TYPE 3	5	6	30
TOTAL			100

TYPE 3 CONSTRUCTION SEQUENCING:

1. PLACE KEY LOG AT ANGLE AND ELEVATION SPECIFIED ON SHEET C3.2, WITH TILT ANGLE AND BURIAL AS SPECIFIED.
2. PLACE SECOND LOG AT AN 18° ANGLE WITH THE KEY LOG SUCH THAT THE TWO ROOTWADS BARELY OVERLAP (6 FEET ON CENTER). TILT ANGLE AND BURIAL SHALL BE AS SPECIFIED.
3. PLACE THIRD LOG SUCH THAT ROOTWADS 2 & 3 OVERLAP BY 1' AND FORM A 150° ANGLE AT THEIR FACES. TILT ANGLE AND BURIAL SHALL BE AS SPECIFIED.
4. PLACE FOURTH LOG SUCH THAT THE ROOTWAD FACE OVERLAPS WITH THE ROOTWAD OF LOG 2 AND THE STEM RESTS ON LOG 2. LOG 4 SHALL BE PERPENDICULAR TO THE SLOPE AND INSTALLED AT THE TILT ANGLE AND BURIAL AS SPECIFIED.
5. PLACE FIFTH LOG SPACED FOUR FEET DOWNSTREAM OF LOG 4, SIMILARLY ORIENTED WITH THE BANK. LOG 5 RESTS ON LOG 2 AND IS APPROXIMATELY 6.5 FEET FROM ROOTWAD COLLAR OF LOG 2. TILT ANGLE AND BURIAL SHALL BE AS SPECIFIED.
6. PLACE SIXTH LOG SPACED 9.5 FEET DOWNSTREAM OF LOG 5, ALSO ROUGHLY PERPENDICULAR TO THE BANK. THE STEM OF LOG 6 (8.5 FEET FROM ROOTWAD COLLAR) SHALL REST ON LOG 2, APPROXIMATELY 18.5 FT FROM THE ROOTWAD COLLAR OF LOG 2. TILT ANGLE AND BURIAL SHALL BE AS SPECIFIED.

NOT FOR CONSTRUCTION

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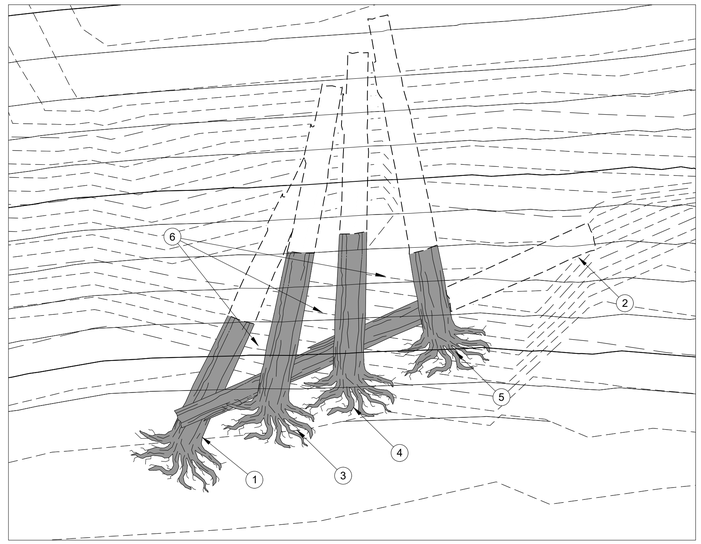
ALAMO MANHATTAN
BANK STABILIZATION
PORTLAND, OR
CONSTRUCTION DETAILS

SHEET NO.
C3.1
OF

FILE: C19050-C3.1.DWG ### 10/2020 9:11:12 AM - LEAHB

KEY LOG LOCATION AND ORIENTATION						
STRUCTURE TYPE	STATION	OFFSET	NORTHING	EASTING	ELEVATION (ROOT COLLAR CROWN)	ANGLE θ
Type III	0+48.13	-50.28	674286.6772	7646887.3718	9.04	128°
Type I	0+58.47	-27.10	674270.9914	7646867.4159	14.10	104°
Type I	0+63.40	-31.08	674267.1804	7646872.4737	12.01	81°
Type I	0+68.00	-36.42	674264.0084	7646878.7799	10.55	63°
Type I	0+72.90	-31.22	674256.6691	7646875.1220	12.58	104°
Type II	0+73.52	-39.33	674257.4921	7646883.2337	10.12	46°
Type III	1+25.21	-39.23	674188.6799	7646881.2164	8.74	143°
Type I	1+39.25	-26.72	674178.2062	7646865.5606	13.58	106°
Type I	1+46.75	-28.03	674170.6133	7646864.9362	12.90	101°
Type I	1+48.04	-36.72	674167.1823	7646873.0178	9.65	129°
Type I	1+51.96	-27.62	674165.6776	7646863.2255	13.04	121°
Type I	1+56.54	-36.50	674158.6083	7646870.5450	9.64	120°
Type I	1+58.92	-27.76	674158.3623	7646861.3971	12.96	105°
Type II	1+63.59	-33.91	674151.5974	7646865.8274	10.22	79°
Type I	1+77.24	-30.89	674137.9327	7646858.0886	11.48	120°
Type I	1+83.22	-36.60	674129.5673	7646861.0348	8.47	102°
Type I	1+87.91	-31.79	674126.4102	7646854.5874	10.79	121°
Type I	1+91.13	-38.18	674120.5513	7646859.0600	8.05	109°
Type I	1+96.25	-24.74	674120.6972	7646844.4393	14.26	131°
Type II	2+06.94	-37.31	674104.4290	7646850.5930	8.85	133°
Type I	2+09.81	-23.69	674107.7774	7646837.0038	14.12	102°
Type I	2+12.02	-32.41	674101.5464	7646843.5750	10.06	119°
Type I	2+16.72	-28.32	674098.8648	7646837.4706	11.87	120°
Type I	2+18.90	-37.38	674092.2849	7646844.1736	8.34	102°
Type I	2+23.19	-38.63	674087.3800	7646842.7827	7.68	120°
Type I	2+29.42	-27.14	674087.3080	7646829.3044	12.28	103°
Type I	2+31.31	-31.73	674083.0718	7646832.0650	10.19	121°
Type I	2+35.48	-27.09	674081.9059	7646825.8051	12.67	88°

KEY LOG LOCATION AND ORIENTATION						
STRUCTURE TYPE	STATION	OFFSET	NORTHING	EASTING	ELEVATION (ROOT COLLAR CROWN)	ANGLE θ
Type III	2+41.64	-46.22	674066.3779	7646838.5683	6.75	128°
Type I	2+75.46	-36.88	674050.6627	7646822.2253	9.74	119°
Type II	2+92.16	-46.63	674031.9859	7646827.2408	7.78	133°
Type I	2+99.87	-52.50	674023.0014	7646830.8721	6.27	119°
Type II	3+17.74	-46.31	674007.3934	7646820.1917	8.68	116°
Type I	3+21.23	-35.20	674006.9567	7646808.5562	11.69	107°
Type I	3+26.21	-47.35	673998.9518	7646818.9650	8.43	119°
Type I	3+30.21	-31.81	673999.1839	7646802.9184	13.13	127°
Type I	3+41.30	-23.88	673990.5774	7646792.3405	15.82	134°
Type II	3+44.94	-42.57	673982.1378	7646809.4165	9.62	93°
Type I	3+47.08	-21.75	673985.5639	7646788.7635	16.45	121°
Type I	3+52.97	-40.64	673974.8994	7646805.4336	10.22	107°
Type I	3+61.07	-25.72	673971.0149	7646788.9134	15.31	97°
Type II	3+61.99	-44.22	673965.2608	7646806.5127	9.17	78°
Type I	3+77.04	-34.88	673953.1963	7646793.5391	13.30	130°
Type I	3+91.83	-27.31	673940.9247	7646782.3362	14.84	133°
Type II	3+92.31	-44.35	673935.9762	7646798.6537	8.95	126°
Type III	4+11.66	-39.41	673918.6075	7646788.7879	8.63	143°
Type II	4+24.32	-22.81	673911.6706	7646769.8085	13.57	93°
Type I	4+37.97	-29.53	673897.7642	7646773.8905	9.75	102°
Type I	4+42.92	-29.38	673892.9338	7646772.8056	9.69	120°
Type II	4+47.13	-22.27	673890.1487	7646765.0238	11.52	73°
Type I	4+69.26	-23.61	673868.1528	7646762.1501	10.24	118°
Type I	4+74.72	-22.20	673862.9282	7646759.6845	10.48	129°
Type I	4+87.78	-16.12	673851.0996	7646751.0195	12.97	119°
Type I	4+88.13	-25.26	673848.8314	7646759.8818	9.33	136°
Type III	5+01.25	-27.17	673835.2276	7646758.7969	8.12	128°



3 TYPE 4 LARGE WOOD STRUCTURE
NOT TO SCALE

TYPE 3 LARGE WOOD STRUCTURE MATERIAL SCHEDULE

CONST. NOTE	QUANTITY (EA)	DBH (IN)	LENGTH (FT)	ROOTWAD ATTACHED?	MIN. PERCENT OF LOG BURIED	STEM TILT ANGLE (DEG.)
1	1	18-24	24	YES	55%	2.0 DOWN
2	1	18-24	30	NO	20%	5.0 DOWN
3	1	18-24	24	YES	50%	7.0 DOWN
4	1	18-24	24	YES	50%	5.0 DOWN
5	1	18-24	24	YES	65%	2.0 DOWN

TYPE 4 CONSTRUCTION SEQUENCING:

