

CITY OF TROUTDALE

PLANNING COMMISSION STAFF REPORT

**TYPE III FLOOD HAZARD PERMIT with concurrent SITE AND
DESIGN REVIEW and VARIANCES
FILE NO. 13-047 ODOT Multi-Use Trail Extension
under the I-84 Sandy River Bridges**

APPLICANT: Anneke Van der Mast, Project Planner, DEA Inc.

OWNER: ODOT
City of Troutdale

STAFF: Elizabeth McCallum, Senior Planner, City of Troutdale
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STAFF REPORT DATE: January 8, 2014

REQUEST: Construct a multiuse trail extension within ODOT right-of-way within the Special Flood Hazard Area and the Vegetation Corridor and Slope District of the Sandy River. Variances are requested from the dimensional standards for trails within the vegetation corridor and slope district.

LOCATION: West bank of the Sandy River between NE Harlow Road and NW 257th Way under the I-84 Sandy River bridges and a portion of City-owned land abutting the ODOT right-of-way

TAX MAP & TAX LOT: ODOT right-of-way and City tax lot IN3E25BD-00400

PLAN DESIGNATION: Industrial north of I-84 right-of-way
Commercial south of I-84 right-of-way

ZONING DISTRICT: South of I-84 right-of-way: General Commercial (GC). North of I-84 right-of-way: Light Industrial (LI)

OVERLAY ZONING: Flood Management Area (FLMA), Vegetation Corridor and Slope District (VECO), Airport Landing Field Overlay (ALF), and Town Center

APPLICABLE CRITERIA: Troutdale Development Code: 2.000 Procedures; 3.120 General Commercial; 4.100 Airport Landing Field Overlay; 4.300 Vegetation Corridor and Slope District; 4.600 Flood Management Area; 4.700 Town Center Overlay; 5.600 Grading and Erosion Control; 5.800 Stormwater Management; 6.200 Variance; 8.000 Site Orientation and Design Review; 9.000 Off-Street Parking and Loading; 11.000 Landscaping and Screening

City of Troutdale Construction Standards for Public Works Facilities

City of Troutdale Municipal Code 13.10.270 Tree Removal

Multnomah County Road Rules

ODOT regulations

ATTACHMENTS:

1. Comments from City Building Official
2. Comments from City’s Chief Engineer
3. Flood Hazard Determination prepared by Senior Planner

SUMMARY:

ODOT proposes to construct a multi-use trail extension connecting NE Harlow Road to NW 257th Way and the eastbound I-84 bridge over the Sandy River. The construction of the multi-use path was outside the scope of the I-84 bridge replacement Flood Hazard Permit with concurrent Site and Design Review conducted in November 1999.

The proposed multi-use pathway is not entirely within ODOT right-of-way and is partially within the Vegetation Corridor and Slope District and/or Flood Management Area. The area outside of the right-of-way is property owned by the City of Troutdale that abuts the ODOT right-of-way. The multi-use trail also connects to City and County rights-of-way.

According to the Building Official (Attachment 1 comments), any work proposed on private property may require additional permits through the City of Troutdale Building Department in accordance with the Oregon Structural Specialty Code (condition number 1).

The City’s Chief Engineer commented on the use (Attachment 2) as follows (conditions arising from the Chief Engineer’s comments are proposed in condition number 2.):

1. *Any and all utility and transportation plans submitted with this application have been reviewed for the purpose of determining the feasibility of providing utility and transportation facilities for the project in accordance with City standards. This land use approval does not constitute final approval of details, including but not limited to alignments, materials and points of access, connection or discharge, that are depicted or*

suggested in the application. The applicant is required to submit detailed construction drawings and/or plat drawings for the project, as applicable. The City of Troutdale will review plans, in detail, when they are submitted and approve, reject or require modifications to the plans or drawings based upon conformance with City standards, the TDC and the professional engineering judgment of the Chief Engineer.

2. It is the opinion of the Public Works Department that the proposed multi-use trail extension can be developed in accordance with the requirements of the Troutdale Development Code (as it pertains to Public Works requirements) and Construction Standards for Public Works Facilities, and can be approved. Public Works has no objection to the proposed variances.

3. The City of Troutdale Water Master Plan calls for a new water main following the alignment of the proposed bench trail, creating a new loop into the north industrial area from the urban renewal area to Harlow Place. The City of Troutdale is currently finalizing design for the water main segment within the limits of the proposed multi-use path. It is the intent of the City to negotiate a construction contract with the applicant's existing contractor to install the water main segment in conjunction with the bench trail construction, at the City's expense. The City's design consultant is collaborating with ODOT staff to ensure design of the water main segment is compatible with ODOT's plans and to obtain an ODOT right-of-way permit. This additional element is not expected to impact any of the VECO or FHA standards under consideration for this application:

- a. The water main will be entirely underground, so will not affect any proposed finished grades or create any cut or fill in the FHA or VECO.*
- b. The water main will be installed in conjunction with the bench trail construction, so all erosion control and restoration will be covered with ODOT's proposed work.*
- c. The water main will be installed in conjunction with the bench trail construction, in the same alignment, so no additional disturbance in the VECO or FHA will occur.*

Installation of the water main in conjunction with the bench trail will achieve economy and efficiency for the public benefit and will prevent the need to disturb the VECO, FHA or proposed improvements in the future to install the water main. A copy of the construction plans for the water main are attached for reference and the case record.

4. The applicant has not proposed any City utility service connections to serve the site, and none are required.

5. The proposed multi-use path will be constructed with permeable materials. Stormwater quality facilities are not required by the City.

6. *Erosion control will be covered under the applicant's existing NPDES 1200 permit for the site.*

7. *The path segment along 257th Way will be partially in City right-of-way and partially in ODOT right-of-way. The City and ODOT should enter into an agreement establishing respective maintenance responsibilities for the path. Public Works engineering staff has participated in ongoing consultation and collaboration with ODOT in the layout and design of the path and finds the design acceptable. Construction in the City's right-of-way will require a Public Works Permit.*

A Flood Hazard Permit is required because a portion of the multi-use trail will be within the Special Flood Hazard Area (including floodway) of the Sandy River.

A variance is required because the design of the multi-use trail exceeds some of the dimensional standards for trails within the vegetation corridor associated with the Sandy River.

PROCEDURE:

Type III procedure is required as the variances requested are a deviation from the dimensional standards of more than 30%.

Public notification of the hearing was mailed December 13, 2013 to property owners within 250 feet of the site, to other interested parties identified by staff to be those participating in a Metro grant process for the construction of an access trail along the Sandy River within the Urban Renewal Area, City departments, ODOT, Multnomah County Transportation and Gresham Fire and Emergency Services.

As of December 30, 2013, written comments have been received from: the City Building Official (attachment 1) and the City's Chief Engineer (attachment 2). The Deputy Fire Marshal (with GFES) has no comments at this time). The staff report and proposed conditions of approval have been prepared based upon comments received as of December 30.

Under the Type III procedure, written and verbal comments may be submitted until the close of the hearing. If additional comments are received prior to the close of the hearing, the draft findings will need to identify those comments (whether verbal at the hearing or in writing submitted before or during the hearing).

ANALYSIS

Because the location of the project is adjacent to the west bank of the Sandy River, in addition to underlying zoning district standards, erosion and water quality standards, the development standards of two overlay districts apply: Troutdale Development Code 4.300 Vegetation Corridor and Slope District and 4.600 Flood Management Area.

Vegetation Corridor and Slope District

The width and location of the Vegetation Corridor and Slope district is determined under the following standard of the Troutdale Development Code. The Sandy River is a primary protected water feature. The slope adjacent to the river is greater than 25% for less than 150 feet. The width of the Vegetation Corridor is to be determined from the following standard of the Code:

TDC 4.316 Width of Vegetation Corridor.

<i>Protected Water Feature</i>	<i>Slope Adjacent to Protected Water Feature¹</i>	<i>Starting Point for Measurements from Water Feature</i>	<i>Minimum Width of Vegetation Corridor^{2&3}</i>
<i>Primary Protected Water Features</i>	<i>≥25% for less than 150 feet³</i>	<i>Edge of bankfull stage or two-year storm level. Delineated edge of Title 3 wetland.</i>	<i>Distance from starting point of measurement to top of ravine (break in ≥25% slope)⁴, plus 50 feet⁵</i>

A dimensional topographic site plan view showing the bankfull stage of the Sandy River and the resulting vegetation corridor width with the location of the multi-use trail was submitted with this application. Based upon the topographic drawings submitted, the Vegetation Corridor (VECO) is a 100-foot wide area measured inland from the bankfull stage of the Sandy River. The trail is within the vegetation corridor and slope district under the bridges to the point that it swings “inland” 100 feet or more from that break in slope.

Only that portion of the multi-use trail that is within the Vegetation Corridor and Slope District is subject to any of the following design standards.

TDC 4.312 Uses within the Vegetation Corridor and Slope District.

A. Permitted Uses within the Vegetation Corridor and Slope District.

- 1. Low-impact outdoor recreation facilities, including but not limited to: multi-use paths, accessways, trails, picnic areas, or interpretive and educational displays and overlooks that include benches and outdoor furniture as designated by the Troutdale Parks Plan, or as approved with a land use application, and in compliance with subsection 4.315(D)(1) or 4.315(D)(2) of this chapter, as applicable.*

These standards also apply to the Metro defined Habitat Conservation Areas (HCA) of the City-owned property that will be used for the trail. The regulated HCA areas are the yellow and green colors depicted on the following aerial photo from data provided to the City by Metro.



Drawing V “Vegetation Corridor / Slope District” submitted with the application correctly identifies the VECO and the HCA on the city-owned property. The HCA is part of the entire VECO width.

TDC 4.315 Development Standards. Permitted uses in the vegetation corridor and slope district are to be developed in compliance with the following development standards or in compliance with an approved District Plan in accordance with Metro Code Section 3.07.1330.B.4(a). A District Plan shall be prepared and approved prior to, or in conjunction with, the preparation and approval of a master plan for the eventual development of the specific site. The approval criteria for the District Plan are those of Metro Code Section 3.07.1330.B.3.

A. New Development.

- 1. The applicant shall demonstrate that no reasonably practicable alternative design or method of development exists that would have a lesser impact on the vegetation corridor and slope than the one proposed.*

The applicant states that this trail is a *key connectivity piece for the regional 40-Mile Loop Trail system* and that the trail parallels the Sandy River as shown in the City of Troutdale Parks Master Plan.

The applicant explains that the area for the trail *has been historically disturbed by fill and the I-84 bridge structure for more than 60 years* and that *currently the area is disturbed for*

construction of the new I-84 bridges and riprap benching and grading to accommodate the trail as previously permitted under [City of Troutdale land use permit file number] 09-006.

The applicant also explains that the construction underway for the I-84 bridges includes the embankment and riprap bench where the trail will be constructed.

The applicant further explains that *due to the constricted space under the bridge from the bridge abutments, it is not possible to set the trail back further from the Sandy River*

2. *If no such reasonably practicable alternative design or method of development exists, new structures and development shall be limited in scale, as specified in this section, so that the impacts on the vegetation corridor and slope district are the least necessary and the plans shall include restoration, replacement, or rehabilitation of the vegetation corridor and/or slope associated with the site:*

Mitigation for use of the VECO and floodplain is proposed. The applicant summarizes the mitigation on page 7 of the written narrative:

- The trail is designed with pervious concrete so that stormwater can infiltrate into the ground so that there is no stormwater impact.
- The trail is 12 feet wide with 2 foot shoulders to safely accommodate a high volume of mixed bicycle and pedestrian use per the ODOT Bicycle and Pedestrian Guide.
- The area will be planted with native species of trees and shrubs to improve habitat and vegetative functions in the project area.

- a. *Notwithstanding the provisions of chapter 6.220, Type II Variance, of this code, a maximum of 30% of the total area of the vegetation corridor and slope district on the lot may be used for the development, inclusive of any walkways, driveways, patios, decks, accessory buildings, and similar impervious features.*

The applicant states that the total project area within the VECO is 113,501 square feet and that only 19,827 square feet, or 17 percent, of this VECO area will be developed with the multi-use trail.

The limitation standard is met.

TDC 4.315 A3. The applicant shall provide mitigation to ensure that impacts to the functions and values of the vegetation corridor and integrity of the slope will be mitigated or restored to the extent practicable.

- a. *The existing tree canopy and understory comprised of native plants shall be retained wherever possible outside of the building envelope. A tree preservation and maintenance plan is required to be submitted with the land use application as part of the landscaping plan, or in the case of a single-family dwelling, with the building*

permit. Only those trees approved for removal by the Director, Site and Design Review Committee, or Planning Commission may be removed.

No trees are being removed to construct the multi-use trail.

- b. Any disturbed portions of the site shall be restored and enhanced by removing non-native plants and noxious weeds, and restoring the vegetation corridor with native plant species listed on the Metro Native Plant List. Only native grass varieties will be permitted.*

A revegetation plan is proposed and uses native plants.

- c. A mitigation and restoration plan shall be submitted with the land use application and shall be implemented prior to issuance of a Certificate of Occupancy, a Certificate of Completion for a subdivision, or the final building inspection, as applicable.*
- i. Required plants and plant densities. An applicant must meet Mitigation Option 1, 2 or 3.*

The mitigation and restoration plan submitted is based upon Option 3 as shown on sheets GN-3 and GN-4.

Option 3 is a discretionary review and was selected according to the applicant instead of Option 1 or 2 because no trees are being removed and because there is insufficient room within the VECO to plant the number of mitigation plantings required under Option 2.

TDC 4.315A.3.c.i. Option 3 Discretionary Review. This mitigation plan varies the required number and size of trees and shrubs under Option 1 or Option 2.

- (A) An applicant shall submit the following:*
- (1) A calculation of the number of trees and shrubs that would be required under Option 1 or Option 2.*

The applicant explains that because no trees are being removed the quantity of replacement trees and shrubs cannot be calculated.

Under Option 2, the quantity of trees and shrubs would be 198 trees and 990 shrubs.

- (2) The number and size of trees and shrubs that the applicant proposes to plant.*

The applicant proposes to plant the following (as shown on Sheet GN-4):

- 40 one-inch caliper native trees spaced 10-feet on center where no conflicts exist.
- 333 one-gallon container size native shrubs spaced approximately four-feet on center.

- Plantings extend beyond the VECO along the ROW in an effort to maximize the area planted as part of the mitigation with another 11 trees outside of the VECO for a total of 51 trees.

(3) An explanation of why the proposed number and size of trees and shrubs to be planted will achieve, at the end of the fifth year after initial planting, comparable or better mitigation results than the number and size required under Option 1 or Option 2. Such explanation shall be prepared and signed by a qualified, licensed natural resource professional or a licensed landscape architect and shall include discussion of site preparation including soil additives and removal of invasive and noxious vegetation, plant diversity, plant spacing, planting season and immediate post planting care including mulching, irrigation, wildlife protection and weed control.

and

Approval Criteria for Option 3. A request to vary the number and size of trees and shrubs to be planted may be approved if the applicant demonstrates that the proposed planting will achieve, at the end of the fifth year after initial planting, comparable or better mitigation results than the number and size required under Option 1 or Option 2.

In addition to the explanation in the application narrative starting on page 8, the applicant has submitted an explanation from a licensed landscape architect (Appendix B of the application) as to why the proposed number and size of trees and shrubs to be planted under Option 3 is comparable or better mitigation results than Option 1 or Option 2.

(4) A monitoring and reporting plan for the mitigation site.

The applicant explains the monitoring and reporting responsibilities under the ODOT contract on page 11 of the narrative.

TDC 4.315 A.3.c.ii. On-site mitigation area. All vegetation planted on the applicant's site must be within the Vegetation Corridor and Slope District or in an area contiguous to the Vegetation Corridor and Slope District; provided, however, that if the vegetation is planted outside of the Vegetation Corridor and Slope District of the site, then the applicant shall preserve the contiguous area by executing a deed restriction, such as a restrictive covenant.

The mitigation area is within the VECO or contiguous to the VECO area. The standard is met.

TDC 4.315 A.3.c.iv. Mitigation Planting Standards.

- All trees, shrubs, groundcovers, and grasses shall be from the Metro Native Plant List.*
- Conifers shall be replaced with conifers.*
- Plant size. Replacement trees must be at least one-half inch in caliper, measured at six inches above the ground level for field grown trees or above the soil line for container grown trees (the one-half inch minimum size may be an average caliper measure, recognizing that trees are not uniformly round), unless they are oak or madrone which*

- may be one gallon size. Shrubs must be in at least a one-gallon container or the equivalent in ball and burlap and must be at least 12 inches in height.*
- d) Plant spacing. Trees shall be planted between eight and 12 feet on center and shrubs shall be planted between four and five feet on center, or clustered in single species groups of no more than four plants, with each cluster planted between eight and ten feet on center. When planting near existing trees, the dripline of the existing tree shall be the starting point for plant spacing measurements.*
 - e) Plant diversity. Shrubs must consist of at least two different species. If ten trees or more are planted, then no more than 50% of the trees may be of the same genus.*
 - f) Invasive vegetation. Invasive non-native or noxious vegetation must be removed within the mitigation area prior to planting.*
 - g) Tree and shrub survival. A minimum of 80% of the trees and shrubs planted must remain alive on the fifth anniversary of the date that the mitigation planting is completed. Plants that die within five years of the date of planting must be replaced in kind and of sufficient quantity to meet this minimum 80% coverage standard.*
 - h) Monitoring and reporting. Monitoring of the mitigation plantings is the ongoing responsibility of the property owner. Monitoring shall continue during the first five years of the date of planting. Monitoring shall consist of the submission of color photographs of the mitigation plantings immediately following completion of the initial planting and then annually between September 1 and 21st for the next five years. Photographs shall be dated and a north arrow included on the photographs. The photographs shall be submitted to the Community Development Department with a cover letter that includes the name and contact information for the current property owner, the land use file number, and the address of the property.*
 - i) To enhance survival of tree replacement and vegetation plantings, the following practices are recommended:
 - (i) Planting season. Plant bare root trees between December 1 and February 28, and potted plants between October 15 and April 30.*
 - (ii) Wildlife protection. Use plant sleeves or fencing to protect trees and shrubs against wildlife browsing and resulting damage to plants.*
 - (iii) Irrigation. Water new plantings one inch per week between June 15 to October 15, for three years following planting.*
 - (iv) Weed control. Remove or control non-native or noxious vegetation throughout maintenance period.*
 - (v) Mulching. Mulch new plantings a minimum of three inches in depth and 18 inches in diameter to retain moisture and discourage weed growth.**

The plan and proposed maintenance meets the mitigation planting standards.

TDC 4.315 A.3.d. The portion of the vegetation corridor and slope district that is not disturbed with the use shall be conserved and maintained as open space. This may occur through private ownership; private conditions, covenants, and restrictions; conservation easements enforceable by the City, other public or private nonprofit agency, or where approved by the City

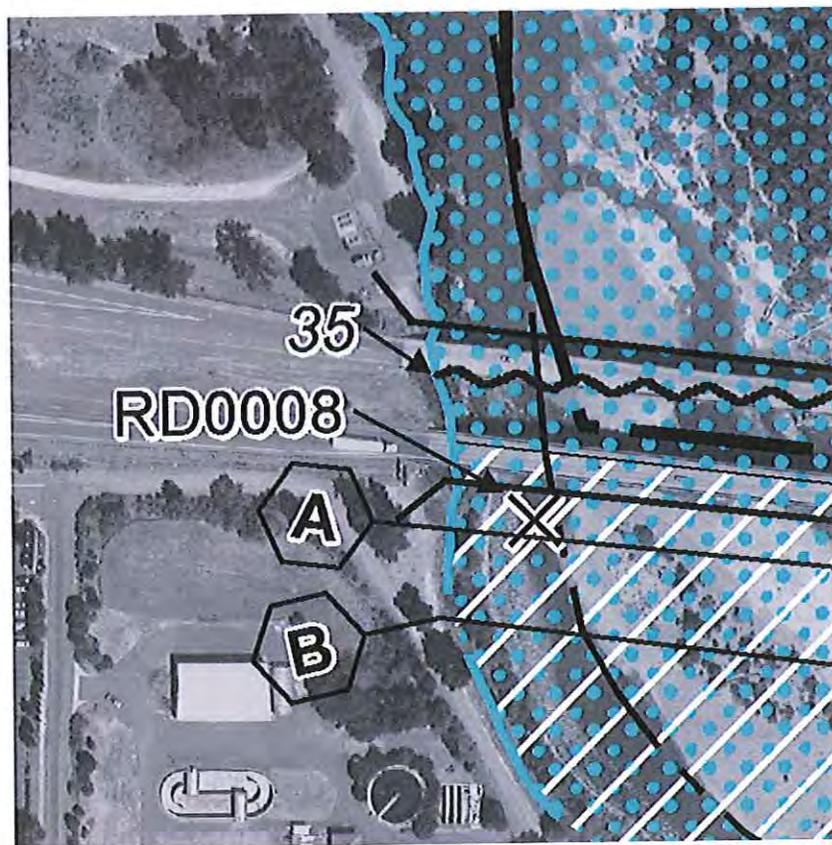
Council; dedication to the City; or donation to other appropriate public or private nonprofit agency.

The balance of the VECO not being developed as part of the multi-use trail is in the ownership of ODOT or the City of Troutdale.

TDC 4.315 A.4. The use satisfies all applicable standards of chapters 4.600, Flood Management Area; 5.600, Erosion Control and Water Quality Standards; and 5.800, Stormwater Management, of this code.

Flood Management Area

The flood management area is the one-percent annual chance floodplains in the City as mapped by FEMA and the Flood Insurance Rate Maps (FIRM). The one-percent annual chance floodplain is also called the Special Flood Hazard Area (SFHA) and the regulatory flood. A common term used for one-percent annual chance floodplain is the one-hundred year flood. FEMA FIRM panel 41051C0217H effective December 18, 2009 applies to this site. A FIRMette produced from the FIRM prepared by staff is attached (attachment 3). A detail from the FIRMette follows.



Provided this copy of this report is in color, the Special Flood Hazard area is outlined in aqua blue on the FIRM and has evenly spaced dots within the outlined area. The floodway of the Sandy River is marked with diagonal white lines over the SFHA designation. Stream cross sections and reference datum points are noted. From the complete FIRM panel and Flood Profiles for the Sandy River published in FEMA's Flood Insurance Study (FIS) for Multnomah County, Oregon and Incorporated Areas, Study Number 41051CV000A dated December 18, 2009.

The Base Flood Elevation (BFE) of the Special Flood Hazard Area of the Sandy River within the length of the subject trail is variable ranging from 35 to 37.3 feet NAVD 88 datum. In between the bridges, the BFE is 35 feet NAVD 88 datum. At cross section A the BFE is 35.5 to 36 feet NAVD 88 datum. At cross section B the BFE is closer to 36 feet NAVD 88 datum.

The BFE on the detail for the path under the bridge identifies the "100 yr" elevation at 37.3 feet. However, because the BFE varies along this reach of the river, the detail and plan drawings for the trail must accurately show the elevation of the BFE based upon the flood profile for the Sandy River in the FIS (Attachment 3) (condition number 1).

The floodway and floodplain are co-terminus in the special flood hazard area (SFHA) south of the I-84 bridges. It appears from the details that the trail does drop below elevation 35 feet and into the Special Flood Hazard Area of the Sandy River. As such, portions of the multi-use trail is within the floodway of the Sandy River. The multi-use trail is permitted in the SFHA and floodway under the following applicable standards of TDC 4.600 Flood Management Area.

TDC 4.615 Uses within the Floodway or within Wetlands.

B. Permitted Uses within the Floodway or within Wetlands. The following uses are permitted subject to review under the standards for development of section 4.617, Development Standards, of this chapter:

- 1. Open space, trails, walkways, and bike paths, as designated by the Troutdale Parks Plan, or as approved with a land use application.*

The multi-use trail is part of a designated trail system called the 40-Mile Loop Trail identified in the City's Parks Plan.

TDC 4.617 Development Standards. The land use application shall establish through the use of narrative, site plans, and professional reports, the following:

A. New development, including additions or alterations to existing structures, in the Flood Management Area may be allowed, provided that:

- 1. The applicant shall demonstrate that there is no reasonable nor practical alternative design or method of development that would have a lesser impact on the Flood Management Area than the one proposed.*

The applicant's justification for use of the same reason for using the VECO area applies to the use of the flood management area.

2. If there is no reasonable nor practical alternative design or method of development the project shall be designed in compliance with applicable parts of subsections (C) through (U) of this section, so that the impacts on the Flood Management Area are limited and the plans shall include restoration, replacement, or rehabilitation of the vegetation within the Flood Management Area.

The applicable parts of subsections C through U are:

TDC 4.617 C. As applicable, the development must be authorized by the Oregon Department of State Lands, U.S. Army Corps of Engineers, and the Oregon Department of Fish and Wildlife. The applicant shall obtain and submit a copy of all required state and federal permits for any proposed development in the Flood Management Area, including Section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 USC 1334.

Because the development is not below the Ordinary High Water line of the Sandy River and does not involve fill-removal of wetlands, staff knows of no reason that permits from these agencies are required.

TDC 4.617 D. Unless otherwise authorized under the provisions of this chapter, the development shall comply with the underlying zoning district dimensional standards and the minimum vegetation corridor as established in sections 4.316, Width of Vegetation Corridor, and 4.317, Method for Determining Vegetation Corridors Next to Primary Protected Water Features, of this code.

The justification for placing the multi-use trail within the VECO has been established and the VECO standards can be met and mitigation is proposed.

TDC 4.617 E. Protect the water quality resource and Flood Management Area functions and values from uncontained areas of hazardous materials as defined by the Department of Environmental Quality water quality standards.

No uncontained areas of hazardous materials are part of this development.

TDC 4.617 F. Limit impervious surface areas in the Flood Management Area.

1. The impervious surface of the development may not exceed 30% of the flood plain area, provided the standards of this code are met. Exception: Public roads necessary to serve the transportation needs of the City may exceed 30% of the Flood Management Area.

The multi-use trail will be constructed with pervious surface but the retaining walls within the development area are impervious.

The multi-use trail is not entirely within public right-of-way, but the portion that is within the flood management area is within right-of-way. The multi-use trail is part of the transportation system for the City and staff offers for the Planning Commission's consideration that it is also exempt from the maximum impervious area. Details of the retaining walls are provided by the applicant under Appendix D and details shall be submitted with applicable building permits as may be required under the Oregon Structural Specialty Code (condition number 1).

3. The applicant shall provide mitigation to ensure that impacts to the functions and values of the vegetation corridor and integrity of the slope will be mitigated or restored to the extent practicable.

The mitigation proposed for use of the VECO satisfies mitigation for development within the Special Flood Hazard Area (flood management area).

TDC 4.617 G. Maintain flood storage capacity. Balanced cut and fill is required for permitted development in the Flood Management Area. Excavation and fill shall be performed in a manner to maintain or increase flood storage and conveyance capacity and not increase design flood elevations. A professional engineer registered in Oregon must certify that the development will not result in any increase in flood levels during the occurrence of the base flood discharge, and that water quality will not be adversely affected. The applicant shall obtain a Conditional Letter of Map Revision-Fill (CLOMR-F) from FEMA prior to grading and filling the site and then obtain and submit the final Letter of Map Revision-Fill (LOMR-F) prior to final inspections, or issuance of a certificate of completion, or issuance of the certificate of occupancy.

- 1. All fill placed at or below the design flood elevation in the Flood Management Area shall be balanced with at least an equal amount of soil material removal. The development shall be designed to minimize development within the Flood Management Area and amount of fill necessary. Balanced cut and fill may be used to elevate structures but shall not be used for density transfer. Residential density must be calculated prior to changes to the floodplain as a result of balanced cut and fill.*
- 2. Excavation shall not be counted as compensating for fill if such areas will be filled with water in non-storm winter conditions.*
- 3. The cumulative effect of any proposed development shall not increase the water surface elevation of the base flood. Onsite flood storage capacity shall not decrease as a result of development, vegetation removal, or excavation.*
- 4. A "No-Rise" certification is required for any fill or permitted development within the floodway pursuant to section 60.3(d)(3) of the National Flood Insurance Program.*

- a. *The "No-Rise" supporting data and a copy of the engineering certification must be submitted to, and reviewed by, the City prior to approval of development, and the data shall be submitted with the Flood Hazard Permit.*
- b. *The "No-Rise" certification and supporting technical data must stipulate no impact on the 100-year flood elevations, floodway elevations, or floodway widths at the new cross-sections and at all existing cross-sections anywhere in the model.*
- c. *A sample "No-Rise" certification is available in the Community Development Department.*

The applicant has established that flood storage capacity is maintained and that there is no net rise within the floodway due to this construction (applicant's appendix E).

TDC 4.617 L. Remove temporary fills. Temporary fills permitted during construction or emergency bank stabilization shall be removed if not in compliance with the balanced cut and fill standard of this code or prior to issuance of a Certificate of Occupancy or release of any bond issued for the development.

The applicant has established that the development complies with balanced cut and fill requirements. The standard is met.

TDC 4.617 M. Preserve and/or restore the vegetation corridor within the disturbed areas, and retain the existing tree canopy as established in sections 4.316, Width of Vegetation Corridor, and 4.317, Methods for Determining Vegetation Corridors Next to Primary Protected Water Features, of this chapter. An enhancement plan for disturbed areas shall be prepared and implemented to stabilize slopes to prevent landslides on slopes and sedimentation of water features. This plan shall provide for the replanting and maintenance of approved plant species designed to achieve pre-disturbance conditions.

The application includes a mitigation planting plan as explained under the VECO standards. That mitigation plan satisfies TDC 4.617 M.

TDC 4.617 N. Maintain or reduce stream temperatures.

The plan is that the multi-use trail be constructed of pervious paving. Pervious paving allows stormwater to percolate into the subgrade and avoids direct discharge of heated stormwater into the river. The standard is met.

TDC 4.617 O. Minimize erosive velocities, nutrient, and pollutant loading into water. Use filtering, infiltration, and natural water purification for stormwater runoff in compliance with the Erosion Control and Water Quality Standards of chapter 5.600 of this code. The applicant's

engineering plans shall certify that runoff and sedimentation from the site will comply with the standards of chapter 5.600, Erosion Control and Water Quality Standards, of this code.

An erosion control plan has been submitted (see drawing GA-4).

TDC 4.617 P. Anchoring. All new construction and substantial improvements shall be anchored to prevent flotation, collapse, or lateral movement of the structure.

This standard applies to the retaining walls within the Special Flood Management Area or as otherwise determined by the Building Official. Submit anchoring details with the building permit application (condition number 1).

TDC 4.617 Q. Construction Materials and Methods. All new construction and substantial improvements shall use flood-resistant materials in accordance with the requirements of FEMA Technical Bulletin 2-93 "Flood Resistant Materials Requirements" and utilities shall be designed and installed in accordance with FEMA Publication 348 "Protecting Building Utilities from Flood Damage."

Stone, gravel, and pervious paving used within the SFHA are flood-resistant materials.

If there will be lighting within the multi-use path, all fixtures must be elevated one foot above the BFE or be designed to be water tight (condition number 1).

TDC 4.315 A4 is met with conditions as the development standards applicable to development within the flood management area, specifically the Special Flood Hazard Area of the Sandy River floodway, the City's erosion control and stormwater management standards are met through the design of the multi-use trail or can be met with conditions.

OTHER APPLICABLE VECO DEVELOPMENT STANDARDS

TDC 4.315 A.5. All excavation over three feet in depth shall require submission of an engineering report addressing the hydrology, geology, and soils of the site as specified in this chapter. The siting, engineering, erosion control, water quality, and enhancement or revegetation of the site shall comply with the standards of this chapter. The applicant's engineering plans shall certify that runoff from the site will not increase above pre-development quantity and rate, and that visible and measurable erosion is prevented.

The applicant has provided geotechnical design details for the path and retaining walls that satisfies this standard (appendix D).

With respect to erosion control, the application includes an erosion control plan to prevent visible and measurable erosion into the Sandy River during construction. The erosion control plan is explained in applicant's appendix C.

With respect to stormwater runoff from the site, the stormwater management plan for the new I-84 bridges covers this project according to the information in the applicant's appendix C, 4th page from the end of appendix C.

TDC 4.315 D. Approval Standards for Walkways and Bike Paths and other Low-Impact Outdoor Recreation Facilities.

1. Within the VECO of any property other than City-owned or Metro-owned parks and greenspaces.

TDC 4.315 D.1.a. A gravel walkway or bike path shall not be constructed closer than ten feet from the boundary of the protected water feature. Walkways and bike paths shall be constructed so as to minimize disturbance to existing vegetation. Where practicable, a maximum of ten percent of the trail may be within 30 feet of the protected water feature.

The City has determined that this standard applies to pervious paved walkways/bike paths and that the distance from the boundary of the Sandy River is that distance measured inland from the Ordinary High Water line. The applicant has requested a variance from this standard as the multi-use trail as approximately 80 percent of the trail is within 30 feet of the boundary of the Sandy River. The variance criteria that apply for a 70 percent increase in the dimensional limitation of TDC 4.315D1a are those of TDC 6.215. A response to the variance criteria was provided by the applicant beginning on page 17 of the applicant's narrative.

A. Special circumstances or conditions including, but not limited to, lot size, lot shape, topography, or size or shape of building, apply to the property, development, or to the intended use and are not typical of the general conditions in the surrounding area;

The applicant explains that the special circumstance is the new I-84 bridge construction and the resulting constrained location for this river-side trail and that the topography and general conditions of the site are not typical of other surrounding areas.

B. The variance authorized will not be injurious to adjacent properties or the surrounding neighborhood or otherwise detrimental to the public welfare;

To summarize the applicant's explanation, the trail will maximize the use of right-of-way to provide a public amenity and that there is no surrounding neighborhood that will be impacted by this variance.

C. The variance authorized will be consistent with the general purpose and intent of the provision from which a variance is sought; and

To summarize the applicant's explanation, staff agrees with the applicant that the purpose and intent of the standard is to minimize vegetation disturbance within the VECO and floodplain.

However, the location of the multi-use trail is almost entirely within 30 feet of the Sandy River – a *historically disturbed* area used for transportation by the public for *over a half a century*. The *site restoration plan* will mitigate portions of the VECO and floodplain to *better than pre-project conditions*.

D. The variance is the minimum necessary to relieve a practical difficulty and the resulting hardship.

To summarize the applicant's response, the practical difficulty is *that the I-84 right-of-way prohibits the placement of the trail along the Sandy River in any other location in the vicinity*. The variance is requested so that there is no gap in the regional trail connection along the Sandy River. *Allowing for more than 10 percent of the trail within 30 feet of the Sandy River is the minimum necessary considering the practical difficulty and resulting hardship....*

TDC 4.315 D.1.b. A paved walkway or bike path shall not be constructed closer than ten feet from the boundary of the protected water feature. For any paved walkway or bike path, the width of the vegetation corridor must be increased by a distance equal to the width of the path. Walkways and bike paths shall be constructed so as to minimize disturbance to existing vegetation. Where practicable, a maximum of ten percent of the trail may be within 30 feet of the protected water feature.

The multi-use trail is not paved. As such, 4.315 D.1.b. does not apply.

TDC 4.315 D.1c. A walkway or bike path shall not exceed ten feet in width.

A variance from this standard is requested as the trail width is 16.5 feet including shoulders to accommodate the railing. The increase in width is a 61 percent increase. The variance criteria are those of TDC 6.215 and the applicant's response to the criteria begins on page 19 of the narrative submitted.

A. Special circumstances or conditions including, but not limited to, lot size, lot shape, topography, or size or shape of building, apply to the property, development, or to the intended use and are not typical of the general conditions in the surrounding area;

A summary of the applicant's response to this criterion is:

- The width of the trail is to accommodate multi-use: pedestrians and bicyclists.
- The trail is part of a regional-trail.

B. The variance authorized will not be injurious to adjacent properties or the surrounding neighborhood or otherwise detrimental to the public welfare;

- The applicant states that the trail is designed to consider public safety and that this width will minimize the potential conflict between users of different speed (bicycles / pedestrians).
- The applicant states that the trail is in an area almost entirely within right-of-way, is not near neighbors that would be disturbed and that there will be no long-term light or noise impacts.

C. The variance authorized will be consistent with the general purpose and intent of the provision from which a variance is sought; and

The applicant states that the purpose and intent of the standard is to minimize the disturbance of vegetation within the VECO. The width requested is to accommodate multi-modal use of the trail: pedestrians and bicyclists. A proposal with two separate trails for the two user groups would result in more impact into the VECO. The applicant states *the variance is consistent with the general purpose of the provision.*

D. The variance is the minimum necessary to relieve a practical difficulty and the resulting hardship.

The applicant states that the wider path is necessary to accommodate the combined pedestrian and bicyclist use of the trail in order to reduce conflicts between the two user groups (the practical difficulty and resulting hardship).

TDC 4.315 D.2. Within the VECO or within mapped Habitat Conservation Areas of City-owned or Metro-owned parks and greenspaces:

a. Shall contain less than 500 square feet of new impervious surface or such other area as may be proposed to obtain federal funding or to comply with AASHTO standards; and,

The trail is to be constructed of pervious material. The standard is met.

b. Trails for pedestrians or bicycles shall be constructed using non-hazardous, pervious materials, with a maximum width of not to exceed (1) the width necessary for federal funding, if utilized, (which is currently ten feet) for regionally significant or federally funded trails, and (2) on other trails, the greater of the width recommended under applicable AASHTO standards for the expected type and volume of use, or four feet.

The trail material is pervious material. The width proposed is 16.5 feet to accommodate both pedestrians and bicycles.

CITY WATER MAIN CONSTRUCTION:

As explained in the Chief Engineer’s comments (Attachment 2), the City of Troutdale has been working with ODOT to coordinate the placement of a water main within the same alignment as the multi-use trail. As the water main will be within the same area of the VECO and floodplain of the Sandy river as the multi-use trail, the impact to the VECO and floodplain is not greater than that of the trail alone. Plumbing permits may be required for the main (condition number 2): the Building Official will make this determination. The City’s water main is permitted within the VECO and floodway of the Sandy River provided it is constructed in compliance with the standards of the Code for those overlay districts:

- TDC 4.312 Uses within the Vegetation Corridor and Slope District.*
- A. Permitted Uses within the Vegetation Corridor and Slope District.*
- 5. Expansion of existing streets and public utility facilities or construction of new streets and public utility facilities necessary to support permitted development outside the vegetation corridor and on slopes less than 25% in compliance with subsection 4.315(C) of this chapter.*

TDC 4.315 A. New Development.

- 1. The applicant shall demonstrate that no reasonably practicable alternative design or method of development exists that would have a lesser impact on the vegetation corridor and slope than the one proposed.*
- 2. If no such reasonably practicable alternative design or method of development exists, new structures and development shall be limited in scale, as specified in this section, so that the impacts on the vegetation corridor and slope district are the least necessary and the plans shall include restoration, replacement, or rehabilitation of the vegetation corridor and/or slope associated with the site:*
 - a. Notwithstanding the provisions of chapter 6.220, Type II Variance, of this code, a maximum of 30% of the total area of the vegetation corridor and slope district on the lot may be used for the development, inclusive of any walkways, driveways, patios, decks, accessory buildings, and similar impervious features.*

The water main will be within the same area of the VECO as the multi-use trail. The multi-use trail does not use more than 30% of the VECO.

- 3. The applicant shall provide mitigation to ensure that impacts to the functions and values of the vegetation corridor and integrity of the slope will be mitigated or restored to the extent practicable.*

The Chief Engineer has declared the purpose of the water main in his comments of December 18, 2013 and those comments are the justification for use of the VECO under TDC 4.315 A (1) to (3). The construction of the water main at the same time the multi-use trail extension is constructed and in the same location minimizes the impact on the VECO.

The mitigation plantings are all proposed by ODOT. The collaboration between Public Works and ODOT will include an intergovernmental agreement as explained by the City's Chief Engineer that will be responsive to the City's participation in the on-going maintenance of the required mitigation plantings (condition number 2).

TDC 4.315 C. Construction of public utilities and public streets not included in the review of the tentative plat shall be processed as a Type II site and design review land use application and shall be subject to the following approval criteria, provided that it meets the standards of subsections (A)(1) – (3) of this section, as applicable, and the following:

The water main has been identified under this Type III procedure and satisfies the Type II procedure requirement of the standard.

1. *The application shall declare a need for a public street or public utility crossing of the vegetation corridor and slope district.*

The chief engineer's comments in his comments on the multi-use trail dated December 18, 2013 explains the need for the water main.

2. *All grading and improvement plans for such public street, including necessary accessory engineered slopes and utility extensions underneath the street, shall be submitted with the application.*

The City shall continue to coordinate with ODOT's contractor such that all details of the water main, including engineering, are included in the plan drawings submitted for permits (condition number 2).

3. *The location of the public street or public utilities is proper in relation to adjacent uses, the development of the community, and to the various elements and objectives of the Comprehensive Land Use Plan and the Transportation System Plan.*

The Chief Engineer's comments dated December 18, 2013, explain that this water main is identified in the Troutdale Water Master Plan and is needed for a loop system to serve the north industrial area of the City from the Urban Renewal Area to NE Harlow Place.

4. *The public street or public utility will not be materially detrimental to the character of the neighborhood, nor will it endanger the public health, safety, and general welfare.*

The Chief Engineer states that the water main will be entirely underground so it will not affect any proposed finished grades of the multi-use trail or create additional cut or fill in the flood hazard area or VECO.

TDC 4.615 Uses within the Floodway or within Wetlands.

B. Permitted Uses within the Floodway or within Wetlands. The following uses are permitted subject to review under the standards for development of section 4.617, Development Standards, of this chapter:

- 6. Construction, expansion, and/or maintenance of public roadways and public utility facilities necessary to support permitted development.*

TDC 4.617 Development Standards. The land use application shall establish through the use of narrative, site plans, and professional reports, the following:

A. New development, including additions or alterations to existing structures, in the Flood Management Area may be allowed, provided that:

- 1. The applicant shall demonstrate that there is no reasonable nor practical alternative design or method of development that would have a lesser impact on the Flood Management Area than the one proposed.*
- 2. If there is no reasonable nor practical alternative design or method of development the project shall be designed in compliance with applicable parts of subsections (C) through (U) of this section, so that the impacts on the Flood Management Area are limited and the plans shall include restoration, replacement, or rehabilitation of the vegetation within the Flood Management Area.*
- 3. The applicant shall provide mitigation to ensure that impacts to the functions and values of the vegetation corridor and integrity of the slope will be mitigated or restored to the extent practicable.*

The responses to flood management area development standard TDC 4.617A are the same as those for development in the VECO.

TDC 4.617 R. Utilities and Roads.

- 2. All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of floodwaters into the system.*

The new water main must meet applicable NFIP and State of Oregon building / plumbing codes for public utilities (condition number 1).

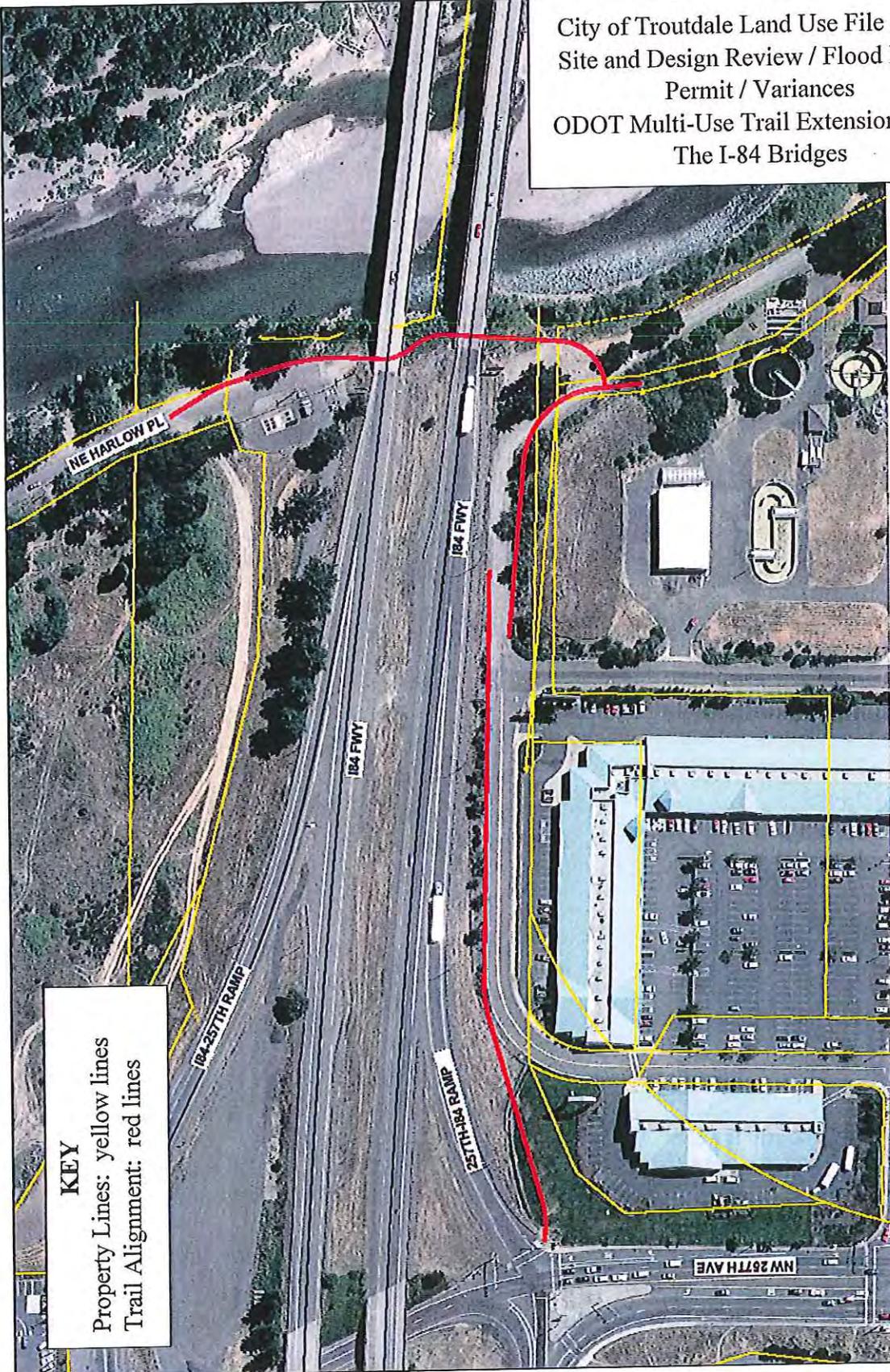
RECOMMENDATION:

Staff recommends approval of the multi-use trail extension under the I-84 Sandy River Bridges as proposed, and approval of a variance from TDC 4.315 D.1.a. to allow the pervious paved path to be constructed closer than ten feet from the boundary of the protected water feature and for 80 percent of the trail to be within 30 feet of the Sandy River and approval of a variance from TDC 4.315 D.1.c. to allow the path to be more than ten feet in width within the VECO of the Sandy River up to a width of 16.5 feet, inclusive of shoulders to accommodate required railings subject to compliance with recommended mitigating conditions of approval.

Staff also recommends that this land use approval be the Site and Design Review and Flood Hazard Permit approval for the public water main identified by the Chief Engineer in his comments dated December 18, 2013.

Draft Findings of Fact and Final Order and conditions of approval have been prepared for the Planning Commission's consideration in this matter. The draft conditions include conditions requested from other departments and agencies.

City of Troutdale Land Use File 13-047
Site and Design Review / Flood Hazard
Permit / Variances
ODOT Multi-Use Trail Extension Under
The I-84 Bridges



KEY
Property Lines: yellow lines
Trail Alignment: red lines

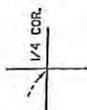
CITY OF TROUTDALE LAND USE FILE 13-047
 SDR/FHP/VAR ODOT MULTI-USE TRAIL EXTENSION
 UNDER THE I-84 BRIDGES OVER THE SANDY RIVER

IN 3E 25B
 & INDEX
 TROUTDALE

NW 1/4 SEC. 25 T.1N. R.3E. W.M.
 MULTNOMAH COUNTY
 1" = 200'

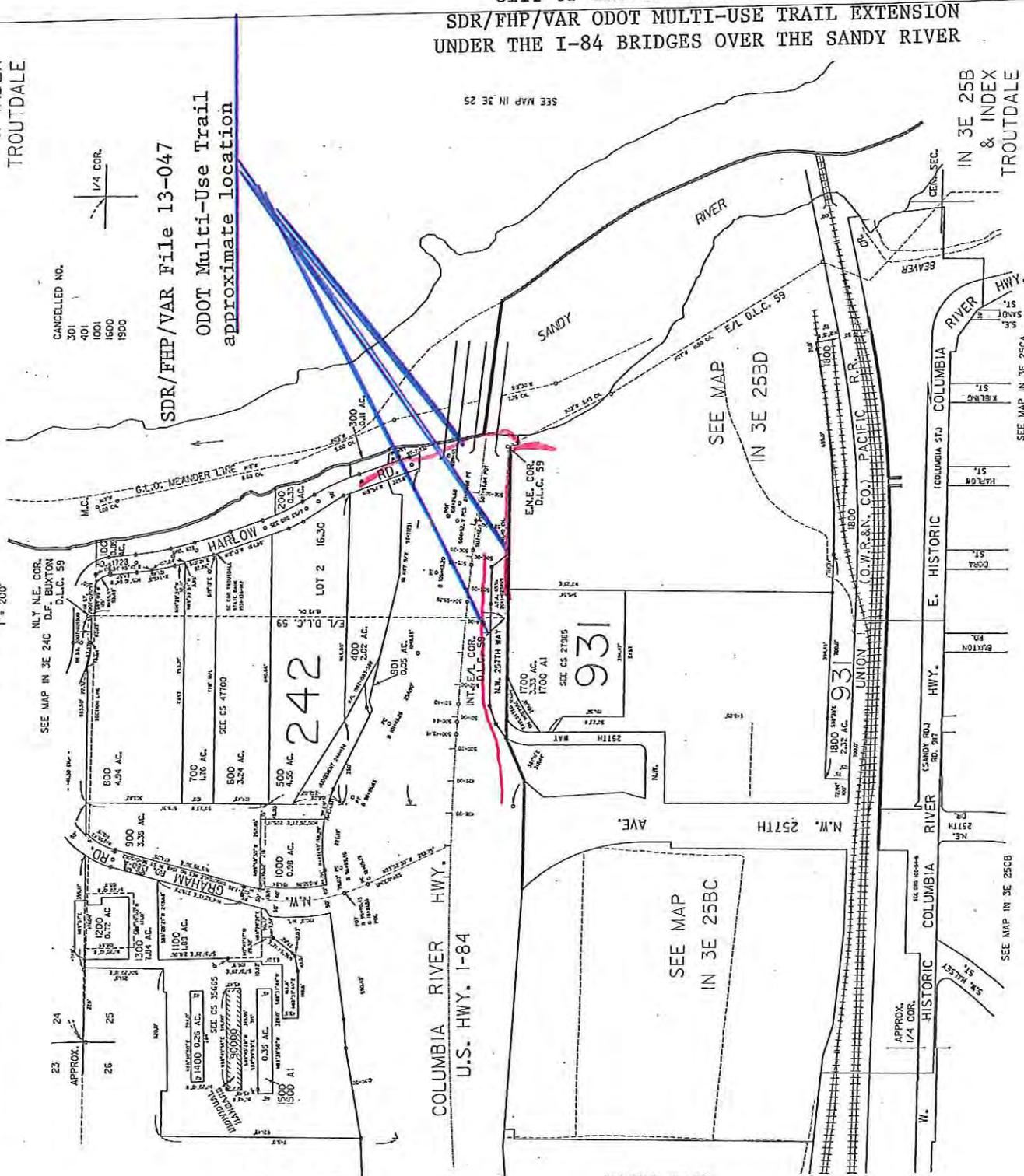
THIS MAP WAS PREPARED FOR
 ASSESSMENT PURPOSE ONLY

CANCELLED NO.
 301
 401
 1001
 1500
 1900



SDR/FHP/VAR File 13-047

ODOT Multi-Use Trail
 approximate location



SEE MAP IN 3E 25

IN 3E 25B
 & INDEX
 TROUTDALE

SEE MAP
 IN 3E 25BD

SEE MAP IN 3E 25CA

23 24
 APPROX.
 25 26

SEE MAP IN 3E 26A

SEE MAP IN 3E 26AD

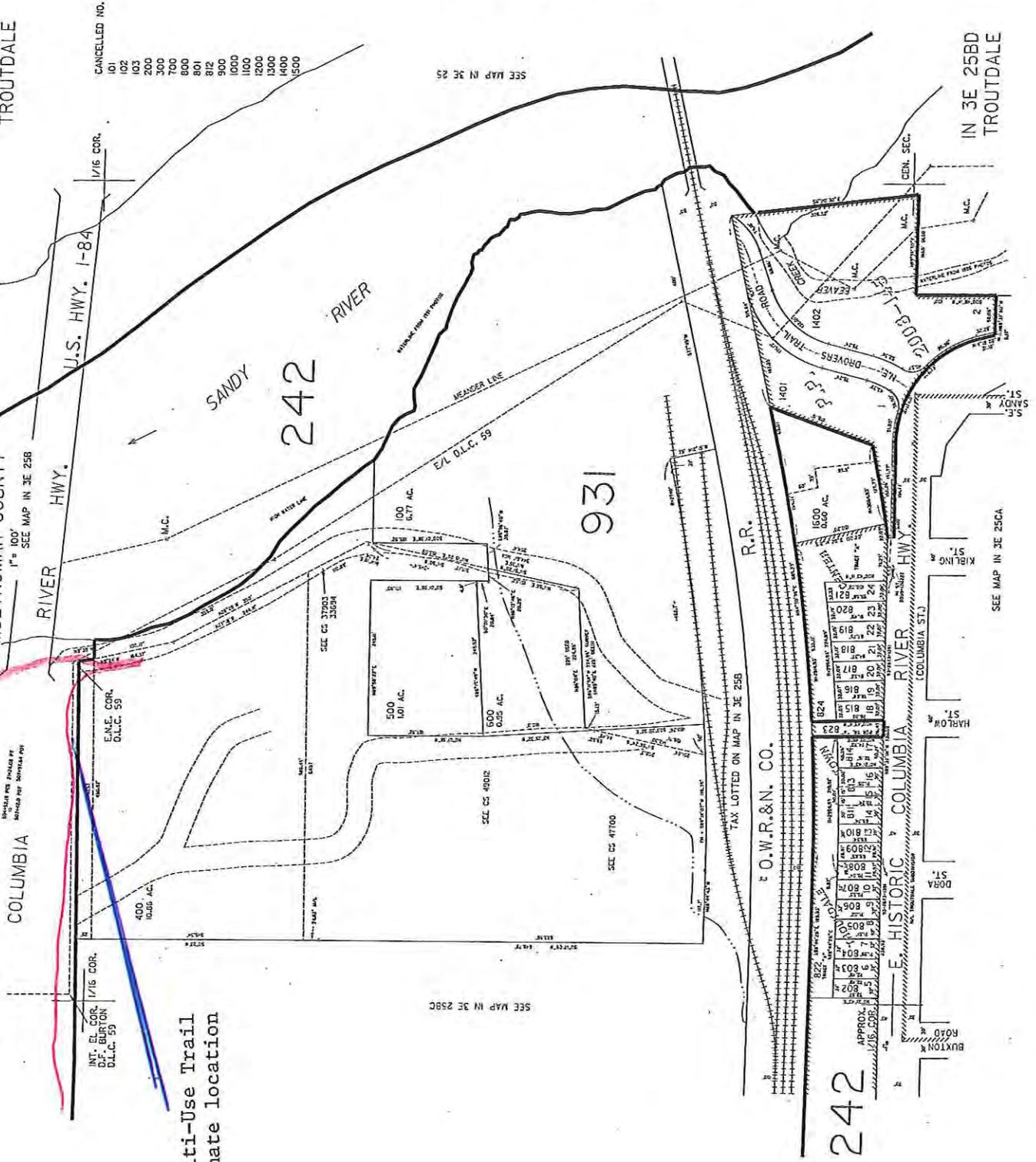
SEE MAP IN 3E 25CB

CITY OF TROUTDALE LAND USE FILE 13-047c
 SDR/FHP/VAR ODOT MULTI-USE TRAIL EXTENSION
 UNDER THE I-84 BRIDGES OVER THE SANDY RIVER

IN 3E 25BD
 TROUTDALE

IN 3E 25BD
 TROUTDALE

SE 1/4 NW 1/4 SEC. 25 T. 1N. R. 3E. W. 1/4
 MULTNOMAH COUNTY



CANCELLED NO.
 01
 02
 03
 200
 300
 700
 801
 812
 900
 1000
 1200
 1300
 1400
 1500

SEE MAP IN 3E 25

SEE MAP IN 3E 25C

TAX LOTTED ON MAP IN 3E 25

SEE MAP IN 3E 25CA

THIS MAP WAS PREPARED FOR
 ASSESSMENT PURPOSE ONLY

ODOT Multi-Use Trail
 approximate location

**BUILDING DEPARTMENT
CITY OF TROUTDALE**

**ATTACHMENT 1
FHP/SDR/VAR FILE 13-047**

18 December 2013

MEMORANDUM FOR PLANNING DIVISION

FROM: Stephen Winstead
Building Official

SUBJECT: Building Department Comments to Planning Application 13-047
Multi-use Trail Extension under the I-84 Bridges

References: (a) Submittal Package from Planning Department
(b) Oregon Structural Specialty Code

1. In accordance with reference (a) the work appears to be constructed within the public right-of-way. Any work proposed on private property may require additional permits through the City of Troutdale Building Department in accordance with reference (b).

Stephen Winstead
Building Official
City of Troutdale

copy to Craig Ward
City Manager

Date: December 18, 2013

To: Elizabeth McCallum, Senior Planner

CC: File
David Schaffer, Water & Streets Superintendent
Mike Sorensen, Wastewater Superintendent
Amy Pepper, Civil Engineer
John Bushard, Engineering Associate II

From: Travis Hultin, Chief Engineer *TH*

RE: **Type II SDR and Type III Variance Review, Multi-use Trail Extension under the I-84 Bridges (File No. 13-047)**

The Public Works Department has reviewed the Type II SDR and Type III Variance submittal for the Multi-use Trail Extension under the I-84 Bridges. These comments are divided into two categories: general comments and proposed conditions. General comments are informational points to guide the applicant in the proper planning of public works infrastructure for this project, to inform the applicant of possible extraordinary issues and/or to provide the basis for findings. Proposed conditions are requirements that Public Works recommends be formally imposed on the developer in the final order. Note that references to the "City Standards" herein refer to the *Construction Standards for Public Works Facilities*.

General Comments/Findings

1. Any and all utility and transportation plans submitted with this application have been reviewed for the purpose of determining the feasibility of providing utility and transportation facilities for the project in accordance with City standards. This land use approval does not constitute final approval of details, including but not limited to alignments, materials and points of access, connection or discharge, that are depicted or suggested in the application. The applicant is required to submit detailed construction drawings and/or plat drawings for the project, as applicable. The City of Troutdale will review plans, in detail, when they are submitted and approve, reject or require modifications to the plans or drawings based upon conformance with City standards, the TDC and the professional engineering judgment of the Chief Engineer.
2. It is the opinion of the Public Works Department that the proposed multi-use trail extension can be developed in accordance with the requirements of the Troutdale Development Code (as it pertains to Public Works requirements) and Construction Standards for Public Works Facilities, and can be approved. Public Works has no objection to the proposed variances.
3. The City of Troutdale Water Master Plan calls for a new water main following the alignment of the proposed bench trail, creating a new loop into the north industrial area from the urban renewal area to Harlow Place. The City of Troutdale is currently finalizing design for the water main segment within the limits of the proposed multi-use path. It is the intent of the City to negotiate a construction contract with the applicant's existing

contractor to install the water main segment in conjunction with the bench trail construction, at the City's expense. The City's design consultant is collaborating with ODOT staff to ensure design of the water main segment is compatible with ODOT's plans and to obtain an ODOT right-of-way permit. This additional element is not expected to impact any of the VECO or FHA standards under consideration for this application:

- a. The water main will be entirely underground, so will not affect any proposed finished grades or create any cut or fill in the FHA or VECO.
- b. The water main will be installed in conjunction with the bench trail construction, so all erosion control and restoration will be covered with ODOT's proposed work.
- c. The water main will be installed in conjunction with the bench trail construction, in the same alignment, so no additional disturbance in the VECO or FHA will occur.

Installation of the water main in conjunction with the bench trail will achieve economy and efficiency for the public benefit and will prevent the need to disturb the VECO, FHA or proposed improvements in the future to install the water main. A copy of the construction plans for the water main are attached for reference and the case record.

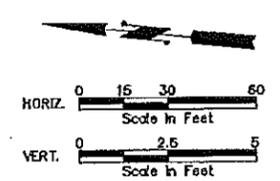
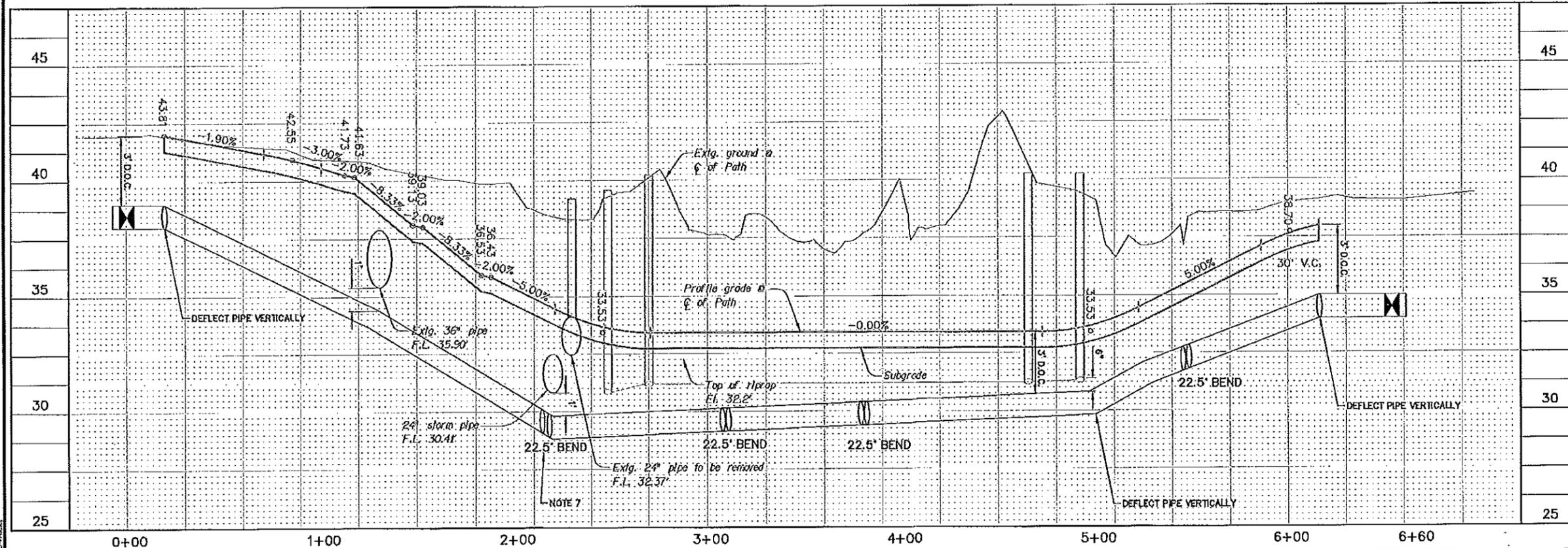
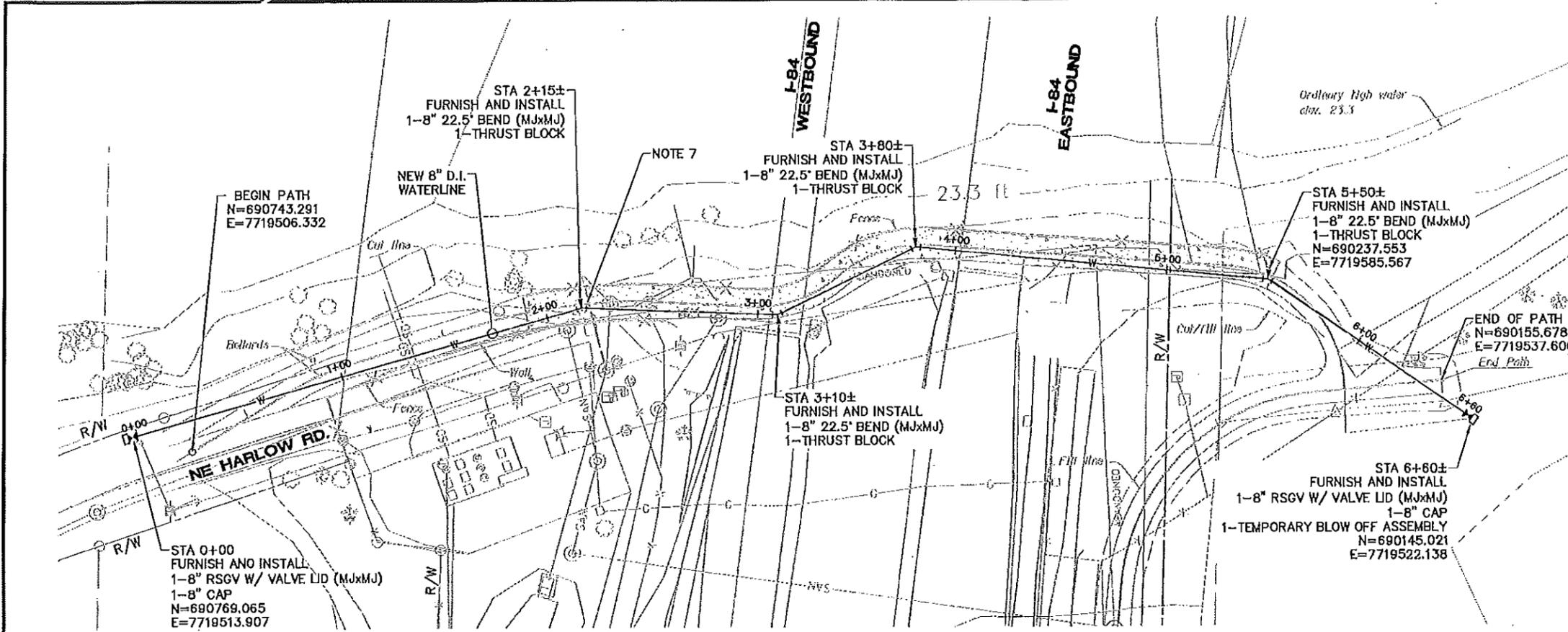
4. The applicant has not proposed any City utility service connections to serve the site, and none are required.
5. The proposed multi-use path will be constructed with permeable materials. Stormwater quality facilities are not required by the City.
6. Erosion control will be covered under the applicant's existing NPDES 1200 permit for the site.
7. The path segment along 257th Way will be partially in City right-of-way and partially in ODOT right-of-way. The City and ODOT should enter into an agreement establishing respective maintenance responsibilities for the path. See proposed condition 2. Public Works engineering staff has participated in ongoing consultation and collaboration with ODOT in the layout and design of the path and finds the design acceptable. Construction in the City's right-of-way will require a Public Works Permit.

Proposed Conditions

1. ODOT will work continue to work constructively with the City and it's consultants to allow concurrent installation of the City's proposed water main under the proposed bench trail.
2. ODOT will collaborate with the City to enter into an intergovernmental agreement establishing respective ownership and maintenance responsibilities for the path along 257th Way.

CONSTRUCTION NOTES:

1. THE NEW 8" WATERLINE IS TO EXTEND BEYOND THE LIMITS OF THE ODOT BENCH TRAIL CONSTRUCTION AND ODOT RIGHTS-OF-WAY IN BOTH DIRECTIONS BY A MINIMUM OF 5 FEET. THE WATERLINE WILL BE BEGIN WITHIN THE CITY OF TROUTDALE'S RIGHT-OF-WAY IN NE HARLOW ROAD TO THE NORTH AND END ON CITY PROPERTY TO THE SOUTH.
2. CONSTRUCTION SHALL BE CONCURRENT WITH SANDY RIVER BENCH TRAIL PROJECT. ONLY WORK IN ADDITION TO ORIGINAL BENCH TRAIL WORK SHALL BE PAID AS PART OF THE SCOPE OF THIS PROJECT. WORK SHALL NOT BE DUPLICATED FOR THE TWO PROJECTS.
3. WATERLINE IS TO BE PRESSURE TESTED BUT NOT CHLORINATED. ONCE WATERLINE HAS PASSED PRESSURE TEST, THE LINE IS TO BE EMPTIED AND CAPPED ON BOTH ENDS. CHLORINATION AND BACTERIOLOGICAL TESTING WILL BE DONE AT A FUTURE DATE WHEN WATERLINE IS TIED IN TO SYSTEM.
4. INSTALL THRUST BLOCKS AND MEGALUGS AT ALL FITTING LOCATIONS.
5. WATERLINE MUST BE INSTALLED BENEATH THE NEW BENCH TRAIL. DEFLECTIONS OR ADDITIONAL FITTINGS REQUIRED TO MAINTAIN THIS ALIGNMENT ARE TO BE COORDINATED WITH THE ENGINEER. ANY CHANGES TO THE BENCH TRAIL ALIGNMENT WILL REQUIRE COORDINATION WITH ENGINEER TO DETERMINE THE EFFECT ON THE WATERLINE ALIGNMENT.
6. FITTINGS, AS SHOWN IN PLAN AND PROFILE, ARE TO BE USED TO CHANGE DIRECTION OF THE WATERLINE IN THE HORIZONTAL PLANE. THE PIPE SHALL BE VERTICALLY DEFLECTED TO FOLLOW THE NEW GRADE ALONG THE ALIGNMENT, EXCEPT WHERE NOTED OTHERWISE.
7. USE 22.5' BEND TO TURN THE WATERLINE BOTH VERTICALLY AND HORIZONTALLY IN THIS LOCATION.



PRELIMINARY

FILE NAME: \\D:\DATA\PROJECTS\PROJECTS\13\13844 - CITY OF TROUTDALE - MARINE DRIVE @ I-84 WATERLINE RELOCATION\CAD SHEETS\13844_PP.DWG
 DATE TIME: 12/23/2013 6:46:12 AM
 USER: JAMES R. SHAWER
 PLOTTER: HP DesignJet 5000PS
 PLOT FILE: P13844.PP

DESIGNED	TPF				
DRAWN	EMK, VS				
CHECKED	JRS				
SYN		REVISION	DATE	BY	APP'D

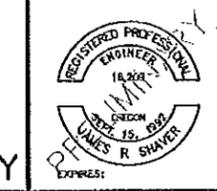


6000 Meadows Road, Suite 345
 Lake Oswego, OR 97035
 p. 503.597.3222 | f. 503.597.7655
 Civil | Structural | Planning | Survey
 www.paceeng.com

CITY OF TROUTDALE
 SANDY RIVER
 WATERLINE

DATE
 DECEMBER 2013
 SCALE
 1" = 30'

PLAN & PROFILE



JOB NUMBER
13844
 DWG NAME: P13844_PP
 SHEET C3 of C4

CITY OF TROUTDALE FLOOD HAZARD PERMIT APPLICATION FILE No. 13-047

**SECTION III: SPECIAL FLOOD HAZARD AREA DETERMINATION
(TO BE COMPLETED BY STAFF)**

COMMUNITY: TROUTDALE

FIRM Panel No. 41051C0217H Effective Date Dec. 18, 2009

Additional FIRM Panels Nos: _____ Effective Date _____

FIRM zone designation AE. If the FIRM SFHA designation is Zone A and the Base Flood Elevation (BFE) data is not available from another authoritative source as authorized in subsection 4.613(B) of this chapter, the Flood Hazard Permit shall be reviewed for compliance with FEMA Publication 265 issued July 1995 "Managing Floodplain Development in Approximate Zone A Areas" and applicable State of Oregon building codes.

Nearest stream cross-section: A and B Sandy R. River mile: _____

Base Flood Elevation (zone AE): range 35 to 37.3 feet NAVD 88 datum

Is development located in the floodway?

The floodway of the Sandy River and the floodplain are coterminous at this location.

YES	NO
X	

Is development fully or partially located in the Special Flood Hazard Area (SFHA)?

The SFHA (one percent annual chance floodplain) is coterminous with the floodway of the Sandy River at this location.

YES	NO
X	

Is additional information needed prior to a determination?

YES	NO
	X

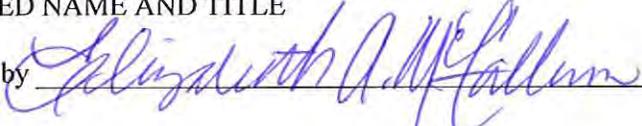
DETERMINATION:

	The property is partially within the SFHA, but the development is not in the SFHA or floodway and a Flood Hazard Permit is <u>not</u> required.
X	Development is in the SFHA or floodway, additional information as noted in Part IV must be submitted to the Planning Division along with the \$50.00 application fee. Submitted

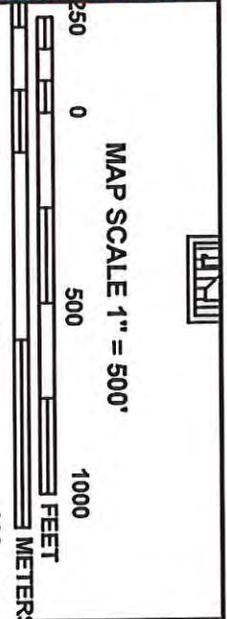
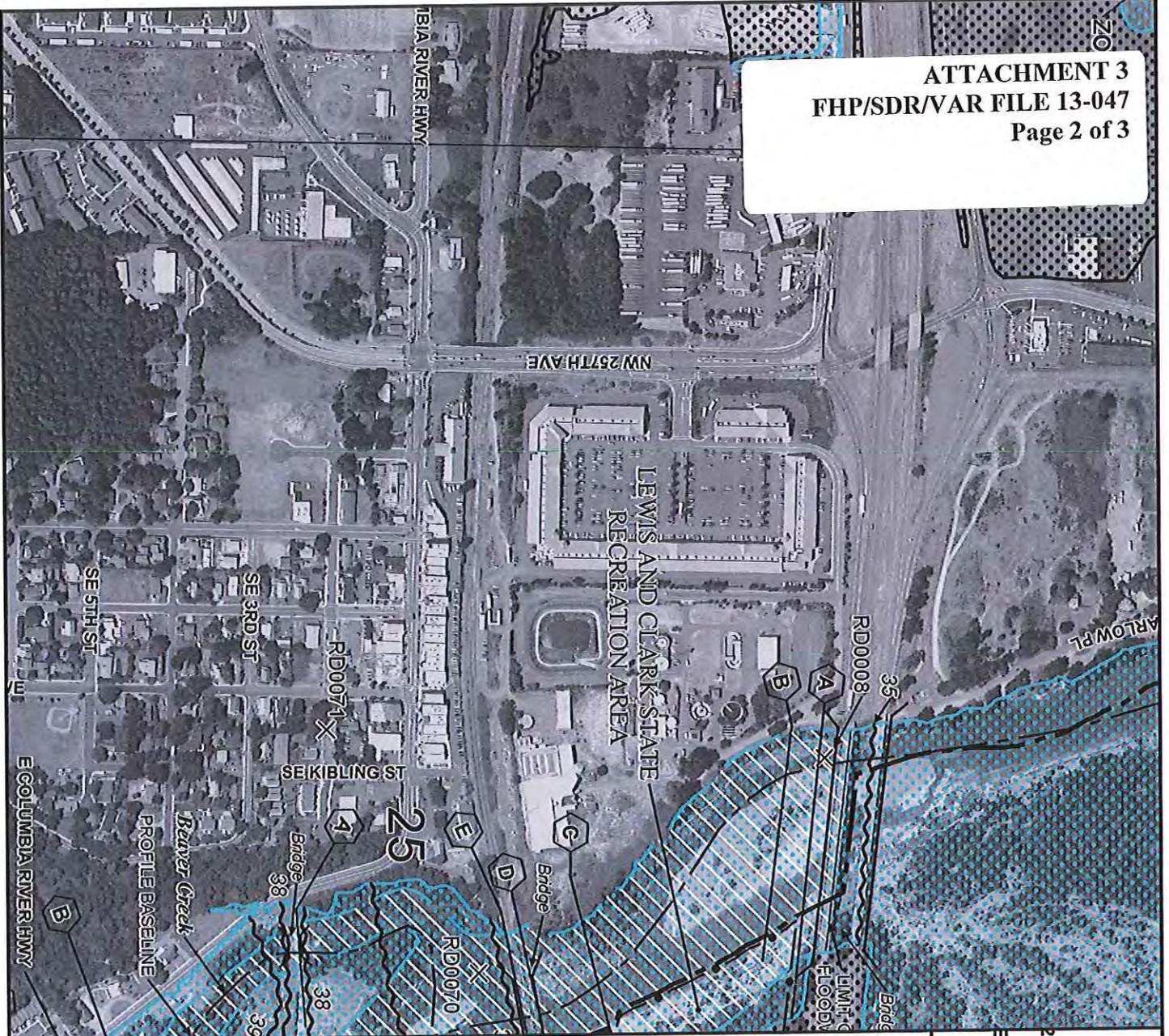
The determination of the SFHA of this property was completed by:

ELIZABETH A. MCCALLUM, SENIOR PLANNER

PRINTED NAME AND TITLE

Signed by 

Date: 1-7-2014



NFIP
NATIONAL FLOOD INSURANCE PROGRAM

FIRM
 FLOOD INSURANCE RATE MAP
 MULTNOMAH COUNTY,
 OREGON
 AND INCORPORATED AREAS

PANEL 217 OF 550
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

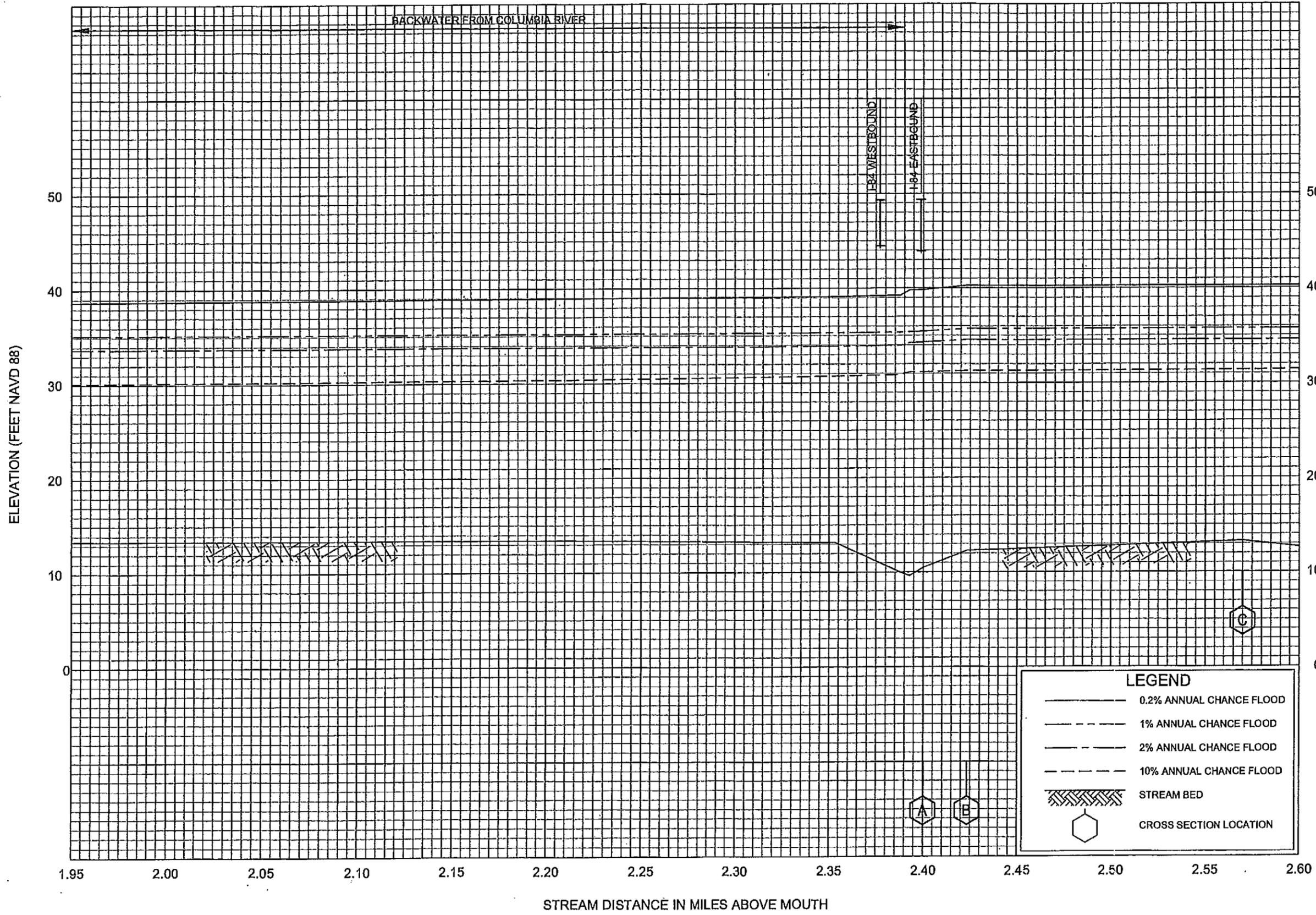
CONTAINS:
 COMMUNITY NUMBER 410179
 MULTNOMAH COUNTY TROUBDALE CITY OF 410184

NUMBER 0217
 PANEL 0217H
 SUFFIX H

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER 41051C0217H
 EFFECTIVE DATE DECEMBER 18, 2009
 Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



FLOOD PROFILES
SANDY RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY
 MULTNOMAH CO, OR
 AND INCORPORATED AREAS



**CITY OF TROUTDALE
PLANNING COMMISSION FINDINGS of
FACT, FINAL ORDER and CONDITIONS**

**TYPE III FLOOD HAZARD PERMIT with concurrent SITE AND
DESIGN REVIEW and VARIANCES
FILE NO. 13-047 ODOT Multi-Use Trail Extension
under the I-84 Sandy River Bridges**

APPLICANT: Anneke Van der Mast, Project Planner, DEA Inc.

OWNER: ODOT
City of Troutdale

STAFF: Elizabeth McCallum, Senior Planner, City of Troutdale
(503) 674-7228 / Elizabeth.mccallum@troutdaleoregon.gov

STAFF REPORT DATE: January 8, 2014

REQUEST: Construct a multiuse trail extension within ODOT right-of-way within the Special Flood Hazard Area and the Vegetation Corridor and Slope District of the Sandy River. Variances are requested from the dimensional standards for trails within the vegetation corridor and slope district.

LOCATION: West bank of the Sandy River between NE Harlow Road and NW 257th Way under the I-84 Sandy River bridges and a portion of City-owned land abutting the ODOT right-of-way

TAX MAP & TAX LOT: ODOT right-of-way and City tax lot 1N3E25BD-00400

PLAN DESIGNATION: Industrial north of I-84 right-of-way
Commercial south of I-84 right-of-way

ZONING DISTRICT: South of I-84 right-of-way: General Commercial (GC). North of I-84 right-of-way: Light Industrial (LI)

OVERLAY ZONING: Flood Management Area (FLMA), Vegetation Corridor and Slope District (VECO), Airport Landing Field Overlay (ALF), and Town Center

APPLICABLE CRITERIA: Troutdale Development Code: 2.000 Procedures; 3.120 General Commercial; 4.100 Airport Landing Field Overlay; 4.300 Vegetation Corridor and Slope District; 4.600 Flood Management Area; 4.700 Town Center Overlay; 5.600 Grading and Erosion Control; 5.800 Stormwater Management; 6.200 Variance; 8.000 Site Orientation and Design Review; 9.000 Off-Street Parking and Loading; 11.000 Landscaping and Screening

City of Troutdale Construction Standards for Public Works Facilities

City of Troutdale Municipal Code 13.10.270 Tree Removal

Multnomah County Road Rules

ODOT regulations

FINDINGS OF FACT:

The staff report dated January 8, 2014 in this matter is hereby adopted as the findings in this matter.

ORDER:

Based upon the foregoing Findings of Fact, the Troutdale Planning Commission approves the constructions of a multi-use trail extension under the I-84 Sandy River Bridges with a variance from TDC 4.315 D.1.a. to allow the pervious paved path to be constructed closer than ten feet from the boundary of the protected water feature and for 80 percent of the trail to be within 30 feet of the Sandy River and a variance from TDC 4.315 D.1.c. to allow the path to be more than ten feet in width within the VECO of the Sandy River up to a width of 16.5 feet, inclusive of shoulders to accommodate required railings subject to compliance with recommended mitigating conditions of approval.

The Planning Commission also approves the construction of a public water main within the Vegetation Corridor and Special Flood Hazard Area of the Sandy River as identified by the Chief Engineer in his comments dated December 18, 2013 subject to conditions of approval.

CONDITIONS OF APPROVAL:

1. Submit the following additional details with a building permit application to the City of Troutdale:
 - a. All plan drawings shall accurately identify the Base Flood Elevation (BFE) of the one-percent annual chance flood using the NAVD 88 datum. The BFE shall be determined for the entire length of the multi-use trail where it parallels the Sandy River. The determination of the BFE shall be based upon the Sandy River Flood Profile published in FEMA's Flood Insurance Study (FIS) for Multnomah County, Oregon and Incorporated Areas, Study Number 41051CV000A dated December 18, 2009, profile page 51P. The BFE and reference datum shall be clearly labeled on all drawings.
 - b. Submit anchoring details with the building permit application for any fixtures and structures above ground or as otherwise required under the applicable State building codes for construction within the Special Flood Hazard Area.
 - c. Electrical fittings within the Special Flood Hazard Area shall be elevated one foot above the one percent annual chance BFE for the Sandy River as designated in the Flood Profile in FEMA's Flood Insurance Study (FIS) for Multnomah County, Oregon and Incorporated Areas, Study Number 41051CV000A dated December 18, 2009, profile page 51P, or be designed to be water tight one foot above the BFE, in accordance with the procedures in FEMA Technical Bulletin X and any applicable State building codes.
 - d. The installation of the new water main must meet any applicable NFIP and State of Oregon building / plumbing codes for public utilities. The City of Troutdale shall be responsible for providing the necessary engineering information with all regulatory permits.
 - e. Any work proposed on private property may require additional permits through the City of Troutdale Building Department in accordance with the Oregon Structural Specialty Code.
 - f. All construction within the one percent annual chance Special Flood Hazard Area shall comply with applicable NFIP and State of Oregon Codes for construction within the regulatory floodplain.