1. PLACE KEY LOG AT ANGLE AND ELEVATION SPECIFIED ON SHEET C3.2, WITH TILT ANGLE AND BURIAL AS SPECIFIED.
2. PLACE SECOND LOG AT A 20° ANGLE WITH THE BANK FACE, WITH THE UPSTREAM END RESTING ON THE ROOT COLLAR OF LOG 1. TILT ANGLE AND BURIAL SHALL BE AS SPECIFIED.
3. PLACE THIRD LOG SUCH THAT THE ROOT COLLAR OF THE LOG RESTS ON LOG 2, 7 FT FROM THE UPSTREAM END. TILT ANGLE AND BURIAL SHALL BE AS SPECIFIED.
4. PLACE FOURTH LOG SUCH THAT THE ROOT COLLAR OF THE LOG RESTS ON LOG 2, 12 FT FROM THE UPSTREAM END. TILT ANGLE AND BURIAL SHALL BE AS SPECIFIED.
5. PLACE FIFTH LOG SUCH THAT THE ROOT COLLAR OF THE LOG RESTS ON LOG 2, JUST UPSTREAM OF THE BURIAL POINT (18 FEET FROM UPSTREAM END). TILT ANGLE AND BURIAL SHALL BE AS SPECIFIED.
6. FILL BOTTOM OF VOIDS IN TYPE 4 LOG STRUCTURE WITH CLASS 700 RIP RAP AND ROUNDED RIVER ROCK. FILL VOIDS UP TO LOG CROWNS WITH SOIL AND PLANT PER LANDSCAPING PLAN.

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NO.	DATE	DESCRIPTION	APPD.

REVISIONS

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PROJECT COMPLETED
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FINAL MAP DATA

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CAD BY | SECTION ENGR
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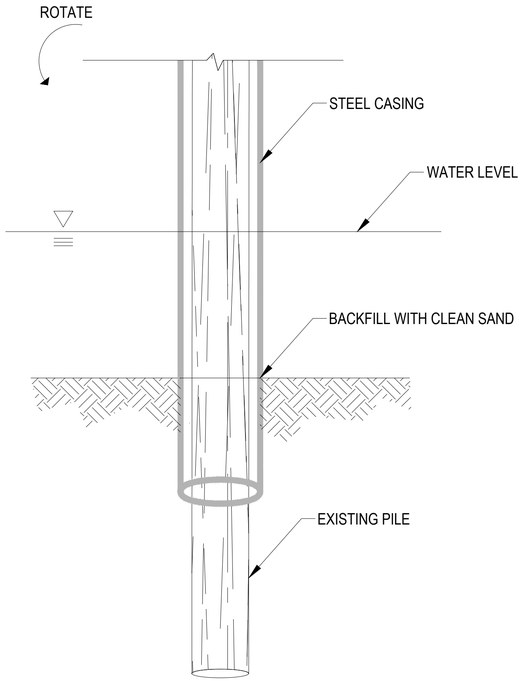
Portland, OR 97204
503. 287. 6825
www.otak.com

OTAK PROJECT NUMBER
19050.2

ALAMO MANHATTAN
BANK STABILIZATION
PORTLAND, OR
CONSTRUCTION DETAILS

SHEET NO.
C3.2
OF



PILE REMOVAL DETAIL

USE THE FOLLOWING STEPS TO MINIMIZE CREOSOTE RELEASE, SEDIMENT DISTURBANCE, AND TOTAL SUSPENDED SOLIDS:

1. INSTALL A FLOATING SURFACE BOOM TO CAPTURE FLOATING SURFACE DEBRIS.
2. KEEP ALL EQUIPMENT (E.G., BUCKET, STEEL CABLE, VIBRATORY HAMMER) OUT OF THE WATER, GRIP PILES ABOVE THE WATERLINE, AND COMPLETE ALL WORK DURING LOW WATER AND LOW CURRENT CONDITIONS.
3. DISLODGE THE PILING WITH A VIBRATORY HAMMER, WHENEVER FEASIBLE--NEVER INTENTIONALLY BREAK A PILE BY TWISTING OR BENDING.
4. SLOWLY LIFT THE PILE FROM THE SEDIMENT AND THROUGH THE WATER COLUMN.
5. PLACE THE PILE IN A CONTAINMENT BASIN ON A BARGE DECK, PIER, OR SHORELINE WITHOUT ATTEMPTING TO CLEAN OR REMOVE ANY ADHERING SEDIMENT (A CONTAINMENT BASIN FOR THE REMOVED PILES AND ANY ADHERING SEDIMENT MAY BE CONSTRUCTED OF DURABLE PLASTIC SHEETING WITH SIDEWALLS SUPPORTED BY HAY BALES OR ANOTHER SUPPORT STRUCTURE TO CONTAIN ALL SEDIMENT, AND RETURN FLOW MAY BE DIRECTED BACK TO THE WATERWAY).
6. FILL THE HOLES LEFT BY EACH PILING WITH CLEAN, NATIVE SEDIMENTS.
7. DISPOSE OF ALL REMOVED PILES, FLOATING SURFACE DEBRIS, ANY SEDIMENT SPILLED ON WORK SURFACES, AND ALL CONTAINMENT SUPPLIES AT A PERMITTED UPLAND DISPOSAL SITE.

IF PILE CAN NOT BE REMOVED BY PULLING FOLLOW DETAIL

1. INSTALL STEEL CASING BELOW MUDLINE, MIN 3FT or REFUSAL
2. ROTATE CASING TO SNAP PILE OFF BELOW MUDLINE
3. TRANSPORT PILE IN CASING TO DISPOSAL AREA
4. DISPOSE PILE IN ACCORDANCE TO ALL STATE AND FEDERAL REGULATIONS
5. BACKFILL HOLE WITH CLEAN SAND OR MATERIALS AS SHOWN ON PLANS
6. IF WILE IS NOT FULLY REMOVED MARK REMNANT OF SHEETS C2.0 AND C2.1 AS PROVIDED BY ENGINEER OF RECORD

NOT FOR CONSTRUCTION

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NO.	DATE	DESCRIPTION	APPD.

REVISIONS

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ALAMO MANHATTAN
BANK STABILIZATION
PORTLAND, OR
CONSTRUCTION DETAILS

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C3.3
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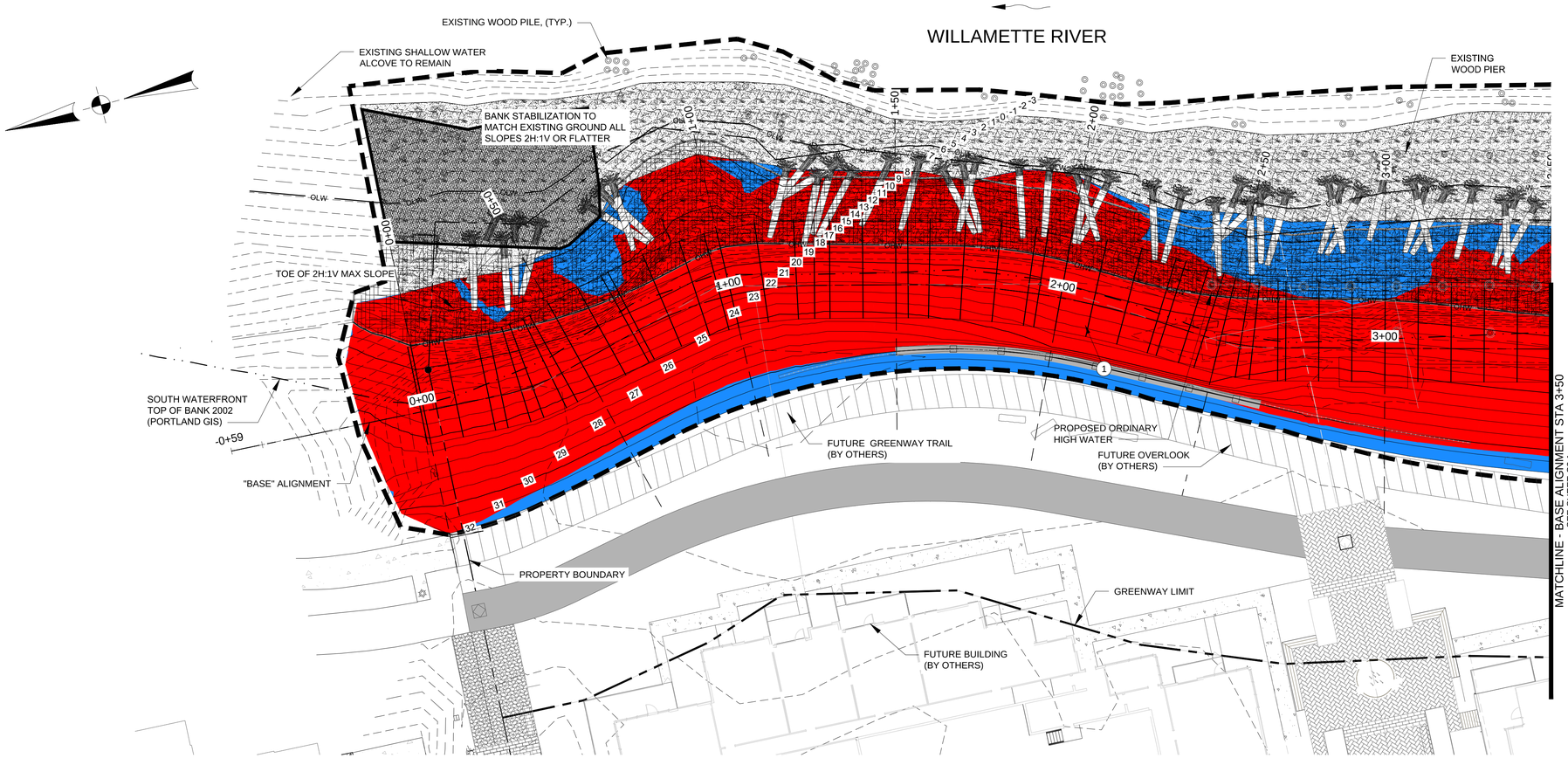