2. Water Main Conditions:

- a. ODOT will work continue to work constructively with the City and it's consultants to allow concurrent installation of the City's proposed water main under the proposed bench trail.
 - b. ODOT will collaborate with the City to enter into an intergovernmental agreement establishing respective ownership and maintenance responsibilities for the path along 257th Way.
 - c. Collaborate on the on-going maintenance of the required mitigation plantings for encroachment into the VECO and Special Flood Hazard Area of the Sandy River on City-owned property or right-of-way that is outside of the ODOT right-of-way.
3. This Flood Hazard Permit expires within 180 days of this approval if construction has not commenced during that period (required standard of the NFIP).

Approved this 15th day of JANUARY 2014

Tanney Staffenson, Chair
Troutdale Planning Commission

***REVISED* Narrative for Concurrent Review of:**

- ❖ **Type II Site and Development Review**
- ❖ **Type III Variance for Vegetation
Corridor and Slope District Standards**
- ❖ **Flood Hazard Permit**

for

**Multi-Use Trail Extension
Under I-84 Bridges**

Submitted to:
City of Troutdale
104 SE Kibling Avenue
Troutdale, OR 97060-2099

Prepared for:
Geoff Crook Environmental Program Manager
Oregon Department of Transportation

680 Cottage Street NE
Salem, OR 97301-2412

Prepared by:
David Evans and Associates, Inc.
2100 River Parkway
Portland, OR 97201

December 12, 2013

PROJECT: Construct multiuse trail extension connecting Harlow Road to 257th Way and the eastbound I-84 Bridge over the Sandy River

FILE NUMBER: P2013-006; previous approval file number 09-006

APPLICANT: Oregon Department of Transportation (ODOT) and Oregon Bridge Delivery Partners (OBDP)

APPLICANT'S REPRESENTATIVE: David Evans and Associates, Inc. (DEA). DEA has been retained by OBDP to design and obtain permits for this work on behalf of its client, ODOT.

OWNERS: ODOT (right-of-way)
City of Troutdale (right-of-way and 1N3E25BD-00400)
Note: On December 12, 2012, ODOT provided a letter outlining a jurisdictional transfer (No. 653b) of a section of Old Kendall Frontage Road (NW 257th Way).

LOCATION: ODOT right-of-way along the west bank of the Sandy River and under the I-84 Bridges at the Sandy River in the City of Troutdale between Harlow Road and 257th Way.
City property south of eastbound freeway approach right-of-way commonly called the "Old Sewage Treatment Plant"

TAX MAP & TAX LOT: ODOT Right-of-Way, City of Troutdale Right-of-Way and City Tax Lot 1N3E25BD-00400

TAX LOT SIZE: ROW and 10.86 acres on TL 00400

PLAN DESIGNATION: Commercial on south side of right-of-way; Industrial on north side

ZONING DISTRICT: South side of right-of-way: General Commercial (GC)
North side of right-of-way: Light Industrial (LI)

OVERLAY ZONING: Vegetation Corridor and Slope Overlay District (VECO)
Flood Management Area (FLMA)
Airport Landing Field Overlay (ALF)

EXHIBITS: Vegetation Corridor and Slope District Site Plan (Sheet V), Details (Sheet 2A-6) Erosion Control Plan (Sheet GA-4), Roadside Development details and elevations (Sheets GN-3, and GN-4).

NOTE:

A previous land use approval, Case No. 09-006 Replacement of Sandy River and Jordan Road Bridges (I-84: Sandy River-Jordan Road (Bundle 210) included approval for riprap benching and grading for the multiuse trail alignment as well as replacement of the I-84 bridges over the Sandy River.

PROPOSAL SUMMARY AND REQUEST

REQUEST:

The request is for approval for the multiuse path connecting Harlow Road to 257th Way and the eastbound multiuse trail on the I-84 Bridge over the Sandy River through a Type II Site and Design Review and Type III Variance.

The applicant's representatives attended a preapplication meeting with City staff on August 15, 2013. The notes are attached as Appendix A. At the pre application meeting, Multnomah County requested information regarding access to the trail and parking for users. No parking for the trail extension is provided. Per Kirstin Stallman, ODOT Scenic Area Coordinator, parking is available at Lewis and Clark State Park. Oregon Parks and Recreation is providing improved trail access (a separate project) from their parking areas to the new 16 multiuse path over the Sandy River Bridge. The proposed project is a missing link in the 40-Mile Loop Trail System connecting Harlow Road, a low volume city street and important connection to the 40-Mile Loop to the north, to a new multiuse trail to be constructed on the new I-84 Sandy River Bridges to south to 257th Avenue and the city's system of sidewalks and bike lanes. The project is intended to serve pedestrians and cyclists heading north and south from Harlow Road to 257th by improving connectivity in the area.

PROPOSAL:

DEA has been retained by OBDP to design and obtain permits for this work on behalf of its client, ODOT. As the applicant's representative, DEA prepared the land use and environmental applications. The project is being managed as one project under the auspices of the state's Oregon Transportation Investment Act (OTIA) III program. As part of that program, OBDP has developed several programmatic approaches to permitting to address typical impacts associated with bridge repair and replacement and associated features (as described below in section titled OTIA III Environmental Permitting Approach).

This project is part of the I-84: Sandy River-Jordan Road (Bundle 210) project that is under construction. Currently, the I-84 bridges over the Sandy River are being replaced with wider bridges. As a result of the above project actions almost all of the site area for this portion of the project has been disturbed for construction purposes. The project components that were previously permitted for the project include the following activities:

- demolition of the existing bridges;
- adding auxiliary lanes to the bridges for the I-84 eastbound on-ramp and westbound off-ramp;
- grading to raise the elevation of the bridges by several feet;

-
- cuts in the floodplain;
 - installation of stone columns within the roadway embankments west of the river, in the vicinity of the bridge abutments, to stabilize the soil;
 - constructing new bridge approaches and grading to meet the existing plan and profile of I-84 west of the project limits;
 - constructing new bridge abutments and bridge spans;
 - Constructing new multiuse path across the Sandy River on the eastbound bridge and carrying path down to meet existing grade along 257th Way
 - Relocating 257th Way south of existing location to clear widened roadway embankment
 - Constructing riprap bench and grading to accommodate future multiuse trail under the bridge.

This project is to pave with pervious pavement the multiuse trail on the riprap bench that was prepared as part of the project that was previously permitted and provide connective trail pieces from the riprap bench to the roadways (257th Way and Harlow Road). The trail will then extend along the west bank of the Sandy River under the I-84 Bridges (bridge nos. 06875 and 06875A) connecting Harlow Road and 257th Way. Therefore, this application is a request for the following project components only:

- Installing pervious concrete or pervious asphalt on riprap bench and area previously graded for trail
- Installing fence and railing along eastern edge of riprap bench trail section
- Installing retaining wall along Harlow Road
- Grading for trail approaches to Harlow Road and 257th Way. The grading activities will result in a net cut in the Special Flood Hazard Area of 28.99 cubic yards and in the Floodway Areas in Zone AE of 78.08 cubic yards. The base flood elevation (BFE) will not be altered.

The typical section of the multiuse trail section will be pervious concrete or asphalt, 12 feet wide, with 2-foot shoulders on each side. The multiuse path conforms to the extent feasible to the requirements of Oregon Bicycle and Pedestrian Plan, adopted June 14, 1995 and AASHTO 1990 publication Guide for the Development of Bicycle Facilities.

No additional environmental impacts are caused by incorporating the multiuse path connections into the I-84: Sandy River-Jordan Road (Bundle 210) project because the multiuse trail along the river will use pervious concrete and all the work will take place above Ordinary High Water Elevation; therefore, the improvements will fall within the existing Bundle 210 Biological Opinion, Department of State Lands (DSL) and Corps of Engineers (Corps) permits. There will be no tree removal as part of this project.

Standards Addressed:

City of Troutdale Development Code:

- 4.300 Vegetation Corridor and Slope Overlay District
- 4.600 Flood Management Area
- 6.200 Variance

OTIA III ENVIRONMENTAL PERMITTING APPROACH

The OTIA program includes a comprehensive regional mitigation and conservation strategy including the co-development and issuance of a Regional General Permit (RGP) by the Corps. The consultation resulted in Endangered Species Act – Section 7 Consultation, Informal Concurrence and Formal Biological Opinion, and Conference & Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation (ODOT, OTIA III Statewide Bridge Delivery Program, Oregon, June 28, 2004).

Upon the completion of the OTIA III Biological Opinion (BO) and other permitting approvals, ODOT, in concert with the regulatory community, created and agreed upon Environmental Performance Standards (EPS) that, if followed, would meet the terms and conditions of the relevant permits for the proposed bridge projects. Thus, the EPS became the framework of the consultation strategy to avoid long-term adverse effects, avoid and minimize short-term adverse effects, and promote beneficial effects in a manner meaningful to promote recovery of listed species and their habitats. The EPS also were intended to benefit non-listed species across Oregon.

The following EPS guide the environmental protection measures for the portion of the I-84: Sandy River-Jordan Road (Bundle 210) project Species Avoidance and Adverse Effect Minimization, Habitat Avoidance and Removal Minimization, Water Quality, Stormwater, and Site Restoration. The details of the EPS are in Appendix C. The applicable ODOT Standard Specifications and the Special Provisions which implement the EPS and which are the principal means of protecting the natural resources in the project area are included in Appendix C for reference.

COMPLIANCE WITH TROUTDALE DEVELOPMENT CODE

As requested at the August 15, 2013 preapplication meeting, only the standards for which a variance is being requested or where the applicant feels the basis for code interpretation needs to be explained, are being addressed in narrative form. Consistency with all other standards is being demonstrated through the plan sheets and exhibits.

An original application was submitted on September 18, 2013. An incompleteness letter was received on September 27, 2013. This revised application and revised supporting plan sheets address the incompleteness items and project changes which occurred since submittal. The datum conversion referencing the BFE for the purpose of responding to the Flood Management Area standards were done with the correct conversion and using NAVD88 as confirmed by project engineer Mike Hickey (see Appendix B).

4.300 VEGETATION CORRIDOR AND SLOPE DISTRICT

4.311 Applicability. These standards apply to all development in the Vegetation Corridor and Slope District as defined in section 1.040, Vegetation Corridor and Slope District, and Water Quality and Flood Management Definitions, of this code and to the Metro Title 13 Habitat Conservation Areas of all City-owned and Metro-owned parks and greenspaces as shown on the Metro Title 13 Habitat Conservation Area map. The vegetation corridor, inclusive of the wetland areas identified on the U.S. Department of the Interior, Fish and Wildlife Service National Wetland Inventory 1988 (NWI), are generally mapped on the Metro Title 3 map. Metro's Title 3 and Title 13 maps are used as reference only. Not all wetlands recognized by the Oregon Division of State Lands are mapped on either the NWI or Title 3 map.

A. Specific determination of the vegetation corridor and slope district shall be made at the time of a development proposal. The final boundary shall be based on a topographical and slope analysis provided by a professional licensed surveyor in the State of Oregon, and a wetland delineation, if applicable, submitted by a qualified wetland specialist. The Oregon Division of State Lands must approve delineations of wetlands under their jurisdiction. The City will keep a record of all surveys and wetland delineations as revisions to the local copy of the Title 3 map. The survey will be used instead of the Title 3 map to determine the vegetation corridor width. The City will submit this information to Metro for future updates of the Title 3 map.

3. Exceptions:

- a. Engineered slopes associated with public streets.*

Response: The area adjacent to the Sandy River was surveyed by professional licensed surveyors employed by David Evans and Associates, Inc. in 2006-2008. Borders were determined based on the methodology described in the response to sections 4.316 and 4.317. The slopes within the project area and descending to the Sandy River were

engineered when the existing I-84 bridges were built. Additionally, the slopes were reengineered to include a stone column field and a riprap bench was installed as permitted under the previous permit for the Bundle 210, I-84 bridge replacement project.

Sheet V shows the slope measurements increments which required two increments of 25 feet from the bankfull elevation before a break in the 25 percent slope occurred. A 50-foot buffer was offset from those measurements. A line was drawn to connect the slope measurements and to create the boundary of the vegetated corridor.

4.312 Uses within the Vegetation Corridor and Slope District.

A. Permitted Uses within the Vegetation Corridor and Slope District.

1. Low-impact outdoor recreation facilities, including but not limited to: multiuse paths, accessways, trails, picnic areas, or interpretive and educational displays and overlooks that include benches and outdoor furniture as designated by the Troutdale Parks Plan, or as approved with a land use application, and in compliance with subsection 4.315(D)(1) or 4.315(D)(2) of this chapter, as applicable.

Response: The project is a multiuse path and part the regional 40-Mile Loop Trail. It will provide safe bicycle and pedestrian connection under a major obstruction to the trail, the I-84 interstate highway.

4.313 Approval Procedures. Permits are required for all uses within this district:

D. Type III Procedure. A variance from the standards of this chapter shall be a Type III procedure. The Planning Commission shall review variances to this chapter pursuant to section 6.220, Type II Variance, of this code. An affirmative finding must be made, with or without conditions, for each variance criteria.

Response: A variance is being requested for standards 4.315, D.1.a and c. This narrative addresses the variance criteria in section 6.215.

4.315 Development Standards. Permitted uses in the vegetation corridor and slope district are to be developed in compliance with the following development standards or in compliance with an approved District Plan in accordance with Metro Code Section 3.07.1330.B.4 (a). A District Plan shall be prepared and approved prior to, or in conjunction with, the preparation and approval of a master plan for the eventual development of the specific site. The approval criteria for the District Plan are those of Metro Code Section 3.07.1330.B.3.

A. New Development.

1. The applicant shall demonstrate that no reasonably practicable alternative design or method of development exists that would have a lesser impact on the vegetation corridor and slope than the one proposed.

Response: This project will take the opportunity provided by the replacement of the I-84 bridges to construct an extension of a regional trail under the Sandy River bridges providing a key connectivity piece for the regional 40-Mile Loop Trail system. The trail is shown to parallel the Sandy River per the 40-Mile Loop Trail map and Map 5.2 Facilities Plan of the City of Troutdale Parks Master Plan. This area of the vegetation corridor and slope district has been historically disturbed by fill and the I-84 bridge structure for more than 60 years. Currently, the area is disturbed for construction of the new I-84 bridges and riprap benching and grading to accommodate the trail as previously permitted under permit 09-006. At this time, the westbound I-84 Sandy River Bridge is being constructed including the embankment and riprap bench. Due to the constricted space under the bridge from the bridge abutments, it is not possible to set the trail back further from the Sandy River, the protected water feature. The trail is designed with pervious concrete so that stormwater can infiltrate into the ground so that there are no stormwater impacts. The trail is 12 feet wide with 2 foot shoulders to safely accommodate a high volume of mixed bicycle and pedestrian use per the ODOT Bicycle and Pedestrian Guide. As shown in Appendix B, sheet GN-4, the area will be planted with native species of trees and shrubs to improve habitat and vegetative functions in the project area. There is no other practicable design or method to accommodate the trail because this area of the vegetation corridor has already been disturbed and prepared to accommodate the trail, a regional trail is identified on regional and city maps adjacent to the river, and the project has been designed to limit impacts by being pervious concrete and includes site restoration to provide riparian habitat.

2. If no such reasonably practicable alternative design or method of development exists, new structures and development shall be limited in scale, as specified in this section, so that the impacts on the vegetation corridor and slope district are the least necessary and the plans shall include restoration, replacement, or rehabilitation of the vegetation corridor and/or slope associated with the site:

a. Notwithstanding the provisions of chapter 6.220, Type II Variance, of this code, a maximum of 30% of the total area of the vegetation corridor and slope district on the lot may be used for the development, inclusive of any walkways, driveways, patios, decks, accessory buildings, and similar impervious features.

Response: Development within the vegetation corridor will occur within ODOT right-of-way, City of Troutdale right-of-way and the City of Troutdale owned property 1N3E25BD Tax Lot 400. The total project area within the VECO is 113,501 square feet. The total developed area for the project area is 19,827 square feet. Therefore, the total developed area within the vegetation corridor is 17%.

3. The applicant shall provide mitigation to ensure that impacts to the functions and values of the vegetation corridor and integrity of the slope will be mitigated or restored to the extent practicable.

c. A mitigation and restoration plan shall be submitted with the land use application and shall be implemented prior to issuance of a Certificate of Occupancy, a Certificate of Completion for a subdivision, or the final building inspection, as applicable.

i. Required plants and plant densities. An applicant must meet Mitigation Option 1, 2 or 3.

Option 3. Discretionary Review. This mitigation plan varies the required number and size of trees and shrubs under Option 1 or Option 2.

The project will not remove any trees and thus cannot meet Option 1. Due to site constraints on the west bank of the Sandy River at the location of the I-84 bridge construction, mitigation for development of the trail under the I-84 bridges in the Vegetated Corridor (VECO) must comply with the requirements of "Option 3" subject to discretionary review. The applicant has provided a mitigation plan in accordance with Option 3 as shown on sheets GN-3, and GN-4. The mitigation plan includes as much area within the VECO as possible, but due to the limited area to plant, also includes areas outside of the VECO. The mitigation plan was prepared in consideration of the standards of Option 2, the Port of Portland landscaping standards, and to create the most suitable vegetative landscape for the area given the site limitation and parameters. The registered landscape architect for the project, based on evaluation of the site conditions and the City and Port of Portland standards, designed a planting plan that best meets the mitigation objectives and is most likely to achieve long-term riparian, wildlife, and aesthetic values. The site constraints are as follows:

- The trail length within the VECO is 575-feet. Of that length, 170 feet is covered by the freeway bridges and unavailable for mitigation planting.
- North of the westbound bridge, for a length of about 160 feet, is a storm sewer pump station and other underground and overhead utilities where trees cannot be planted. Trees will also interfere with future maintenance on utilities.
- East of the trail, the river bank is comprised of large riprap that is not conducive to planting. There is very little earth shoulder to the bank before the grade breaks to steep riprap. It is not practicable to infill the large rock with planting soil due to the fluctuations in river elevation and the strength and velocity of the river at high flow and the erodible nature of planting soil.
- North of the bridge structures, plantings are subject to review by Port of Portland for compliance with its Wildlife Hazard Management Plan. This plan requires that trees be spaced so that mature canopies do not merge. This plan's plant list does not include native riparian trees, but it does allow for a variance. The Oregon white oak (*Quercus Garryana*) is similar in growth habit to the approved Scarlet oak (*Quercus coccinea*) and 3 Oregon white oak are specified north of the bridge at the approved 60' spacing.

(A) *An applicant shall submit the following:*

(1) *A calculation of the number of trees and shrubs that would be required under Option 1 or Option 2.*

Response: No trees are being removed as part of the project therefore Option 1 would not apply to the project. Under Option 2, the planting requirements for mitigation of the 19, 827 SF of disturbed area within the VECO would be 198 trees and 990 shrubs.

(2) *The number and size of trees and shrubs that the applicant proposes to plant.*

Response: The proposed plantings within the vegetated corridor are 40 - 1" caliper native trees and 333 1-gallon container size native shrubs as shown on Sheet GN-4. The trees are spaced approximately 10' on center where no conflicts exist and the shrubs are spaced approximately 4' on center. Plantings extend beyond the VECO along the ROW in an effort to maximize the area planted as part of the mitigation with another 11 trees (see Sheets GN-4 and GN-3) bringing the total number of trees to 51.

(3) *An explanation of why the proposed number and size of trees and shrubs to be planted will achieve, at the end of the fifth year after initial planting, comparable or better mitigation results than the number and size required under Option 1 or Option 2. Such explanation shall be prepared and signed by a qualified, licensed natural resource professional or a licensed landscape architect and shall include discussion of site preparation including soil additives and removal of invasive and noxious vegetation, plant diversity, plant spacing, planting season and immediate post planting care including mulching, irrigation, wildlife protection and weed control.*

Response: A stamped memorandum providing an explanation by an Oregon licensed Landscape Architect, Bob Marshall, as to why the site restoration plan provided under the Option 3 Discretionary Review is the best for the project area compared to Option 2 is included in Appendix B and referenced herein. As shown on sheets GN-3, and GN-4, the proposed mitigation includes the most trees and shrubs that can reasonably be planted to ensure healthy plants in consideration of riparian habitat and the Port of Portland landscaping standards. Every effort has been made to preserve existing trees and native vegetation. The proposed number of trees to be planted and area covered in native vegetation within the VECO, adjacent areas, and right-of-way is considerably greater than existed prior to the beginning of this project. Most of the project area identified is, and has been, historically disturbed for transportation and urban uses.

The goals of the site restoration plan are to improve water quality, facilitate production of habitat elements, and restore other aquatic habitat forming processes harmed during project construction. Generally, the objectives of the restoration plan are to replace the functions of the vegetation that is to be altered during this project. This will be done by planting the native vegetation and removing invasive non-native species.

The tree and shrub site restoration plan has been designed to provide for a healthy and sustainable native vegetative plant community. Although Option 2 would require more plantings, Option 2 provides only a general equation to be applied to all sites and does not consider the context of the site and suitability for planting and interrelationship of vegetation to each other. Crowding the trees closer than 10' on center (O.C.) is not an option as the species used (red alder, bitter cherry, and Oregon white oak) have mature canopy spreads of between 20' and more than 60'. The required 10' spacing is already likely to result in weak plants subject to blow down in the gorge winds.

The planting plan includes red alder (*Alnus rubra*), bitter cherry (*Prunus emarginata*) and Oregon white oak (*Quercus garryana*). These three native trees provide very different wildlife functions. Alder is known for its fast growing nature which will quickly help to provide shade over the water to inhibit thermal pollution. Alder has a very tough root system that will work to bind the soil and prevent erosion in the long term. To provide viable plant diversity while using plants approved by the PDX Wildlife Hazard Management Plan the following plants are included: kinnikinnick (*Arctostaphylos uva-ursi*), creeping manonia (*Mahonia repens*) and woods rose (*Rosa gymnocarpa*). Beside compliance with the Port of Portland Wildlife Hazard Management Plan, these low shrubs will not block views of the river or create a tunnel effect that can result in perceived or real safety concerns as a wall of shrubs allows persons to hide at the edge of the trail. The planting plan for the project is shown on sheet GN-4. All disturbed areas will be seeded with a seed mix that contains plants that are tolerant of wet conditions and of drier conditions, so native seeding will take hold on all disturbed ground.

A diverse pallet of plants was selected based on the area in which they will be planted. Elevations and slopes of the restoration area will ensure conformance to elevation and hydrologic requirements of target plant species. Plantings are mulched with medium grind bark to help preserve soil moisture. Planting period is between September 1 and May 15. Project specifications require plantings have gelled timed released water installed. Trees of 1" caliper receive 4 gel packs and shrubs receive 3 gel packs. Plantings will be maintained by the installation contractor during the first year, with watering and weed control occurring as necessary. No permanent irrigation is anticipated.

Site preparation for the planting will be performed consistent with the Oregon Standard Specifications for Construction. Special provisions stipulate that rocks, clods, and debris be removed and that 14 weed species (including Himalayan blackberry, Scotch broom and thistles) be killed and removed. Planting pits are specified to be 3 times the root ball (container size) and planting backfill is comprised of 75% sandy loam topsoil and 25% compost. In addition to tree and shrub planting, the disturbed soils are seeded with a diverse native grass and forb mix. A compost blanket of mulch is specified as the bed for seeding which will hasten the seed germination, provide nutrients and soil biology to the native soil and provide erosion control. It is specified that seeding take place prior to September 15 and that planting take place in the late autumn to allow plants to establish good root systems prior to the following growing season.

(4) A monitoring and reporting plan for the mitigation site

Response: The contractor is responsible for plant health and maintenance during a one year warranty period. Per the Environmental Performance, monitoring and maintenance will be conducted for five years or until success criteria is achieved – whichever occurs first. The Contractor will assume monitoring responsibility for the first year following construction. ODOT will assume monitoring responsibility for monitoring thereafter. During the site visit, the Contractor will inspect the plantings and make plans to correct factors that may prevent attainment of design and success criteria established in this plan or in permits issued by regulatory agencies. For each site monitoring visit, a written record will document the date, site conditions, and any corrective action that will be taken

(B) Approval Criteria for Option 3. A request to vary the number and size of trees and shrubs to be planted may be approved if the applicant demonstrates that the proposed planting will achieve, at the end of the fifth year after initial planting, comparable or better mitigation results than the number and size required under Option 1 or Option 2.

Response: The above responses, specifically, the response to (3) and the stamped memo from a licensed Oregon Landscape Architect in Appendix B, demonstrate that Option 3 will provide comparable or potentially better mitigation than under Option 2. Although the planting plan will plant less trees and shrubs than Option 2, the planting plan has been developed specifically for the site conditions and to ensure that the plants are placed in conditions where they will thrive and create a diverse vegetative habitat.

D. Approval Standards for Walkways and Bike Paths and other Low-Impact Outdoor Recreation Facilities.

1. Within the VECO of any property other than City-owned or Metro-owned parks and greenspaces.

- a. A gravel walkway or bike path shall not be constructed closer than ten feet from the boundary of the protected water feature. Walkways and bike paths shall be constructed so as to minimize disturbance to existing vegetation. Where practicable, a maximum of ten percent of the trail may be within 30 feet of the protected water feature.*

Response: The trail is pervious concrete and is not within 10 feet of the boundary of the protected water feature (Sandy River). The boundary was determined by Ms. McCallum to be OHW as provided in the pre-application meeting notes, Appendix A. However, it is within 30 feet of the protected water feature for more than 10% , approximately 80% of the trail being constructed for this project. This project will take the opportunity provided by the replacement of the I-84 bridges to construct a regional trail under the Sandy River bridges that provides a key connectivity piece for the regional trail system. Due to the constricted space under the bridge from the bridge abutments, it is not possible to set the trail back further from the Sandy River, the protected water feature. The trail on regional and local maps parallels the Sandy River per the 40-Mile Loop Trail map and

Map 5.2 Facilities Plan of the City of Troutdale Parks Master Plan. Therefore, a variance from this standard is being requested (see section 6.200).

c. A walkway or bike path shall not exceed ten feet in width.

Response: The trail will be 12 feet wide with 2-foot-wide paved shoulders under the bridge and along the river except along Harlow Road it will be 12 feet with 2-foot gravel shoulders. There is also 6" to accommodate the railing. This width is necessary for safety:

- The trail is along the the bridge abutments and on a riprap bench with a steep grade. Therefore, there isn't any other "fallout" area should there be collisions if users try to pass each other. Also, a wider and more open path may be a crime deterrent.
- More separation of users. Increased width can better accommodate a variety of users such as serious bicyclists and recreational bicyclists, and pedestrians including recreationalists who may carry gear used to enjoy the river such as fishing gear and innertubes. The ODOT Bicycle and Pedestrian Design Guide calls for a 12-foot wide path in areas with high mixed use by bicyclists and pedestrians.

Therefore, a variance from this standard is being requested.

2. Within the VECO or within mapped Habitat Conservation Areas of City-owned or Metro-owned parks and greenspaces:

b. Trails for pedestrians or bicycles shall be constructed using nonhazardous, pervious materials, with a maximum width of not to exceed (1) the width necessary for federal funding, if utilized, (which is currently ten feet) for regionally significant or federally funded trails, and (2) on other trails, the greater of the width recommended under applicable AASHTO standards for the expected type and volume of use, or four feet.

Response: The trail will be constructed using nonhazardous pervious concrete. Only an approximately 2-foot-wide corner of the trail crosses into the HCA. The trail does not pass through the HCA as shown on the Site Plan. The City property, the "old sewage treatment plant" on TL 00400 is not a City- or Metro-designated park or greenspace.

4.600 FLOOD MANAGEMENT AREA

4.615 Uses within the Floodway or within Wetlands.

B. Permitted Uses within the Floodway or within Wetlands. The following uses are permitted subject to review under the standards for development of section 4.617, Development Standards, of this chapter:

1. Open space, trails, walkways, and bike paths, as designated by the Troutdale Parks Plan, or as approved with a land use application.

Response: The project is a multiuse trail and is shown to parallel the Sandy River per the 40-Mile Loop Trail map and Map 5.2 Facilities Plan of the City of Troutdale Parks Master Plan. There will be no structures as defined on FEMA's website (<http://www.fema.gov/floodplain-management/structure>):

"Structure" for insurance coverage purposes, means a walled and roofed building, other than a gas or liquid storage tank, which is principally above ground and affixed to a permanent site, as well as a manufactured home on a permanent foundation. For the latter purpose, the term includes a building while in the course of construction, alteration, or repair, but does not include building materials or supplies intended for use in such construction, alteration or repair, unless such materials or supplies are within an enclosed building on the premises.

4.616 Permit Required. A Flood Hazard Permit is required for development within the Flood Management Area except as noted:

D. A Type III procedure and Flood Hazard Permit shall be processed for uses requiring a Type III review in the underlying zoning district, and for all special variances requested from the standards of this chapter.

Response: This permit application is requesting a Type III Variance review.

F. Submission Requirements. An application for development within the Flood Management Area shall include the following:

A "No-Rise" certification and a Letter of Map Revision-Fill (LOMR-F) shall be submitted with the land use application for the following activities within the floodway as mapped by FEMA:

- a. Permanent bank stabilization that occurs in the floodway.*
- b. Development, alterations or relocations of the floodway, including any permanent fill within the floodway. [Adopted by Ord. 702, ef. 11/24/00; amendment by Ord No. 798, ef. 12/18/2009]*

Response: A registered engineer has provided a no-net-rise certificate for the project (Appendix E). No structures as defined by FEMA will be constructed in the floodplain or

floodway. There will be small amounts of cut but no fill as part of this project. All fill and temporary fill was permitted under the previous permit (09-006). Per the FEMA website, a LOMR-F is for structures elevated on fill above the BFE.

(http://www.fema.gov/media/fhm/lomrf/ot_lomrf.html):



Letter of Map Revision Based on Fill (LOMR-F)

Official revision, by FEMA, of a community's effective **National Flood Insurance Program (NFIP)** map to remove structure(s) or lot(s) from the floodplain when they have been elevated above the **Base Flood Elevation (BFE)** by the placement of fill.

▲ Close

Additionally, for the previous permit (06-009) FEMA Region X responded that no CLOMR or similar process was necessary because there would be no permanent change in the base flood elevation.

4.617 Development Standards. The land use application shall establish through the use of narrative, site plans, and professional reports, the following:

A. New development, including additions or alterations to existing structures, in the Flood Management Area may be allowed, provided that:

- 1. The applicant shall demonstrate that there is no reasonable nor practical alternative design or method of development that would have a lesser impact on the Flood Management Area than the one proposed.*

Response: Please see response to 4.315.A.1. The new development of a multiuse trail consists of paving a previously constructed riprap bench and graded area with pervious materials, adding safety fencing, constructing a retaining wall, minor grading for the trail at roadway approaches, and some cut under the trail in flood management area to increase flood storage capacity. Multiuse trails are not pollutant generating sources. No structures as defined by FEMA are included in this portion of the project. A professional engineer registered in Oregon has certified that the development will not result in any increase in flood levels during the occurrence of the base flood discharge. A planting plan to mitigate for vegetative disturbances is shown on sheet GN-4.

G. Maintain flood storage capacity. Balanced cut and fill is required for permitted development in the Flood Management Area. Excavation and fill shall be performed in a manner to maintain or increase flood storage and conveyance capacity and not increase design flood elevations. A professional engineer registered in Oregon must certify that the development will not result in any increase in flood levels during the

occurrence of the base flood discharge, and that water quality will not be adversely affected. The applicant shall obtain a Conditional Letter of Map Revision-Fill (CLOMR-F) from FEMA prior to grading and filling the site and then obtain and submit the final Letter of Map Revision-Fill (LOMR-F) prior to final inspections, or issuance of a certificate of completion, or issuance of the certificate of occupancy.

1. All fill placed at or below the design flood elevation in the Flood Management Area shall be balanced with at least an equal amount of soil material removal. The development shall be designed to minimize development within the Flood Management Area and amount of fill necessary. Balanced cut and fill may be used to elevate structures but shall not be used for density transfer. Residential density must be calculated prior to changes to the floodplain as a result of balanced cut and fill.

2. Excavation shall not be counted as compensating for fill if such areas will be filled with water in non-storm winter conditions.

3. The cumulative effect of any proposed development shall not increase the water surface elevation of the base flood. Onsite flood storage capacity shall not decrease as a result of development, vegetation removal, or excavation.

4. A "No-Rise" certification is required for any fill or permitted development within the floodway pursuant to section 60.3(d)(3) of the National Flood Insurance Program.

Response: A registered engineer has provided a no-net-rise certificate for the project (Appendix E). No structures as defined by FEMA will be constructed in the floodplain or floodway. There will be a net cut as a result of the project. The cut will increase flood storage and conveyance capacity in the floodplain and floodway. Per the FEMA website, a LOMR-F is for structures elevated on fill above the BFE (http://www.fema.gov/media/thm/lomr/f/ot_lomr/f.html):



Letter of Map Revision Based on Fill (LOMR-F)

Official revision, by FEMA, of a community's effective National Flood Insurance Program (NFIP) map to remove structure(s) or lot(s) from the floodplain when they have been elevated above the **Base Flood Elevation (BFE)** by the placement of fill.

▲Close

Additionally, for the previous permit (06-009) FEMA Region X responded that no CLOMR or similar process was necessary because there would be no permanent change in the base flood elevation.

P. Anchoring. All new construction and substantial improvements shall be anchored to prevent flotation, collapse, or lateral movement of the structure.

Response: The retaining wall north of the bridge along Harlow Road will be anchored with steel piles. Geotechnical design parameters for the wall were provided by Foundation Engineering Inc. on February 7th, 2013.

Q. Construction Materials and Methods. All new construction and substantial improvements shall use flood-resistant materials in accordance with the requirements of FEMA Technical Bulletin 2-93 "Flood Resistant Materials Requirements" and utilities shall be designed and installed in accordance with FEMA Publication 348 "Protecting Building Utilities from Flood Damage." The following standards are only a summary of those requirements:

- 1. All new construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage.*
- 2. All new construction and substantial improvements shall be constructed using methods and practices that minimize flood damage.*
- 3. Electrical, heating, ventilation, plumbing, and air conditioning equipment, and other service facilities shall be designed and/or otherwise elevated or located so as to prevent water from entering or accumulating within the components during conditions of flooding.*
- 4. No construction materials or methods may be used within the floodplain that would impair or damage water quality or native vegetation.*
- 5. All development shall have adequate drainage provided to reduce exposure to flood damage and maintain water quality.*

Response: All new improvements will be constructed with pervious concrete or steel and anchored with steel in concrete. Due to the relative small amount of stormwater flow off of the multiuse trail due to the pervious surface, flow will be allowed to infiltrate into the surrounding soil and riprap base. Multiuse paths are non-pollutant generating uses. Therefore, the project will be resistant to flood and maintain water quality. The project is permitted under an umbrella ODOT 1200-C permit. A copy of this permit was included with the previous application.

6.200 VARIANCE

6.225 Type III Variance. The Planning Commission may grant a variance under the Type III procedure if the request involves the expansion or reduction of a quantifiable provision in this code by more than 30%, or if this request is referred to the Planning Commission in accordance with section 6.235 of this chapter and the criteria in section 6.215 of this chapter are met. [Adopted by Ord. 705, ef. 5/10/01]

Response: Variances are being requested from the below standards, 4.315. D.1.a and c. Please note, the project is not a walkway or a bike path. It is a combined walkway *and* bike path; a multiuse trail. For that reason, a wider path is necessary to safely accommodate the different path users. The trail is identified on the City of Troutdale's Map 5.2 as a trail adjacent to the Sandy River.

Variance request for: 4.315.D.1.a

- a. A gravel walkway or bike path shall not be constructed closer than ten feet from the boundary of the protected water feature. Walkways and bike paths shall be constructed so as to minimize disturbance to existing vegetation. Where practicable, a maximum of ten percent of the trail may be within 30 feet of the protected water feature.*

The trail will be constructed with pervious surfaces. Approximately 80% of the multiuse trail is within 30 feet of the boundary of the Sandy River which is OHW as determined by Ms. McCallum. Therefore, the variance request is to expand the provision of the code by 70%. The trail is identified on the City of Troutdale's Map 5.2 as a trail adjacent to the Sandy River.

6.215 Criteria

- A. Special circumstances or conditions including, but not limited to, lot size, lot shape, topography, or size or shape of building, apply to the property, development, or to the intended use and are not typical of the general conditions in the surrounding area;*

Response: This project will take the opportunity provided by the replacement of the I-84 bridges to construct a regional trail under the Sandy River bridges that provides a key connectivity piece for the regional trail system. The trail is identified on regional and local maps paralleling the Sandy River - the 40-Mile Loop Trail map and Map 5.2 Facilities Plan of the City of Troutdale Parks Master Plan, Most of the trail is in state (interstate highway) or local street right-of-way and is therefore not comprised of lots. Additionally, the I-84 right-of-way area has been used for transportation uses for more than fifty years. Due to the constricted space under the bridge from the bridge abutments and engineered slope, the only feasible location for the trail to pass under I-84 is on the

benched area of the engineered slope. I-84 is the only east-west interstate in the area. Interstates, due to the number of vehicle travel lanes they provide, require substantially wider areas of right-of-way. Therefore, the existing conditions are not typical of the general conditions in the surrounding area. It is not possible to set the trail back further from the Sandy River, the protected water feature.

B. The variance authorized will not be injurious to adjacent properties or the surrounding neighborhood or otherwise detrimental to the public welfare;

Response: The trail will maximize the use of right-of-way to provide a public amenity – a multiuse trail that will improve bicycle and pedestrian connectivity in the surrounding area and provide a connection to a regional trail system. The trail is almost entirely in right-of-way or on public property and land previously disturbed for transportation or public related uses within 30 feet of the Sandy River. There is no surrounding neighborhood. Adjacent property is across the streets from the trail and the trail will not impact how the properties are used. The trail will not create any long-term light or noise impacts. The project does not include illumination and the ambient background noise is likely high due to I-84 traffic. The bridge replacement currently is under construction and the construction of the trail will occur simultaneously with the continuing construction of the bridge replacement. Therefore, trail construction will not cause detrimental impacts to adjacent property or public welfare.

C. The variance authorized will be consistent with the general purpose and intent of the provision from which a variance is sought; and

Response: The purpose and intent of the standard is to minimize vegetation disturbance. However, almost the entire project area and especially the area within 30 feet of the Sandy River, the protected water feature, has been historically disturbed for transportation use, a public use, for over half a century. The site restoration plan will replant as much of the project area as possible within the VECO with native plants to restore vegetation to a better than pre-project condition.

D. The variance is the minimum necessary to relieve a practical difficulty and the resulting hardship.

Response: The practical difficulty is that the I-84 right-of-way prohibits the placement of the trail along the Sandy River in any other location in the vicinity. The resulting hardship of not constructing the project is either the continuing gap in the regional trail connection along the Sandy River or the cost of providing a trail connection much further from the Sandy River. Allowing for more than 10% of the trail within 30 feet of the Sandy River is the minimum necessary considering the practical difficulty and resulting hardship and in consideration that the area with 30 feet of the Sandy River has historically been disturbed for transportation uses.

Variance request for: 4.315.D.1.c

c. A walkway or bike path shall not exceed ten feet in width.

The trail width is 16.5 feet including shoulders and to accommodate the railing. Therefore the variance request is to expand the provision of the code by 61%.

6.215 Criteria

A. Special circumstances or conditions including, but not limited to, lot size, lot shape, topography, or size or shape of building, apply to the property, development, or to the intended use and are not typical of the general conditions in the surrounding area;

Response: The width of the trail, which is a section of the regional trail system, is necessary to safely provide enough area for separation of trail users e.g. bicyclists from pedestrians. This project will take the opportunity provided by the replacement of the I-84 bridges to construct a key connection to a regional trail system. The trail is identified on regional and local maps paralleling the Sandy River - the 40-Mile Loop Trail map and Map 5.2 Facilities Plan of the City of Troutdale Parks Master Plan, The trail is in state highway and local street right-of-way and in linear strips of land that do not constitute lots. I-84 is the only east-west interstate in the area. Interstates, due to the number of vehicle travel lanes they provide, require substantial right-of-way. Additionally, the I-84 right-of-way area has been used for transportation uses for more than fifty years. Due to the constricted space under the bridge from the bridge abutments and engineered slope, the only location for the trail to pass under I-84 is on the engineered slope bench. The bench has been designed to accommodate the proposed trail width. Therefore, the existing conditions are not typical of the general conditions in the surrounding area.

B. The variance authorized will not be injurious to adjacent properties or the surrounding neighborhood or otherwise detrimental to the public welfare;

Response: The trail will maximize the use of right-of-way to provide a public amenity – a multiuse trail that will improve bicycle and pedestrian connectivity in the surrounding area and connect to a regional trail system. The trail has been designed in consideration of public safety and welfare by providing enough space to safely accommodate pedestrians and bicyclists. A wider trail minimizes the potential for conflict between users who travel at different speeds. The trail is almost entirely in right-of-way or on public property; and land previously disturbed for transportation or public related uses within 30 feet of the Sandy River. There is no surrounding neighborhood. Adjacent property is across the streets from the trail and the trail will not affect how the properties are used. The trail will not create any long-term light or noise impacts. The project does not include illumination and the ambient background noise is likely high due to I-84 traffic. The bridge replacement currently is under construction and the construction of the trail will occur simultaneously with the continuing construction of the bridge

replacement. Therefore, the trail construction will not cause detrimental impacts to adjacent property or public welfare.

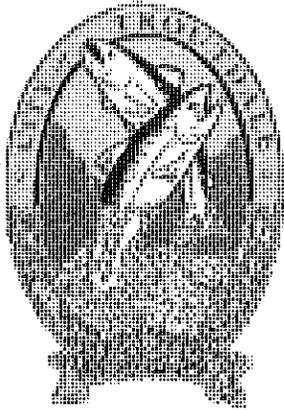
C. The variance authorized will be consistent with the general purpose and intent of the provision from which a variance is sought; and

Response: The provision's purpose and intent is to minimize vegetation disturbance for a walkway or bike path. However, the project is a combined walkway and bike path and is wider than the standard to accommodate the combined use. If the walkway and bike path were split, and each 10 feet wide, the trail would be twenty feet wide. The proposed trail is 16.5 feet wide, less than the width of two trails. The site restoration plan will replant as much of the project area as possible within the VECO with native plants to restore vegetation to a condition better than pre-project. Therefore, the variance is consistent with the general purpose of the provision.