GENERAL NOTES:

1. BANK SECTIONS ARE SHOWN ON SHEETS C2.2 - C2.5.

CONSTRUCTION NOTES

(1) CONSTRUCT RETAINING WALL AND FENCE, SEE SHEET C3.X FOR DETAILS

LEGEND

- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- PROPOSED 1' CONTOUR
- PROPOSED 5' CONTOUR
- ORDINARY HIGH WATER (OHW ELEV 18.22')
- SOUTH WATER FRONT TOP OF BANK (2002, PORTLAND GIS)
- BASE ALIGNMENT (FOR HORIZONTAL REFERENCE)
- PROPOSED FENCE

Cut Areas are shown in Red
Fill Areas are shown in Blue

Overall
Cut = 5,430 CY
Fill = 170 CY
Net = 5,260 CY CUT

Below Ordinary High Water
Cut = 1,130 CY
Fill = 100 CY
Net = 1,030 CY CUT

Note: Quantities are based on comparison of existing and proposed surfaces and does not include material replacement

0 20 40
SCALE IN FEET

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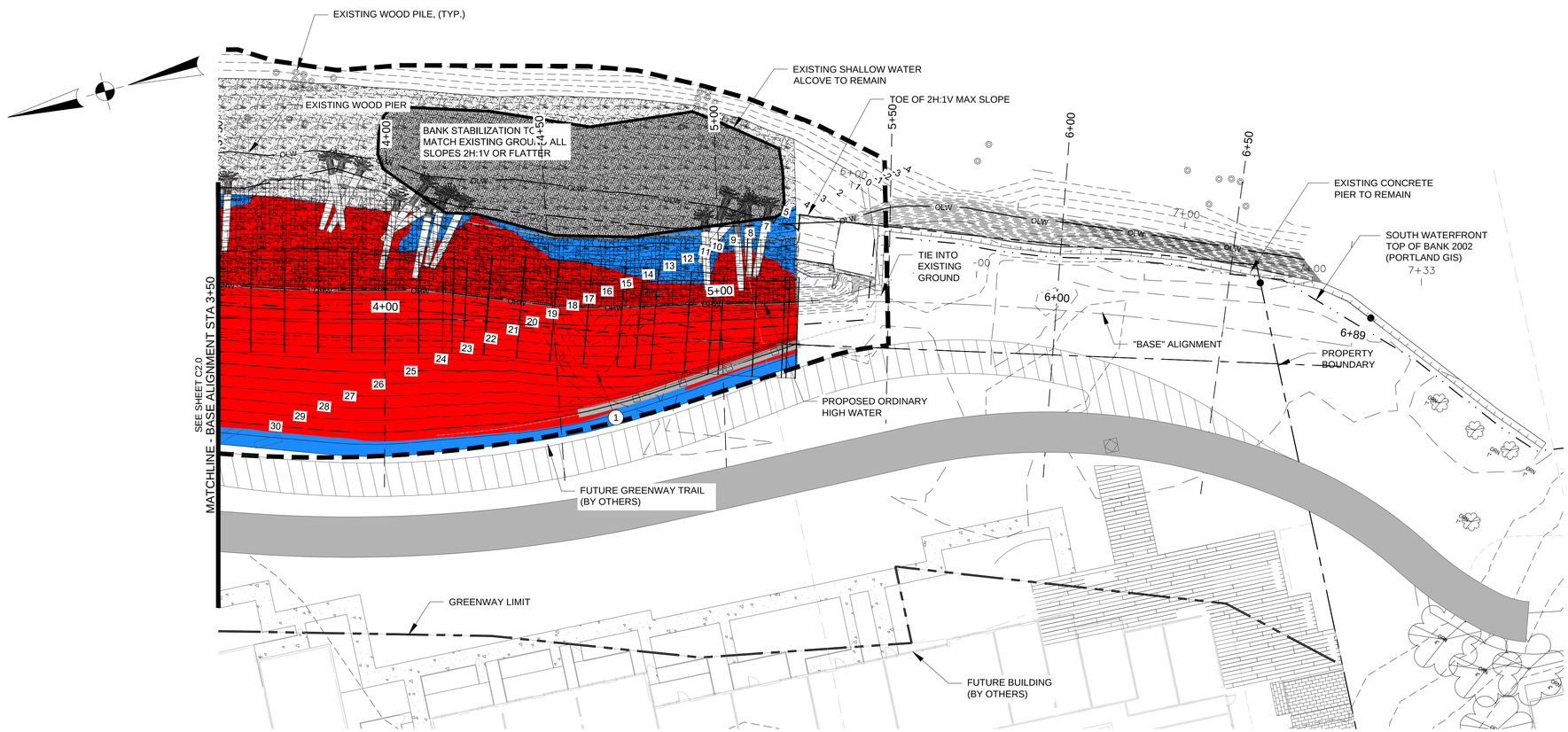

GENERAL NOTES:

1. BANK SECTIONS ARE SHOWN ON SHEETS C2.2 - C2.5.

CONSTRUCTION NOTES

1. CONSTRUCT RETAINING WALL AND FENCE, SEE SHEET C3.X FOR DETAILS

LEGEND

- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- PROPOSED 1' CONTOUR (1)
- PROPOSED 5' CONTOUR (5)
- ORDINARY HIGH WATER (OHW ELEV 18.22') (OHW)
- SOUTH WATER FRONT TOP OF BANK (2002, PORTLAND GIS)
- BASE ALIGNMENT (FOR HORIZONTAL REFERENCE)
- PROPOSED FENCE

0 20 40
SCALE IN FEET

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GRADING PLAN AND PROFILE

SHEET NO.
C2.1
OF

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Technical Memorandum

To:	City of Portland Bureau of Development Services
From:	Joshua Owens, PE
Copies:	Wade Johns, Alamo Manhattan Properties, LLC
Date:	January 6, 2020
Subject:	LU 19-225732 DZM GW Bank Stabilization and Enhancement at the South Waterfront Blocks 41, 42, 44, and 45; No Rise Analysis
Project No.:	19050.200

This Technical Memorandum documents an analysis of potential floodway impacts resulting from proposed bank stabilization associated with development of Blocks 41, 42, 44, and 45 in Portland's South Waterfront (NE corner of SW Bond Avenue and SW Lowell Street, Figure 1). The proposed development includes four multi-story mixed-use buildings. Willamette Greenway improvements are required to be constructed adjacent to the river bank as part of the currently entitled project's conditions of approval and will be dependent on bank stabilization and enhancement. Bank work will involve the removal of old pilings and miscellaneous fill and re-grading the bank with riprap and natural materials to provide stabilization and protection.

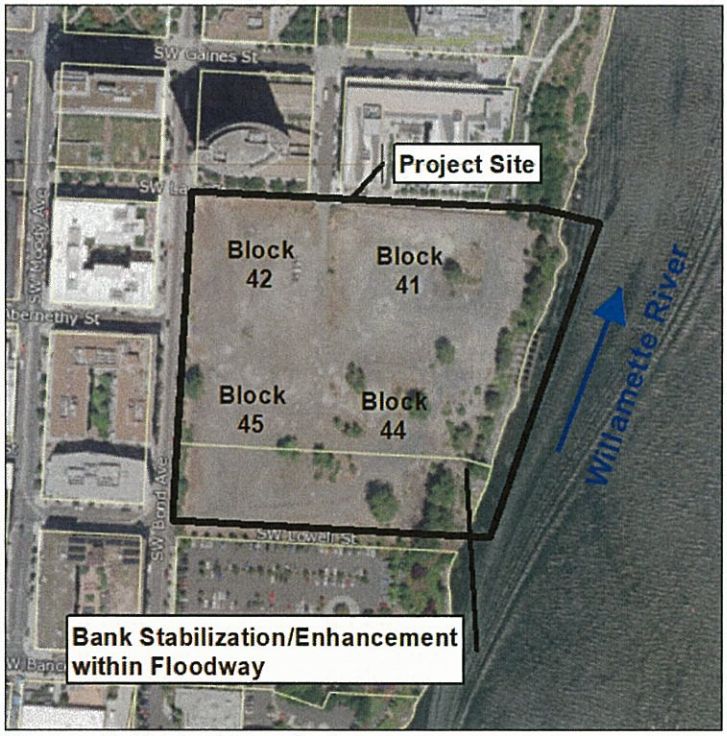

Figure 1: Project Location

As shown on Figure 2, the proposed bank stabilization project is in the Special Flood Hazard Areas (SFHA, 100-year floodplain) along the Willamette River and therefore must meet floodplain development

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requirements as documented in Chapter 24.50 of the City of Portland Code. In addition, because the project will occur in the mapped regulatory floodway along the river, it must also meet the requirements of Section 24.50.060D of the code that prohibits encroachments into the floodway unless it is demonstrated by technical analysis from a registered engineer that the development will result in no increase in the base flood (100-year) elevation. This is known as the "no-rise" requirement and must be satisfied to avoid a more involved process to revise the SFHA through the Conditional Letter of Map Revision (CLOMR) and Letter of Map Revision (LOMR) process. The technical analyses presented here documents that the "no-rise" requirement will be met by the proposed project.