D. The variance is the minimum necessary to relieve a practical difficulty and the resulting hardship.

Response: The practical difficulty is that trail is a combined walkway and bike path and requires a width of more than 10 feet. . Providing a 10-foot-wide trail would be a detriment to public welfare as it would increase the chance of conflict between users of different speed and not provide the connection to the regional trail system. This is would be the resulting hardship. The trail has been designed to the minimum width necessary to safely accommodate the various trail users – 12 feet wide with 2-foot-wide shoulders. Therefore, the variance is the minimum necessary.

Appendix A City of Troutdale Preapplication Meeting Notes



**CITY OF TROUTDALE
PRE-APPLICATION CONFERENCE NOTES
FILE NUMBER: P2013-006
MULTI-USE TRAIL EXTENSION UNDER I-84 BRIDGES**

**CITY CONFERENCE BUILDING
223 S BUXTON RD, TROUTDALE, OR 97060
THURSDAY AUGUST 15, 2013 at 2:00 P.M.**

APPLICANT: Shelley Richard, Environmental Manager DEA Inc.
Anneke Van der Mast, Project Planner, DEA Inc.
Doug Johnson, Project Manager/Engineer, DEA Inc.

OWNER: ODOT
City of Troutdale

STAFF: Elizabeth McCallum, Senior Planner, City of Troutdale
(503) 674-7228 / Elizabeth.mccallum@troutdaleoregon.gov

REQUEST: Construct a multiuse trail extension

LOCATION: west bank of the Sandy River between NE Harlow Road and NW
257th Way under the I-84 Sandy River bridges

TAX MAP & TAX LOT: ODOT right-of-way and City tax lot 1N3E25BD-00400

PLAN DESIGNATION: Commercial and Industrial

ZONING DISTRICT: South side of bridges: General Commercial (GC)
North side of bridges: Light Industrial (LI)

OVERLAY ZONING: Flood Management Area (FLMA), Vegetation Corridor and Slope
District (VECO), and Airport Landing Field Overlay (ALF)

BACKGROUND

The construction of the multi-use path was outside the scope of the I-84 bridge replacement Flood Hazard Permit with concurrent Site and Design Review conducted in November 1999.

The proposed multi-use pathways not entirely within ODOT right-of-way and is partially within the Vegetation Corridor and Slope District and/or Flood Management Area.

The area outside of the right-of-way is property owned by the City of Troutdale that abuts the ODOT right-of-way.

PROCEDURE:

This preapplication review has identified that multiple standards from TDC 4.300 Vegetation Corridor and Slope District that cannot be met outright. The approval of the Planning Commission is required for variances from TDC 4.300.

*TDC 4.313 Approval Procedures. Permits are required for all uses within this district:
 D. Type III Procedure. A variance from the standards of this chapter shall be a Type III procedure. The Planning Commission shall review variances to this chapter pursuant to section 6.220, Type II Variance, of this code. An affirmative finding must be made, with or without conditions, for each variance criteria.*

APPLICABLE STANDARDS

Vegetation Corridor and Slope District

The width and location of the Vegetation Corridor and Slope district is determined under the following standard of the Troutdale Development Code:

TDC 4.316 Width of Vegetation Corridor.

Protected Water Feature	Slope Adjacent to Protected Water Feature ¹	Starting Point for Measurements from Water Feature	Minimum Width of Vegetation Corridor ^{2&3}
Primary Protected Water Features	<25%	Edge of bankfull stage or two-year storm level. Delineated edge of Title 3 wetland.	50 feet
Primary Protected Water Features	≥25% for less than 150 feet ³	Edge of bankfull stage or two-year storm level. Delineated edge of Title 3 wetland.	Distance from starting point of measurement to top of ravine (break in ≥25% slope) ⁴ , plus 50 feet ⁵

Primary Protected Water Features	$\geq 25\%$ for 150 feet or more ³	Edge of bankfull stage or two-year storm level. Delineated edge of Title 3 wetland.	200 feet ⁴
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- 1 At least three slope measurements, evenly spaced along the frontage adjacent to the protected water feature, shall be made, at no more than 100-foot increments.
- 2 These minimum setbacks may be affected by other overlay standards.
- 3 Vegetation corridors in excess of 50 feet for primary protected water features, or in excess of 15 feet for secondary protected water features, apply on steep slopes only in the *uphill* direction from the protected water feature.
- 4 Where the protected water feature is confined by a ravine or gully, the top of the ravine is the break in the slope that is $\geq 25\%$ (see Figures 4 and 5 in section 4.317 of this chapter). If a slope of $\geq 25\%$ continues beyond 200 feet, the development standards of this chapter continue to apply until the break in slope.
- 5 A maximum reduction of 25 feet may be permitted in the width of vegetation corridor beyond the break in slope if a geotechnical report demonstrates that the slope is stable. To establish the width of the vegetation corridor, measure in 25-foot increments from the minimum setback away from the water feature until the slope is less than 25% (top or ravine).

The Sandy River is a primary protected water feature. The slope adjacent to the river is greater than 25% for less than 150 feet. As such, based upon the width of the slope and where it begins to be less than 25% (break in slope), the width of the vegetation corridor is 100 feet along the Sandy River. The trail will clearly be within the vegetation corridor and slope district under the bridges to the point that it swings "inland" 100 feet or more from that break in slope.

A dimensional topographic site plan view showing the bankfull stage of the Sandy River and the resulting vegetation corridor width with the location of the multi-use trail within that area must be prepared and submitted with the Site and Design Use application.

That portion of the multi-use trail that is outside of the Vegetation Corridor and Slope District and totally within ODOT right-of-way is not subject to any of the following design standards.

TDC 4.312 Uses within the Vegetation Corridor and Slope District.

A. Permitted Uses within the Vegetation Corridor and Slope District.

- I. Low-impact outdoor recreation facilities, including but not limited to: multi-use paths, accessways, trails, picnic areas, or interpretive and educational displays and overlooks that include benches and outdoor furniture as*

designated by the Troutdale Parks Plan, or as approved with a land use application, and in compliance with subsection 4.315(D)(1) or 4.315(D)(2) of this chapter, as applicable.

These development standards do not apply to the portion of the trail that is entirely within the ODOT or City of Troutdale right-of-way *outside* of the vegetation corridor and slope district and that portion of the trail is not required to be evaluated for review under a land use approval.

Standards that apply to the trail within the Vegetation Corridor and Slope District within right-of-way or land owned by Troutdale or ODOT and within that portion of the trail that is within the Habitat Conservation Area of the city-owned right-of-way or land (parcel outside of a right-of-way).

TDC 4.315 Development Standards. Permitted uses in the vegetation corridor and slope district are to be developed in compliance with the following development standards or in compliance with an approved District Plan in accordance with Metro Code Section 3.07.1330.B.4(a). A District Plan shall be prepared and approved prior to, or in conjunction with, the preparation and approval of a master plan for the eventual development of the specific site. The approval criteria for the District Plan are those of Metro Code Section 3.07.1330.B.3.

A. New Development.

- 1. The applicant shall demonstrate that no reasonably practicable alternative design or method of development exists that would have a lesser impact on the vegetation corridor and slope than the one proposed.*

The Site and Design Review application shall include a written justification to use the land within the Vegetation Corridor and Slope District and/or Habitat Conservation Area.

- 2. If no such reasonably practicable alternative design or method of development exists, new structures and development shall be limited in scale, as specified in this section, so that the impacts on the vegetation corridor and slope district are the least necessary and the plans shall include restoration, replacement, or rehabilitation of the vegetation corridor and/or slope associated with the site:*

Impacts are minimized through compliance with the design standards of TDC 4.300 and a revegetation plan as specified in TDC 4.315A.3.

- a. Notwithstanding the provisions of chapter 6.220, Type II Variance, of this code, a maximum of 30% of the total area of the vegetation corridor and slope district on*

the lot may be used for the development, inclusive of any walkways, driveways, patios, decks, accessory buildings, and similar impervious features.

The maximum use of the vegetation corridor and slope district allowed, without a variance is 30 percent. The application shall clearly show on the site plan drawings the percent of the vegetation corridor and slope district that will be used for the multi-use trail and associated improvements, such as retaining walls. A Type III variance is required under TDC 4.313D. This is more restrictive than the foregoing standard. The Code requires that when there is a conflict in standards the more restrictive applies.

TDC 4.315 A3. The applicant shall provide mitigation to ensure that impacts to the functions and values of the vegetation corridor and integrity of the slope will be mitigated or restored to the extent practicable.

- a. The existing tree canopy and understory comprised of native plants shall be retained wherever possible outside of the building envelope. A tree preservation and maintenance plan is required to be submitted with the land use application as part of the landscaping plan, or in the case of a single-family dwelling, with the building permit. Only those trees approved for removal by the Director, Site and Design Review Committee, or Planning Commission may be removed.*
- b. Any disturbed portions of the site shall be restored and enhanced by removing non-native plants and noxious weeds, and restoring the vegetation corridor with native plant species listed on the Metro Native Plant List. Only native grass varieties will be permitted.*
- c. A mitigation and restoration plan shall be submitted with the land use application and shall be implemented prior to issuance of a Certificate of Occupancy, a Certificate of Completion for a subdivision, or the final building inspection, as applicable.*
 - i. Required plants and plant densities. An applicant must meet Mitigation Option 1, 2 or 3.*

Option 1. *Number and type of trees and shrubs that must be planted to qualify as mitigation.*

<i>TREE REPLACEMENT MITIGATION OPTION 1</i>	
<i>Size of Tree Removed</i>	<i>Number of Trees and Shrubs to Plant</i>
<i>6 to 12" diameter</i>	<i>1 tree and 1 shrub</i>
<i>13 to 18" diameter</i>	<i>2 trees and 3 shrubs</i>

<i>19 to 24" diameter</i>	<i>3 trees and 6 shrubs</i>
<i>25 to 30" diameter</i>	<i>4 trees and 9 shrubs</i>
<i>Over 30" diameter</i>	<i>5 trees and 15 shrubs</i>

Option 2. The mitigation is calculated based on the size of the area disturbed within the Vegetation Corridor and Slope District. Native trees and shrubs are required to be planted at a rate of one tree and five shrubs for every 100 square feet of disturbance area. All fractions are rounded to the nearest whole number. Bare ground must be planted or seeded with native grasses or herbs.

TDC 4.315A.3.c.i. Option 3 Discretionary Review. This mitigation plan varies the required number and size of trees and shrubs under Option 1 or Option 2.

(A) An applicant shall submit the following:

- (1) A calculation of the number of trees and shrubs that would be required under Option 1 or Option 2.*
- (2) The number and size of trees and shrubs that the applicant proposes to plant.*
- (3) An explanation of why the proposed number and size of trees and shrubs to be planted will achieve, at the end of the fifth year after initial planting, comparable or better mitigation results than the number and size required under Option 1 or Option 2. Such explanation shall be prepared and signed by a qualified, licensed natural resource professional or a licensed landscape architect and shall include discussion of site preparation including soil additives and removal of invasive and noxious vegetation, plant diversity, plant spacing, planting season and immediate post planting care including mulching, irrigation, wildlife protection and weed control.*
- (4) A monitoring and reporting plan for the mitigation site.*

Approval Criteria for Option 3. A request to vary the number and size of trees and shrubs to be planted may be approved if the applicant demonstrates that the proposed planting will achieve, at the end of the fifth year after initial planting, comparable or better mitigation results than the number and size required under Option 1 or Option 2.

TDC 4.315 A.3.c.ii. On-site mitigation area. All vegetation planted on the applicant's site must be within the Vegetation Corridor and Slope District or in an area contiguous to the Vegetation Corridor and Slope District; provided, however, that if the vegetation is planted outside of the Vegetation Corridor and Slope District of the site, then the applicant shall preserve the contiguous area by executing a deed restriction, such as a restrictive covenant.

TDC 4.315 A.3.c.iii. Off-site mitigation area. Some or all of the vegetation may be planted off-site subject to the following requirements.

- a) The off-site property must lie within the city limits of Troutdale or the Troutdale Urban Planning Area, except for mitigation as a result of development on property owned by the Port of Portland within 10,000 feet of an Aircraft Operating Area, as defined by the FAA, in which case the Port may be permitted to mitigate in the U.S. Forest Service Sandy River Delta Recreation Area, provided that the Port can demonstrate that it is not practicable for the mitigation to occur within the city limits of Troutdale or the Troutdale Urban Planning Area and has entered into a written agreement with the U.S. Forest Service which permits such plantings.*
- b) The applicant shall submit a map and accompanying narrative that details the following:*
 - (i) The number of trees and shrubs that can be planted on-site;*
 - (ii) The on-site location where those trees and shrubs can be planted;*
 - (iii) An explanation of why it is not practicable for mitigation to occur on-site;*
 - (iv) The proposed location for off-site mitigation; and*
 - (v) Documentation that the applicant can carry out and ensure the success of the mitigation, including documentation that the applicant possesses legal authority to conduct and maintain the mitigation, and, if the mitigation is not within the Vegetation Corridor and Slope District, documentation that the mitigation site will be protected after the monitoring period expires, such as through the use of a restrictive covenant.*

TDC 4.315 A.3.c.iv. Mitigation Planting Standards.

- a) All trees, shrubs, groundcovers, and grasses shall be from the Metro Native Plant List.*
- b) Conifers shall be replaced with conifers.*
- c) Plant size. Replacement trees must be at least one-half inch in caliper, measured at six inches above the ground level for field grown trees or above the soil line for container grown trees (the one-half inch minimum size may be an average caliper*

measure, recognizing that trees are not uniformly round), unless they are oak or madrone which may be one gallon size. Shrubs must be in at least a one-gallon container or the equivalent in ball and burlap and must be at least 12 inches in height.

- d) Plant spacing. Trees shall be planted between eight and 12 feet on center and shrubs shall be planted between four and five feet on center, or clustered in single species groups of no more than four plants, with each cluster planted between eight and ten feet on center. When planting near existing trees, the dripline of the existing tree shall be the starting point for plant spacing measurements.*
- e) Plant diversity. Shrubs must consist of at least two different species. If ten trees or more are planted, then no more than 50% of the trees may be of the same genus.*
- f) Invasive vegetation. Invasive non-native or noxious vegetation must be removed within the mitigation area prior to planting.*
- g) Tree and shrub survival. A minimum of 80% of the trees and shrubs planted must remain alive on the fifth anniversary of the date that the mitigation planting is completed. Plants that die within five years of the date of planting must be replaced in kind and of sufficient quantity to meet this minimum 80% coverage standard.*
- h) Monitoring and reporting. Monitoring of the mitigation plantings is the ongoing responsibility of the property owner. Monitoring shall continue during the first five years of the date of planting. Monitoring shall consist of the submission of color photographs of the mitigation plantings immediately following completion of the initial planting and then annually between September 1 and 21st for the next five years. Photographs shall be dated and a north arrow included on the photographs. The photographs shall be submitted to the Community Development Department with a cover letter that includes the name and contact information for the current property owner, the land use file number, and the address of the property.*
- i) To enhance survival of tree replacement and vegetation plantings, the following practices are recommended:
 - (i) Planting season. Plant bare root trees between December 1 and February 28, and potted plants between October 15 and April 30.**

- (ii) *Wildlife protection. Use plant sleeves or fencing to protect trees and shrubs against wildlife browsing and resulting damage to plants.*
- (iii) *Irrigation. Water new plantings one inch per week between June 15 to October 15, for three years following planting.*
- (iv) *Weed control. Remove or control non-native or noxious vegetation throughout maintenance period.*
- (v) *Mulching. Mulch new plantings a minimum of three inches in depth and 18 inches in diameter to retain moisture and discourage weed growth.*

TDC 4.315 A.3.d. The portion of the vegetation corridor and slope district that is not disturbed with the use shall be conserved and maintained as open space. This may occur through private ownership; private conditions, covenants, and restrictions; conservation easements enforceable by the City, other public or private nonprofit agency, or where approved by the City Council; dedication to the City; or donation to other appropriate public or private nonprofit agency.

TDC 4.315 A.4. The use satisfies all applicable standards of chapters 4.600, Flood Management Area; 5.600, Erosion Control and Water Quality Standards; and 5.800, Stormwater Management, of this code.

TDC 4.315 A.5. All excavation over three feet in depth shall require submission of an engineering report addressing the hydrology, geology, and soils of the site as specified in this chapter. The siting, engineering, erosion control, water quality, and enhancement or revegetation of the site shall comply with the standards of this chapter. The applicant's engineering plans shall certify that runoff from the site will not increase above pre-development quantity and rate, and that visible and measurable erosion is prevented.

The site plan shall clearly delineate the boundary between ODOT right-of-way, City-owned right-of-way or parcels of land and the width of the Vegetation Corridor and Slope district. The following standards only apply within the Vegetation Corridor and Slope district area whether owned by the City or ODOT.

It appears two types of multi-use trail surface are proposed: reinforced concrete pavement and an Hot Mix Asphaltic Concrete (HMAC). Both surfaces are impervious. The design standards for the portion of the multi-use trail that is in the vegetation corridor and slope district but outside of city-owned property or City right-of-way are:

TDC 4.315 D. Approval Standards for Walkways and Bike Paths and other Low-Impact Outdoor Recreation Facilities.

1. Within the VECO of any property other than City-owned or Metro-owned parks and greenspaces.

a. A gravel walkway or bike path shall not be constructed closer than ten feet from the boundary of the protected water feature. Walkways and bike paths shall be constructed so as to minimize disturbance to existing vegetation. Where practicable, a maximum of ten percent of the trail may be within 30 feet of the protected water feature.

The trail is paved so “a” does not apply.

b. A paved walkway or bike path shall not be constructed closer than ten feet from the boundary of the protected water feature. For any paved walkway or bike path, the width of the vegetation corridor must be increased by a distance equal to the width of the path. Walkways and bike paths shall be constructed so as to minimize disturbance to existing vegetation. Where practicable, a maximum of ten percent of the trail may be within 30 feet of the protected water feature.

The Planner has established that the distance from the boundary of the Sandy River is that distance measured inland from the Ordinary High Water line. It is not possible to determine how far from the OHW of Sandy River the trail, inclusive of all construction, not just the travel surface, is to be. It appears to be highly variable. The land use application must clearly show the distance from the OHW of the Sandy River on the site plans.

An increase in the width of the vegetation corridor as required under this standard may not be practicable or possible or reasonable. The standard is intended to require an additional width of vegetation equal to the width of the trail immediately beside the vegetation corridor otherwise required. A variance from this standard would be required or the plan modified. A variance would be the Type III procedure.

c. A walkway or bike path shall not exceed ten feet in width.

The trail will be up to 16 feet wide in various locations. As such, a variance from this standard will also be required.

The land use application must include a site plan that clearly shows the alignment of the trail in relationship to the OHW, bankfull stage of the Sandy River, its floodplain and the vegetation corridor width and slope district. These features need to be labeled on the site plan and detail drawings.

That portion of the multi-use trail that is within city-owned property or City right-of-way is subject to the standards of TDC 4.300 that apply to areas identified by Metro as Habitat Conservation Areas (HCA). The HCA standards are distinguished from other standards in TDC 4.300 to comply with Metro Title 13. Those development standards are:

TDC 4.315D.2. Within the VECO or within mapped Habitat Conservation Areas of City-owned or Metro-owned parks and greenspaces:

The Habitat Conservation Area on the city-owned right-of-way and property within by the alignment of the trail is shown in the following details from the Metro Title 13 map. This map is reference only and a detailed analysis of the actual location of the HCA areas will need to be field determined.

The standard applies to the low-, moderate-, and high-conservation HCA areas. The HCA area may or may not be wider than the 100-foot wide vegetation corridor and slope district as measured from the break in slope adjacent to the Sandy River. The whitish color of the HCA is not regulated, only the yellow and green areas.



- a. *Shall contain less than 500 square feet of new impervious surface or such other area as may be proposed to obtain federal funding or to comply with AASHTO standards; and,*

The total impervious area of the multi-use trail will need to be quantified and then justified if it equals or exceeds 500 square feet. A variance from this standard is not required if the justifications are there is federal funding or it is necessary to comply with AASHTO standards.

- b. *Trails for pedestrians or bicycles shall be constructed using non-hazardous, pervious materials, with a maximum width of not to exceed (1) the width*

necessary for federal funding, if utilized, (which is currently ten feet) for regionally significant or federally funded trails, and (2) on other trails, the greater of the width recommended under applicable AASHTO standards for the expected type and volume of use, or four feet.

(1) The trail uses impervious materials. A variance from the standard limiting the surface to pervious materials and a maximum width of 10 feet will be required within the HCA *only*, unless pervious material is used and the width does not exceed 10 feet within the HCA of the City-owned right-of-way or property. This standard does not apply to the vegetation corridor and slope district outside of the HCA and does not apply to HCA on ODOT right-of-way or parcels of land.

(2) The schematic drawings submitted with the Site and Design Review application must clearly show the width of the trails and specify whether this is a federally funded project or the design is chosen to comply with AASHTO standards.

Flood Management Area

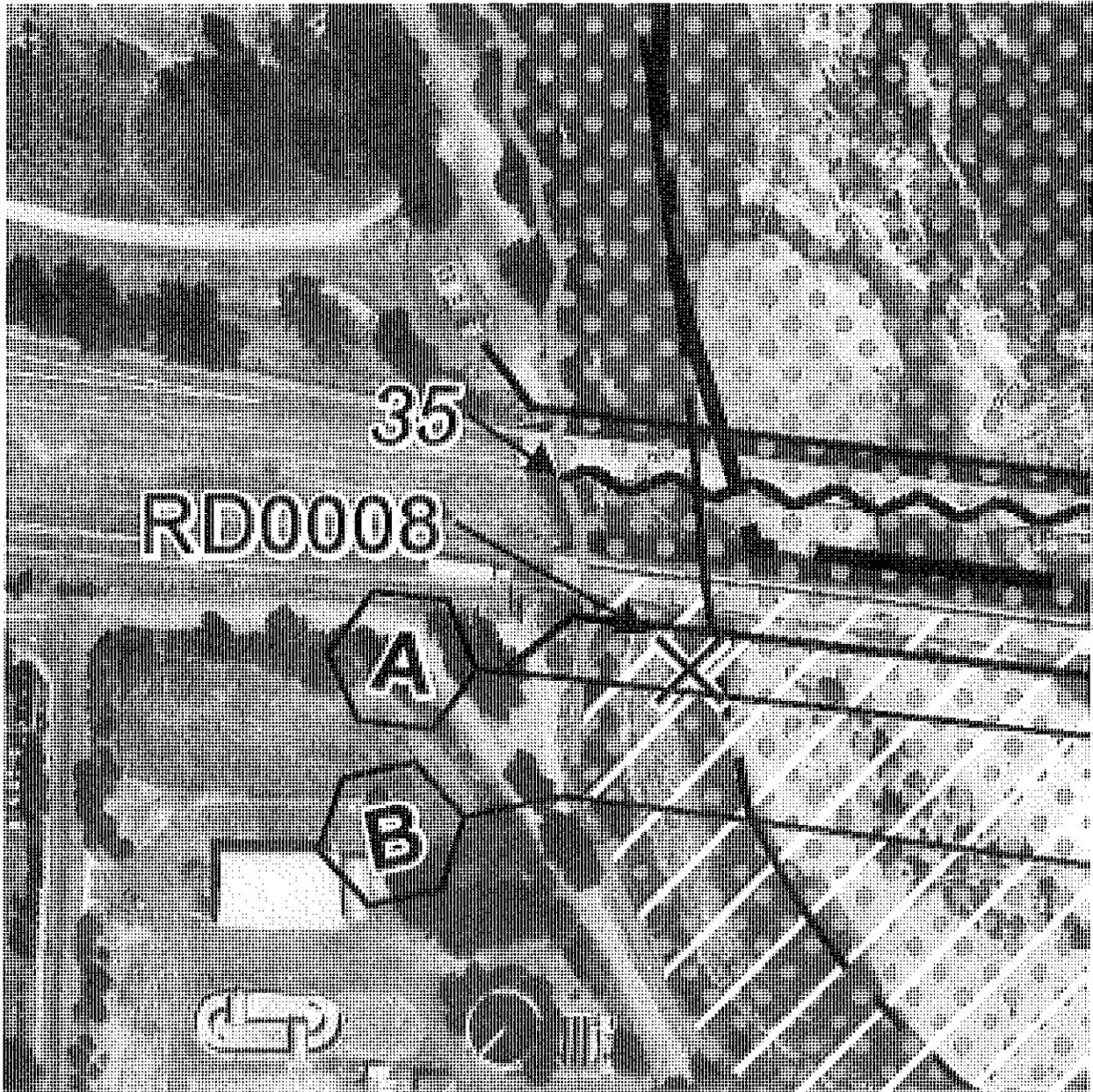
The one percent annual chance flood is shown as the 100 year at elevation 37.3 feet on detail drawing 2B-15.

The Senior Planner finds that the Base Flood Elevation is as low as 35 feet in this area. The Base Flood Elevation (BFE) of the Special Flood Hazard Area of the Sandy River within the length of the subject trail is variable. In between the bridges, the BFE is 35 feet NAVD 88 datum. At cross section A the BFE is 35.5 to 36 feet NAVD 88 datum. At cross section B the BFE is closer to 36 feet NAVD 88 datum. It appears from the details that the trail does drop below elevation 35 feet and into the Special Flood Hazard Area of the Sandy River.

Any portion of the trail at or below the BFE's is subject to the following standards for development within the Flood Management Area. The retaining walls are structures that would be subject to anchoring standards of the NFIP.

Note: the floodway and floodplain are co-terminus in the special flood hazard area (SFHA) south of the I-84 bridges.

The following picture is a detail of the FEMA FIRM panel 41051C0217H effective December 18, 2009. An entire FIRMette is attached to these notes along with the Sandy River flood profile and floodway data.



The trail is allowed within the floodway subject to compliance with the vegetation corridor and slope district development standards and any additional standards of the Flood Management Area.

TDC 4.615 Uses within the Floodway or within Wetlands.

- B. Permitted Uses within the Floodway or within Wetlands. The following uses are permitted subject to review under the standards for development of section 4.617, Development Standards, of this chapter:
 - 1. Open space, trails, walkways, and bike paths, as designated by the Troutdale Parks Plan, or as approved with a land use application.**

TDC 4.616 Permit Required. A Flood Hazard Permit is required for development within the Flood Management Area except as noted:

- D. A Type III procedure and Flood Hazard Permit shall be processed for uses requiring a Type III review in the underlying zoning district, and for all special variances requested from the standards of this chapter.*

The Flood Hazard Permit is processed concurrently with the Type III Site and Design Review and variances.

If the trail is within the Flood Management Area, the following standards apply. Many of the standards are similar to those for development in the Vegetation Corridor and Slope District:

TDC 4.617 Development Standards. The land use application shall establish through the use of narrative, site plans, and professional reports, the following:

- A. New development, including additions or alterations to existing structures, in the Flood Management Area may be allowed, provided that:
 - 1. The applicant shall demonstrate that there is no reasonable nor practical alternative design or method of development that would have a lesser impact on the Flood Management Area than the one proposed.*
 - 2. If there is no reasonable nor practical alternative design or method of development the project shall be designed in compliance with applicable parts of subsections (C) through (U) of this section, so that the impacts on the Flood Management Area are limited and the plans shall include restoration, replacement, or rehabilitation of the vegetation within the Flood Management Area.*
 - 3. The applicant shall provide mitigation to ensure that impacts to the functions and values of the vegetation corridor and integrity of the slope will be mitigated or restored to the extent practicable.**

- B. *A professional engineer registered in Oregon must certify that the development will not result in any increase in flood levels during the occurrence of the base flood discharge, and that water quality will not be adversely affected.*
- C. *As applicable, the development must be authorized by the Oregon Department of State Lands, U.S. Army Corps of Engineers, and the Oregon Department of Fish and Wildlife. The applicant shall obtain and submit a copy of all required state and federal permits for any proposed development in the Flood Management Area, including Section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 USC 1334.*
- D. *Unless otherwise authorized under the provisions of this chapter, the development shall comply with the underlying zoning district dimensional standards and the minimum vegetation corridor as established in sections 4.316, Width of Vegetation Corridor, and 4.317, Method for Determining Vegetation Corridors Next to Primary Protected Water Features, of this code.*
- E. *Protect the water quality resource and Flood Management Area functions and values from uncontained areas of hazardous materials as defined by the Department of Environmental Quality water quality standards.*
- F. *Limit impervious surface areas in the Flood Management Area.*
 - 1. *The impervious surface of the development may not exceed 30% of the flood plain area, provided the standards of this code are met. Exception: Public roads necessary to serve the transportation needs of the City may exceed 30% of the Flood Management Area.*
 - 2. *Clustering of houses and multiple-family units, zero lot line developments, and/or modifications to setbacks may be approved under the Type II procedure in order to accommodate the density permitted within the underlying zoning district and not exceed the impervious surface limitation of 30% of the Flood Management Area on the site.*
 - 3. *The Director may grant an administrative variance of up to 50% of any dimensional standard in the underlying zoning district where necessary to avoid construction within the Flood Management Area.*
- G. *Maintain flood storage capacity. Balanced cut and fill is required for permitted development in the Flood Management Area. Excavation and fill shall be performed in a manner to maintain or increase flood storage and conveyance*

capacity and not increase design flood elevations. A professional engineer registered in Oregon must certify that the development will not result in any increase in flood levels during the occurrence of the base flood discharge, and that water quality will not be adversely affected. The applicant shall obtain a Conditional Letter of Map Revision-Fill (CLOMR-F) from FEMA prior to grading and filling the site and then obtain and submit the final Letter of Map Revision-Fill (LOMR-F) prior to final inspections, or issuance of a certificate of completion, or issuance of the certificate of occupancy.

- 1. All fill placed at or below the design flood elevation in the Flood Management Area shall be balanced with at least an equal amount of soil material removal. The development shall be designed to minimize development within the Flood Management Area and amount of fill necessary. Balanced cut and fill may be used to elevate structures but shall not be used for density transfer. Residential density must be calculated prior to changes to the floodplain as a result of balanced cut and fill.*
- 2. Excavation shall not be counted as compensating for fill if such areas will be filled with water in non-storm winter conditions.*
- 3. The cumulative effect of any proposed development shall not increase the water surface elevation of the base flood. Onsite flood storage capacity shall not decrease as a result of development, vegetation removal, or excavation.*
- 4. A "No-Rise" certification is required for any fill or permitted development within the floodway pursuant to section 60.3(d)(3) of the National Flood Insurance Program.
 - a. The "No-Rise" supporting data and a copy of the engineering certification must be submitted to, and reviewed by, the City prior to approval of development, and the data shall be submitted with the Flood Hazard Permit.*
 - b. The "No-Rise" certification and supporting technical data must stipulate no impact on the 100-year flood elevations, floodway elevations, or floodway widths at the new cross-sections and at all existing cross-sections anywhere in the model.*
 - c. A sample "No-Rise" certification is available in the Community Development Department.**

- L. *Remove temporary fills. Temporary fills permitted during construction or emergency bank stabilization shall be removed if not in compliance with the balanced cut and fill standard of this code or prior to issuance of a Certificate of Occupancy or release of any bond issued for the development.*
- M. *Preserve and/or restore the vegetation corridor within the disturbed areas, and retain the existing tree canopy as established in sections 4.316, Width of Vegetation Corridor, and 4.317, Methods for Determining Vegetation Corridors Next to Primary Protected Water Features, of this chapter. An enhancement plan for disturbed areas shall be prepared and implemented to stabilize slopes to prevent landslides on slopes and sedimentation of water features. This plan shall provide for the replanting and maintenance of approved plant species designed to achieve pre-disturbance conditions.*
- N. *Maintain or reduce stream temperatures.*
- O. *Minimize erosive velocities, nutrient, and pollutant loading into water. Use filtering, infiltration, and natural water purification for stormwater runoff in compliance with the Erosion Control and Water Quality Standards of chapter 5.600 of this code. The applicant's engineering plans shall certify that runoff and sedimentation from the site will comply with the standards of chapter 5.600, Erosion Control and Water Quality Standards, of this code.*
- P. *Anchoring. All new construction and substantial improvements shall be anchored to prevent flotation, collapse, or lateral movement of the structure.*
- Q. *Construction Materials and Methods. All new construction and substantial improvements shall use flood-resistant materials in accordance with the requirements of FEMA Technical Bulletin 2-93 "Flood Resistant Materials Requirements" and utilities shall be designed and installed in accordance with FEMA Publication 348 "Protecting Building Utilities from Flood Damage." The following standards are only a summary of those requirements:*
 - 1. *All new construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage.*
 - 2. *All new construction and substantial improvements shall be constructed using methods and practices that minimize flood damage.*

3. *Electrical, heating, ventilation, plumbing, and air conditioning equipment, and other service facilities shall be designed and/or otherwise elevated or located so as to prevent water from entering or accumulating within the components during conditions of flooding.*
4. *No construction materials or methods may be used within the floodplain that would impair or damage water quality or native vegetation.*
5. *All development shall have adequate drainage provided to reduce exposure to flood damage and maintain water quality.*

Stormwater Runoff

Stormwater runoff from construction activities must be captured through the use of erosion control. The City's erosion control standards are in TDC 5.600 and the City of Troutdale Construction Standards for Public Works Facilities.

Stormwater runoff from the impervious sections of the finished trail must be captured and pre-treated prior to discharge into the City's right-of-way, stormwater systems, or to the Sandy River. The standards of TDC 5.800 Stormwater Management apply.

Building Permits

Retaining walls and lighting may require permits from the Building Safety Division of the City of Troutdale. Please contact the Building Inspector, Tom Sheirbon, at 503-674-7260.

SUBMISSION MATERIALS

- Standard City of Troutdale Land Use Application Form
- Application Fee of 1/10th of one percent of project value but not less than \$300. A credit of \$200 applies.
- Additional fees for Type III variances. The first variance is \$600. Additional variances in the same application are \$125.00 each.
- List of property owners within 250 feet of the VECO of the affected right-of-way and tax lots owned by ODOT and/or the City of Troutdale.
- Mailing labels.
- Narrative responding to the justification standards for the use of the VECO (TDC 4.315A.1.)
- Narrative responding to the variance criteria of TDC 6.215 for any variance from a dimensional standard of the VECO that is not met.

- Narrative responding to the variance criteria of TDC 6.230 for any variance that is from a non-dimensional VECO standard that is not met.
- Dimensional plan drawings showing all dimensional standards that must be evaluated.
- Revegetation / mitigation plan as required under any of the three options of TDC 4.315A.3.
- A current topographical survey shall be prepared for the entire site. The contours shall be at two-foot intervals.
 - At least three slope measurements along the affected water feature shall be made, at no more than 100-foot increments.
 - The contour maps identifying slope percentages shall be prepared and certified by a licensed professional. The mapping shall depict the width of the vegetation corridor as established in sections 4.316, Width of Vegetation Corridor, and 4.317, Method for Determining Vegetation Corridors Next to Primary Protected Water Features, of this chapter. The vegetation corridor width will vary from site to site.
- A grading plan shall also include a construction phase erosion control plan and a schedule of operations, and shall be prepared by a professional engineer registered in Oregon.
- Water quality plan. The applicant's engineer shall provide a water quality plan, consistent with the provisions of chapter 5.600, Erosion Control and Water Quality Standards, of this code and with the State of Oregon Department of Environmental Quality's National Pollutant Discharge Elimination System (NPDES) program administered by the City.

Additional submission materials may be required if the trail is within the floodway. The following are the submission materials for development within the Flood Management Area. Some of the materials are responsive to both the vegetation corridor and slope district and the Flood Management Area.

TDC 4.616 F. Submission Requirements. An application for development within the Flood Management Area shall include the following:

1. Topographic survey. Where development, excavation, or vegetation removal is proposed within the Flood Management Area, an on-the-ground topographical survey shall be prepared for the entire site. The survey shall show trees or tree clusters, existing roads, utilities, and structures with two-foot contours. The survey maps shall be provided by the property owner or applicant for development approval.
2. Base flood elevation data. Where base flood elevation data is provided through the City's Flood Insurance Study, or by other means as permitted in this chapter, the developer shall obtain and record the actual elevation lowest floor (including basement) of all new or substantially improved structures, including the placement of a manufactured home, and whether or not the

structure contains a basement. This information shall be based upon NAVD 88 and provided on a City Flood Hazard Permit form.

a. For all new or substantially improved, elevated, or floodproofed structures, verify and record the actual elevation.

b. Where development occurs within Zone A of the Flood Management Area and the Base Flood Elevation (BFE) data is not available either through the Flood Insurance Study or from another authoritative source as authorized in subsection 4.613(B) of this chapter, the Flood Hazard Permit shall be reviewed for compliance with FEMA Publication 265 issued July 1995 "Managing Floodplain Development in Approximate Zone A Areas" and applicable State of Oregon building codes.

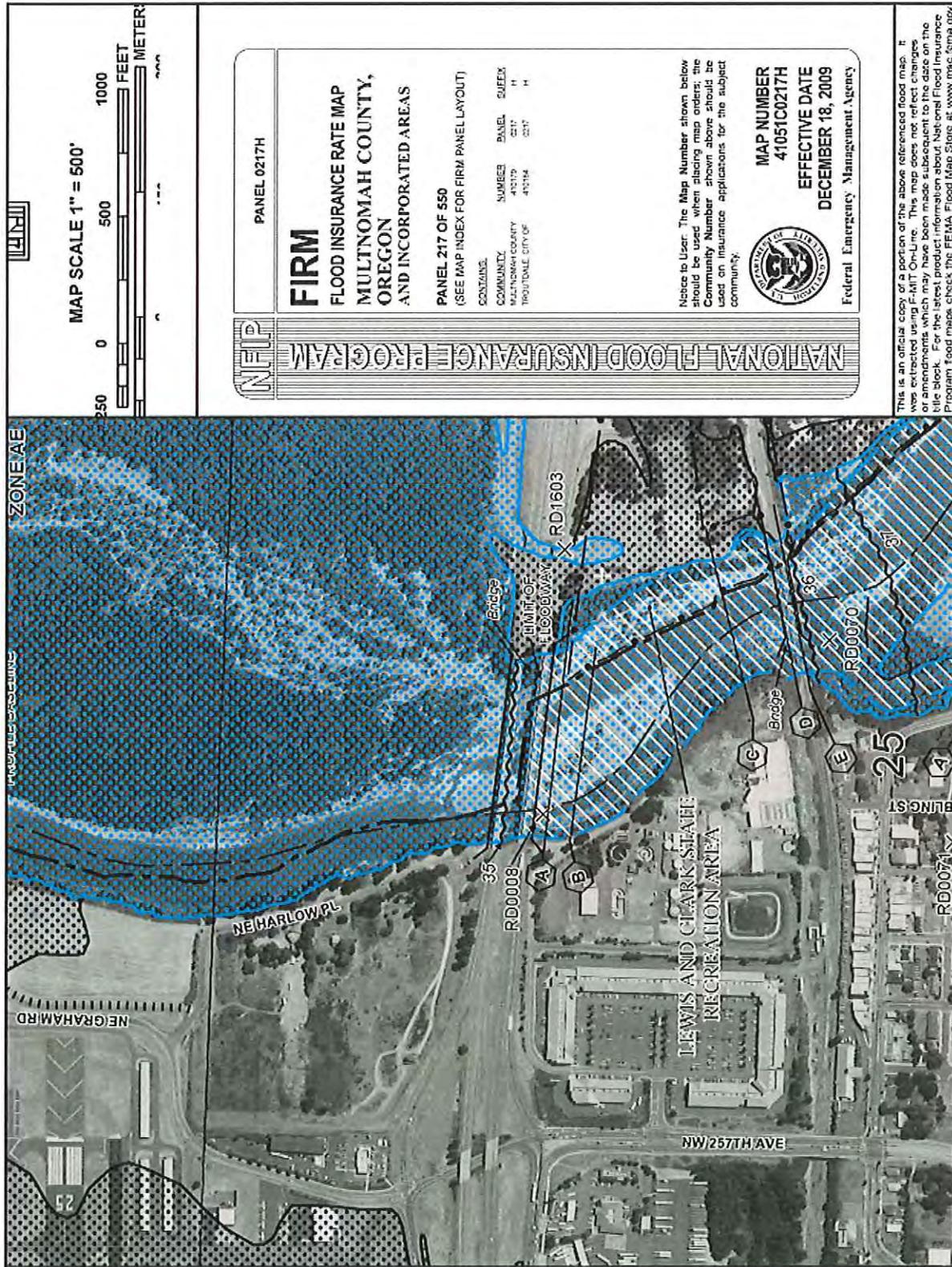
3. Hydrology and soils report. This report shall include information on the hydrological activities of the site, the effect of hydrologic conditions on the proposed development, and any hydrological or erosion hazards. This report shall also include characteristics of the soils on the site, suitability for development, its carrying capacity, and erosion or slumping characteristics that might present a hazard to life and property, or adversely affect the use or stability of a public facility or utility. Finally, this report shall include information on the nature, distribution, and strength of existing soils; the adequacy of the site for development purposes; and an assessment of grading procedures required to impose the minimum disturbance to the natural state. The report shall be prepared by a professional engineer registered in Oregon.

4. Grading plan. The grading plan shall be specific to a proposed physical structure or use and shall include information on terrain (two-foot intervals of property), drainage, direction of drainage flow, location of proposed structures and existing structures which may be affected by the proposed grading operations, water quality facilities, post-grading, and finished contours or elevations, including all cut and fill slopes and proposed drainage channels. Project designs including, but not limited to, locations of surface and subsurface devices, walls, dams, sediment basins, storage reservoirs, and other protective devices shall form part of the submission. The grading plan shall also include a construction phase erosion control plan and a schedule of operations and shall be prepared by a professional engineer registered in Oregon.

5. Vegetation report. This report shall consist of a survey of existing vegetation, whether it is native or introduced, and how it will be altered by the proposed development. Measures for enhancement of the site, including revegetation with approved plant species, will be clearly stated, as well as methods for immediate and long-term stabilization of slopes and control of soil erosion. The vegetation report shall be prepared by a landscape architect, landscape designer, botanist, or arborist with specific knowledge of approved plant species, planting and maintenance methods, survival rates, and their ability to control erosion and sedimentation. The

contractor for installation and maintenance will be responsible for replacing any approved plant species that do not survive the first two years after planting.

6. A “No-Rise” certification and a Letter of Map Revision-Fill (LOMR-F) shall be submitted with the land use application for the following activities within the floodway as mapped by FEMA:
 - a. Permanent bank stabilization that occurs in the floodway.
 - b. Development, alterations or relocations of the floodway, including any permanent fill within the floodway.



Appendix B Project Plan Sheets



DAVID EVANS
AND ASSOCIATES INC.

MEMORANDUM

DATE: December 12, 2013
TO: Ms. McCallum
City of Troutdale Planning Department
FROM: Bob Marshall
SUBJECT: TDC 4.315 A(3)(c)i Option 3 – Discretionary Review
PROJECT: OBDP00000002 – I-84: Sandy River-Jordan Rd. – Bundle 210
COPIES: Anneke Van Der Mast

The project will not remove any trees and thus cannot meet Option 1. Due to site constraints on the west bank of the Sandy River at the location of the I-84 bridge construction, mitigation for development of the trail under the I-84 bridges in the Vegetated Corridor (VECO) must comply with the requirements of “Option 3” subject to discretionary review. The applicant has provided a mitigation plan in accordance with Option 3 as shown on sheets GN, GN-3, and GN-4. The mitigation plan includes as much area within the VECO as possible, but due to the limited area to plant, also includes areas outside of the VECO. The mitigation plan was prepared in consideration of the standards of Option 2, the Port of Portland landscaping standards, and to create the most suitable vegetative landscape for the area given the site limitation and parameters. The registered landscape architect for the project, based on evaluation of the site conditions and the City and Port of Portland standards, designed a planting plan that best meets the mitigation objectives and is most likely to achieve long-term riparian, wildlife, and aesthetic values.

- The trail length within the VECO is 575-feet. Of that length, 170 feet is covered by the freeway bridges and unavailable for mitigation planting.
 - North of the westbound bridge, for a length of about 160 feet, is a storm sewer pump station and other underground and branches with overhead utilities where trees cannot be planted because roots will conflict with underground piping and overhead wires. Trees will also interfere with future maintenance on utilities.
 - East of the trail, the river bank is comprised of large riprap that is not conducive to planting. There is very little earth shoulder to the bank before the grade breaks to steep riprap. It is not practicable to infill the large rock with planting soil due to the fluctuations in river elevation and the strength and velocity of the river at high flow and the erodible nature of planting soil.
 - North of the bridge structures, plantings are subject to review by Port of Portland for compliance with its Wildlife Hazard Management Plan. This plan requires that trees be spaced so that mature canopies do not merge. This plan’s plant list does not include native riparian trees, but it does allow for a variance. The Oregon white oak (*Quercus Garryana*) is similar in growth habit to the approved Scarlet oak (*Quercus coccinea*) and 3 Oregon white oak are specified north of the bridge at the approved 60’ spacing.
-

Below outlines how the requirements are met:

Option 3. Discretionary Review. This mitigation plan varies the required number and size of trees and shrubs under Option 1 or Option 2.

A) An applicant shall submit the following:

- (1) A calculation of the number of trees and shrubs that would be required under Option 1 or Option 2.*

Response: No trees are being removed as part of the project therefore Option 1 would not apply to the project. Under Option 2, the planting requirements for mitigation of the 19, 827 SF of disturbed area within the VECO would be 198 trees and 990 shrubs.

- (2) The number and size of trees and shrubs that the applicant proposes to plant.*

Response: The proposed plantings within the vegetated corridor are 40 - 1" caliper native trees and 333 1-gallon container size native shrubs. The trees are spaced approximately 10' on center where no conflicts exist and the shrubs are spaced approximately 4' on center. Plantings extend beyond the VECO along the ROW in an effort to maximize the area planted as part of the mitigation and another 11 trees are planned just outside the VECO in this easement area bringing the total number of trees to 51.

- (3) An explanation of why the proposed number and size of trees and shrubs to be planted will achieve, at the end of the fifth year after initial planting, comparable or better mitigation results than the number and size required under Option 1 or Option 2. Such explanation shall be prepared and signed by a qualified, licensed natural resource professional or a licensed landscape architect and shall include discussion of site preparation including soil additives and removal of invasive and noxious vegetation, plant diversity, plant spacing, planting season and immediate post planting care including mulching, irrigation, wildlife protection and weed control.*

Response: This memorandum provides an explanation by an Oregon licensed Landscape Architect, Bob Marshall, as to why the site restoration plan provided under the Option 3 Discretionary Review is the best for the project area compared to Option 2. As shown on sheets GN-1, GN-3, and GN-5, the proposed mitigation includes the most trees and shrubs that can reasonably be planted to ensure healthy plants in consideration of riparian habitat and the Port of Portland landscaping standards. Every effort has been made to preserve existing trees and native vegetation. The proposed number of trees to be planted and area covered in native vegetation within the VECO, adjacent areas, and right-of-way is considerably greater than existed prior to the beginning of this project. Most of the project area identified is, and has been, historically disturbed for transportation and urban uses.

The goals of the site restoration plan are to improve water quality, facilitate production of habitat elements, and restore other aquatic habitat forming processes harmed during project construction. Generally, the objectives of

the restoration plan are to replace the functions of the vegetation that is to be altered during this project. This will be done by planting the native vegetation and removing invasive non-native species.

The tree and shrub site restoration plan has been designed to provide for a healthy and sustainable native vegetative plant community. Although Option 2 would require more plantings, Option 2 provides only a general equation to be applied to all sites and does not consider the context of the site and suitability for planting and interrelationship of vegetation to each other. Crowding the trees closer than 10' on center (O.C.) is not an option as the species used (red alder, bitter cherry, and Oregon white oak) have mature canopy spreads of between 20' and more than 60'. The required 10' spacing is already likely to result in weak plants subject to blow down in the gorge winds.

The planting plan includes red alder (*Alnus rubra*), bitter cherry (*Prunus emarginata*) and Oregon white oak (*Quercus garryana*). These three native trees provide very different wildlife functions. Alder is known for its fast growing nature which will quickly help to provide shade over the water to inhibit thermal pollution. Alder has a very tough root system that will work to bind the soil and prevent erosion in the long term. To provide viable plant diversity while using plants approved by the PDX Wildlife Hazard Management Plan the following plants are included: kinnikinnick (*Arctostaphylos uva-ursa*), creeping mahonia (*Mahonia repens*) and woods rose (*Rosa gymnocarpa*). Beside compliance with the Port of Portland Wildlife Hazard Management Plan, these low shrubs will not block views of the river or create a tunnel effect that can result in perceived or real safety concerns as a wall of shrubs allows persons to hide at the edge of the trail. The planting plan for the project is shown on sheet GN-4. All disturbed areas will be seeded with a seed mix that contains plants that are tolerant of wet conditions and of drier conditions, so native seeding will take hold on all disturbed ground.

A diverse pallet of plants was selected based on the area in which they will be planted. Elevations and slopes of the restoration area will ensure conformance to elevation and hydrologic requirements of target plant species. Plantings are mulched with medium grind bark to help preserve soil moisture. Planting period is between September 1 and May 15. Project specifications require plantings have gelled timed released water installed. Trees of 1" caliper receive 4 gel packs and shrubs receive 3 gel packs. Plantings will be maintained by the installation contractor during the first year, with watering and weed control occnrring as necessary. No permanent irrigation is anticipated.

Site preparation for the planting will be performed consistent with the Oregon Standard Specifications for Construction. Special provisions stipulate that rocks, clods, and debris be removed and that 14 weed species (including Himalayan blackberry, Scotch broom and thistles) be killed and removed. Planting pits are specified to be 3 times the root ball (container size) and planting backfill is comprised of 75% sandy loam topsoil and 25% compost. In addition to tree and shrub planting, the disturbed soils are seeded with a diverse native grass and forb mix. A compost blanket of mulch is specified as the bed for seeding which will hasten the seed germination, provide nutrients and soil biology to the native soil and provide erosion control. It is specified that seeding take place prior to September 15 and that planting take place in the late autumn to allow plants to establish good root systems prior to the following growing season.

(4) A monitoring and reporting plan for the mitigation site

Response: The contractor is responsible for plant health and maintenance during a one year warranty period. Per the Environmental Performance Standards (see land use application narrative), monitoring and maintenance will be conducted for five years or until success criteria is achieved – whichever occurs first. The Contractor will assume monitoring responsibility for the first year following construction. ODOT will assume monitoring responsibility for monitoring thereafter. During the site visit, the Contractor will inspect the plantings and make plans to correct factors that may prevent attainment of design and success criteria established in this plan or in permits issued by regulatory agencies. For each site monitoring visit, a written record will document the date, site conditions, and any corrective action that will be taken.

Please consider the rationale for the Option 3 mitigation in your determination for approval.

Thank you.



Attachments/Enclosures:

Initials:

File Name: Document2



Anneke Van der Mast

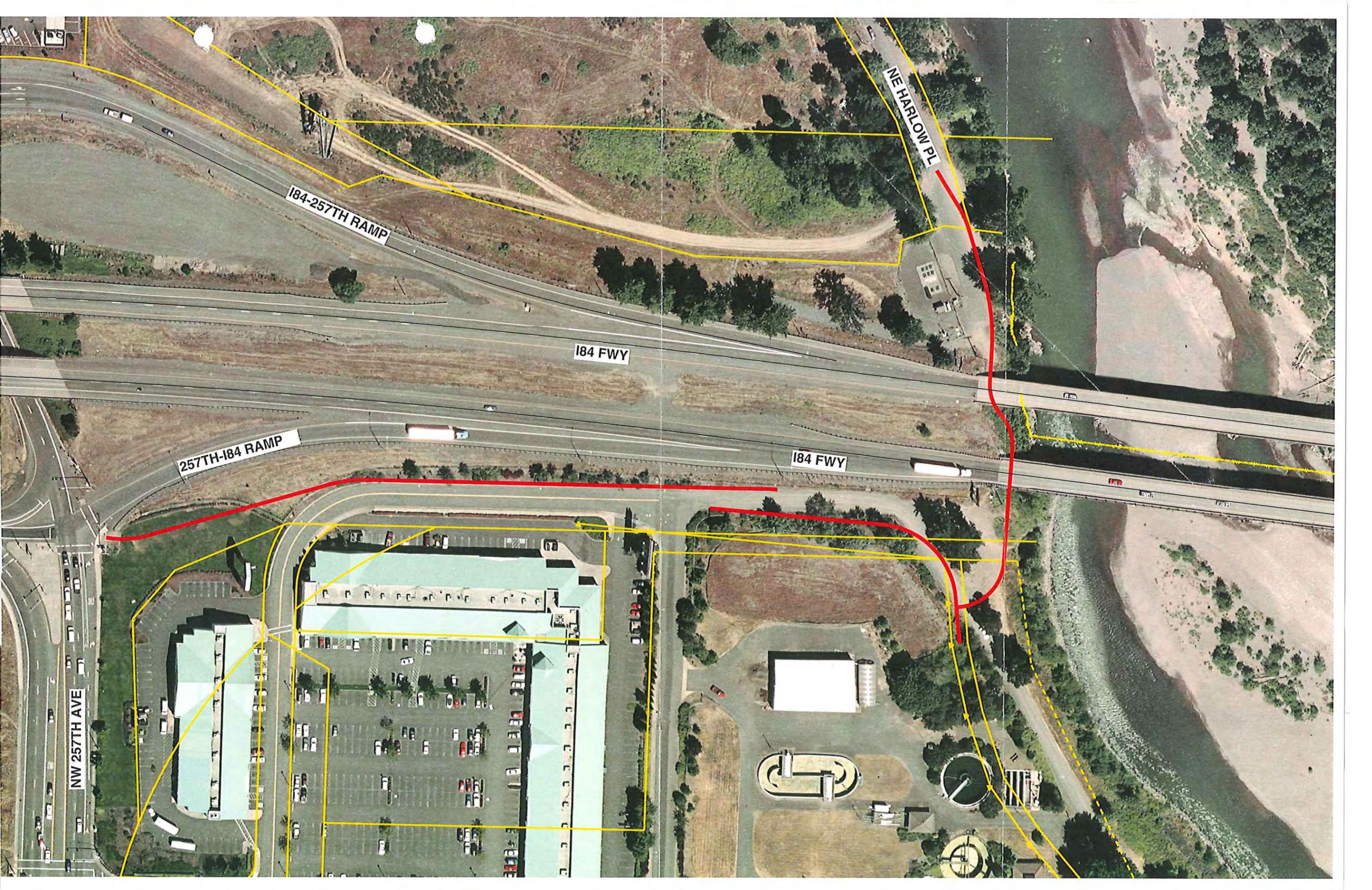
From: Anneke Van der Mast
Sent: Thursday, December 12, 2013 2:57 PM
To: Anneke Van der Mast (AMV@deainc.com)
Subject: FW: Sandy River West Side TrailDatum Confirmation

From: Mike Hickey
Sent: Thursday, December 12, 2013 2:55 PM
To: Anneke Van der Mast; Mike Hickey
Subject: RE: Sandy River West Side TrailDatum Confirmation

Anneke,

The original conversion note from '29 vertical datum to '88 vertical datum was reversed.
The project is based on '88 datum.
To convert NAVD88 datum to NGVD29 datum subtract 3.43.

Hope this helps
Mike



NE HARLOW PL

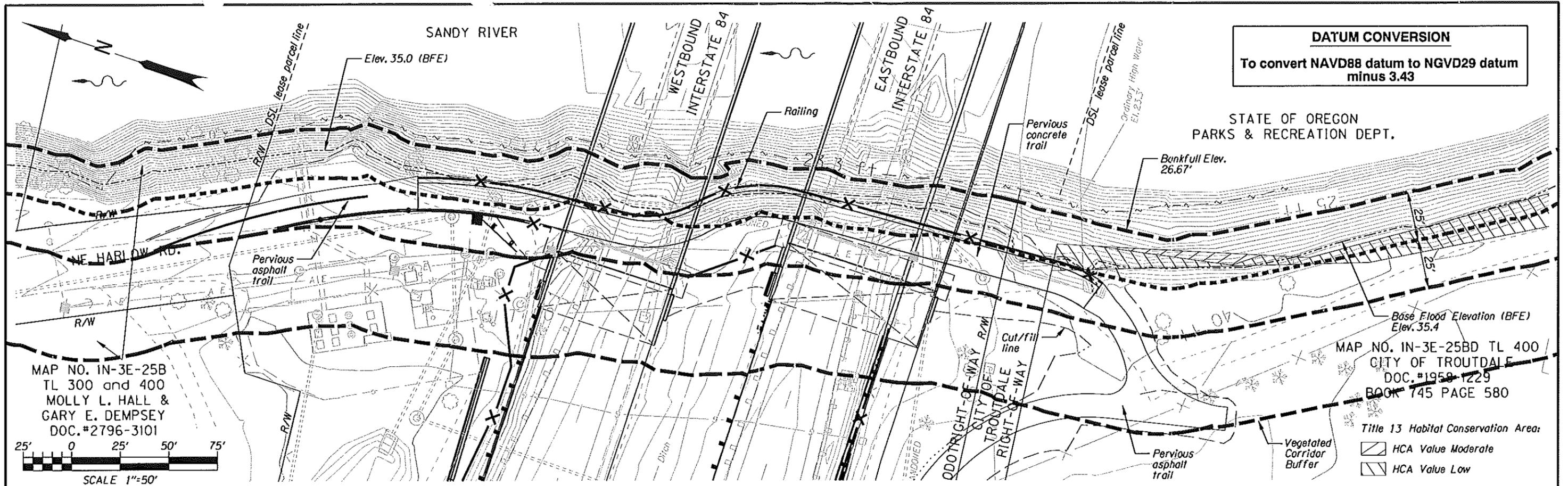
184-257TH RAMP

184 FWY

257TH-184 RAMP

184 FWY

NW 257TH AVE

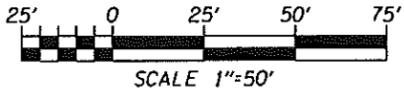


DATUM CONVERSION
 To convert NAVD88 datum to NGVD29 datum
 minus 3.43

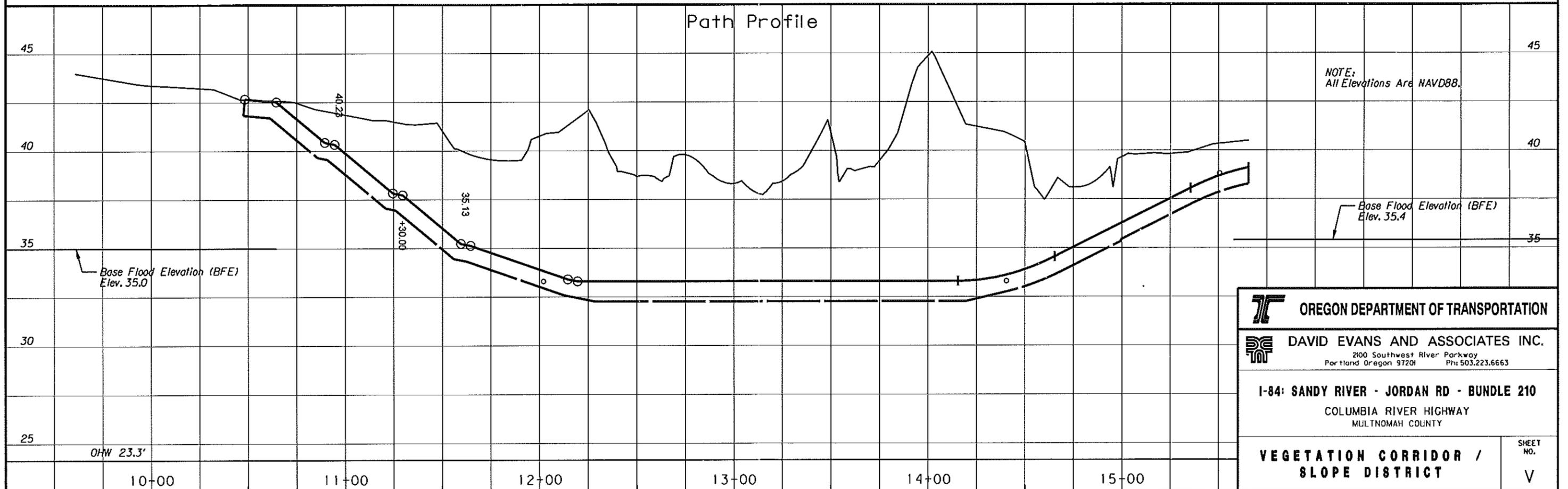
STATE OF OREGON
 PARKS & RECREATION DEPT.

MAP NO. IN-3E-25B
 TL 300 and 400
 MOLLY L. HALL &
 GARY E. DEMPSEY
 DOC.#2796-3101

MAP NO. IN-3E-25BD TL 400
 CITY OF TROUTDALE
 DOC.#1959-1229
 BOOK 745 PAGE 580



Title 13 Habitat Conservation Area:
 HCA Value Moderate
 HCA Value Low



OREGON DEPARTMENT OF TRANSPORTATION

DAVID EVANS AND ASSOCIATES INC.
 2100 Southwest River Parkway
 Portland Oregon 97201 Ph: 503.223.6663

I-84: SANDY RIVER - JORDAN RD - BUNDLE 210
 COLUMBIA RIVER HIGHWAY
 MULTNOMAH COUNTY

VEGETATION CORRIDOR / SLOPE DISTRICT

SHEET NO. V

DATUM CONVERSION
To convert NAVD88 datum to NGVD29 datum
minus 3.43

Limits of seeding:
at edge of shoulder
aggregates - 9' from face
of guardrail or 15' from
edge of pavement
where no guardrail

No work zone
(Ordinary High Water)

All areas disturbed by
construction to be included
in weed management area

Stormwater system
See Shts. GJ and GJ-2
For Details

Regulated work area
below ordinary high water
elevation 23.30

Ordinary high water
elevation 23.30

BFE
Elev. 35.0

Ordinary high water
elevation 23.30

SEE SHEET GN-3

SEE SHEET GN-5

MATCHLINE

MATCHLINE

Remove
aggregate
base rock.
Prepare for
seeding per
01040.4B(d)

Preserved 36" oak,
24" maple & 24"
Douglas fir

Temp. const. ease.

Plant trees between
stone columns (See
ground improvement details
for drg. no. B1315)

Vegetated corridor
inland limit

Bankfull & Vegetated
corridor buffer

Temp. const. ease.
BFE Elev. 35.4

Preserved 36" oak
& twin 15" oaks

SANDY RIVER

NOTE:
All Elevations Are NAVD88.

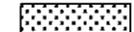
DSL easement

Legend:

-  Permanent Seed Mix No. 1
-  Permanent Seed Mix No. 2
-  Native Upland Shrub Mix (Shade Tolerant)
-  Scouler's Willow - Plant Cuttings

 Red Twig Dogwood - Plant Cuttings

 Soft Rush

 Slough Sedge

 Spreading Rush

 Native Upland Shrub Mix (Sun)

- ① Seed with Permanent Seed Mix No. 1
- ② Plant conifer trees, Douglas Fir, 3' ht., - 14 (For detail see sht. GN)
- ③ Plant deciduous trees, Oregon White Oak, 1" cal., - 25 (For detail see sht. GN)
- ④ Plant deciduous trees, Oregon Ash, 1" cal., - 36 (For detail see sht. GN)
- ⑤ Plant deciduous trees, Pacific Dogwood, 1" cal., - 16 (For detail see sht. GN)
- ⑥ Plant deciduous trees, Scouler's Willow, 1" cal., - 25 (For detail see sht. GN)

- ⑦ Seed with Permanent Seed Mix No. 2
- ⑧ Plant tubeling plants, 0.04 gal. Soft Rush - 600 (For detail see sht. GN)
- ⑨ Install plant cuttings, small, Scouler's willow - 1300 (For Detail, See Sht. GN-2)
- ⑩ Install plant cuttings, small, Red Twig Dogwood - 2275 (For detail see sht. GN-2)
- ⑪ Plant tubeling plants, 0.04 gal. Slough Sedge - 575 (For detail see sht. GN)

- ⑫ Install stormwater system topsoil, 18" thickness in water quality swale - 522
- ⑬ Plant tubeling plants, 0.04 gal. Spreading Rush - 295 (For detail see sht. GN)
- ⑭ Install topsoil, 24" over riprap (See coir block soil lift detail, Sht. GA)
- ⑮ Plant shrubs, 1 gal. containers - 585 (Native, upland species, see legend)

- ⑯ Plant shrubs, 1 gal. containers - 333 (Native, upland species - sun, see legend)
- ⑰ Plant trees, 1" cal. red alder - 16 (for detail, see sht. GN)
- ⑱ Plant trees, 1" cal. bitter cherry - 21 (for detail, see sht. GN)
- ⑲ Plant trees, 1" cal. Oregon White Oak - 4 (for detail, see sht. GN)

REVISIONS

Plantings for File 13-047

REGISTERED
FOR REVIEW ONLY
LANDSCAPE ARCHITECT
333
Robert Marshall
OREGON
10/12/95

OREGON DEPARTMENT OF TRANSPORTATION

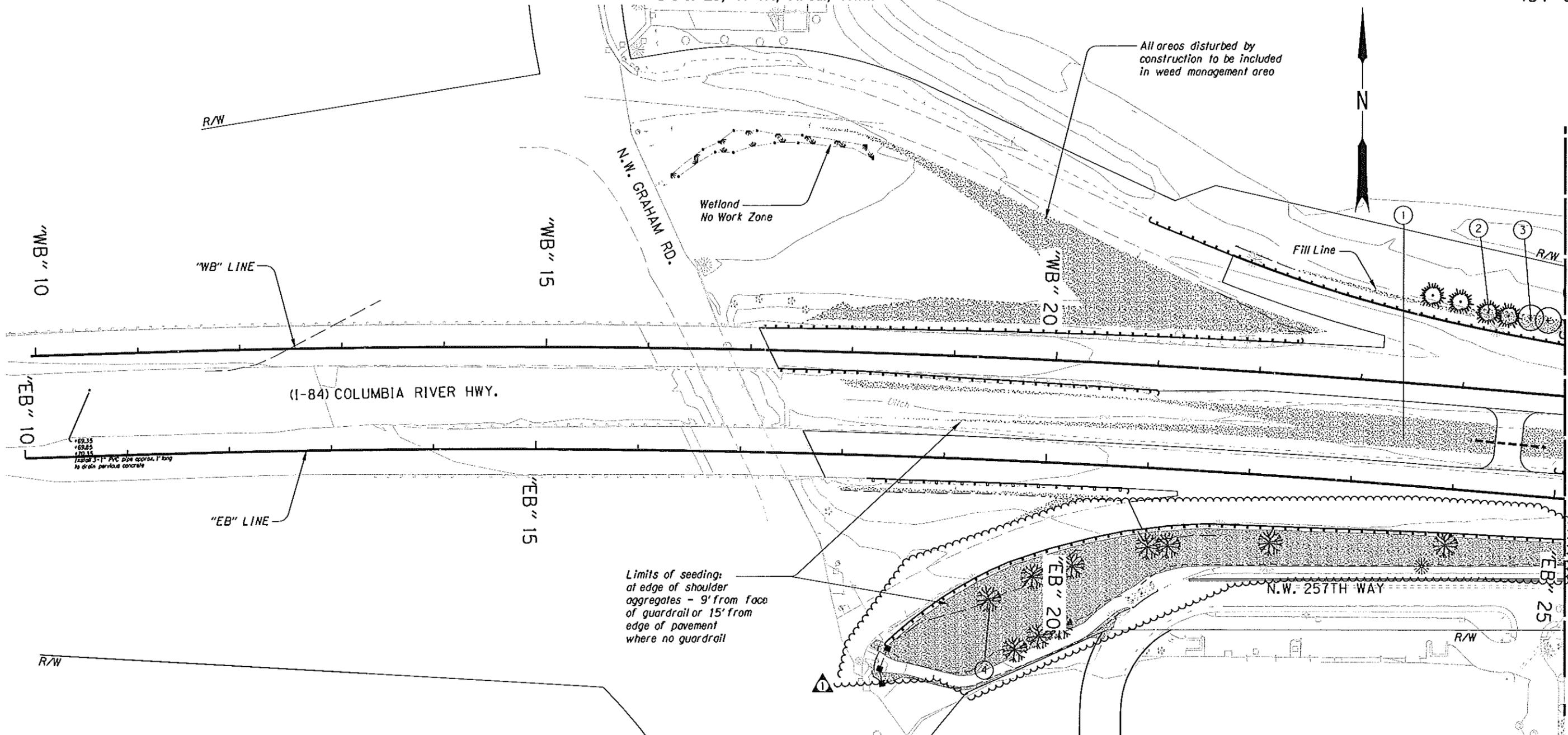
DAVID EVANS AND ASSOCIATES INC.
200 Southwest River Parkway
Portland Oregon 97201 Ph: 503.223.6663

I-84: SANDY RIVER - JORDAN RD - BUNDLE 210
COLUMBIA RIVER HIGHWAY
MULTNOMAH COUNTY

Reviewed By - R. Williams
Designed By - R. Marshall
Drafted By - R. Marshall

ROADSIDE DEVELOPMENT
PLAN

SHEET NO.
GN-4



- ① Seed with Permanent Seed Mix No. 1
- ② Plant conifer trees, Douglas Fir, 3' ht., - 4 (For detail see sht. GN)
- ③ Plant deciduous Trees, Oregon Ash, 1" Cal. - 2 (For detail see sht. GN)
- ④ Plant deciduous Trees, Oregon white oak 1" Cal. - 10 (For detail see sht. GN)

Legend:

	Permanent Seed Mix No. 1
	Permanent Seed Mix No. 2 (Same as area of stormwater topsoil)

REVISIONS	
①	Revised 10-15-13 Revised White Oak quantity

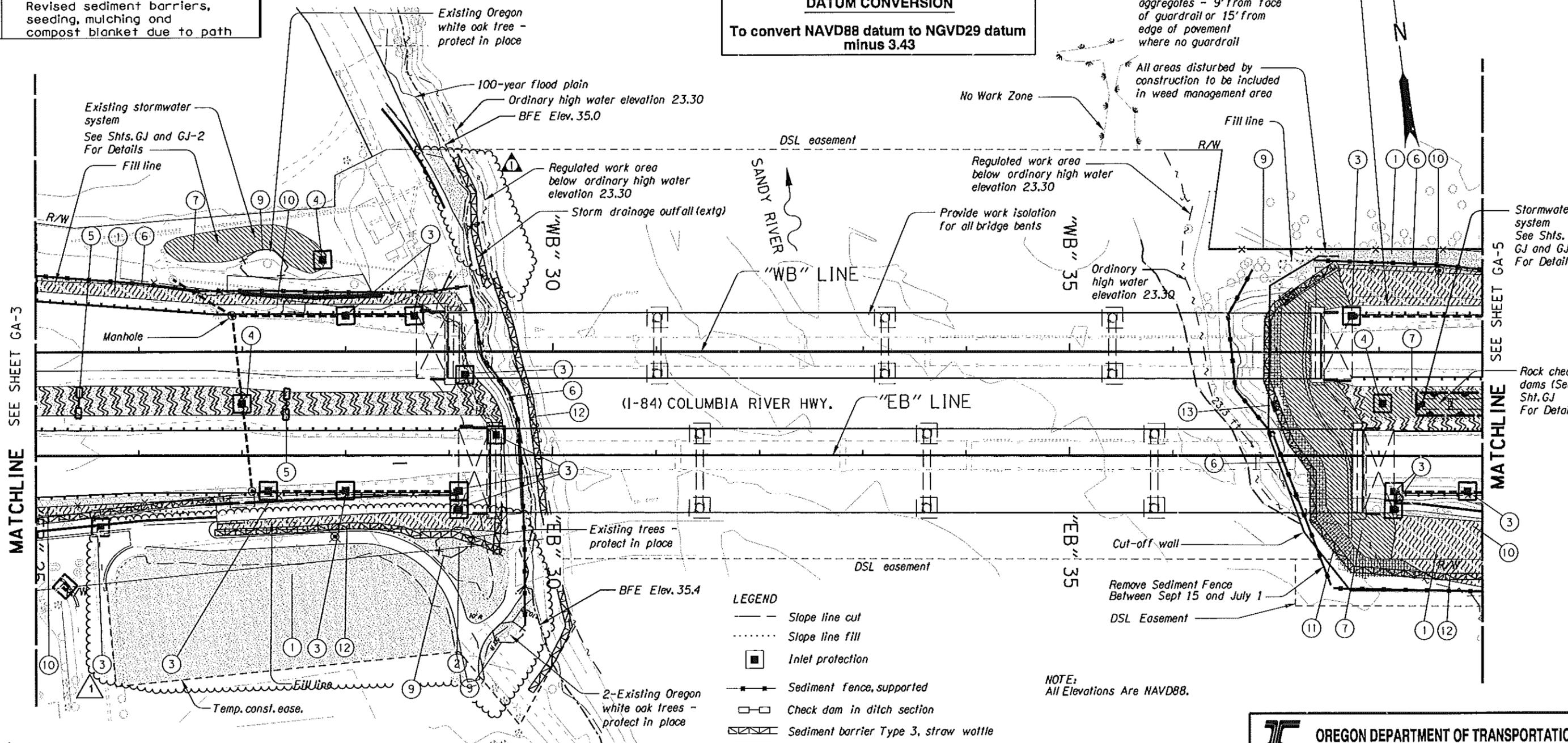
REGISTERED
333
Robert Marshall
ARCHITECT
FOR REVIEW ONLY
OREGON
10/12/95
LANDSCAPE ARCHITECT

OREGON DEPARTMENT OF TRANSPORTATION	
DAVID EVANS AND ASSOCIATES INC. 2100 Southwest River Parkway Portland Oregon 97204 Ph: 503.223.6663	
I-84: SANDY RIVER - JORDAN RD - BUNDLE 210 COLUMBIA RIVER HIGHWAY MULTNOMAH COUNTY	
Reviewed By - R. Williams Designed By - R. Marshall Drafted By - R. Marshall	
ROADSIDE DEVELOPMENT PLAN	SHEET NO. GN-3

REVISIONS

- Revised 10-3-13
- Revised sediment barriers, seeding, mulching and compost blanket due to path

DATUM CONVERSION
 To convert NAVD88 datum to NGVD29 datum minus 3.43



- LEGEND**
- Slope line cut
 - Slope line fill
 - Inlet protection
 - *— Sediment fence, supported
 - Check dam in ditch section
 - ▨ Sediment barrier Type 3, straw wattle
 - ▩ Erosion control matting
 - ▧ Coir block soil lift w/ plant cuttings (small)
 - ▦ Seeding and mulching
 - ▥ Compost blanket
 - ▤ Compost blanket with matting
 - ~ Direction of flow
 - x— Temporary orange plastic mesh fence
 - - - Storm water pipe (see drainage plans)
 - ▣ Class 700 storm water outfall scour protection

NOTE:
 All Elevations Are NAVD88.

- ① Seed with Permanent Seed Mix No. 1
- ② Install compost blanket 2" thickness
- ③ Install inlet protection, type 3 (See drg. no. RD1010)
- ④ Install inlet protection, type 4 - 3 (See drg. no. RD1015)
- ⑤ Install check dam, type 3 - 2 (See drg. no. RD1005)
- ⑥ Install sediment fence, supported (See drg. no. RD1040)
- ⑦ Install matting (See drg. no. RD1055)
- ⑧ Install construction entrance (Field locate as directed by engineer) (See drg. no. RD1000)
- ⑨ Install temporary orange plastic Mesh Fence
- ⑩ Install compost blanket with matting (See drg. no. RD1055)
- ⑪ Construct coir block soil lift - 3572 ft. (See detail, sht. GA)
- ⑫ Install sediment barrier, type 3 (See drg. no. RD1035)
- ⑬ Construct stormwater outfall scour protection from class 700 riprap (See Sht. GA-2 for detail)

REGISTERED
 333
 Robert Marshall
 OREGON
 10/12/95
 LANDSCAPE ARCHITECT

OREGON DEPARTMENT OF TRANSPORTATION

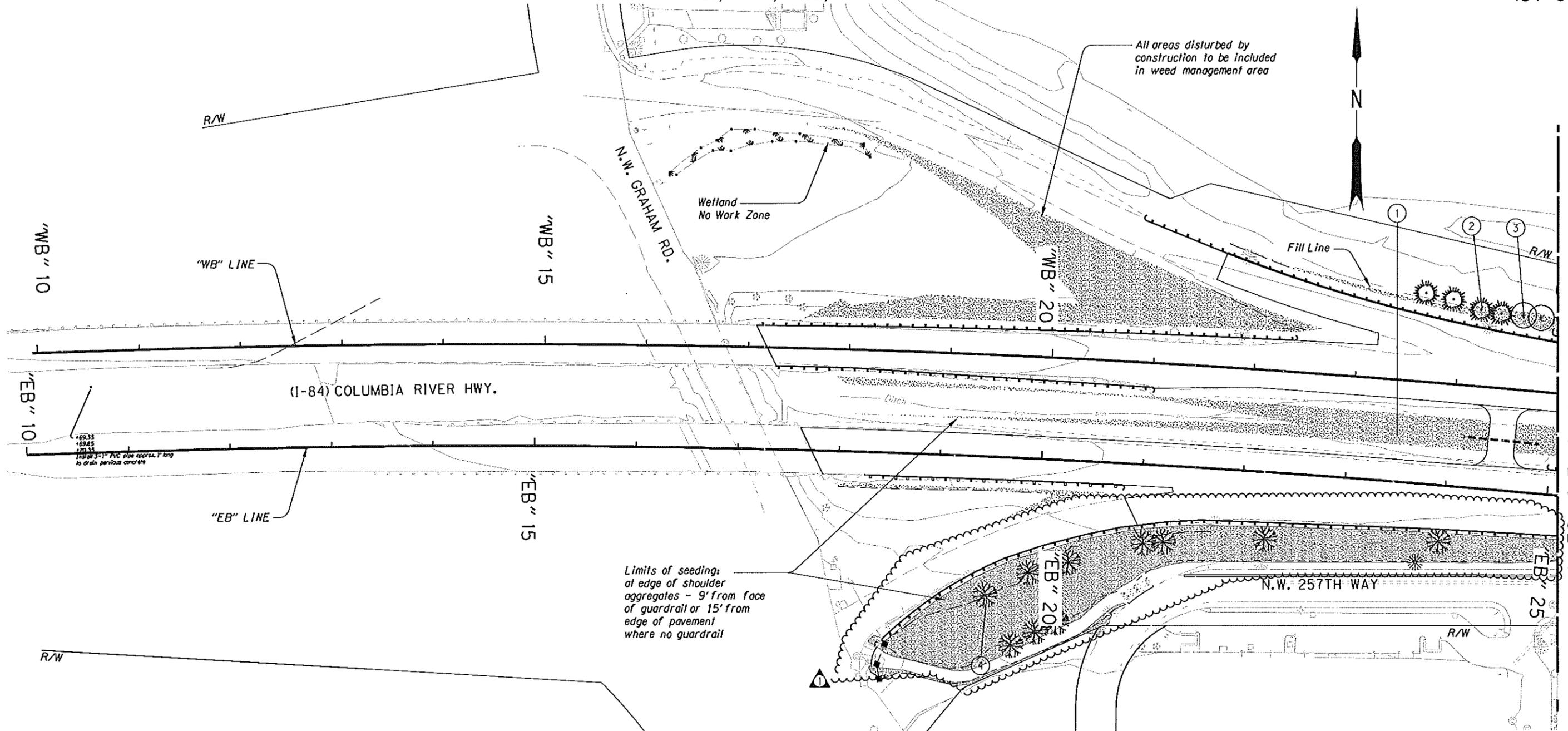
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 2100 Southwest River Parkway
 Portland Oregon 97201 Ph: 503.223.6663

I-84: SANDY RIVER - JORDAN RD - BUNDLE 210
 COLUMBIA RIVER HIGHWAY
 MULTNOMAH COUNTY

Reviewed By - R. Williams
 Designed By - R. Marshall
 Drafted By - R. Marshall

EROSION CONTROL PLAN

SHEET NO.
GA-4



MATCHLINE SEE SHEET GN-4

- ① Seed with Permanent Seed Mix No. 1
- ② Plant conifer trees, Douglas Fir, 3' ht., - 4
(For detail see sht. GN)
- ③ Plant deciduous Trees, Oregon Ash, 1" Cal. - 2
(For detail see sht. GN)
- ④ Plant deciduous Trees, Oregon white oak 1" Cal. - 10
(For detail see sht. GN)

Legend:

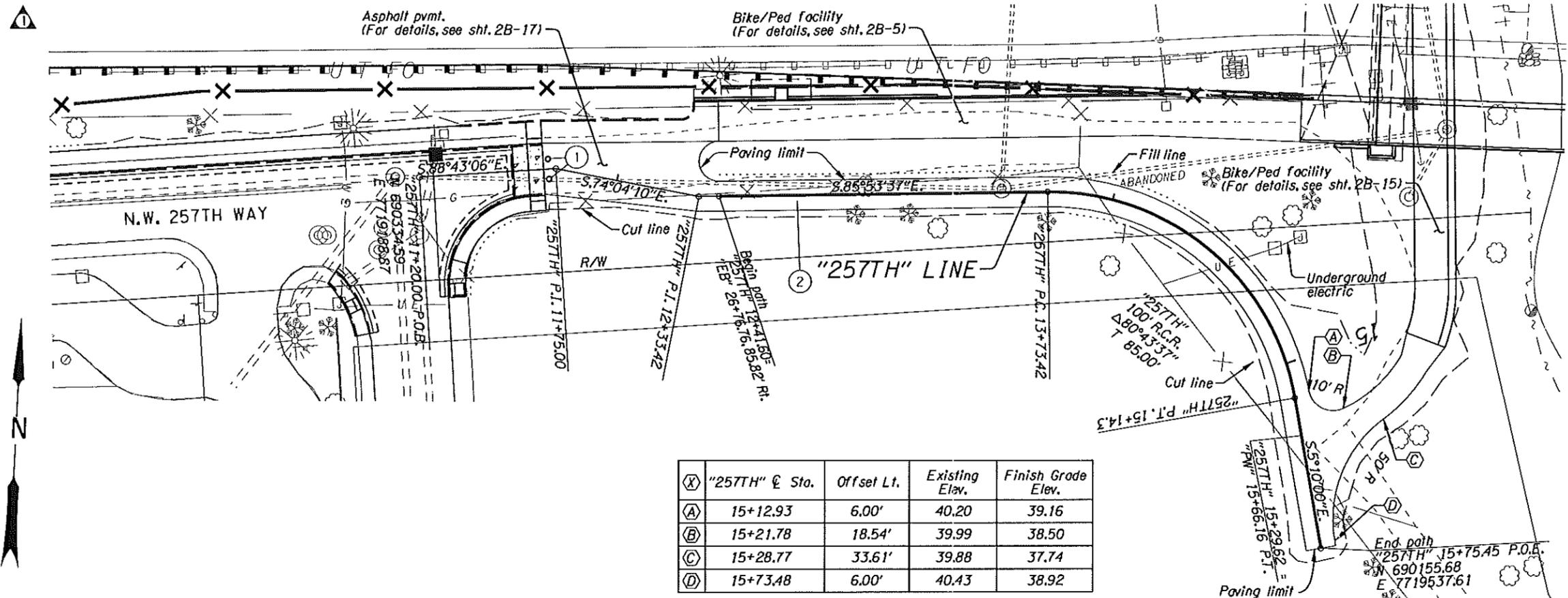
	Permanent Seed Mix No. 1
	Permanent Seed Mix No. 2 (Same as area of stormwater topsoil)

Limits of seeding:
at edge of shoulder
aggregates - 9' from face
of guardrail or 15' from
edge of pavement
where no guardrail

REVISIONS	
①	Revised 10-15-13 Revised White Oak quantity

REGISTERED
333
Robert Marshall
LANDSCAPE ARCHITECT
FOR REVIEW ONLY
OREGON
10/12/95

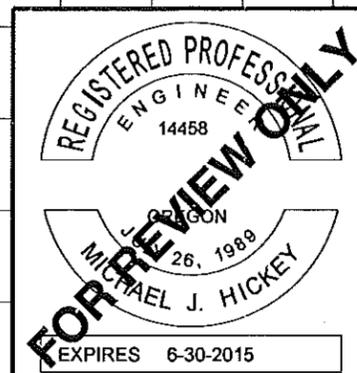
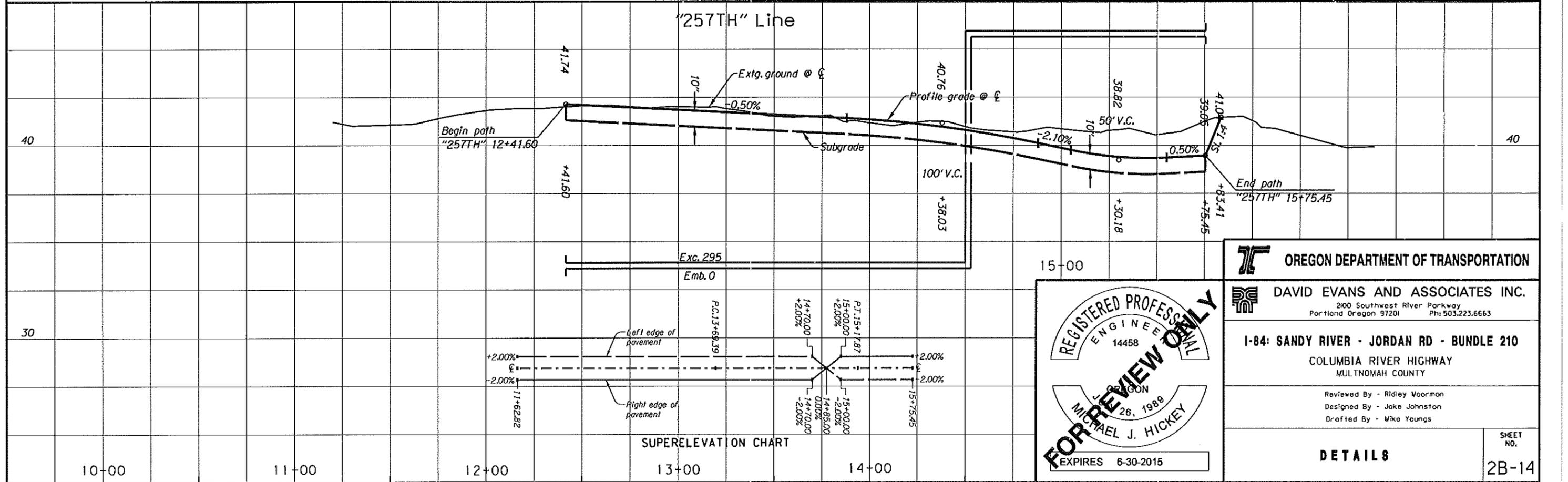
OREGON DEPARTMENT OF TRANSPORTATION	
DAVID EVANS AND ASSOCIATES INC. 2100 Southwest River Parkway Portland Oregon 97201 Pht 503.223.6663	
I-84: SANDY RIVER - JORDAN RD - BUNDLE 210 COLUMBIA RIVER HIGHWAY MULTNOMAH COUNTY	
Reviewed By - R. Williams Designed By - R. Marshall Drafted By - R. Marshall	
ROADSIDE DEVELOPMENT PLAN	SHEET NO. GN-3