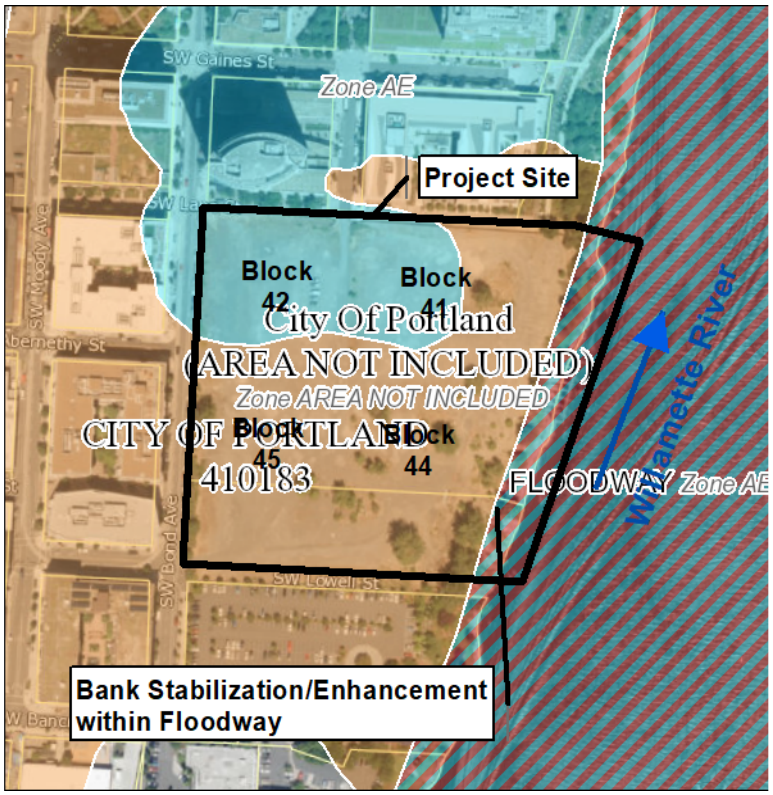

Figure 2: Project with Floodway Overlay

The potential impacts to 100-year water-surface elevations were evaluated by performing a hydraulic analysis of the Willamette River in the vicinity of the project. The analysis was carried out by modifying the hydraulic model developed for the LOMR for TriMet's Tilikum Crossing bridge that is located about 0.75 miles downstream of the proposed bank stabilization project. As the upstream extent of this model ends at the upstream face of the Ross Island bridge, the model was extended upstream through the project reach with five (5) additional cross sections that are spaced close enough to reflect proposed changes associated with the project and one (1) additional cross section approximately 250 ft upstream of the project, for a total of six (6) additional cross sections. The new cross sections were developed by cutting from a terrain model developed using the following sources of information:

- Site Survey
- 2014 LiDAR obtained from the Oregon Department of Geology and Mineral Industries (DOGAMI)
- 2005 Willamette Bathymetry as 5 ft contours available from the City of Portland

Manning's n values for the new cross sections were set to be consistent with the downstream cross sections. This included a Manning's n value for the main channel equal to 0.03 and an overbank n value of 0.05. Where cross sections traverse Ross Island the n value was set to 0.08 to reflect the dense

vegetation on the island. The updated model extended upstream through the project reach with six new cross sections forming the Corrected Effective (Existing Conditions) model for the no-rise analysis.

A Project Conditions model was created by updating the cross sections in the vicinity of the project to reflect the preliminary proposed grading as of December 17, 2019. The proposed final grading will be used and modified as needed to confirm the no-rise condition when final design occurs, and permits are issued. Any grading revisions will result in additional bank removal and this preliminary design is presented as a worst-case scenario for flow obstruction as it represents the local fill of the potential overlook. The project will lay back the bank from approximately ordinary low water to the existing top of bank resulting in a net removal of material from the river. There will be one location at the proposed Abernathy Overlook that will result in local fill within the floodway. Cross section 14.48 is located to represent the overlook at the location where it most protrudes into the flow (Southeast corner of overlook), see Figure 3. The bank will be laid back and armored with riprap below ordinary high water (approximately elevation 20.3, NAVD88) that will have a similar roughness to the existing channel and bank material with a Manning's n of 0.03. Above Ordinary High Water, the bank will be laid back and planted with dense riparian vegetation in accordance with the City of Portland development standards. The dense vegetation above Ordinary High Water will result in a similar roughness to the existing overbank with a Manning's n of 0.05. To capture this break in roughness, the bank stations for the proposed cross sections were adjusted to ordinary high water, which is the top of riprap armoring. Appendix A shows the cross sections comparing the Project and Effective Corrected conditions.

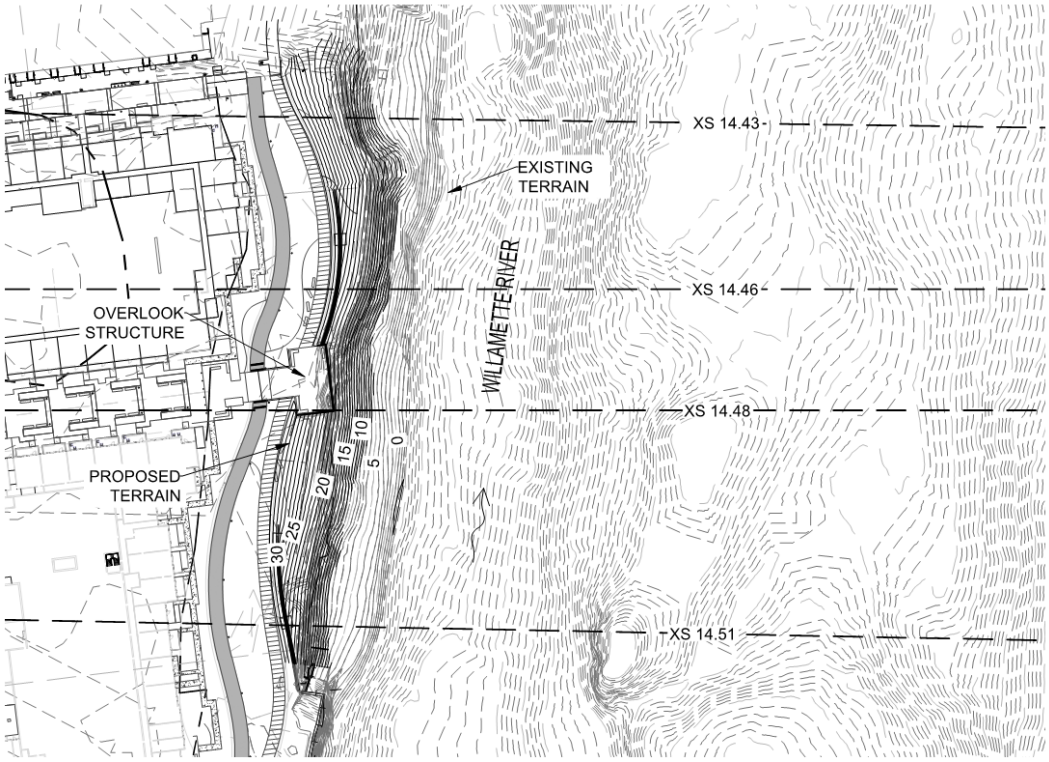

Figure 3: Cross-Section locations through the project reach of the Willamette River

Table 1 compares computed 100-year water-surface elevations between Existing Conditions and Project Conditions for the five cross sections that exhibited a difference (to the thousandth of a foot). The results show that computed water-surface elevations are the same for both conditions (to the nearest hundredth of a foot), demonstrating that the proposed project will not result in any increases in base flood (100-year) water-surface elevations, and thus meets the "no-rise" requirement. Output of the hydraulic model for all cross sections is included in Appendix B.

Table 1: Water Surface Elevation Difference at Project Cross Sections, all other model cross sections had no change

River Station	Project Conditions	Effective Corrected Conditions	Rise
	W.S. Elev	W.S. Elev	
	(ft)	(ft)	(ft)
14.57	33.193	33.192	0.001
14.53	33.207	33.206	0.001
14.51	33.165	33.164	0.001
14.48	33.113	33.116	-0.003
14.46	33.109	33.109	0.000
14.43	33.075	33.077	-0.002