- ① Sta. "257TH" 11+72.00
Install removable bollard @ 8' O.C. - 2
(For details, see sht. 2B-16)
- ② Const. asph. conc. sidewalk
(See drg. no. RD720)

Station	Offset Lt.	Existing Elev.	Finish Grade Elev.
"257TH" C Sta.			
(A) 15+12.93	6.00'	40.20	39.16
(B) 15+21.78	18.54'	39.99	38.50
(C) 15+28.77	33.61'	39.88	37.74
(D) 15+73.48	6.00'	40.43	38.92

REVISIONS	
①	Revised TBD Added sheet



OREGON DEPARTMENT OF TRANSPORTATION

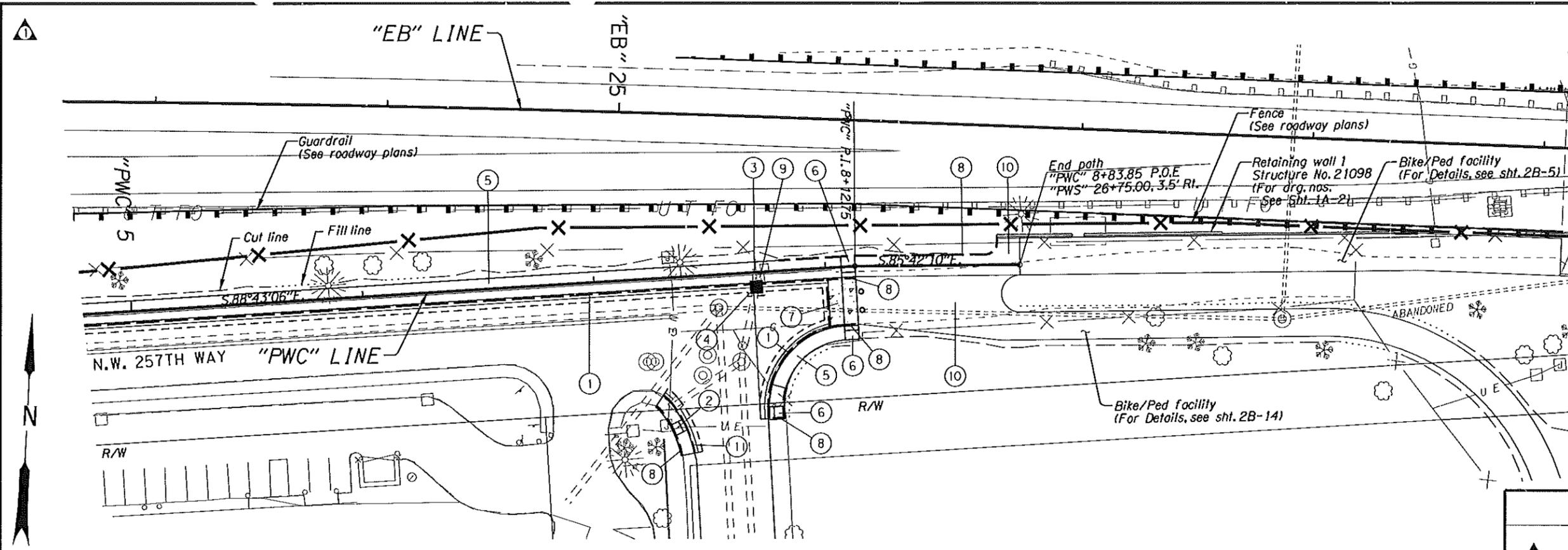
DAVID EVANS AND ASSOCIATES INC.
2100 Southwest River Parkway
Portland Oregon 97201 Ph: 503.223.6663

I-84: SANDY RIVER - JORDAN RD - BUNDLE 210
COLUMBIA RIVER HIGHWAY
MULTNOMAH COUNTY

Reviewed By - Ridley Woormon
Designed By - Jake Johnston
Drafted By - Mike Youngs

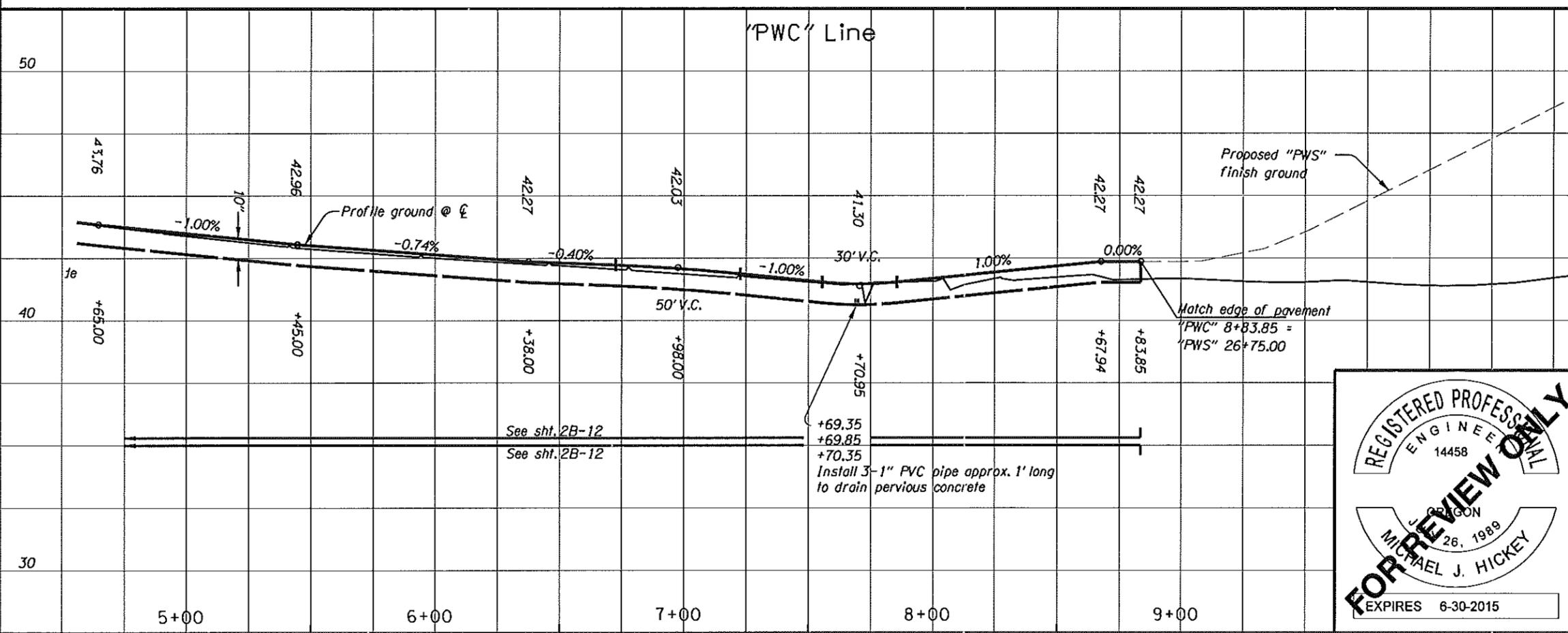
DETAILS

SHEET NO. 2B-14



- ① Const. standard curb and gutter (See drg. no. RD700)
- ② Const. parallel sidewalk ramp - 1 (For details, see sht. 2B-17) (See drg. no. RD755)
- ③ Remove stop sign - 1
- ④ Sta. "PWC" 7+69.85, 6.36' Rt. Const. type G-2 inlet - 1 (Rim elev. 40.70' F.L. 36.90' Connect to extg. 12" conc. storm pipe
- ⑤ Const. pervious P.C. conc. pvmt. (See drg. no. RD720)
- ⑥ Const. perpendicular sidewalk ramp - 3 (See drg. no. RD755)
- ⑦ Const. conc. driveway 20' (For details, see sht. 2B-17) (See drg. no. RD715)
- ⑧ Const. standard curb (See drg. no. RD700)
- ⑨ Remove catch basin
- ⑩ Const. asph. conc. sidewalk (See drg. no. RD720)

REVISIONS	
⚠	Revised TBD Added sheet



OREGON DEPARTMENT OF TRANSPORTATION

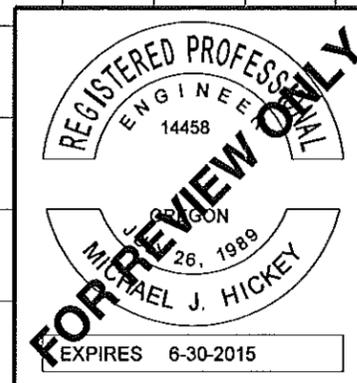
DAVID EVANS AND ASSOCIATES INC.
2100 Southwest River Parkway
Portland Oregon 97204 Ph 503.223.6663

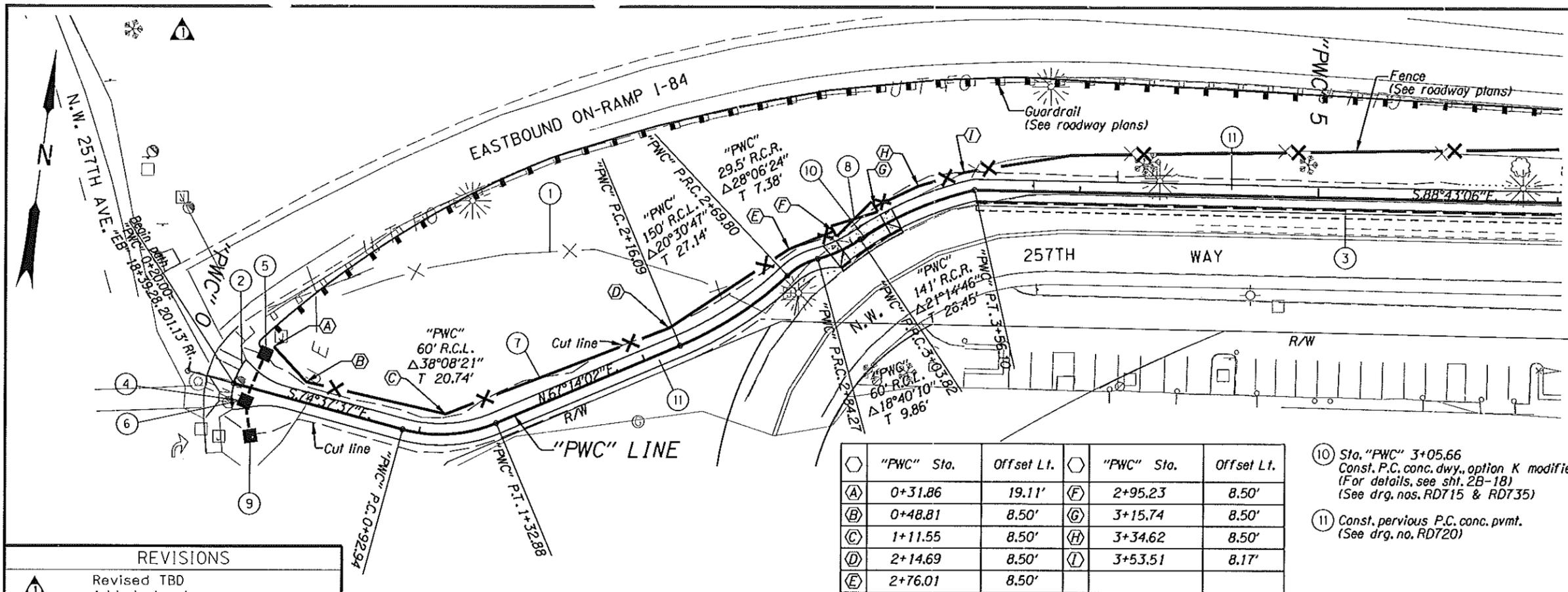
I-84: SANDY RIVER - JORDAN RD - BUNDLE 210
COLUMBIA RIVER HIGHWAY
MULTNOMAH COUNTY

Reviewed By - Ridley Moorman
Designed By - Jake Johnston
Drafted By - Mike Youngs

DETAILS

SHEET NO. **2B-13**

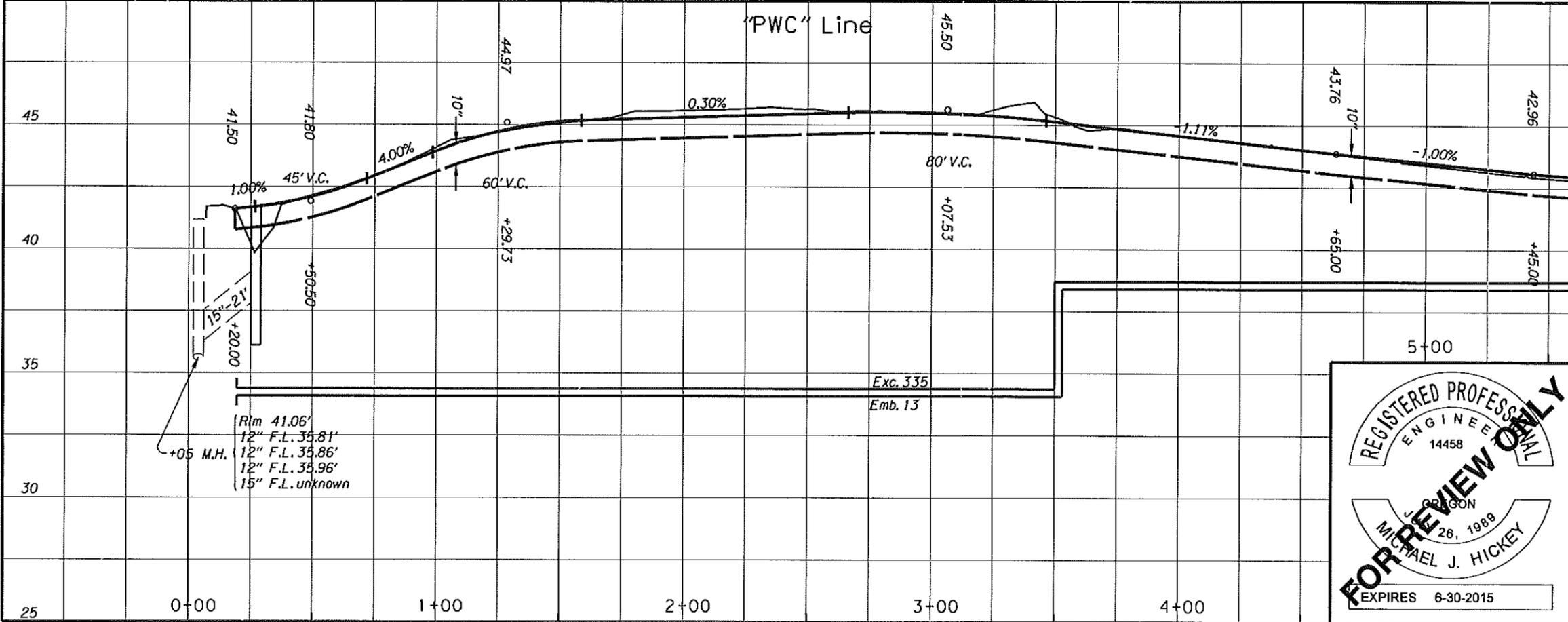




- 43V-050
- 1 Remove extg. fence
 - 2 Sta. "PWC" 0+27.18
Remove extg. curb
(For details, see sht. 2B-16)
 - 3 Const. standard curb and gutter
(See drg. no. RD700)
 - 4 Const. type G-2 inlet with solid top
Inst. 12" sew. pipe - 21.42', Sl. = 2.0%
5' Depth
Inst. 12" sew. pipe - 14.59', Sl. = 2.0%
5' Depth
F.L. elev. 37.74' In (N)
F.L. elev. 37.74' In (S)
F.L. elev. 37.72' Out (W)
(For details, see sht. 2B-18)
(See drg. nos. RD336 & RD 364)
 - 5 Sta. "PWC" 0+29.24, 15.25' Lt.
Const. field inlet
Grate elev. 41.63'
F.L. elev. 38.17' Out (S)
(See drg. no. RD374)
 - 6 Connect to existing structures
 - 7 Sta "PWC" 0+31.86 Lt. to 3+53.51 Lt.
Const. type CL-6 fence (color #4) - 18' add'l.
(See sht. 3A, note 4)
(See drg. nos. RD815 & RD820)
 - 8 Sta "PWC" 3+05.00 Lt. inst. 20' gate
(See drg. nos. RD810 & RD820)
 - 9 Sta "PWC" 0+32.20, 19.38' Rt.
Const. field inlet
Grate elev. 41.25'
F.L. elev. 38.03' Out (N)
(See drg. no. RD 374)
 - 10 Sta. "PWC" 3+05.66
Const. P.C. conc. dwy., option K modified
(For details, see sht. 2B-18)
(See drg. nos. RD715 & RD735)
 - 11 Const. pervious P.C. conc. pvt.
(See drg. no. RD720)

"PWC" Sta.	Offset Lt.	"PWC" Sta.	Offset Lt.
(A) 0+31.86	19.11'	(F) 2+95.23	8.50'
(B) 0+48.81	8.50'	(G) 3+15.74	8.50'
(C) 1+11.55	8.50'	(H) 3+34.62	8.50'
(D) 2+14.69	8.50'	(I) 3+53.51	8.17'
(E) 2+76.01	8.50'		

REVISIONS	
1	Revised TBD Added sheet



REGISTERED PROFESSIONAL ENGINEER
 14458
 OREGON
 MICHAEL J. HICKEY
 26, 1989
 EXPIRES 6-30-2015

OREGON DEPARTMENT OF TRANSPORTATION

DAVID EVANS AND ASSOCIATES INC.
 2100 Southwest River Parkway
 Portland Oregon 97201 Ph: 503.223.6663

I-84: SANDY RIVER - JORDAN RD - BUNDLE 210
 COLUMBIA RIVER HIGHWAY
 MULTNOMAH COUNTY

Reviewed By - Ridley Woorman
 Designed By - Jake Johnston
 Drafted By - Mike Youngs

DETAILS

SHEET NO. 2B-12

Appendix C Environmental Performance Standards, ODOT Standard Specifications and ODOT Special Provisions

Appendix C

Environmental Performance Standards Supporting Documentation Applicable Environmental Performance Standards

Species Avoidance and Effects Minimization

- Fish Avoidance
- Timing of In-Water Work
- Cessation of Work
- Fish Screens
- Fish Passage
- Hydro-Acoustic
- Isolation of In-Water Work Area
- Capture and Release
- Wildlife Avoidance (Bridge Disturbance)
- Migratory Birds
- Bats
- Wildlife Passage

Habitat Avoidance and Removal Minimization

- Streambank Protection
- Habitat Removal

Water Quality

- Pollution and Erosion Control Plan
- Spill Prevention and Staging Activities
- Construction Discharge Water
- Piling Removal
- Treated Wood
- Site Stabilization
- Stormwater Management
- Site Restoration
- Access/Staging
- Compensatory Mitigation
- Fluvial
- Deleterious Waste Materials
- Materials Procurement and Use Hierarchy
- Materials Performance Standard
- Contamination Performance Standard

Non-applicable Environmental Performance Standards

- Wildlife Avoidance/Harassment (High Noise)
- Marbled Murrelet
- Bald Eagle
- Northern Spotted Owl
- Peregrine Falcon
- Marine Mammals Avoidance
- Noise Disturbance
- Visual Disturbance
- Monitoring
- Plant Avoidance
- Vernal Pool Fairy Shrimp Avoidance
- Habitat Avoidance and Removal Minimization
- Borrow Pits

Species Avoidance and Effects Minimization

Several of the **Species Avoidance and Effects Minimization** environmental performance standards are appropriate for this project as outlined below.

Fish Avoidance

The **Fish Avoidance** environmental performance standard is appropriate for this project because federally listed species including Lower Columbia River (LCR) Chinook salmon, LCR coho salmon, and LCR steelhead may occur in the Sandy River in the vicinity of Bridge 06875A. Eulachon (smelt) is proposed for listing and is present throughout the project reach. This environmental performance standard is being applied by employing avoidance techniques outlined below and by ODOT standard construction specifications and special provisions.

Specification section 00290.34 addresses protection of fish and fish habitat.

Timing of In-Water Work

The **Timing of In-Water Work** environmental performance standard is appropriate for this project because bridge replacement activities, including existing pier removal, new pier installation, and installation of temporary structures, will require work below the ordinary high water (OHW) level of the Sandy River. The in-water work window is July 15-August 31.

Due to the low clearance it would be extremely difficult to completely extract the piles below the new I-84 bridges requiring approximately 162 piles to be cut off three feet below existing ground elevation. All other temporary structures would be removed at the completion of the work in accordance with the environmental performance standards. A 5-foot below-grade cut was cited in the original permits.

Existing roadway fill embankment will be removed below the OHW elevation on the east side of the channel. It is likely the contractor will conduct excavation below the OHW elevation outside the in-water work window but in dry conditions. The river is expected to maintain low flows through October, allowing the contractor time to conduct work in the dry.

Work occurring outside of the preferred in-water window to successfully complete the project will not proceed without approval from the appropriate regulatory agencies (e.g., NMFS, ODFW).

Cessation of Work

The **Cessation of Work** environmental performance standard is appropriate for this project because work will be occurring within and adjacent to the Sandy River. This environmental performance standard will be followed through monitoring of current and projected river flows. Work will be ceased under high flow conditions that may inundate work areas and/or threaten the capacity of structures (e.g., cofferdams) to keep work areas isolated, except for efforts to minimize natural resource damage.

Fish Screens

The **Fish Screens** environmental performance standard is appropriate for this project because pumping may occur for work area isolation. This environmental performance standard will be properly followed by installing, operating, and maintaining fish screens (in accordance with NOAA Fisheries criteria) on any intake to pumps used as part of any work area isolation, including isolation used for the removal of the existing bridge piers and installation of the new bridge piers.

The following is a draft special provision that modifies the standard specifications in 00290.34 to show detail on how this project will meet the fish screen EPS.

(3) Water Intake Screening – Install, operate, and maintain fish screens on each water intake used for project construction, including pumps used to isolate an in-water work area. When drawing or pumping water from any stream, protect fish by equipping intakes with screens having a minimum 27% open area and meeting the following requirements:

- Perforated plate openings shall be 3/32 inch or smaller.
- Mesh or woven wire screen openings shall be 3/32 inch or smaller in the narrowest direction.
- Profile bar screen or wedge wire openings shall be 1/16 inch or smaller in the narrow direction.
- Choose size and position of screens to meet the following criteria:

Type	Approach Velocity ¹ (Ft./Sec.)	Sweeping Velocity ² (Ft./Sec.)	Wetted Area of Screen (Sq. Ft.)	Comments
Ditch Screen	≤ 0.4	Shall exceed approach velocity	Divide max. water flow rate (cfs) by 0.4 fps	If screen is longer than 4 feet, angle 45° or less to stream flow
Screen with proven self-cleaning system	≤ 0.4	–	Divide max. water flow rate (cfs) by 0.4 fps	–
Screen with no cleaning system other than manual	≤ 0.2	–	Divide max. water flow rate (cfs) by 0.2 fps	Pump rate 1 cfs or less
¹ Velocity perpendicular to screen face at a distance of approximately 3 inches ² Velocity parallel to screen				

- Provide ditch screens with a bypass system to transport fish safely and rapidly back to the stream.

Specification section 00290.34(3) addresses fish screens.

Fish Passage

The **Fish Passage** environmental performance standard is appropriate for this project because work will occur within the Sandy River, a fish bearing stream. This environmental performance standard will be properly followed through the maintenance of fish passable Sandy River flows around in-water construction areas, which will be isolated using a steel casing and cofferdams. In-water construction activities will not require the dewatering of the entire channel or bypassing (through a pipe) all flows, or otherwise create conditions that would preclude upstream/downstream fish passage. A Fish Passage Plan will demonstrate how the project will meet ODFW's fish passage compliance criteria for bridges. This environmental performance standard is also being properly followed by use of ODOT standard construction specifications.

The standard for fish passage is a minimum clear opening of 35 feet and a minimum of 75 percent of the channel area to be unobstructed. As currently designed, a minimum 35-foot-wide channel spacing will be maintained for fish passage as well as for boat traffic. The proposed construction plans and the post-construction conditions are expected meet that standard, but to ensure that the standards can be met, additional hydraulic modeling is currently being performed with lower flow levels to ensure that the 35-foot channel spacing will actually be conveying water, which would be an adequate hydraulic opening for fish passage during low flows. Sheet SGD05 of the construction plans shows a minimum 50 wide river opening during construction.

The fish passage plan will be revised under consultation with COW to demonstrate how the project meets fish passage criteria. A draft fish passage plan is included in the application but the final plan will be submitted to Multnomah County under separate cover. The plan provides the information ODFW needs to determine if the design for the replacement of the Sandy River Bridges complies with the fish passage rule (OAR 635 Division 412). The plan shows how temporary construction and the permanent bridge design will impact fish passage according to ODFW's fish passage criteria. An approval letter from ODFW will be issued after that and submitted to the County.

ODOT Standard Specification 00290.34 covers Protection of Fish and Fish Habitat, and paragraph (b) prohibits impediments to adult and juvenile fish passage.

Hydro-Acoustic

The **Hydro-Acoustic** environmental performance standard is appropriate for this project because approximately 404 24-inch diameter steel pipe pilings will be driven for construction of the temporary work and detour bridges. In addition, six 8-foot diameter drilled shafts will be drilled for each permanent replacement bridge. Impact and vibratory hammers will be used to install pilings through the water column when listed fish may be present. A Noise Attenuation Plan (NAP) will be prepared to show how sound attenuation measures will be applied to the project and to demonstrate how hydroacoustic sound pressure levels will be maintained within acceptable ranges, as prescribed in the performance standard. Sound attenuation measures, including bubble curtains, are likely to be used to keep sound pressure levels below the specified thresholds.

This environmental performance standard is also being properly implemented by following standard ODOT specifications.

The draft specification, which will be further refined, is modified by the Special Provisions for this project as follows:

00290.34 (7) Hydro-Acoustic - Hollow steel piling 24 inches in diameter or smaller and H-pile designated as HP24 or smaller may be installed below the ordinary high water as follows:

- ◆ For temporary structures including temporary bridges, minimize the number and diameter of pilings, as feasible.
- ◆ Use vibratory hammer for piling installation.
 - For every 24 hour period the Contractor shall provide at a minimum 12 consecutive hours of hydro-acoustic silence during which a vibratory hammer or impact hammer are not operated.¹
 - Set a maximum of 24" steel pipe piles per day OR
 - Set a maximum of 18" steel pipe piles per day OR
 - Set a maximum of steel H-piles per day.
 - An impact hammer may only be used to proof steel pile,
 - At least 28 calendar days before using vibratory hammers or impact hammers the Contractor shall submit a plan for a pile driving noise attenuation system to the Engineer for approval. The plan shall include, but not be limited to, the following:
 - Plan, elevation, and section views of the overall system, and of the individual components.
 - Material specifications for all components.

¹ This provision is likely to change when the Special Provisions are completed in late summer, but it is unclear how it will change.

- Details of the power source, compressors, flex lines, distribution and bubbler manifolds, air-pressure gauges, flow meters, and appurtenant fittings and deployment gear.
 - Details of the method or system to be used to counteract the buoyancy of the system while in use.
 - Installation procedure.
 - Operation procedure.
 - Monitoring procedure.
 - Underwater Noise Monitoring Plan, which shall be completed using Washington State Department of Transportation Underwater Noise Monitoring Plan template.
- At least 28 calendar days before using vibratory hammers or impact hammers the Contractor shall submit the completed Underwater Noise Monitoring Plan to the Engineer for approval.
 - The Contractor shall not begin pile driving operations until receiving the Engineer's approval of the noise attenuation plan.
 - The Contractor shall operate noise attenuation system at all times during all pile driving operations.
 - The noise attenuation system must reduce sound levels to the level required by the applicable permits. If monitoring indicates these requirements are not being met then the Contractor is to immediately notify the Engineer.
 - The Contractor shall have a biologist, approved by the Engineer, present during all impact pile driving operations to observe and report any indications of dead, injured or distressed fishes, including direct observations of these fishes or increases in bird foraging activity.
 - Upon completion of all pile driving, the noise attenuation system shall become the property of the Contractor and shall be removed and disposed of in accordance with 00310.
 - At a minimum the Contractor is to install bubble curtains as required below. It is the responsibility of the Contractor to develop and implement a noise attenuation system that meets all applicable permit requirements.
 - If water velocity is 1.7 miles per hour or less, surround the piling being driven by an unconfined bubble curtain that will distribute small air bubbles around 100% of the piling perimeter for the full depth of the water column. An unconfined bubble curtain is composed of but not limited to: an air compressor, supply lines to deliver the air, distribution manifolds or headers, perforated aeration pipe, appurtenances, and a frame.
 - If water velocity is greater than 1.7 miles per hour, surround the piling being driven by a confined bubble curtain that will distribute air bubbles around 100% of the piling perimeter for the full depth of the water column. A confined bubble curtain is composed of but not limited to: an air compressor, supply lines to deliver the air, distribution manifolds or headers, perforated aeration pipes, appurtenances, and a means of confining the bubbles (e.g. fabric or metal sleeve, piling, or casing).
 - The lowest ring of bubble curtain shall be designed to ensure complete contact with the substrate without sinking into the substrate and shall accommodate for sloped conditions.

Specification section 00290.34(c7) addresses hydro-acoustic requirements.

Isolation of In-Water Work Area

The **Isolation of In-Water Work Area** environmental performance standard is appropriate for this project because fish are reasonably certain to be present during construction activities. This environmental performance standard will be properly followed by installing steel casing and cofferdams to isolate in-water work areas from the active channel of the Sandy River.

This EPS will be properly followed by installing steel sheet piling to isolate in-water work areas associated with the drilling of the new shafts from the active channel of the Sandy River.

Specification section 00290.34(c) addresses work area isolation. The following is a draft special provision provided to show detail on how this project will meet the isolation of in-water work area EPS.

- **a. General** - Implement work area isolation and dewatering measures prior to any work within the Regulated Work Area. Installation and removal of work area isolation measures is allowed only during the permitted in-water work periods.

At a minimum inspect weekly all work area isolation and de-watering measures for the entire period they are in place. Document inspections and maintain inspection documentation on-site.

Conduct maintenance to ensure a functional condition for the entire period work area isolation measures are in place. Document all maintenance activities and maintain documentation on-site.

Notify the Engineer at least 10 Calendar Days prior to initiating work area isolation and water reintroduction activities and at least three Calendar Days prior to completion of work area isolation construction.

Perform fish removal according to 00290.34(c-13) to remove fish trapped within the containment measures before beginning work within the isolated work area.

Work within the work area isolation measures shall occur in the dry to the extent practicable. The work area isolation measures shall be tall enough and sturdy enough to prevent water from the active channel from overtopping or collapsing the isolation measures for the duration that they are in place.

Work area isolation measures shall prevent fish, including juveniles, from entering the isolated work area. Maintain water flow downstream of the isolated work area at a rate of at least 50% of upstream flow conditions for the duration of the diversion.

Work area isolation measures shall provide complete isolation of the active channel from all construction or work activities.

Work area isolation measures shall contain and prevent suspended sediment, petroleum products and other pollutants from entering the active channel and Regulated Work Area.

Do not discharge contaminated or sediment-laden water, or water within work area isolation measures, directly into jurisdictional waterways, wetlands, beds and banks of the U.S. or the State until it has been satisfactorily treated (e.g., by bioswale, filter, settlement pond, pumping to vegetated upland location, bio-bag or dirt-bag).

The Engineer reserves the authority to suspend the work if the causes listed in 00180.70. Excessive turbidity or damage to natural resources may be considered to constitute such cause.

Notify the Engineer within 24 hours upon discovery of any failure of the work area isolation measures to adequately protect the Regulated Work Area or any waterway. Unless otherwise directed by the Engineer, remove any material that escapes the work area isolation measures within one day of discovery.

- **b. Work Area Isolation Plan** - At least 28 Calendar Days before beginning in-water work, develop and submit a work area isolation plan for review and approval. The Plan is required for all work within the regulated work area. The plan shall show how the work area will be isolated from the active stream flow, both upstream and downstream of the work area using temporary water management facilities (for example: inflatable bags, sandbags, sheet piling, or similar materials), unless otherwise approved in writing by appropriate regulatory agencies through the Engineer. Piling may be installed without work area isolation provided all other relevant conditions are met.
- Do not begin work within the regulated work area until the work area isolation plan is approved.
- The plan shall include, without limitation, the following:
 - Unless otherwise authorized in writing, the plan shall be stamped by a Professional Engineer licensed in the State of Oregon
 - A description of methods to protect fish and sensitive biological resources
 - The sequencing and schedule of dewatering and re-watering activities
 - A plan view of all isolation elements.
 - A list of materials and equipment necessary to provide appropriate redundancy of key plan elements.
 - Details of how the regulated work area will be isolation from all construction or work activities.
 - If a pump is used, a sizing submittal is required. If pumps are used, operate the pumps as needed up to 24-hours a day during the diversion to prevent de-watering the stream downstream of the diversion. Keep a back up pump available in the event of failure of the primary pump
 - Description of how passage for adult and juvenile fish shall be maintained for the duration of the Project, including intermittent streams
 - A schedule of frequency of inspections and anticipated maintenance.

The Plan, documented inspections and maintenance reports shall be maintained on-site.

Safe passage around or through the in-water work area must be provided for adult and juvenile native migratory fish unless otherwise approved in writing by the Regulatory Agencies or The Services through the Engineer.

Capture and Release

The **Capture and Release** environmental performance standard is appropriate for this project because in-water work areas will be isolated, as noted above. The performance standard will be properly followed by ensuring that a capture and release operation is performed in accordance with all applicable criteria, as outlined in the performance standard.

This environmental performance standard is also implemented through construction specifications and special provisions. The following draft specification that modifies the standard specifications in 00290.34(12) details fish capture and release:

(12) Fish Capture and Release - The Contractor will be responsible for all fish capture and release activities before, intermittently during, and immediately after work area isolation, dewatering to isolate an in-water work area, and re-watering an isolated work area. Contractor shall provide a qualified fishery biologist to conduct and supervise fish capture and release activity.

Coordinate work area isolation, de-watering and re-watering activities on-site with a qualified fishery biologist to remove prior to, during, and immediately following isolation, de-watering and re-watering. Any initial preparation work in the stream, prior to the actual start of work area isolation or de-watering, is considered part of the isolation process. Limit turbidity in the Regulated Work Area during re-watering activities.

Provide in writing the name of the selected qualified fishery biologist at least 14 Calendar Days prior to fish capture and release activities.

Obtain fish capture release permits from ODFW. Furnish a copy of all approved fish capture and release permits to the Engineer at least 5 Calendar Days prior to the start of fish capture and release activity

The qualified fishery biologist shall remove fish from the isolated area using trapping, seining, electrofishing or other methods as are prudent and approved by ODFW to minimize risk of injury to fish.

Notify the Engineer in writing at least 24 hours prior to the start of each fish capture and release activity.

The qualified fishery biologist shall ensure safe handling of all fish, and comply with the following procedures:

- Do not use electrofishing if water temperatures exceed 64 degrees F unless no other fish capture method is feasible or successful
- If electrofishing equipment is used to capture fish, comply with the following electrofishing guidelines:
 - NMFS, Backpack Electrofishing guidelines, December 1998.
 - NMFS, Guidelines for Electrofishing Waters Containing Salmonids Listed Under Endangered Species Act, June 2000.
 - Handle all fish with extreme care. Keep fish in water during seining and transfer procedures to prevent the added stress of out-of water handling

- Ensure water quality conditions, including dissolved oxygen levels, within fish transport systems are sufficient to promote fish recovery
- Immediately release fish into a safe release site adjacent to the capture site.
- In the event of mortalities, do not transfer federally listed fish to anyone except The Services, unless otherwise approved in writing by The Services and the appropriate Regulatory Authorities
- Obtain all other federal, state, and local permits necessary to conduct the capture and release activity such as an ODFW Incidental Take Permit and/or a Scientific Taking Permit
- Allow The Services and Regulatory Agencies to accompany the capture team during the capture and release activity, and to inspect teams' capture and release records and facilities

Provide written fish handling report to the Engineer within 5 Calendar Days of completion of each capture and release activity. The report at a minimum shall include the following:

- Name and address of the qualified fishery biologist
- Methods used to isolate the work area
- Methods used to minimize disturbances to fish
- Documentation of stream conditions before and after placement and removal of barriers
- The means of fish removal
- The number and species of fish removed from each pass
- The condition of all fish released
- All incidence of observed injury or death

Wildlife Avoidance (Bridge Demolition)

The **Wildlife Avoidance (Bridge Disturbance)** environmental performance standards are appropriate for this project as outlined below.

Migratory Birds

The **Migratory Birds** environmental performance standard is appropriate for this project because bridge demolition activities could potentially impact migratory birds in the Sandy River riparian corridor.

This environmental performance standard is being properly followed by ensuring that thorough inspections to identify any nests on the bridge will be performed prior to demolition activities; using exclusionary methods prior to March 15th including noise, physical removal and netting; and removal of any nests found without eggs or young. Consultation with USFWS for compliance with the Migratory Bird Treaty Act will occur if eggs have been laid and nest cannot be avoided. Stands of trees suitable for migratory bird nesting will not be cut during the breeding season (March 15 to September 1) unless exclusionary measures have been successfully implemented prior to the breeding season and/or a pre-construction field inspection has determined that migratory birds are not nesting in the trees to be removed.

Specification 00290.36(a) addresses protections for migratory birds. The following draft Special Provision applies to the specifications for migratory birds:

00290.36(a) Migratory Birds - Replace this subsection with the following:

Compliance with the Migratory Bird Treaty Act (16 U.S.C. 703-712) shall be performed by the Agency on behalf of the Contractor. The Contractor shall notify the Engineer in writing, a minimum of 10 Calendar Days prior to beginning clearing and grubbing, bridge demolition or any other activity that has the potential to affect bird nesting habitat when these activities occur from March 1 through September 1.

Immediately notify the Engineer if nests are noted in the Project limits.

Unless authorized in writing by the Engineer, return to the Engineer, within five Calendar Days of removal, all exclusionary measures applied by others prior to NTP for the Project.

Bats

The **Bats** environmental performance standard is appropriate for this project because potential bat roosting habitat in the cracks of the bridge has been noted by ODFW biologists.

This environmental performance standard will be properly followed by conducting a pre-demolition inspection for bat roosting and employing exclusionary methods prior to nest building (March 15).

In addition, the following Special Provisions are proposed to be used to meet the EPS:

SECTION 00575 – BAT HABITAT

Section 00575, which is not in the Standard Specifications, is included in this Project by Special Provision.

Description

00575.00 Scope - This work consists of fabricating, furnishing and installing concrete bat habitat on bridges at locations shown.

Materials

00575.10 General - Furnish commercial grade concrete according to Section 00440.

- Furnish welded wire fabric according to Section 02510.
- Furnish mechanical anchors.
- Acceptance of finished bat habitat will be based on visual inspection by the Engineer.

Construction

00575.40 Habitat - Fabricate bat habitat as shown in design details. Attach to structure with mechanical anchors.

- Bat habitat shall be stained Color No. 1 – Sherwin Williams Otter (#6041) (provided for color intent only).

Special Provision 00290.36(b) addresses protections for bats.

Protect bats by doing the following:

- Schedule bridge demolition outside of the bat breeding season March 1 through September 30.

- If this is not feasible and if approved by the Engineer, appropriate exclusionary methods prior to March 1 to exclude bats from accessing suitable habitat. An exclusionary device is any method that denies birds physical access to the nest site area (for example: nets and hole blockers).
- Exclusionary devices must be installed a minimum of 15 days prior to this period.
- Inspect, maintain, and repair exclusionary devices to prevent active occupancy by bats during period listed above.

In the event that nesting bats are encountered during construction, the Engineer may suspend the work according to 00180.70

Wildlife Passage

The **Wildlife Passage** environmental performance standard is appropriate for this project because the project is located in a riparian corridor (Sandy River), and riparian corridors are, in general, important features for wildlife movement. I-84 currently interrupts the riparian habitat at the Sandy River Bridges. However, the bridge provides enough clearance that movement beneath (along the river) is allowed. This environmental performance standard maintains wildlife passage potential because the new bridges are longer than the existing bridges.

Habitat Avoidance and Removal Minimization

The **Habitat Avoidance and Removal Minimization** environmental performance standard is / is not appropriate for this project as outlined below.

Streambank Protection

The **Streambank Protection** environmental performance standard is appropriate for this project because unavoidable streambank impacts will occur as a result of bridge construction activities on the east side of the Sandy River. The intent of this environmental performance standard will be followed since roadway embankment will be removed allowing natural stream and floodplain function. protected with riprap graded at a 1.5:1 slope and will incorporate netted soil lifts a soft gabion and a brush layer. The west slope will remain stable since existing riprap will not be removed or disturbed.

The construction plans show compost blanket and sediment fencing protecting the streambank and other upland areas that drain to the Sandy River.

Specifications 280.42 (stabilization), 290.34 (site restoration), and 01040.70 (plant establishment) address streambank protection needs.

Habitat Removal

The **Habitat Removal** environmental performance standard is appropriate for this project because temporary fish habitat disturbance will occur as a result of construction. The Sandy River in the project area is designated critical habitat for Lower Columbia River Chinook salmon and steelhead. This environmental performance standard is being properly followed through a design that does not permanently degrade fish habitat or impair the ability of fish species to function in the area long-term. The project will, instead, result in long-term benefits to in-stream habitat, as the number of in-water bents at the crossing will be reduced from 9 to 3. The floodplain will be widened at the project location by removing a net of roadway fill, both above and below OHW, of 1,535 cubic yards that is constricting the Sandy River.

Multiple specification sections will be used to limit the construction impacts on habitat and to explain the proper construction of a new bridge that also limits impacts to habitat. The following is a draft special provision provided to show detail on how this project will meet the EPS.

Standard Specification 00290.34 Protection of Fish and Fish Habitat - Add the following:

Meet with the Agency Biologist, Engineer, and inspector on site, before moving equipment on-site or beginning any work, to ensure that all parties understand the locations of sensitive biological sites and the measures that are required to be taken to protect them.

Permits have been obtained for this project from the Corps and DSL. Maintain a copy of Corps and DSL permits at the project site during construction.

These permits authorize the following permanent impacts:

- 8,600 cubic yards of fill within the regulated work area
- 7,270 cubic yards of removal from the regulated work area
- 1.5 acres of permanent fill

These permits authorize the following temporary impacts:

- 1.5 acres will be temporarily impacted.

All temporary fill shall be removed and the site restored as shown. Changes to the project that may increase the amount of fill or removal within the regulated work area or the acreage of regulated work area impacted are not authorized.

00290.34(a) Regulated Work Areas - Add the following to the end of this subsection:

The regulated work area is the area within the ordinary high water (OHW) elevation that is shown on the plans.

- For this Project, the regulated work area is the area at or below 23.3 feet elevation. The Contractor shall flag the regulated work area and maintain the flagging for the duration of the Contract.
- Perform work within the regulated work area only during the regulated in-water work period. The regulated in-water work period is from July 15th to August 31st. All work area isolation structures and temporary devices shall be completely removed by the end of the regulated in-water work period unless authorized in writing.

Submit a schedule to complete all work within the regulated work area within the regulated in-water work period at least 10 days prior to the pre-construction conference.

00290.34(b) Prohibited Operations - Add the following bullets to the end of this subsection:

- Allow equipment to enter or work in or on the water.

Add the following subsection:

00290.34(c) Fish Protection Measures Required by Environmental Permits:

- (1) **General Equipment Requirements** - Use heavy equipment as follows:
 - Choice of equipment must have the least adverse effects on the environment (for example: minimally sized, low ground pressure).

- Before operations begin and as often as necessary during operation, steam clean all equipment that will be used below the regulated work area until all visible oil, grease, mud, and other visible contaminants are removed. Complete all cleaning in approved staging areas.
- Secure absorbent material around all stationary power equipment (for example: generators, cranes, drilling equipment) operated within 150 feet of wetlands, waters of the State and U. S., drainage ditches, or water quality facilities to prevent leaks, unless suitable containment is provided to prevent spills from entering waters of the state and U.S.

Water Quality

The **Water Quality** environmental performance standards are appropriate to this project as outlined below.

Pollution and Erosion Control Plan

The **Pollution and Erosion Control Plan** environmental performance standard is appropriate for this project because it will involve typical construction activities (e.g., use of heavy equipment, ground disturbance). A Pollution and Erosion Control Plan will be prepared and implemented. The Plan will contain the elements outlined in ODOT's *Standard Specifications for Construction*, including employing practices to prevent erosion and sedimentation, preparation of a spill containment and control plan, planning for any regulated or hazardous products or materials, and inspecting erosion and sediment controls to ensure proper function throughout construction.

Specifications 00280 – Erosion and Sediment Control as well as 00290.20, 00290.30, and 00290.34 address pollution and erosion control. The following is a draft special provision that modifies the standard specifications in 00290.30.

Add the following subsection:

00290.30(c-4) Reporting- Document the number and percentage of project vehicles and equipment that meet or exceed applicable 2007 – 2008 USEPA emissions standards in accordance with 40 CFR 80 and 89. Submit this information to the Engineer when the Project is 50% complete and again at Second Notification. If no project vehicles or equipment are equipped to meet these emissions standards, provide a letter to the Engineer within 30 Calendar Days of the Pre-Construction Conference documenting this information.

00290.30(c-5) Truck and Equipment Fuel Types- Except where authorized by the Engineer in writing, use an ultra-low sulfur diesel fuel or a 20% blend of biodiesel (B20) with ultra-low sulfur diesel fuels for all trucks and equipment used on the Project site.

00290.30(d) Construction Discharge Water – Upon written authorization of the Engineer, the Contractor may use available Agency-Controlled lands on which to construct required construction discharge water treatment facilities, including but not limited to settling basins, if the water would be muddied by excavating material from Agency-Controlled lands.

Obtain and comply with all required permits and facility approvals for discharges to surface water, storm drains, or sanitary sewers or for land application prior to constructing such facilities.

Construct facilities to collect and treat, or collect and properly dispose off site all construction discharge water, including but not limited to concrete washout, concrete cure water, hydromilling, pumping for work-area isolation, equipment wash water, drilling

fluids, water made muddy by taking or washing cobbles, gravel, sand or by placing earth or other materials in or near the water, to remove debris, nutrients, sediment, petroleum hydrocarbons, metals and other pollutants.

If not recycling concrete truck washout water, address disposal options in the PCP. Dispose according to specific NPDES or Water Pollution Control Facilities (WPCF) permit requirements and local sanitary sewer requirements, if any.

Protect storm drain systems, drainage swales, and ditches. Clean out and restore storm drain systems, drainage swales, and ditches to a fully functioning condition without delays.

Spill Prevention and Staging Activities

The **Spill Prevention and Staging Activities** environmental performance standard is appropriate for this project because construction vehicles, equipment, and materials will be present for the work. The project will be consistent with this EPS through the designation of an appropriate staging area and adherence to all specifications regarding vehicle and equipment fueling, cleaning, maintenance, operation, etc. A proposed staging area has been designated on City of Troutdale property on the west side of the river. Portions of the staging area are within 150 feet of the Sandy River. Existing access will be used during construction to the extent possible, although bridge replacement activities will require the installation of temporary work structures for construction access. It is anticipated that temporary gravel bar access will be necessary to allow equipment to access work areas on the dry gravel bar. Equipment will not be allowed to cross through the wetted channel. In the event of any product release with a potential to discharge to State waters, the release will be reported to the Oregon Emergency Response Service (OERS) and containment and cleanup will be completed as soon as possible.

Specification sections 00280 and 00290 address spill prevention and staging activities.

Construction Discharge Water

The **Construction Discharge Water** environmental performance standard is appropriate for this project because construction related discharges (e.g., pumping for work area isolation) will need to be addressed. The Pollution and Erosion Control Plan (to be developed) will include required measures for containing, handling, monitoring, etc. discharge water in accordance with the applicable elements of the environmental performance standard.

The Pollution and Erosion Control Plan will include required measures for containing, handling, monitoring, etc. discharge water in accordance with the applicable elements of the EPS.

Specification section 00290.30 and 00290.34 address related concerns.

The following is a draft special provision provided to show detail on how this project will meet the construction discharge water EPS.

00290.30(d) Construction Discharge Water – Upon written authorization of the Project Manager, the Contractor may use available Agency-Controlled lands on which to construct required construction discharge water treatment facilities, including but not limited to settling basins, if the water would be muddied by excavating material from Agency-Controlled lands.

Obtain and comply with all required permits and facility approvals for discharges to surface water, storm drains, or sanitary sewers or for land application prior to constructing such facilities.

Construct facilities to collect and treat, or collect and properly dispose off site all construction discharge water, including but not limited to concrete washout, hydromilling, pumping for work area isolation, equipment wash water, drilling fluids, water made muddy by taking or washing cobbles, gravel, sand or by placing earth or other materials in or near the water, to remove debris, nutrients, sediment, petroleum hydrocarbons, metals and other pollutants.

If not recycling concrete truck washout water, address disposal options with the PCP. Dispose according to specific NPDES or Water Pollution Control Facilities (WPCF) permit requirements and local sanitary sewer requirements, if any.

Protect storm drain systems, drainage swales, and ditches. Clean out and restore storm drain systems, drainage swales, and ditches to a fully functioning condition without delays.

Piling Removal

The **Piling Removal** environmental performance standard is appropriate for this project because in-water piers will be removed as part of this bridge replacement project.

This environmental performance standard is being properly followed because the piers will be removed entirely and properly disposed/recycled.

Due to the low clearance it would be extremely difficult to completely extract the piles below the new I-84 bridges requiring approximately 162 piles to be cut off three feet below existing ground elevation. All other temporary structures would be removed at the completion of the work in accordance with the environmental performance standards. A 5-foot below-grade cut was cited in the original permits.

Existing piers will be cut at specified elevations, specific to each pier. The minimum pier removal depth would be 3 feet at the west bank. This pier is protected by riprap so no scour is anticipated. Maximum pier removal depth will be over 8.5 feet. Average removal depth across the channel will be 5.5 feet.

The following is a draft special provision provided to show detail on how this project will meet the piling removal EPS.

(10) Piling Removal - If a temporary or permanent piling will be removed, the following conditions apply:

- Dislodge the piling with a vibratory hammer, whenever feasible.
- Once loose, place the piling onto the construction barge or other appropriate dry storage site.
- Fill holes left by each piling with clean, native sediments.

Specification 00290.34(c10) – Piling Removal and 00501 – Bridge Removal will address piling removal.

Treated Wood

The **Treated Wood** environmental performance standard is appropriate for this project. Treated wood is not present on the bridge structure itself, but it is present in the work areas on the roadway guardrail posts. These guardrail posts are outside of OHW. Measures will be taken to ensure that no treated wood debris falls into the water. If treated wood debris does fall into the water, it will be removed immediately. All treated wood debris will be disposed of at an upland facility approved for hazardous materials of this classification. No treated wood debris will be left in the water or stacked on the streambank.

No new treated wood will be installed.

Specification 00501 – Bridge Removal will address treated wood handling. Following is the special provision that modifies the specifications in 00290.34 for treated wood.

- **(9) Treated Wood** - Do not use of lumber, pilings, or other wood products that are treated or preserved with pesticidal compounds below the ordinary high water (OHW) or as part of an in-water or over-water structure, except as described below:

-
- Store treated wood shipped to the Project out of contact with standing water and wet soil, and protected from precipitation.
- Visually inspect each load and piece of treated wood. Reject for use in or above aquatic environments if visible residues, bleeding of preservative, preservative-saturated sawdust, contaminated soil, or other matter is present.
- Use pre-fabricated components to the extent feasible. When field fabrication is necessary, complete all cutting and drilling of treated wood, and field preservative treatment of wood exposed by cutting and drilling outside of the regulated work area. Use tarps, plastic tubs, or similar devices to contain the bulk of any fabrication debris, and wipe off any excess field preservative.
- All treated wood structures, including pilings, shall have design features to avoid or minimize impacts and abrasion by livestock, pedestrians, vehicles, vessels, and floats.
- Treated wood may be used to construct a bridge, over-water structure or an in-water structure, provided that all surfaces exposed to leaching by precipitation, overtopping waves, or submersion are coated with a water-proof seal or barrier are maintained. Apply and contain coatings and paint-on field treatment to prevent contamination. Surfaces that are not exposed to precipitation or wave attack, such as parts of a timber bridge completely covered by the bridge deck, are exempt from this requirement.
- During demolition of treated wood, ensure that no treated wood debris falls into the regulated work area or any waterway. If treated wood debris does fall into the water, remove it immediately and notify the Engineer.
- Store removed treated wood debris in appropriate dry storage areas, at least 150 feet away from the regulated work area.

Site Stabilization

The **Site Stabilization** environmental performance standard is appropriate for this project because ground disturbance will occur during construction. This environmental performance standard is being properly followed by ensuring that disturbed areas are stabilized following any break in work unless construction will resume within four days. This requirement will be incorporated into the Pollution and Erosion Control Plan prepared for the project.

Specification section 00280.42 - Stabilization , 00280.44 –Erosion Prevention BMPs, and 00280.62 – Inspection and Monitoring address site stabilization.

00280.42(a) Soil Exposure Limitations – Replace this subsection with the following:

00280.42(a) Soil Exposure Limitations – Stabilize all exposed areas within 4 days of disturbance using methods that do not rely solely upon germination to control erosion.

00280.42(b) Temporary Stabilization – Delete the first and second bullet

00280.44(e) Slope and Channel Liner Matting – Replace item (2) with the following:

- a. **Seeding Prior to Matting Installation** – Apply seeding according to Section 01030 and apply compost blanket prior to installation of matting.

00280.44(e) Slope and Channel Liner Matting – Add the following subsection:

Install slope matting after installation of compost blanket and seeding. For riverbank applications begin installation of slope matting as farthest downstream point show on plans and work upstream. Construct Anchor trench at top of slope and construct check slots parallel to contours every 15 feet. Anchor upstream edge of matting with anchor trench.

For channel application instruct check slots every 50 feet.

00280.44(e) Slope and Channel Liner Matting – Add the following subsection:

(4) Matting Wrapped Soil Lift Construction – Construct matting wrapped soil lifts as shown on plans. Coordinate construction (if possible) with planting of Plant Cuttings, Large (01040.50(d)) noting the allowable planting season for plant cuttings. Construct Matting Wrapped Soil Lifts as shown on plans and as follows:

- Construct Matting Wrapped Soil Lifts parallel to contours.
- Construct Matting Wrapped Soil Lifts to a finish slope of 1 ½:1.
- Construct lifts of 12” height with base at bottom of excavation.
- Prepare base plumb and flat.
- Lay matting on base so that 2’ minimum is laid horizontal underneath the topsoil lift and 3’ laid horizontal on top of the topsoil.
- Apply lift of topsoil conforming to 01040.14 with lift 12” in height and 36” in depth
- Fold matting over lift of topsoil providing a minimum of 36” cover over topsoil.
- Stake with wedge cut 2 x 4 x 24” stakes. Stake 48” O.C. and stagger staking 15” from nose of Matting Wrapped Soil Lifts and 15” from back of soil lift. Leave 1.5” of stake exposed. Separate gap in matting weave for each stake to prevent tearing of coir twine.
- Install plant cutting, for minimum 3’ embedment, 6” O.C.
- Lay matting on top of previous soil lift so that nose of soil lift will achieve proposed slope grade.
- Repeat until Matting Wrapped Soil Lifts slope armor is complete.

00280.44 Erosion Prevention – Add the following subsection:

00280.44(f) Compost Blanket – Install compost blanket as follows:

Install Compost blanket to a uniform thickness of 2 inches by means of a pneumatic blower. Install Compost Blanket after installation of straw wattle sediment barriers (where specified) and application of specified seeding (Section 01030). Tack Compost Blanket according to 00280.44(d) (2). Where matting is specified install compost blanket prior to installation of matting.

Stormwater Management

The **Stormwater Management** environmental performance standard is appropriate for this project because site stormwater ultimately discharges to the Sandy River and is subject to the requirements of *OAR 340-041-0004*, the Antidegradation Policy for Surface Water.

This environmental performance standard is being properly followed through the preparation and implementation of a Stormwater Management Plan to address treatment of new impervious surface associated with the bridge replacement. A Stormwater Management Plan for the Bundle 210 bridges has been prepared.

Multiple construction specification sections will be used to describe the stormwater management facilities to be constructed.

Site Restoration

The **Site Restoration** environmental performance standard is appropriate for this project because the project is located in the vicinity of the Sandy River and will involve temporary disturbance to riparian vegetation. This environmental performance standard is being properly followed through the preparation and implementation of a Site Restoration Plan, the focus of which will be to ensure that all habitats and accesses disturbed by the project are restored in accordance with the criteria listed in the performance standard. Details regarding streambank shaping and

revegetation efforts (e.g., species selection, slope grading; equipment removal) are included in the Site Restoration Plan.

Specification section 00290.34(c5) will address site restoration. The following is a draft special provision to modify section 00290.34(c5) to show how this project will meet the Site Restoration EPS.

(5) Site Restoration - Restore damaged streambanks to a natural slope, pattern, and profile suitable for establishment of permanent woody vegetation unless precluded by pre-project conditions (for example: natural rock substrate):

- Replant all damaged streambanks before the first April 15 following construction.
- If use of large wood, native topsoil, or native channel material is required for the site restoration according to the roadside development plans, stockpile all large wood, native vegetation, weed-free topsoil, and native channel material displaced by construction. Cut trees or large wood and trees into pieces of no less than 20 feet in length, or as shown on the roadside development plans or as directed. Stockpiled native wood and vegetation remain the property of the Agency.
- Stabilize all disturbed soils, including obliteration of temporary access roads, following any break in work unless construction will resume in 4 Calendar Days.

Access/Staging

The **Access/Staging** environmental performance standard is appropriate for this project because sensitive aquatic habitats (Sandy River and wetlands) exist in the project vicinity.

The project will be consistent with this EPS through design and construction by limiting impacts to minimum areas necessary, marking the boundaries of disturbance limits in the field to protect sensitive areas, and properly locating vehicle and equipment staging, cleaning, maintenance, refueling, and fuel storage areas. The proposed construction staging area is located on City of Troutdale property on the west side of the Sandy River to the south of I-84. Portions of the staging area are within 150 feet of the Sandy River. Existing access will be used during construction to the extent possible, although bridge replacement activities will require the installation of temporary work structures for construction access. It is anticipated that temporary gravel bar access will be necessary to allow equipment to access work areas on the dry gravel bar. Equipment will not be allowed to cross through the wetted channel.

Specification section 00280 will address access and staging.

Compensatory Mitigation

The **Compensatory Mitigation** environmental performance standard is appropriate for this project because waterway impacts occur within the project area. This environmental performance standard will be properly followed through on-site restoration, and the project will result in a net benefit to habitat functions. A primary benefit of the project, for example, is improved in-stream fish habitat conditions by reducing the number of in-water bridge bents from 9 to 3. No wetlands will be impacted as a result of this project.

Fluvial

The **Fluvial** environmental performance standard is appropriate for this project because the project occurs within the stream-floodplain corridor.

With a revised bridge design, a revised study of the fluvial processes of the Sandy River will be conducted in the vicinity of the proposed replacement bridge to determine if the design conforms to the Fluvial Performance Standard. With a revised bridge design, a revised study of the fluvial processes of the Sandy River will be conducted in the vicinity of the proposed replacement bridge to determine if the design conforms to the Fluvial Performance Standard. The general objective

of the standard is to provide the design of channel crossing structure that minimize the impact on normal channel and floodplain processes. Specifically, the goals are to: 1) promote natural sediment transport patterns, 2) provide unaltered fluvial debris movement, 3) allow for longitudinal connectivity and connectivity of the stream-floodplain system, and 4) allow lateral connectivity between the stream and floodplain. The study included the evaluation of historic aerial photographs to define if and how the plan form of the creek near the bridge has changed over time, the estimation of bankfull channel width, and site-potential large wood transport length.

The proposed bridge completely spans the "functional floodplain" and will have a net removal of roadway fill, both above and below OHW, of 1,535 cubic yards. These measures are expected to achieve the desired goals of the Fluvial Performance Standard. The existing bridge does not appear to significantly alter sediment transport in the Sandy River. The proposed bridge will reduce the number of bents in the floodplain from 9 to 3 and therefore will have less effect on natural sediment transport patterns than the existing structures. The maximum length of woody debris transported by the Sandy River was determined to be 140 feet. The minimum span length of the proposed replacement bridge exceeds 140 feet, thereby allowing passage of large woody debris. Because the new structure extends about 70 feet further east than the existing bridge, 1,535 cubic yards of roadway fill in front of the new eastern end bents will be removed (see Roadway Embankment below). The functional floodplain was determined to be approximately 550 feet wide. The proposed bridge replacement will span a total of 840 feet, so longitudinal continuity and connectivity of the stream-floodplain system will be provided. Lateral connectivity between the stream and floodplain is not restricted by either the existing or proposed bridge.

Multiple construction specification sections will be used to describe the bridge construction in a way as to conform to the Fluvial EPS.

Deleterious Waste Materials

The **Deleterious Waste Materials** environmental performance standard is appropriate to this project because hazardous, toxic and waste materials will be closely monitored during construction. This environmental performance standard will be properly followed during construction by ensuring that these materials will not be allowed to enter wetlands and waterways, contaminate fill materials, or be left on site after project completion.

Specification 00290 will address waste material handling.

Materials Procurement and Use Hierarchy

The **Materials Procurement and Use Hierarchy** environmental performance standard is appropriate for this project, and all products and materials will be utilized to minimize waste and pollution and maximize sustainability to the greatest extent possible as design and construction proceeds. This environmental performance standard will be properly followed by adhering to all requirements in the Materials and Contamination Performance Standards Manual.

Materials Performance Standard (all)

The **Materials Performance Standard (all)** environmental performance standards are appropriate for this project and will be followed as project design and construction proceeds.

Contamination Performance Standard

The **Contamination Performance Standard (all)** environmental performance standards are appropriate for this project and will be followed as design and construction proceeds.

This EPS will be followed as project design and construction proceeds.

Not applicable to the Project:

Wildlife Avoidance/Harassment (High Noise)

The **Wildlife Avoidance/Harassment (High Noise)** environmental performance standards are **not** appropriate to this project because listed wildlife species are not found within the project area.

Marbled Murrelet

The **Marbled Murrelet** environmental performance standard is **not** appropriate for this project because this species does not occur in or around the project area.

Bald Eagle

The **Bald Eagle** environmental performance standard is **not** appropriate for this project because known nest sites or communal roosts are not identified within 1 mile of project activities.

Northern Spotted Owl

The **Northern Spotted Owl** environmental performance standard is **not** appropriate for this project because this species does not occur in or around the project area.

Peregrine Falcon

The **Peregrine Falcon** environmental performance standard is **not** appropriate to this project because this species does not occur in or around the project area.

Marine Mammals Avoidance

The **Marine Mammals Avoidance** environmental performance standards are **not** appropriate for this project because marine mammals are not reasonably expected to occur in areas potentially affected by this project.

Noise Disturbance

The **Noise Disturbance** environmental performance standard is **not** appropriate for this project because marine mammals are not found in or around the project area.

Visual Disturbance

The **Visual Disturbance** environmental performance standard is **not** appropriate for this project because marine mammals are not found in or around the project area.

Monitoring

The **Monitoring** environmental performance standard is **not** appropriate for this project because marine mammals are not found in or around the project area.

Plant Avoidance

The **Plant Avoidance** environmental performance standard is **not** appropriate for this project because State and Federally-listed plants or habitat are not found within the project area.

Vernal Pool Fairy Shrimp Avoidance

The **Vernal Pool Fairy Shrimp Avoidance** environmental performance standard is **not** appropriate for this project because the project does not occur within an area that can potentially support Vernal Pool Fairy Shrimp.

Habitat Avoidance and Removal Minimization

The **Habitat Avoidance and Removal Minimization** environmental performance standards are appropriate for this project as outlined below.

Appendix D Geotechnical Documents



FOUNDATION ENGINEERING, INC.
Professional Geotechnical Services

Memorandum

Date: February 7, 2013
To: Doug Johnson, P.E.
David Evans and Associates, Inc.
From: Timothy J. Pfeiffer, P.E., G.E.
Mark B. Catlin, P.E., G.E.
Subject: Geotechnical Design Memorandum - DRAFT
Project: Multi-Use-Path Connection to Harlow Road FEI # 207-2-027
I-84: Sandy River to Jordan Road, Bundle 210 Phase 218

At your request, Foundation Engineering, Inc. (FEI) has completed an evaluation and geotechnical design for the proposed multi-use path retaining wall as part of the Sandy River Bridge project in Multnomah County, Oregon. The scope for this phase of work included a geotechnical field investigation, a review of existing subsurface data, analysis and design, and preparation of recommendations for a soldier pile retaining wall.

The Oregon Department of Transportation (ODOT) is the project owner. The Oregon Bridge Delivery Partners Joint Venture (OBDP) is the contract administrator and prime consultant. David Evans and Associates, Inc. (DEA) is the lead bridge and civil designer. FEI was retained by DEA as the geotechnical consultant.

PROPOSED CONSTRUCTION

ODOT plans to construct a portion of a multi-use path (MUP) extending north from the west abutment of the westbound I-84 bridge, as shown on the Vicinity Map, Figure 1A (Appendix A). This portion of the MUP will be ± 16 feet wide and ± 240 feet long with the north end connecting to Harlow Road. The path will require excavating up to ± 8 feet of soil along the top of the west bank of the Sandy River. The excavation will be supported by a ± 130 -foot long, soldier pile and lagging retaining wall. The height of the wall is greatest adjacent to I-84 and tapers to the north.

BACKGROUND

The MUP is part of the I-84 Sandy River Bridge project currently under construction. FEI previously completed a Foundation Report, dated October 6, 2009, for the bridge and abutment wall adjacent to the proposed MUP wall. The previous report included descriptions of the site geology and seismic conditions referenced in this memorandum. This memorandum is intended to supplement the existing Foundation Report by providing additional investigation and design specific to the proposed MUP wall.

Analysis for the west abutments of the I-84 bridge, located immediately south of the proposed MUP wall, identified a liquefaction hazard and consequent potential embankment failure of the west bank of the Sandy River. Stone columns were designed to mitigate the hazard and protect the west abutments. Installation of the stone columns has recently been completed. However, mitigation stopped just north of the westbound abutment and was not intended to protect the proposed wall area. Therefore, based on the site conditions, the MUP wall and adjacent area of Harlow Road are at risk of liquefaction and lateral spread during a seismic event. We understand that liquefaction mitigation for the MUP wall is not considered cost effective.

FIELD EXPLORATION

Field exploration included one additional boring to characterize the subsurface conditions for the MUP wall. Boring BH-2012-1 was completed on December 15, 2012, using a CME-75 truck-mounted drill rig owned and operated by Hardcore Drilling, LLC. The boring was advanced using mud-rotary drilling techniques to a depth of ± 26 feet. Boring BH-6 (October 2005) was advanced to a depth of ± 130.7 feet, as described in the Geotechnical Data Report by Cornforth Consultants (January 2006). The locations of the borings are shown on Figure 2A (Appendix A).

BH-2012-1 was continuously logged in the field by an FEI engineer. The boring log was prepared based on a review of the field log, the laboratory test results, and examination of samples in our office. Further details of the soil units encountered during the exploration are presented on the boring log (Appendix B). A summary of the site, soil, and ground water conditions are presented below.

Site Conditions

The site conditions along the proposed wall alignment consist of generally level ground above the west bank of the Sandy River. The west bank slopes at $\pm 32^\circ$ to the west side of the Sandy River ± 27 feet downslope. The slope below \pm El. 30 is covered with riprap, and cottonwood trees line the upper portion of the slope.

Unit Descriptions

We divided the subsurface materials encountered in the explorations into the following geologic units based on similar occurrence and engineering properties. This section is intended to provide a general description of the soil units encountered at the wall site.

Fill. Fill was observed to consist of medium dense sand with trace to some silt and scattered organics.

Overbank Deposits. A layer of Overbank Deposits was observed below the fill primarily consisting of silt and clay with variable amounts of fine sand. The unit is typically soft to medium stiff and includes scattered organics. This material represents the native surface of the Columbia River and Sandy River flood plain.

Sand/Silt Alluvium. Below the Overbank Deposits, alluvial soils consisting of interbedded fine sand and silt were observed. The unit is typically very loose to loose sand and medium dense silt. Fine-grained soils within this unit are primarily non-plastic.

Troutdale Formation. Below the Sand/Silt Alluvium, B-6 encountered Troutdale Formation consisting of a very dense gravel with some interbeds of fine sand.

Subsurface Conditions

A summary of the subsurface conditions encountered in BH-2012-1 and B-6 is presented below.

BH-2012-1. This boring was located ± 100 feet north of the WB bridge abutment and ± 10 feet west of the top of the riverbank. Fill consisting of loose sand with various amounts of silt and organics (roots) was observed to a depth of ± 7 feet (\pm El. 34.0). A ± 10 -foot thick layer of soft to medium stiff silt and clay (Overbank Deposits with scattered organics) was observed below the fill to a depth of ± 17 feet (\pm El. 24.0). Below the Overbank Deposits, alluvial soils consisting of very loose to loose silty sand were observed to ± 26.5 feet (\pm El. 14.5), the maximum depth explored.

B-6. This boring was located ± 5 feet south of the WB abutment and ± 35 feet west of the top of the riverbank. Fill, Overbank Deposits, and Sand/Silt Alluvium similar to the soils observed in BH-2012-1 were encountered in B-6. Underlying these soils, Troutdale Formation, consisting of very dense gravels, was encountered from ± 59 feet (\pm El. -16) to ± 130.7 feet (\pm El. -88), the limits of exploration.

Ground Water

The use of mud-rotary drilling methods prevented the measurement of ground water during the subsurface investigation. Typically, the ground water level will closely coincide with the elevation of the water level in the Sandy River. During periods of high rainfall, perched ground water above the river elevation may develop on top of the relatively fine-grained Overbank Deposits. For purposes of analysis, we have assumed that the perched ground water may reach a level of \pm El. 31.

LABORATORY TESTING

Additional laboratory testing conducted for this Geotechnical Design Memorandum included natural water contents, Atterberg limits, percent fines, and bulk density tests. The tests were performed on selected soil samples to classify the materials and estimate their engineering properties.

Laboratory natural moisture content tests were performed in general accordance with the Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass (ASTM D2216). Results of the tests are shown on the boring log (Appendix B).

A percent fines test was performed in general accordance with the Standard Test Methods for Amount Materials in Soils Finer than No. 200 (75- μm) Sieve (ASTM D1140). The results indicate that sample SS-4 from a depth of ± 10 feet contains 80.9% fines, indicating the sample is silt with some sand.

An Atterberg limits test was performed in general accordance with the Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318). The results indicated that sample SS-5 from a depth of ± 15 feet has a plasticity index of 12 and a liquid limit of 36; corresponding to a low plasticity clay (CL).

One bulk density test was performed in general accordance with the Standard Test Method for Density of Soil In Place by Drive-Cylinder Method (ASTM D2937). The results of the test indicate that sample SH-2 from a depth of ± 18 feet has a dry density of 81.2 lb/ft³ and a moisture content of 14.9%.

SEISMIC ANALYSIS

Bedrock Acceleration and Site Response

The seismic design parameters are based on the analysis included in the Revised Foundation Report (2009). The recommended seismic design maps included in the AASHTO LRFD Bridge Design Specifications (2008) are based on USGS National Seismic Hazard Maps (2002). The maps provide peak ground acceleration (PGA), short-period spectral acceleration (S_s), and long-period spectral acceleration (S_1) values. The General Procedure Design Site Response Spectra are shown on Figure 3A (Appendix A) for the 500-year and 1,000-year return events.

Following the AASHTO General Procedure, the bedrock values were scaled to the ground surface using F_{pga} , F_a , and F_v values appropriate for the Site Class. The Site Class accounts for the average soil and rock conditions within 100 feet of the ground surface. A Site Class D is appropriate for this site. The selected F_{pga} , F_a , and F_v values are also presented on Figure 3A (Appendix A).

Liquefaction, Settlement and Lateral Spread

A portion of the proposed MUP wall is within the Bridge Zone Limits as defined by the ODOT Geotechnical Design Manual (2012) (GDM) Section 15.2. The GDM also recommends designing all retaining structures for the seismic acceleration associated with the 1,000-year event, an event which may entail a liquefaction hazard. However, the GDM also recommends that the seismic design performance objectives depend on the consequences of failure. Since the proposed MUP wall does not contribute to the support of the bridge, abutments, or highway, mitigation for liquefaction is not included in this design.

The MUP wall and adjacent area of Harlow Road are at risk of damage resulting from liquefaction and lateral spread during a seismic event. These hazards are discussed in greater detail in the Revised Foundation Report (2009). We also understand that liquefaction mitigation for the MUP wall is not considered cost

effective, partly because the wall is not necessary for support of the bridges, abutments, or highway. Therefore, no mitigation is planned and vertical displacement (settlement) and lateral spread could be large. Since mitigation of liquefaction is not planned, quantification of liquefaction-induced settlement and lateral spread is likewise not cost effective.

Seismic Response of Earth Retaining Structures

As recommended in the GDM (2012) and the American Association of State Highway Officials (AASHTO), LRFD Bridge Design Specifications (2008), we used the Mononobe-Okabe analysis to calculate design parameters for the 1,000-year return earthquake, as described below.

Observation of retaining walls subject to seismic shaking shows good performance up to 0.5g. Recent experimental and analytical studies have shown the seismic earth load pressure may be neglected for a PGA of less than 0.4g or wall heights less than 12 feet (Al Atik and Sitar, 2010; Lew et. al., 2010). However, we have included seismic earth loads to fulfill the AASHTO requirements.

WALL OPTIONS

Soldier pile, soil nail, cantilever, and gravity walls were considered. Site constraints include: conflicts with existing utilities, potential for poor stand-up time, and limited work area. The following provides a discussion of the wall options.

Gravity Walls

Gravity walls, including cantilever walls, segmental block walls, and MSE walls, can be designed for the site conditions. However, construction of gravity walls for this site requires temporary excavations in the retained zone. The excavation requires relocating existing utilities, particularly in the southern half of the wall alignment. In the northernmost portion of the alignment, where only ± 2 to 3 feet of the MUP excavation requires support and mapped utilities are ± 10 feet away, a 42-inch tall, single-slope barrier may be used. Required relocation of existing utilities may make gravity walls uneconomical for the remainder of the wall alignment.

Soil Nail Walls

Soil nail walls are suited to a top-down construction method. However, as with the gravity wall option, existing utilities would have to be relocated, and the granular soils present challenging conditions for soil nail construction. Zones of cohesionless sand are not expected to provide the stand-up time typically required for soil nail wall construction. While construction methods are available to address these challenges, soil nail walls are not likely to be the most cost-effective option for these site conditions.

Soldier Pile Walls

For walls less than 10 feet high, a soldier pile wall can typically be designed without tie-back anchors. Driving and predrilling were considered potential options for installation of the soldier piles. However, due to the relatively loose soil conditions, the additional width of the drilled pile will be required for lateral support. Drilling for soldier pile installation may require full-depth temporary casing.

Wall Selection

During the week of January 17, 2013, the project team discussed construction issues, potential costs, and risks associated with the various wall options. Relocating utilities made gravity walls impractical for much of the wall. Soil nail walls were also discussed. However, the utilities and the potential for poor stand-up time increases the risk and cost of soil nail wall systems.

Based on the team's discussion of construction considerations and risks, a soldier pile wall was selected as the preferred option. Lateral resistance in the relatively loose and soft soil will require the large diameter of drilled and concreted-in-place piles rather than driven piles. A 30-inch diameter shaft was selected for preliminary analysis.

SOLDIER PILE RETAINING WALL

Earth Pressure

Lateral earth pressure parameters were developed for soldier pile walls with a maximum exposed height of ± 8 feet. The walls will be constructed using a top-down construction method. Since local slopes up to 32° were observed to perform well, we used a friction angle of 32° for the soil above \pm El. 26.5, which includes all of the retained soil. Soils at greater depth were assigned a friction angle of 30° , consistent with their lower standard penetration resistance.

A lateral deflection of at least $\pm 0.002 * H$ (where H is the height of the wall) is required for the walls to mobilize an active earth pressure condition. We calculated an active earth pressure coefficient (k_a) of 0.31 for the level back slope and 32° friction angle. An equivalent fluid density of 34 lb/ft^3 was calculated using an assumed unit weight of 112 lb/ft^3 and fully drained conditions. For the temporary lagging, soil arching will transfer some of the load to the soldier piles. Therefore, the temporary lagging may be assumed to support 60% of the earth load.

The ODOT GDM (2012) requires retaining walls be designed for a peak horizontal acceleration corresponding to a 1,000-year return period. For the 1,000-year return period, we used a reduced horizontal acceleration, k_h , equal to 0.16g. This value is equal to $\frac{1}{2}$ of the PGA of 0.32g at the ground surface, calculated by multiplying the USGS (2002) peak acceleration on rock of 0.24g, by the AASHTO site factor (F_{pga}) of 1.31 assuming an AASHTO Site Class D (NCHRP, 2008). The PGA is reduced based on the assumption that ± 1 to 2 inches of lateral wall deflection is tolerable during this event.

The seismic earth pressure was calculated using the Mononobe-Okabe (M-O) method of analysis. For an 8-foot high wall, a resulting horizontal force of 360 lb/ft was calculated. For modeling the seismic force on the wall, an additional uniform pressure of ± 45 lb/ft² may be used. For a 5-foot exposed height wall, we calculated a horizontal force of ± 140 lb/ft for an additional uniform pressure of ± 28 lb/ft². For a 2-1/2-foot exposed height wall, we calculated a total force of ± 38 lb/ft, for an additional uniform pressure of ± 14 lb/ft². The earth forces acting on the wall are shown in Figure 4A (Appendix A). A summary of the calculated lateral earth pressures is provided in Table 1.

Table 1: Lateral Earth Load Parameters for Wall Design

Parameter	Source	Value
Moist Unit Soil Weight, Retained	γ_m	112 lb/ft ³
Buoyant Unit Soil Weight, Embedment	γ_b	48 lb/ft ³
Internal Friction, Retained	ϕ'	32°
Internal Friction, Embedment	ϕ'	30°
Active Earth Pressure Coefficient, Retained, k_a	Level Backslope	0.31
Active Earth Pressure Coefficient, Embedment, k_a	Level Ground	0.33
Active Earth Equivalent Fluid Density, Retained	$k_a * \gamma_m$	34 lb/ft ³
Active Earth Equivalent Fluid Density, Retained (Temporary Lagging)	$0.6 * k_a * \gamma_m$	20 lb/ft ³
Active Earth Equivalent Fluid Density, Embedment	$k_a * \gamma_b$	16 lb/ft ³
Passive Earth Pressure Coefficient, k_p	Level Ground	3.0
Passive Earth Equivalent Fluid Density ⁽¹⁾⁽²⁾	$K_p * \gamma_b$	144 lb/ft ³
Ground Acceleration, 1000-year, A_s	PGA * F_{pga}	0.32g
Reduced Horizontal Acceleration, 1000-year (k_h)	$k_h = 0.5 * A_s$	0.16g
Additional Seismic Earth Pressure, 1000-year (8-foot wall)	M-O	45 lb/ft ²
Additional Seismic Earth Pressure, 1000-year (5-foot wall)	M-O	28 lb/ft ²
Additional Seismic Earth Pressure, 1000-year (2.5-foot wall)	M-O	14 lb/ft ²

⁽¹⁾ Excessive deflection may be required to fully mobilize passive resistance. Therefore, deflection analysis (e.g., LPILE) should be used for design.

⁽²⁾ Assume passive resistance starts 2 feet below the ground surface (per AASHTO).

The appropriate load factors (γ_p) provided in AASHTO Table 3.4.1-2 should be applied to the earth loads to calculate the factored lateral earth load. Selection of the appropriate load factors are dependent on the load case being analyzed.

AASHTO (2008) recommends a load factor of 1.5 for active earth loads and the ODOT GDM recommends using 1.0 for extreme event load conditions.

Lateral Analysis

We understand the soldier pile wall will be designed by DEA. Therefore, our analysis was limited to providing LPILE parameters for the retained soil and underlying native soils.

We developed the parameters in Table 2 based on the soil conditions in BH-2012-1 and an assumed ground water elevation of \pm El. 31.

Table 2. LPILE Soil Parameters

Depth ^{1,2} in. (ft)	Elevation (feet)	Soil Description ²	Soil Type p-y curve model	Effective Unit Weight γ' (pci)	p-y Modulus K (pci)	Effective Friction Angle ϕ' (deg)
0 (0)	41.0	Medium Dense Sand and Medium Stiff Silt	Sand (Reese)	0.065	90	32
120 (10)	31.0					
120 (10)	31.0	Medium Stiff SILT	Sand (Reese)	0.028	60	32
174 (14.5)	26.5			0.028	60	32
174 (14.5)	26.5	Thin Soft CLAY layer over Loose Silty SAND	Sand (Reese)	0.028	20	30
600 (50)	-9.0			0.028	20	30

(1) MUP surface at \pm El. 33.

(2) Top of soldier pile wall at \pm El. 41.9.

(3) Soil model based on soil from profile BH-2012-1 (FEI, December 15, 2012).

We performed lateral analysis for the 8-foot exposed height wall at \pm Sta. "MW" 12+00 using the computer program LPILE 5.0 and the parameters listed in Table 2. For this analysis, we assumed the wall would be supported by a W18 x 76 section concreted into a 35-foot deep, 30-inch diameter pre-bored hole. In accordance with AASHTO (2008), we assumed the passive resistance would start 2 feet below the finished grade. Additional analysis may be needed for different structural sections and wall heights.

Calculated deflection and maximum bending moments for an exposed wall height of 8 feet are summarized in Table 3. The table lists the maximum moment for the factored, strength loads case (which is greater than that for the extreme event seismic case) and the deflection at the unfactored service load. Graphs of the deflections, bending moment, shear, and soil reaction are included in the calculations (Appendix C).

Table 3. Wall Deflection and Maximum Bending Moment

Exposed Wall Height (ft)	Structural Section	Pile Length (ft)	Maximum Moment (ft-kips) strength (factored)	Deflection Ground Surface (inches) (service)	Deflection Top of wall (inches) (service)
8	W18 x 76	35	161	0.5	1.0

The calculated deflection at the service loads will develop during the top-down excavation and placement of the temporary lagging. Post-construction displacement is expected to be relatively minor. The total deflection calculated for seismic loading was 1.0 to 1.5 inches, which is consistent with the assumption that the wall will displace during a seismic event.

The soldier pile wall will be located at a distance at least as great as its exposed height from paved, traffic-bearing surfaces. Thus, no traffic surcharge loading is anticipated.

CONSTRUCTION RECOMMENDATIONS

Specifications and Special Provisions

All specifications contained herein refer to ODOT's Oregon Standard Specifications for Construction, 2008. It is also assumed these specifications will be referred to for general or specific items not addressed in this report. The Standard Specifications do not address soldier pile walls. We can provide draft specifications for the soldier pile wall, if requested.

Soldier Pile Wall

We anticipate the soldier pile wall will be constructed by concreting the structural steel sections in 30-inch diameter, pre-drilled holes (or drilled shafts). The shafts will be drilled to the planned depth, and full-depth temporary casing may be required for sidewall support. The drilled shaft will be backfilled with structural drilled shaft concrete to the elevation of the base of the lagging, and with Controlled Low Strength Material to the top of the pile.

Following installation of the soldier piles, the fill and existing slope will be progressively excavated as the temporary lagging is placed between the flanges of the structural steel sections. Once all the lagging is in place and before construction of the reinforced concrete portion of the wall, drain material (e.g., prefabricated drain panels) should be installed to intercept water in the retained soil. The drain should be discharged through the concrete wall to prevent buildup of hydrostatic pressure.

Construction may require temporary slopes. The existing embankments and subgrade soils consist predominately of cohesionless sand. Therefore, temporary slopes should be no steeper than 1.5(H):1(V). Flatter slopes or protection for erosion will be required during wet weather. It is the responsibility of the contractor to maintain stable cut slopes during construction.

Backfill, if required, should consist of Granular Wall Backfill (Section 00510.12). Light or hand-operated compaction equipment should be used within ± 2 feet of the wall to reduce excessive lateral earth pressures during construction. The backfill should be compacted to 95% relative compaction (AASHTO T99).