Appendix A

Figures

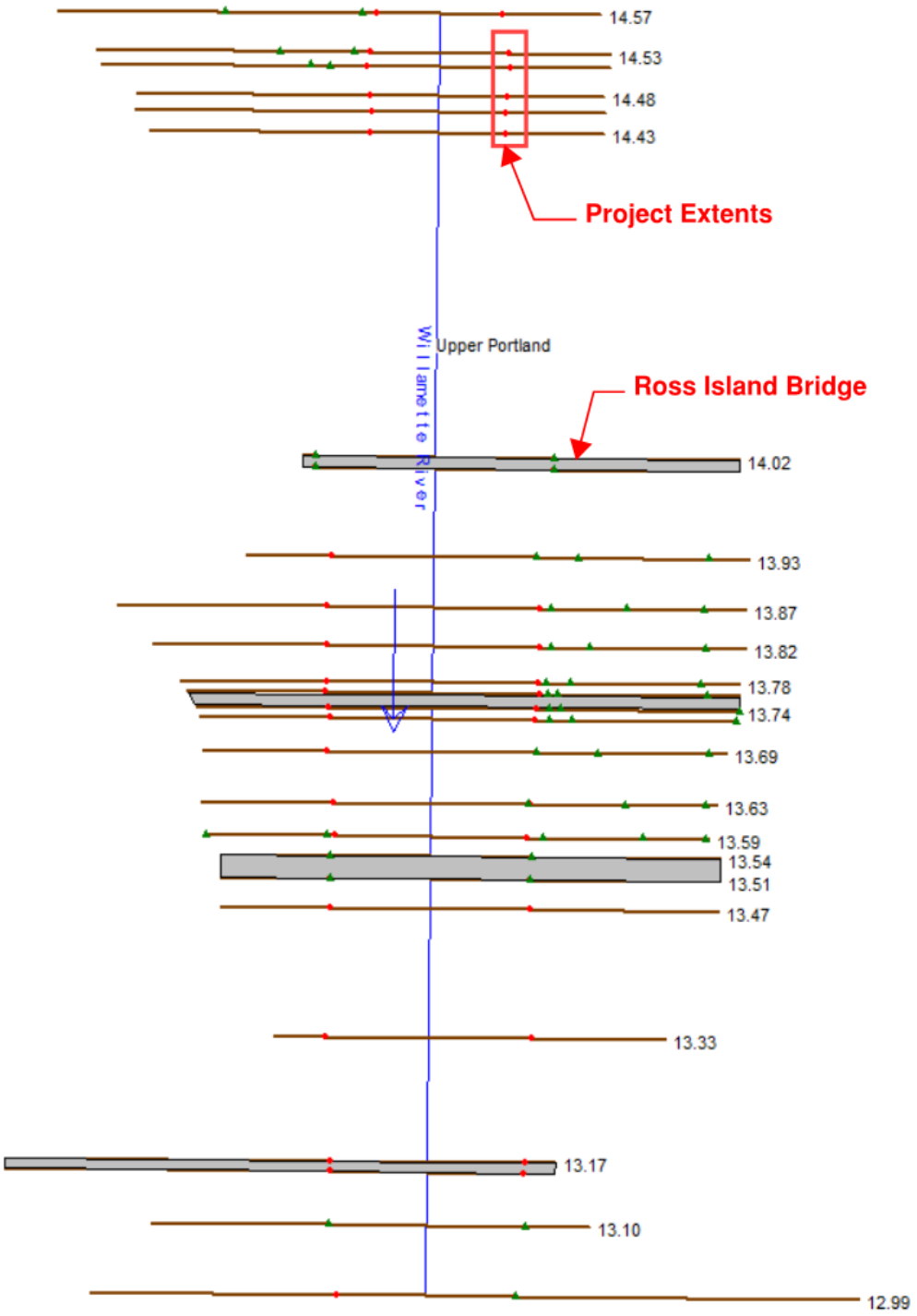

Figure A-1, HEC-RAS Geometry

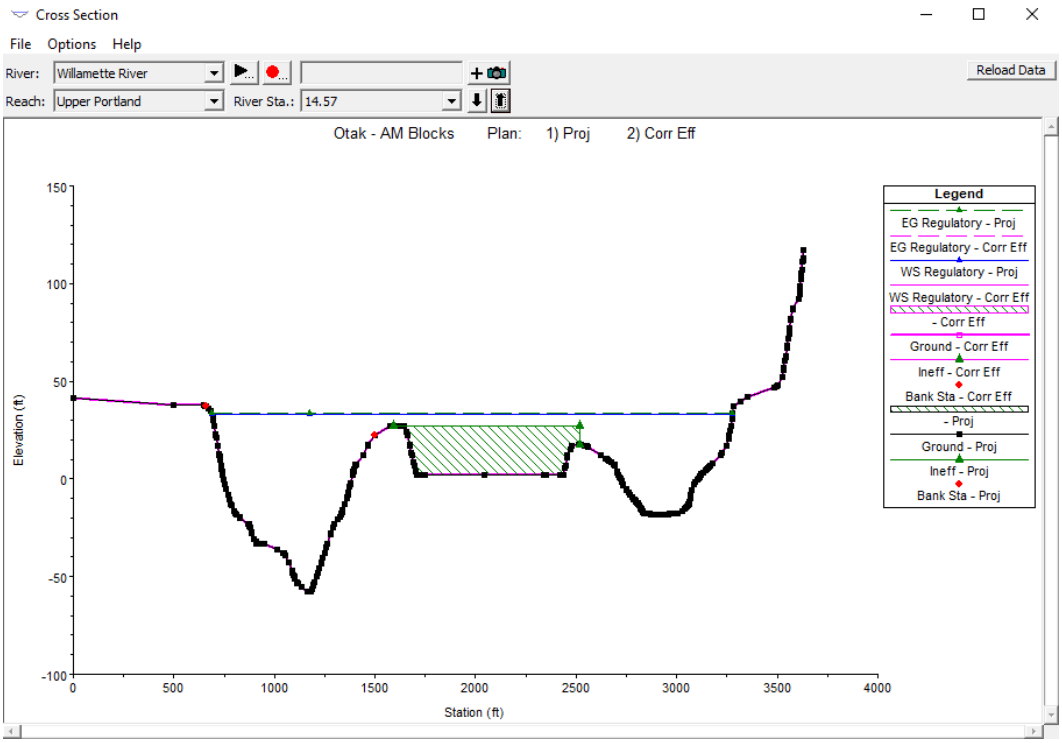

Figure A-2, Cross Section 14.57 (No geometry changes between Effective Corrective and Proposed Conditions)

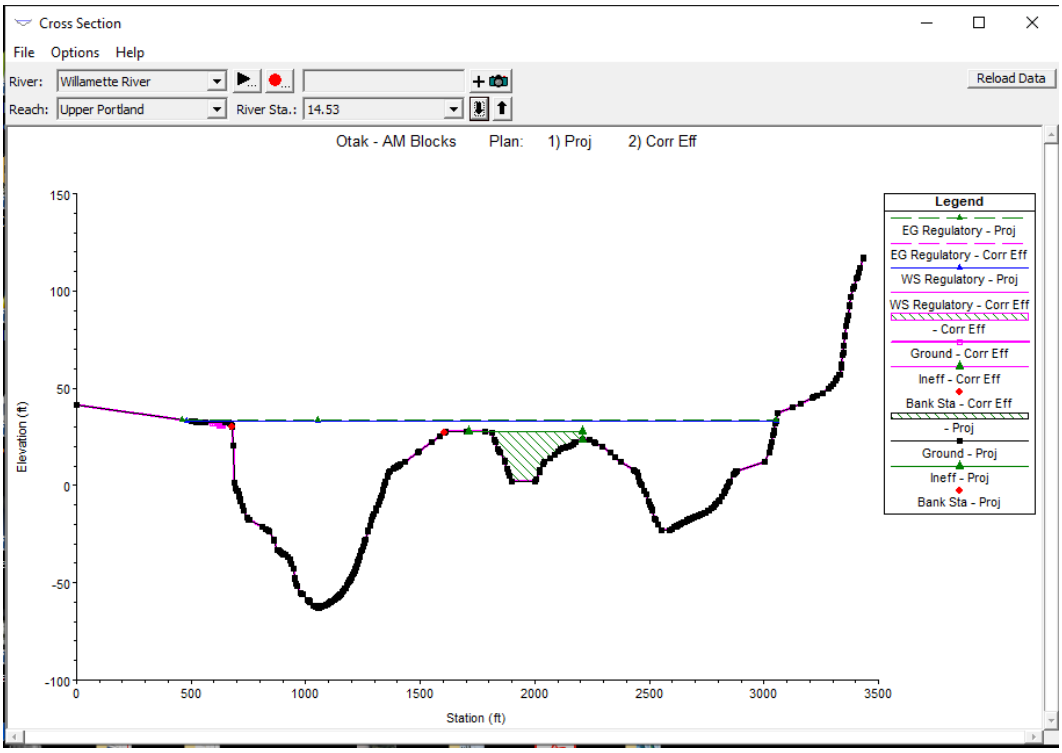

Figure A-3a, Cross Section 14.53 (Effective Corrective geometry shown in purple, Proposed geometry shown in black)

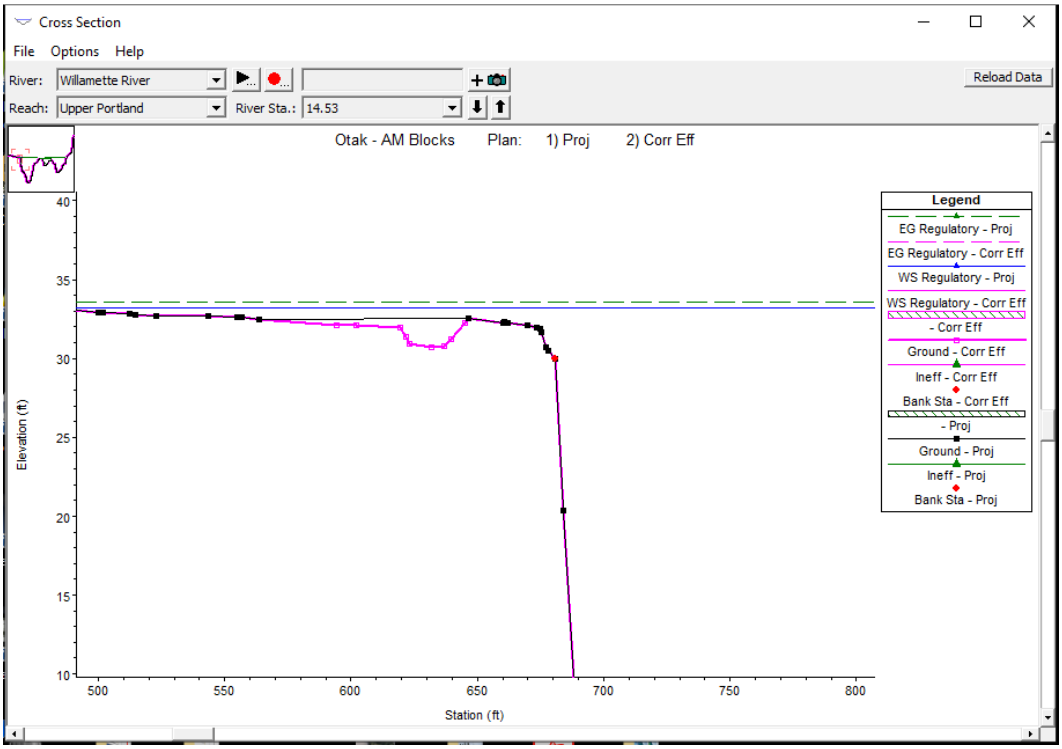

Figure A-3b, Cross Section 14.53 – left bank grading

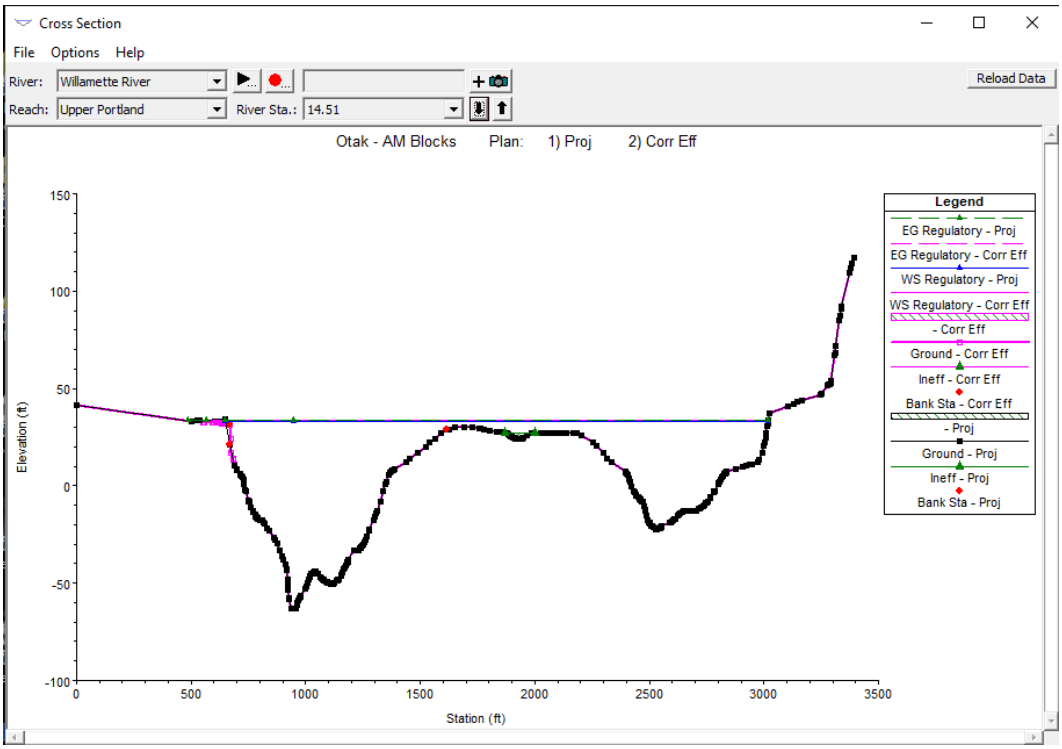

Figure A-4a, Cross Section 14.51 (Effective Corrective geometry shown in purple, Proposed geometry shown in black)

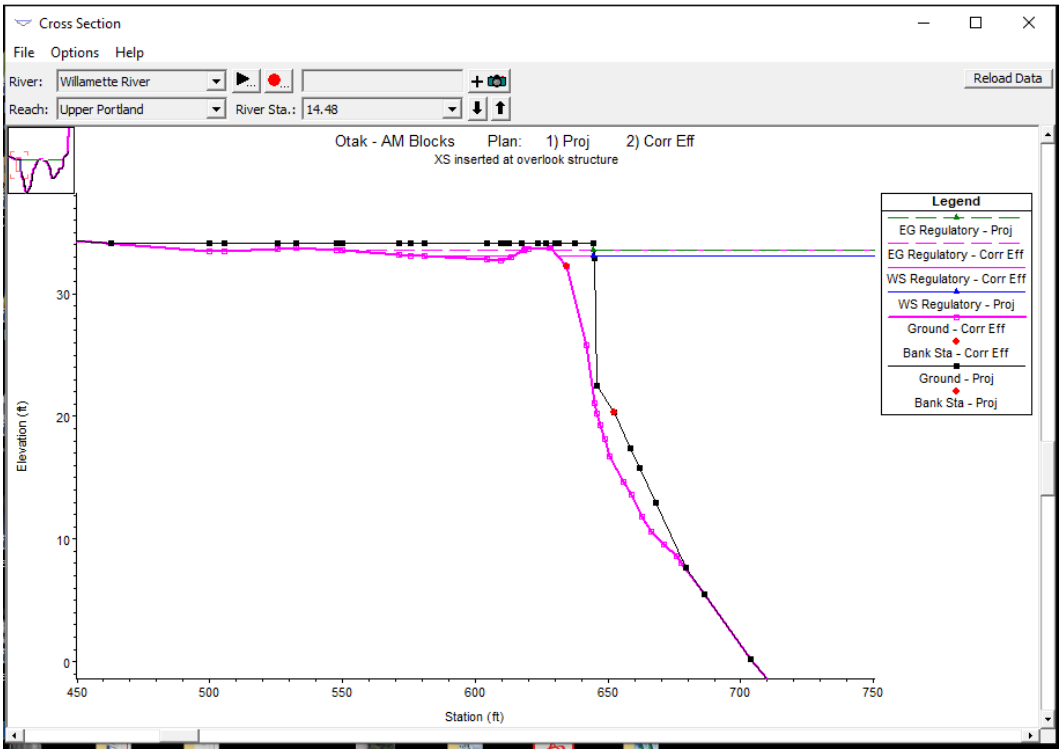

Figure A-4b, Cross Section 14.51 – left bank grading

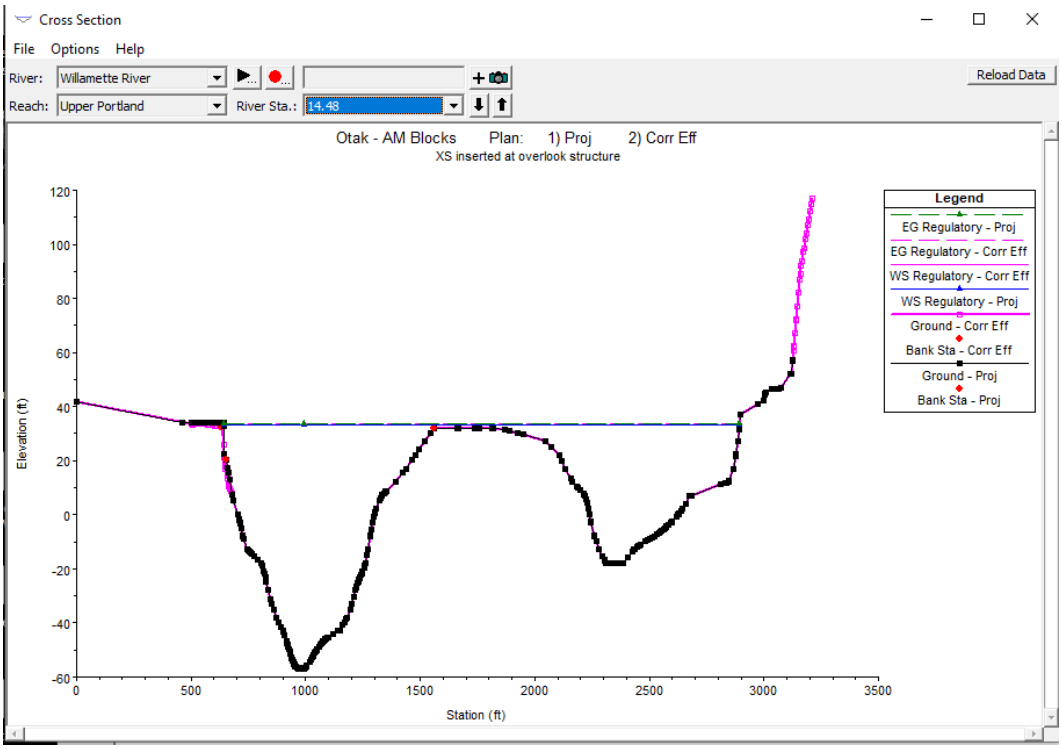

Figure A-5a, Cross Section 14.48 (Effective Corrective geometry shown in purple, Proposed geometry shown in black)

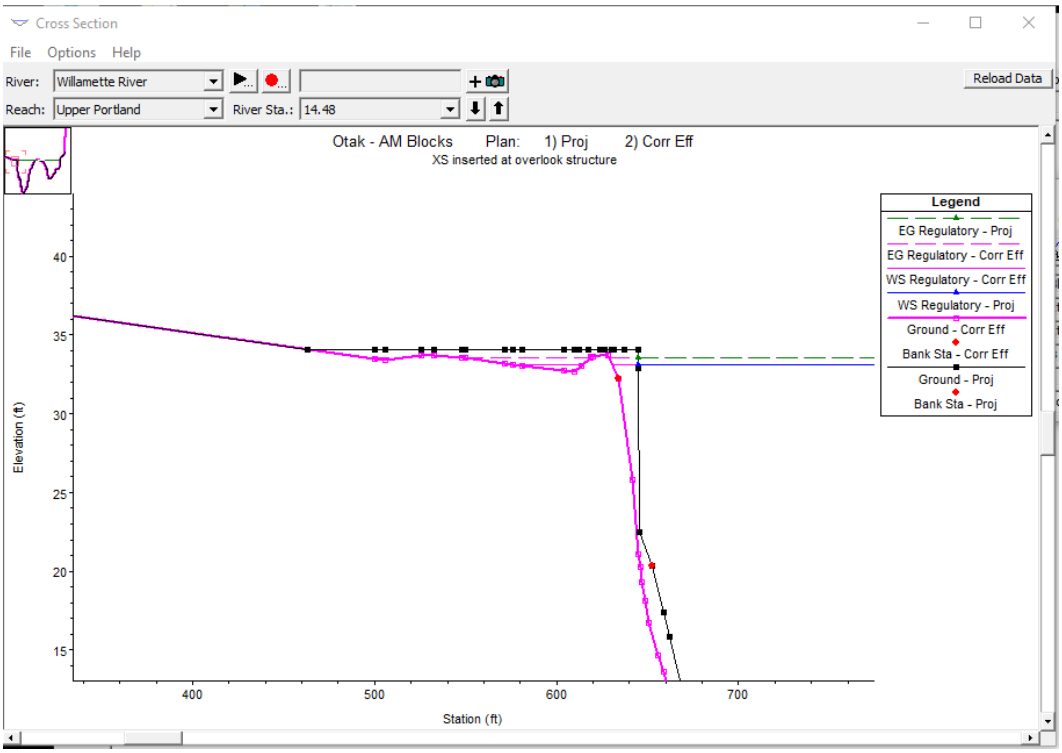

Figure A-5b, Cross Section 14.48 – left bank grading and overlook structure

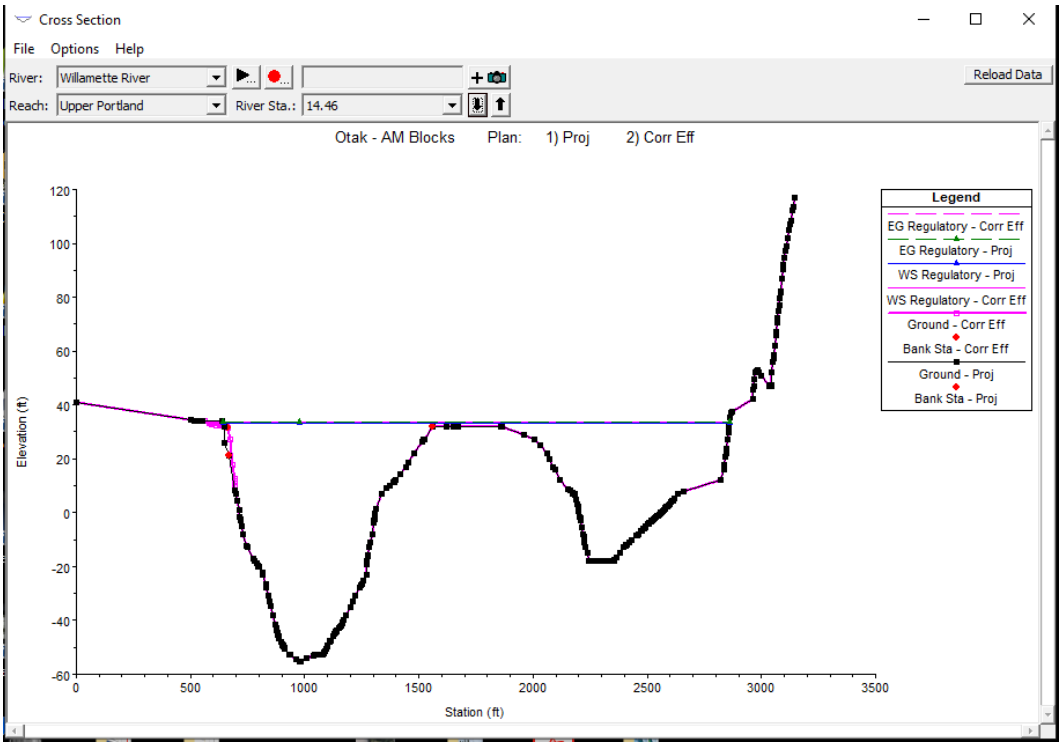

Figure A-6a, Cross Section 14.46 (Effective Corrective geometry shown in purple, Proposed geometry shown in black)

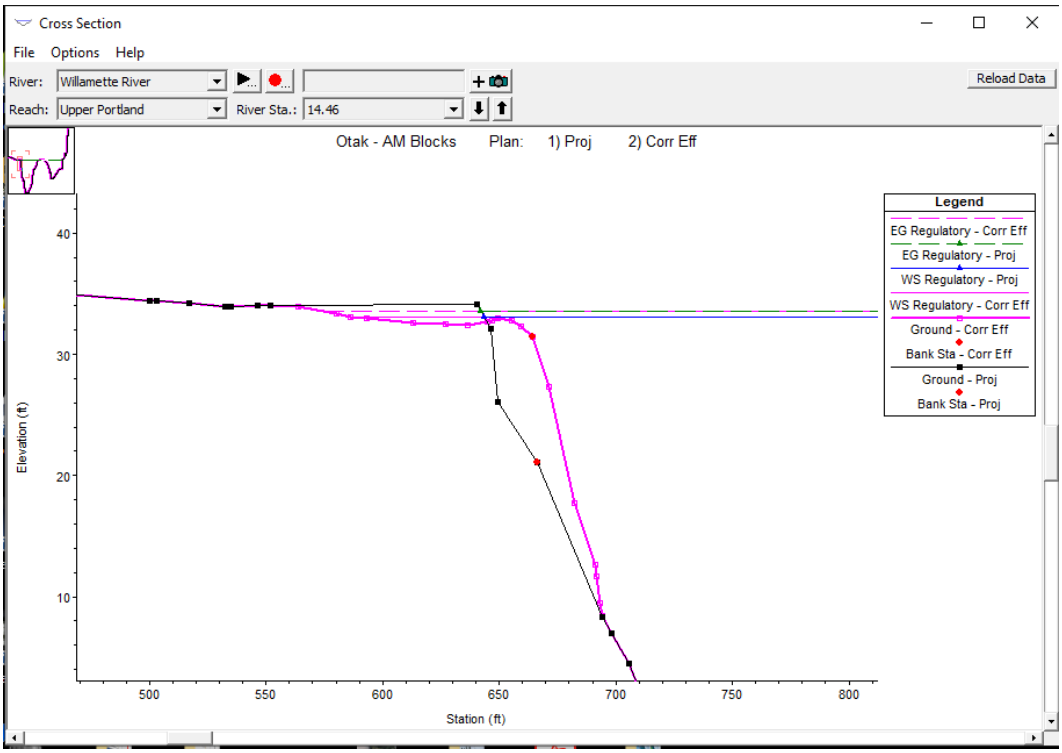

Figure A-6b, Cross Section 14.46 – left bank grading

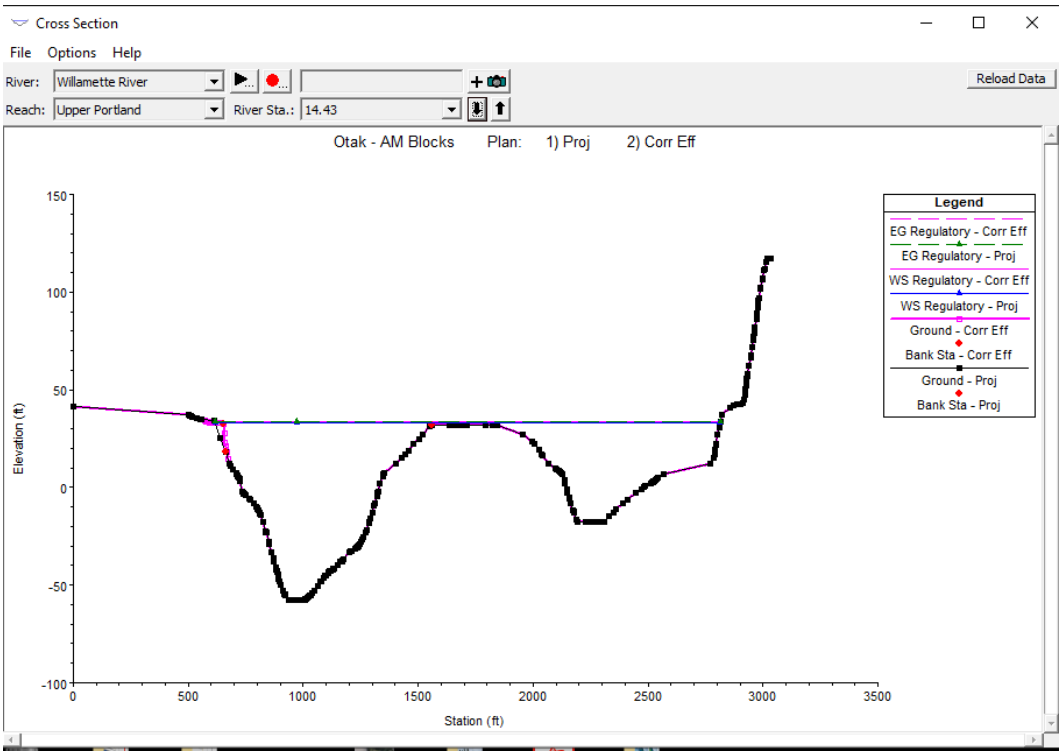

Figure A-7a, Cross Section 14.43 (Effective Corrective geometry shown in purple, Proposed geometry shown in black)

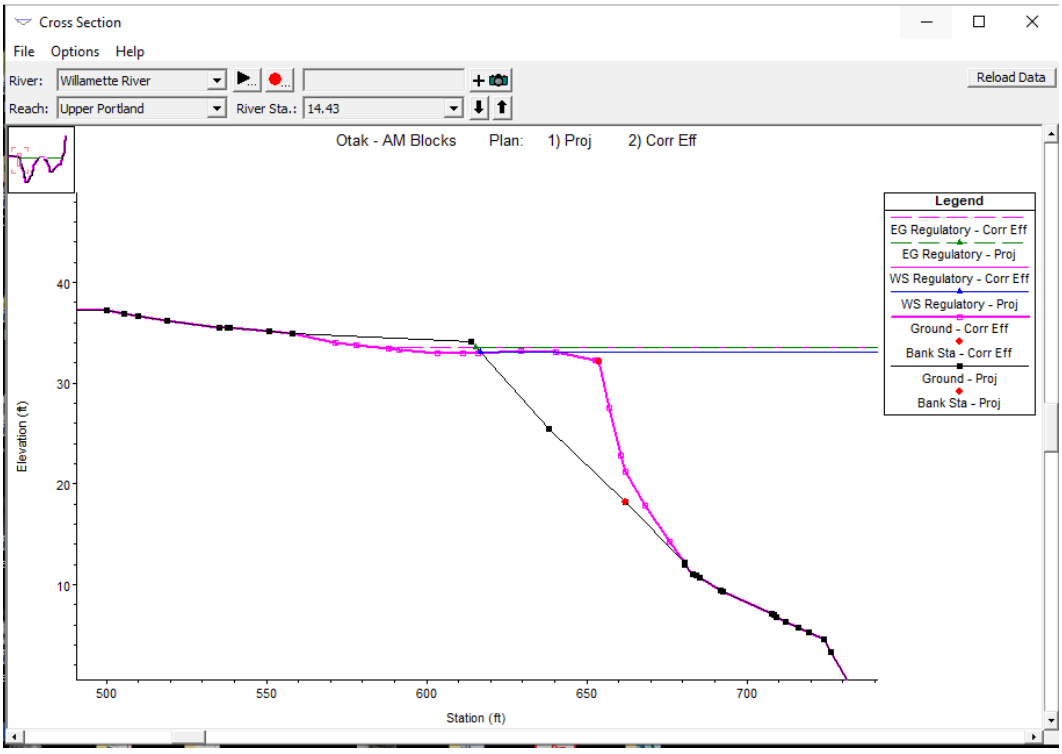

Figure A-7b, Cross Section 14.43 – left bank grading

Appendix B

Tables

Table B-1 HEC-RAS Hydraulic Results. Profile = 100-yr; Q Total = 375,000 cfs. Proj = Project Conditions, Corr Eff = Corrected Effective Conditions

River Sta	Plan	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
14.57	**Proj**	**-57.9**	**33.1932**	**33.6059**	**0.000066**	**5.72**	**77555.05**	**2590.36**	**0.14**
14.57	**Corr Eff**	**-57.9**	**33.1921**	**33.6048**	**0.000066**	**5.72**	**77552.23**	**2590.36**	**0.14**
14.53	**Proj**	**-62.86**	**33.2071**	**33.5766**	**0.000059**	**5.32**	**80856.69**	**2570.2**	**0.13**
14.53	**Corr Eff**	**-62.86**	**33.2060**	**33.5755**	**0.000059**	**5.32**	**80908.28**	**2570.14**	**0.13**
14.51	**Proj**	**-62.9**	**33.1653**	**33.5673**	**0.000071**	**5.54**	**77016.91**	**2369.59**	**0.14**
14.51	**Corr Eff**	**-62.9**	**33.1643**	**33.5662**	**0.000071**	**5.54**	**76942.02**	**2479.46**	**0.14**
14.48	**Proj**	**-57**	**33.1126**	**33.5497**	**0.000075**	**5.74**	**73274.55**	**2248.72**	**0.14**
14.48	**Corr Eff**	**-57**	**33.1160**	**33.5488**	**0.000076**	**5.71**	**73450.37**	**2300.63**	**0.14**
14.46	**Proj**	**-55.15**	**33.1090**	**33.5402**	**0.000071**	**5.71**	**74101.59**	**2216.3**	**0.14**
14.46	**Corr Eff**	**-55.15**	**33.1085**	**33.5409**	**0.000072**	**5.72**	**73827.8**	**2273.96**	**0.14**
14.43	**Proj**	**-57.9**	**33.0746**	**33.5275**	**0.000077**	**5.88**	**73146.8**	**2196.31**	**0.15**
14.43	**Corr Eff**	**-57.9**	**33.0766**	**33.5283**	**0.000078**	**5.87**	**72842.09**	**2196.79**	**0.15**
14.02	Proj	-35.5	32.9549	33.36	0.000065	5.11	73445.93	1975.47	0.13
14.02	Corr Eff	-35.5	32.9549	33.36	0.000065	5.11	73445.93	1975.47	0.13
14.01									
14	Proj	-35.5	32.9292	33.3348	0.000065	5.11	73405.27	1959.25	0.13
14	Corr Eff	-35.5	32.9292	33.3348	0.000065	5.11	73405.27	1959.25	0.13
13.93	Proj	-32.9	32.8357	33.2917	0.000065	5.42	69232.72	1594.38	0.13
13.93	Corr Eff	-32.9	32.8357	33.2917	0.000065	5.42	69232.72	1594.38	0.13
13.87	Proj	-49	32.8858	33.2443	0.000044	4.8	78077.98	1619	0.11
13.87	Corr Eff	-49	32.8858	33.2443	0.000044	4.8	78077.98	1619	0.11
13.82	Proj	-51.83	32.8828	33.23	0.000042	4.73	79330.48	1499.82	0.11
13.82	Corr Eff	-51.83	32.8828	33.23	0.000042	4.73	79330.48	1499.82	0.11
13.78	Proj	-42.28	32.7647	33.2082	0.000062	5.34	70191.62	2089.67	0.13

River Sta	Plan	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
13.78	Corr Eff	-42.28	32.7647	33.2082	0.000062	5.34	70191.62	2089.67	0.13
13.76	Proj	-37.93	32.7306	33.201	0.000068	5.5	68154.77	2116.21	0.14
13.76	Corr Eff	-37.93	32.7306	33.201	0.000068	5.5	68154.77	2116.21	0.14
13.75									
13.74	Proj	-36	32.6739	33.1597	0.000071	5.59	67074.13	2096.13	0.14
13.74	Corr Eff	-36	32.6739	33.1597	0.000071	5.59	67074.13	2096.13	0.14
13.73	Proj	-37	32.6762	33.1518	0.000069	5.53	67787.97	2141.84	0.14
13.73	Corr Eff	-37	32.6762	33.1518	0.000069	5.53	67787.97	2141.84	0.14
13.69	Proj	-35	32.6535	33.136	0.00007	5.57	67303.47	2223.68	0.14
13.69	Corr Eff	-35	32.6535	33.136	0.00007	5.57	67303.47	2223.68	0.14
13.63	Proj	-37.9	32.6058	33.1093	0.000072	5.69	65883.28	2299.85	0.14
13.63	Corr Eff	-37.9	32.6058	33.1093	0.000072	5.69	65883.28	2299.85	0.14
13.59	Proj	-38.9	32.5949	33.0918	0.000069	5.66	66846.5	2437.31	0.14
13.59	Corr Eff	-38.9	32.5949	33.0918	0.000069	5.66	66846.5	2437.31	0.14
13.54	Proj	-34.5	32.6141	33.0708	0.000064	5.42	69178.47	1397.43	0.13
13.54	Corr Eff	-34.5	32.6141	33.0708	0.000064	5.42	69178.47	1397.43	0.13
13.525									
13.51	Proj	-34.5	32.5938	33.0508	0.000064	5.42	69151.22	1397.37	0.13
13.51	Corr Eff	-34.5	32.5938	33.0508	0.000064	5.42	69151.22	1397.37	0.13
13.47	Proj	-34.5	32.5828	33.0371	0.000064	5.41	69832.16	1397.34	0.13
13.47	Corr Eff	-34.5	32.5828	33.0371	0.000064	5.41	69832.16	1397.34	0.13
13.33	Proj	-31.5	32.4739	32.9724	0.000077	5.66	66214.96	1378.15	0.14
13.33	Corr Eff	-31.5	32.4739	32.9724	0.000077	5.66	66214.96	1378.15	0.14
13.17	Proj	-35.5	32.4468	32.9036	0.000061	5.42	69253.68	1317.37	0.13
13.17	Corr Eff	-35.5	32.4468	32.9036	0.000061	5.42	69253.68	1317.37	0.13

River Sta	Plan	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
13.165									
13.16	Proj	-35.5	32.4191	32.8764	0.000061	5.42	69217.21	1317.3	0.13
13.16	Corr Eff	-35.5	32.4191	32.8764	0.000061	5.42	69217.21	1317.3	0.13
13.1	Proj	-54.7	32.5003	32.8184	0.000035	4.52	82921.77	1316.02	0.1
13.1	Corr Eff	-54.7	32.5003	32.8184	0.000035	4.52	82921.77	1316.02	0.1
12.99	Proj	-45.5	32.3	32.7807	0.000062	5.56	67427.81	1196.92	0.13
12.99	Corr Eff	-45.5	32.3	32.7807	0.000062	5.56	67427.81	1196.92	0.13