Seasonal Issues

We recommend construction be restricted to the dry summer months to reduce erosion and facilitate placement and compaction of fill and base material. We understand that tree removal will need to be completed in the winter months. When removing trees and large brush from the slope, roots should be left in place to help support the slope.

The existing vegetation and root structure contributes to the stability of the existing slope. Therefore, we recommend that Grubbing (Section 00320.41) be restricted to the actual area of excavation or embankment construction.

Temporary Shoring

Drawings indicate that wood lagging will be used for temporary excavation support. For the design of structural elements of temporary shoring, a unit weight of 112 pcf and an active lateral earth pressure coefficient (K_a) of 0.31 are appropriate for the retained zone. Because of soil arching, the design pressure on temporary lagging is often assumed to be 60% of the active pressure.

LIMITATIONS

Variation of Subsurface Conditions, Use of Report and Warranty

The analysis, conclusions, and recommendations contained herein are based on the assumption that the subsurface profiles encountered in the referenced borings are representative of overall site conditions. No changes in the enclosed recommendations should be made without our approval. We will assume no responsibility or liability for any engineering judgment, inspection, or testing performed by others.

This report was prepared for the exclusive use of DEA and their design consultants for the Multi-Use Path Connection to Harlow Road, I-84: Sandy River to Jordan Road, Bundle 210 project in Multnomah County, Oregon. Information contained herein should not be used for other sites or for unanticipated construction without our written consent. This report is intended for planning and design purposes. Contractors using this information to estimate construction quantities or costs do so

at their own risk. Our services do not include any survey or assessment of potential surface contamination or contamination of the soil or ground water by hazardous or toxic materials. We assume that those services, if needed, have been completed by others.

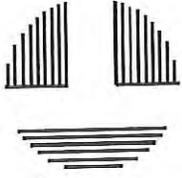
Our work was done in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.

It has been a pleasure assisting you with this phase of your project. Please do not hesitate to contact us if you have any questions or require further assistance.

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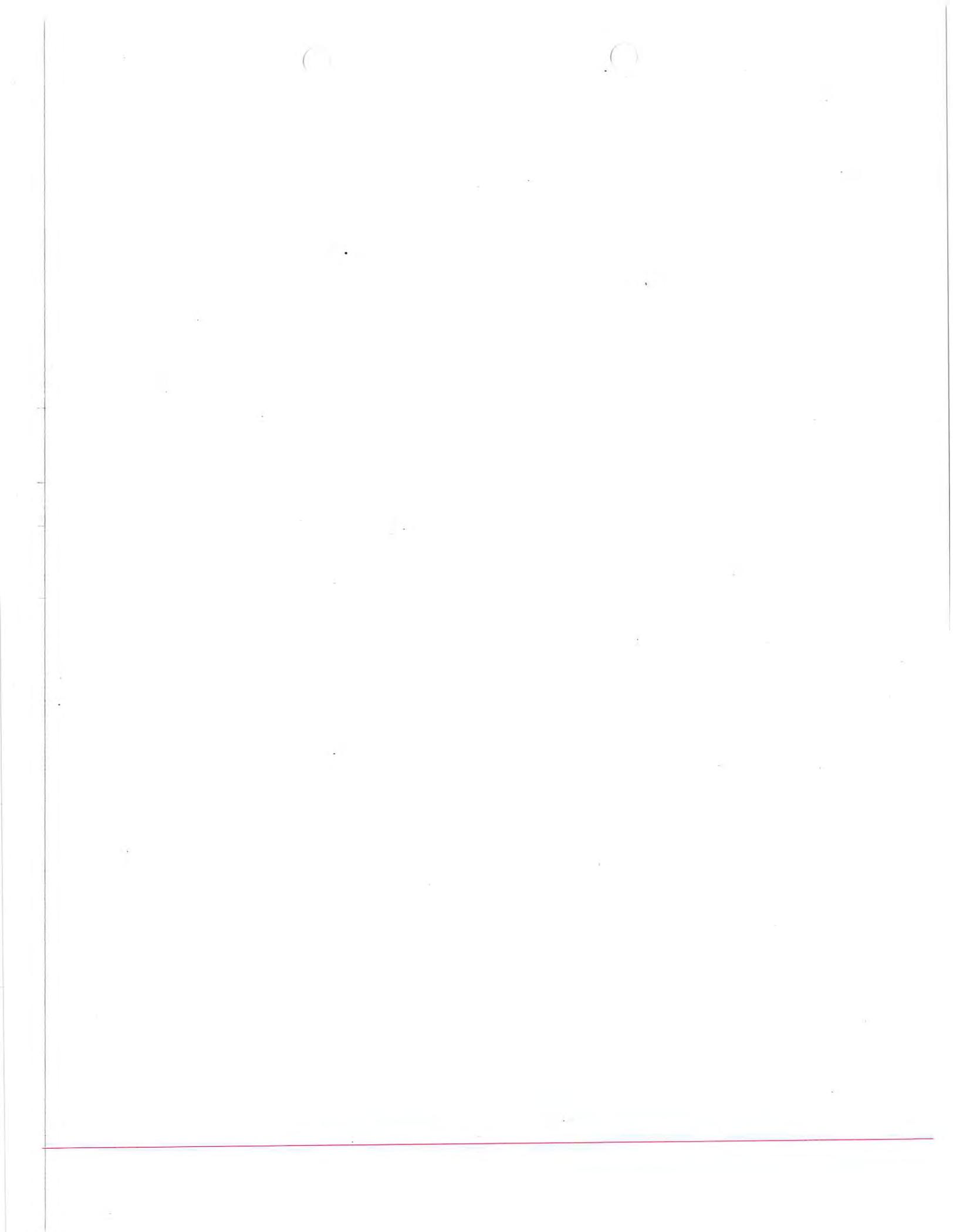
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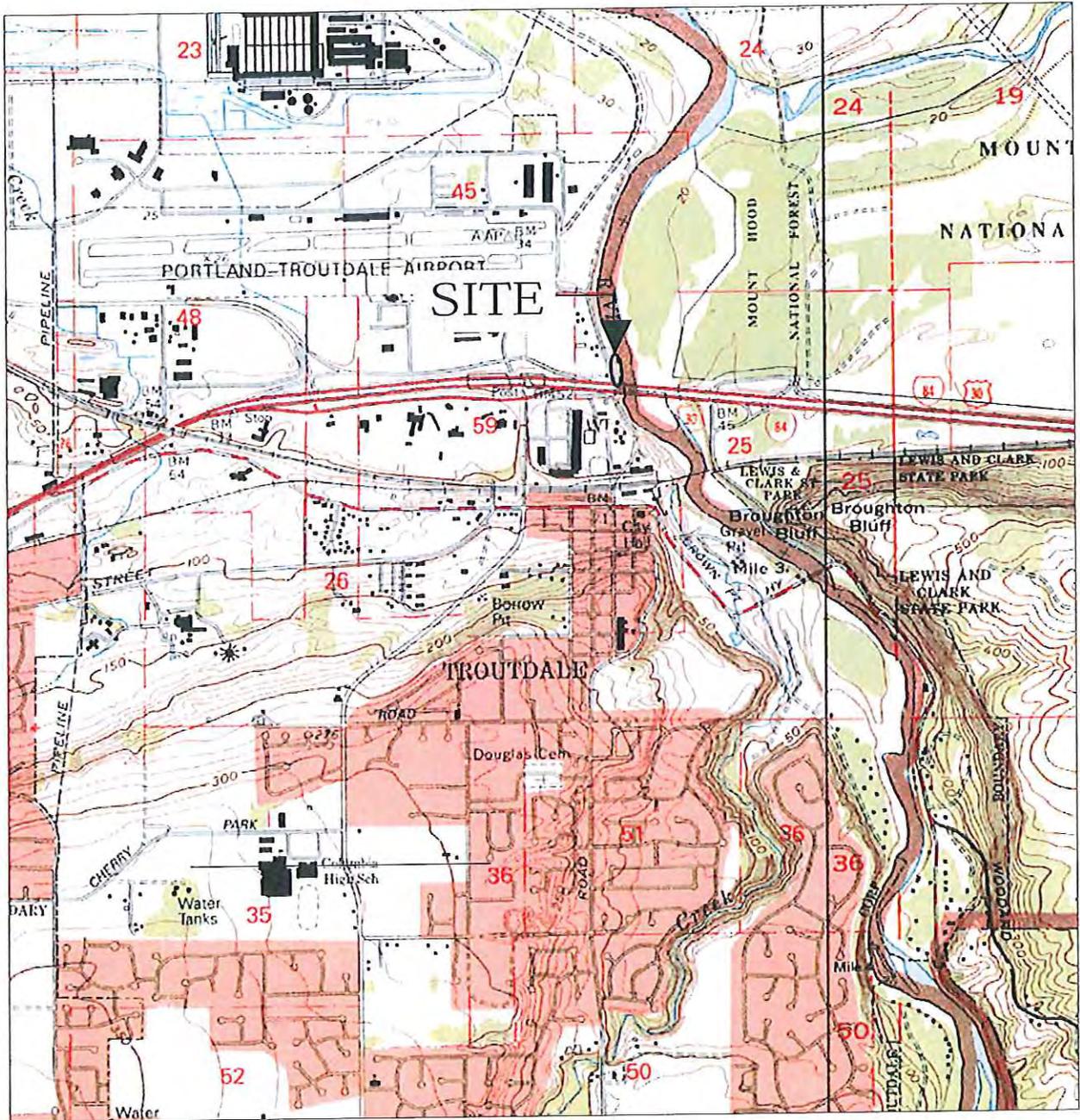




Appendix A

Figures





SCALE: 1" = 2,000'



DATE January 2013
 DWN. mas/mb
 APPR. _____
 REVIS. _____
 PROJECT NO.
 2072027

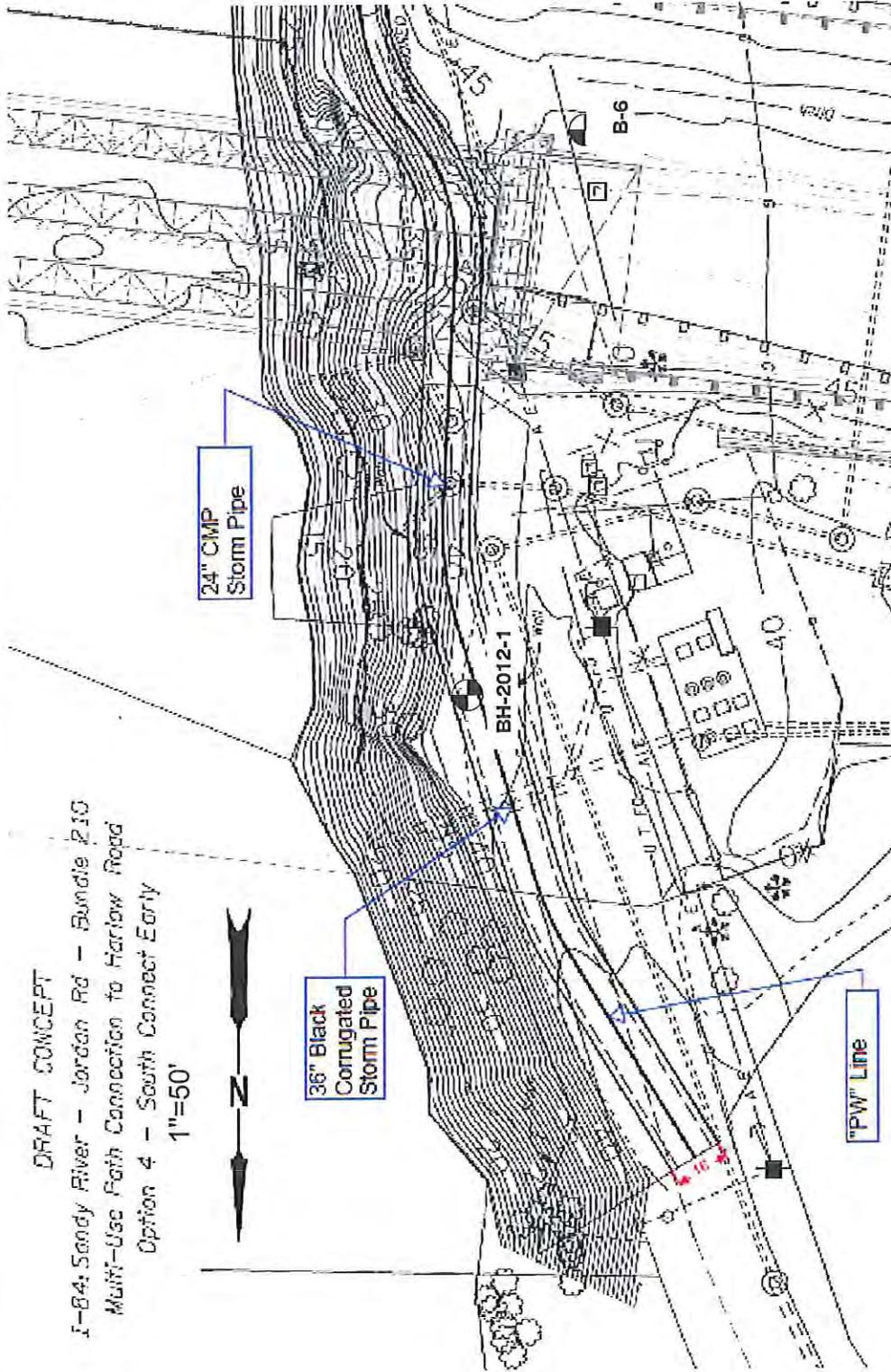


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VICINITY MAP
I-84 - Sandy River Bridges
 Multi-Use Path Wall
 Multnomah County, Oregon

FIGURE NO.

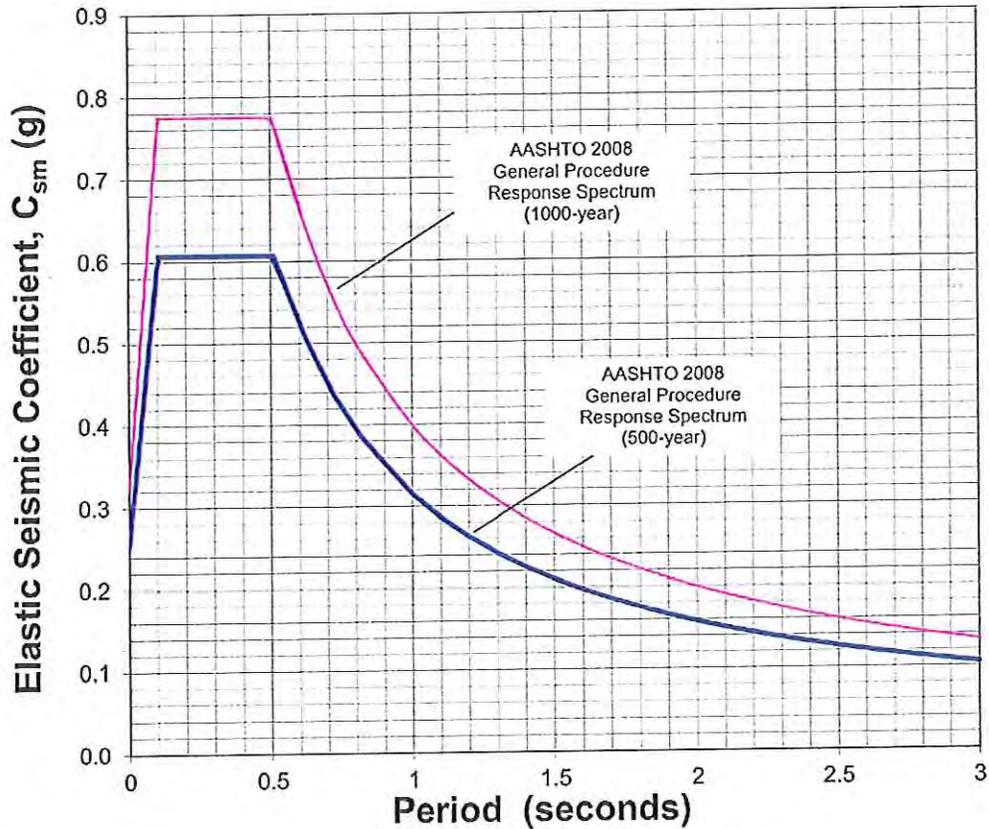
1A



- NOTES:
1. Boring locations were established by metal tape and are approximate only.
 2. See report for a description of subsurface conditions.
 3. Base map obtained from Draft Concept
- I-84: Sandy River to Jordan Road, Bundle 210
Multi-Use Path Connection to Harlow Road by DEA

- BH-2012-1 FEI
- B-6 Cornforth 2005

DATE	January 2013
DWN.	mbc
APPR.	
REVIS.	
PROJECT NO.	



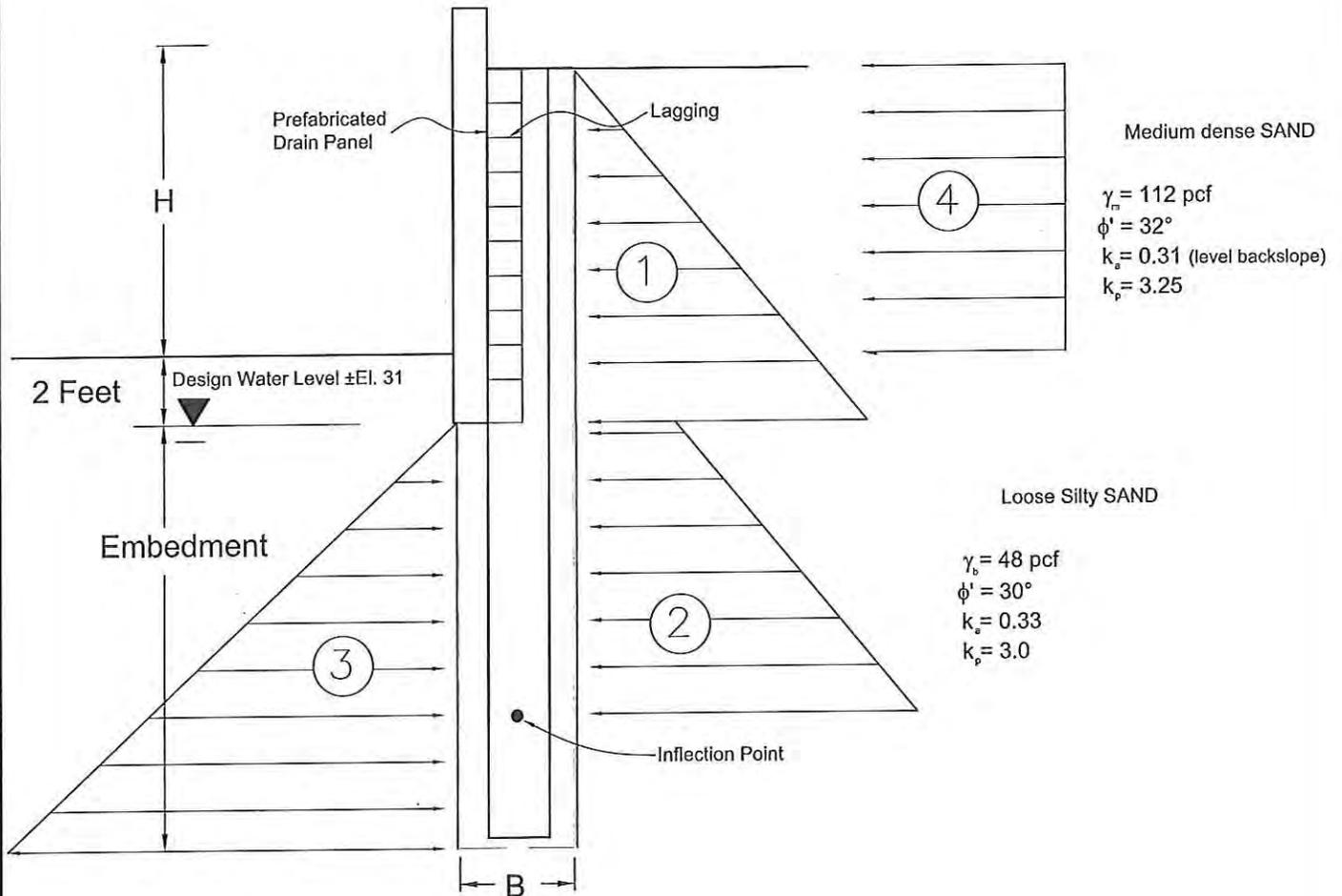
Notes:

- The Design Response Spectrum is based on AASHTO 2008 Section 3.10.3 using the following parameters:

Site Class= D	Damping = 5%							
	500-yr	1000-yr	500-yr	1000-yr	500-yr	1000-yr		
PGA =	0.18	0.24	F_{pga} =	1.45	1.31	A_s =	0.25	0.32
S_s =	0.41	0.58	F_a =	1.47	1.34	S_{DS} =	0.61	0.77
S_1 =	0.14	0.20	F_v =	2.23	2.01	S_{D1} =	0.32	0.40

- PGA, S_s , and S_1 values are based on USGS 2002 maps and USGS mapping software. These values assume 10% and 5% probability of exceedence, respectively, in 50 years.
- F_{pga} , F_a , and F_v were established based on AASHTO 2008, Tables 3.10.3.2-1, 3.10.3.2-2, and 3.10.3.2-3 using the selected PGA, S_s , and S_1 values.

FIGURE 3A.
AASHTO 2008
GENERAL PROCEDURE DESIGN SITE RESPONSE SPECTRA
500 and 1000-Year Return Periods
I-84 - Sandy River Bridges - MUP Wall
Multnomah County, Oregon



Not to Scale

Notes:

- ① Active Earth Equivalent Fluid Density:
 Permanent Lagging: $k_a \cdot \gamma_m = 34 \text{ pcf}$ (applied to lagging with width equal to spacing and height " $H + 2 \text{ feet}$ ")
 Temporary Lagging: $0.6 \cdot k_a \cdot \gamma_m = 20 \text{ pcf}$
 - ② Active Earth Equivalent Fluid Density:
 $k_a \cdot \gamma_m = 16 \text{ pcf}$ (applied to shaft diameter " B ")
 - ③ Passive Earth Equivalent Fluid Density:
 $k_p \cdot \gamma_b = 144 \text{ pcf}$ (Excessive deflection may be required to fully mobilize passive resistance)
 - ④ Additional Seismic Earth Pressure (based on $GL\bar{E}$):
 8-foot high wall: 45 psf
 5-foot high wall: 28 psf
 2.5-foot high wall: 14 psf
- Ground Acceleration, $A_s = 0.32g$ ($PGA \cdot F_{psa}$)
 Reduced Horizontal Acceleration, $k_r = 0.16g$ ($0.5 \cdot A_s$)

DATE January 2013
 DWN. jch/mbc
 APPR. _____
 REVIS. _____
 PROJECT NO. _____
 207-2-027

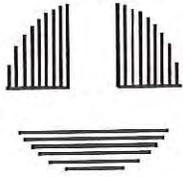
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**LATERAL EARTH PRESSURE PARAMETERS
 AND TYPICAL WALL DETAIL**

I-84 Sandy River Bridge – MUP Wall
 Multnomah County, Oregon

FIGURE NO.
4A



Appendix B

Boring Log

*Professional
Geotechnical
Services*

Foundation Engineering, Inc.

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DISTINCTION BETWEEN FIELD LOGS AND FINAL LOGS

A field log is prepared for each boring or test pit by our field representative. The log contains information concerning sampling depths and the presence of various materials such as gravel, cobbles, and fill, and observations of ground water. It also contains our interpretation of the soil conditions between samples. The final logs presented in this report represent our interpretation of the contents of the field logs and the results of the laboratory examinations and tests. Our recommendations are based on the contents of the final logs and the information contained therein and not on the field logs.

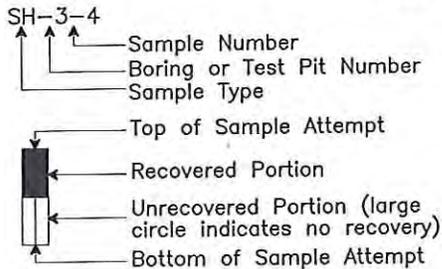
VARIATION IN SOILS BETWEEN TEST PITS AND BORINGS

The final log and related information depict subsurface conditions only at the specific location and on the date indicated. Those using the information contained herein should be aware that soil conditions at other locations or on other dates may differ. Actual foundation or subgrade conditions should be confirmed by us during construction.

TRANSITION BETWEEN SOIL OR ROCK TYPES

The lines designating the interface between soil, fill or rock on the final logs and on subsurface profiles presented in the report are determined by interpolation and are therefore approximate. The transition between the materials may be abrupt or gradual. Only at boring or test pit locations should profiles be considered as reasonably accurate and then only to the degree implied by the notes thereon.

SAMPLE OR TEST SYMBOLS



- S - Grab Samples
- SS - Standard Penetration Test Sample (split-spoon)
- SH - Thin-walled Shelby Tube Sample
- C - Core Sample
- CS - Continuous Sample

- ▲ Standard Penetration Test Resistance equals the number of blows a 140 lb. weight falling 30 in. is required to drive a standard split-spoon sampler 1 ft. Practical refusal is equal to 50 or more blows per 6 in. of sampler penetration.
- Water Content (%).

UNIFIED SOIL CLASSIFICATION SYMBOLS

- | | |
|------------|---------------------|
| G - Gravel | W - Well Graded |
| S - Sand | P - Poorly Graded |
| M - Silt | L - Low Plasticity |
| C - Clay | H - High Plasticity |
| Pt - Peat | O - Organic |

FIELD SHEAR STRENGTH TEST

Shear strength measurements on test pit side walls, blocks of soil or Shelby tube samples are typically made with Torvane or pocket penetrometer devices.

TYPICAL SOIL/ROCK SYMBOLS

- | | | | |
|--|--------|--|-----------|
| | Sand | | Silt |
| | Clay | | Gravel |
| | Basalt | | Siltstone |

WATER TABLE

- Water Table Location
- (1/31/00) Date of Measurement
- Piezometer Tip Location (if used)



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SYMBOL KEY BORING AND TEST PIT LOGS

Explanation of Common Terms Used in Soil Descriptions

Field Identification	Cohesive Soils			Granular Soils	
	SPT	S_u^* (tsf)	Term	SPT	Term
Easily penetrated several inches by fist.	0 - 1	< 0.125	Very Soft	0 - 4	Very Loose
Easily penetrated several inches by thumb.	2 - 4	0.125-0.25	Soft	5 - 10	Loose
Can be penetrated several inches by thumb with moderate effort.	5 - 8	0.25 - 0.50	Medium Stiff (Firm)	11 - 30	Medium Dense
Readily indented by thumb but penetrated only with great effort.	9 - 15	0.50 - 1.0	Stiff	31 - 50	Dense
Readily indented by thumbnail.	16 - 30	1.0 - 2.0	Very Stiff	> 50	Very Dense
Indented with difficulty by thumbnail.	31 - 60	> 2.0	Hard		

* Undrained shear strength

Term	Soil Moisture Field Description
Dry	Absence of moisture. Dusty. Dry to the touch.
Damp	Soil has moisture. Cohesive soils are below plastic limit and usually moldable.
Moist	Grains appear darkened, but no visible water. Silt/clay will clump. Sand will bulk. Soils are often at or near plastic limit.
Wet	Visible water on larger grain surfaces. Sand and cohesionless silt exhibit dilatancy. Cohesive silt/clay can be readily remolded. Soil leaves wetness on the hand when squeezed. "Wet" indicates that the soil is wetter than the optimum moisture content and above the plastic limit.

Term	PI	Plasticity Field Test
Nonplastic	0 - 3	Cannot be rolled into a thread.
Low Plasticity	3 - 15	Can be rolled into a thread with some difficulty.
Medium Plasticity	15 - 30	Easily rolled into thread.
High Plasticity	> 30	Easily rolled and rerolled into thread.

Term	Soil Structure Criteria
Stratified	Alternating layers at least 1 inch thick - describe variation.
Laminated	Alternating layers at less than 1 inch thick - describe variation.
Fissured	Contains shears and partings along planes of weakness.
Slickensides	Partings appear glossy or striated.
Blocky	Breaks into lumps - crumbly.
Lensed	Contains pockets of different soils - describe variation.

Term	Soil Cementation Criteria
Weak	Breaks under light finger pressure.
Moderate	Breaks under hard finger pressure.
Strong	Will not break with finger pressure.

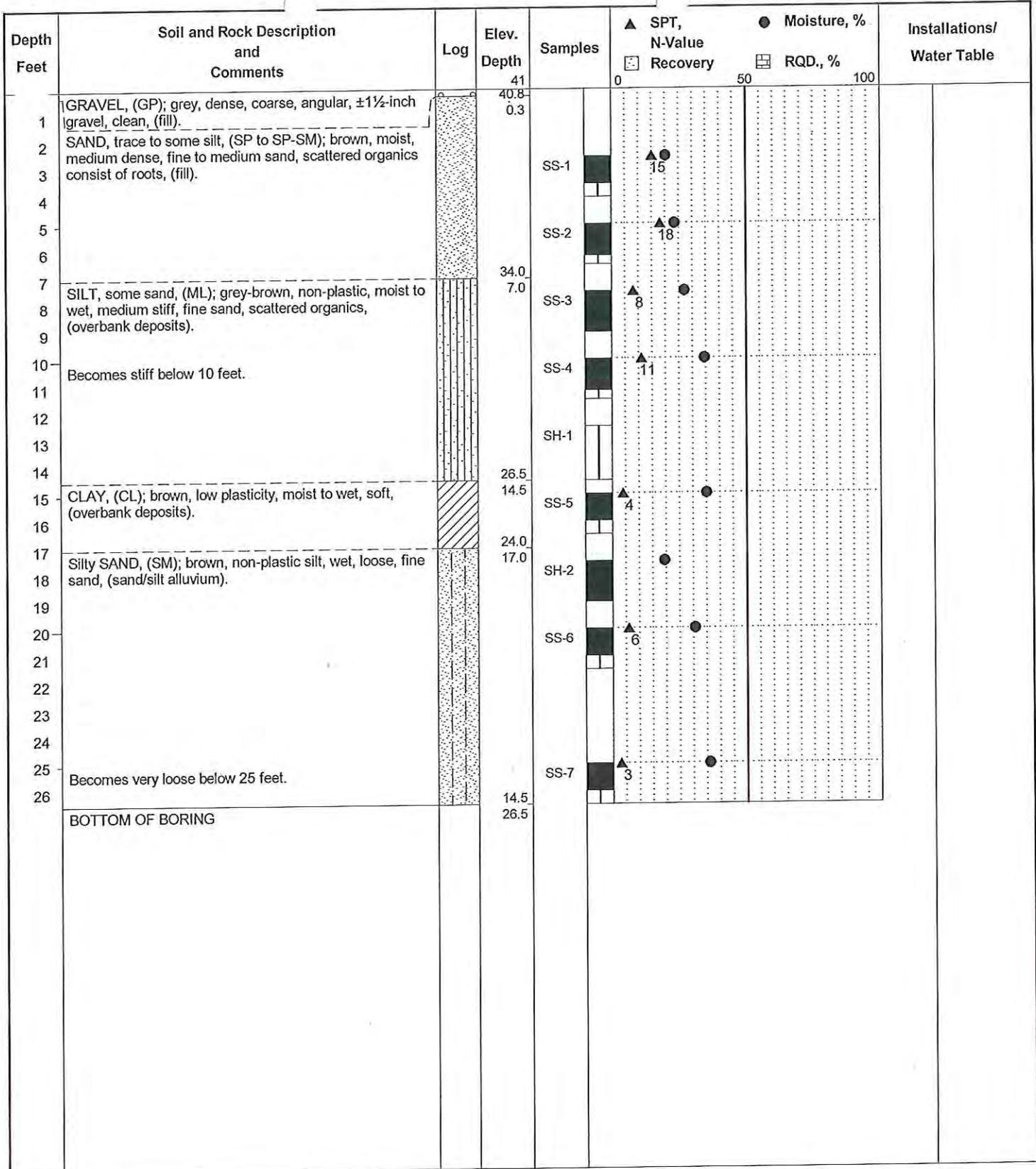


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COMMON TERMS
SOIL DESCRIPTIONS



Project No.: 2072027 - 218

Surface Elevation: 41.0 feet (Approx.)

Date of Boring: December 15, 2012

Boring Log: BH-2012-1

I-84 Sandy River Bridges

Multi-Use Path Wall

Multnomah County, Oregon

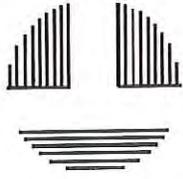


Foundation Engineering, Inc.

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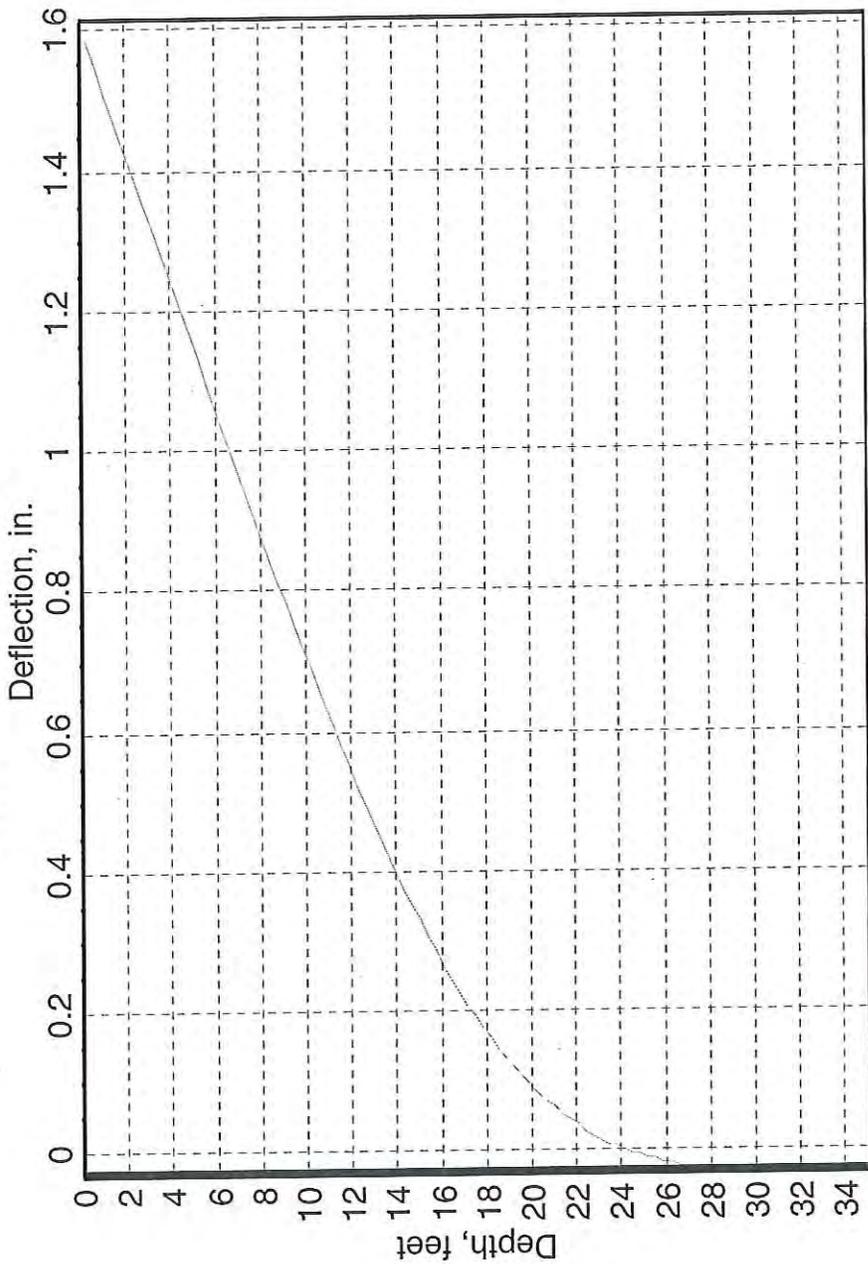


Appendix C

Calculations

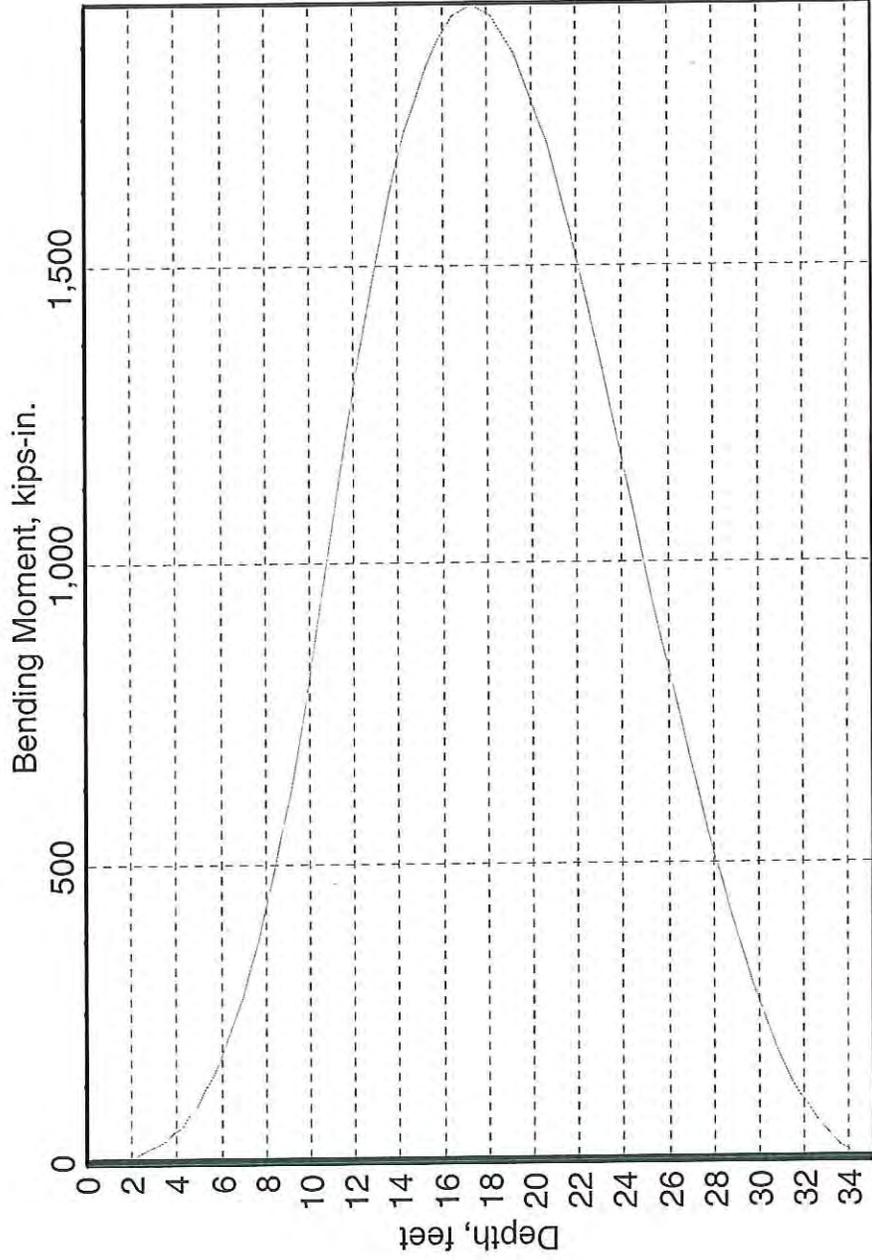


**Lateral Deflection vs. Depth
I-84 Sandy River Bridge - MUP Wall
Strength (factored) Case**



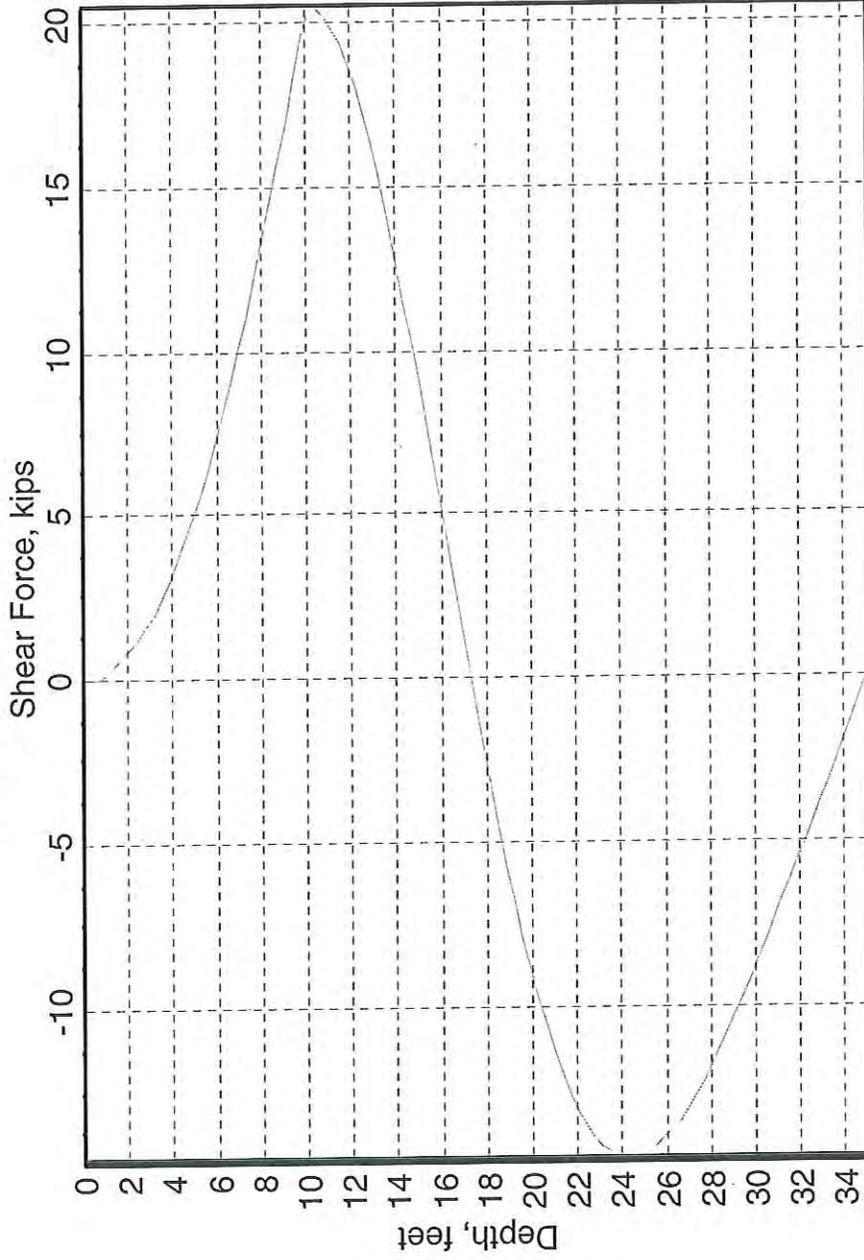
LPILE Plus 5.0, (c) 2008 by Ensoft, Inc.

**Bending Moment vs. Depth
I-84 Sandy River Bridge - MUP Wall
Strength (factored) Case**



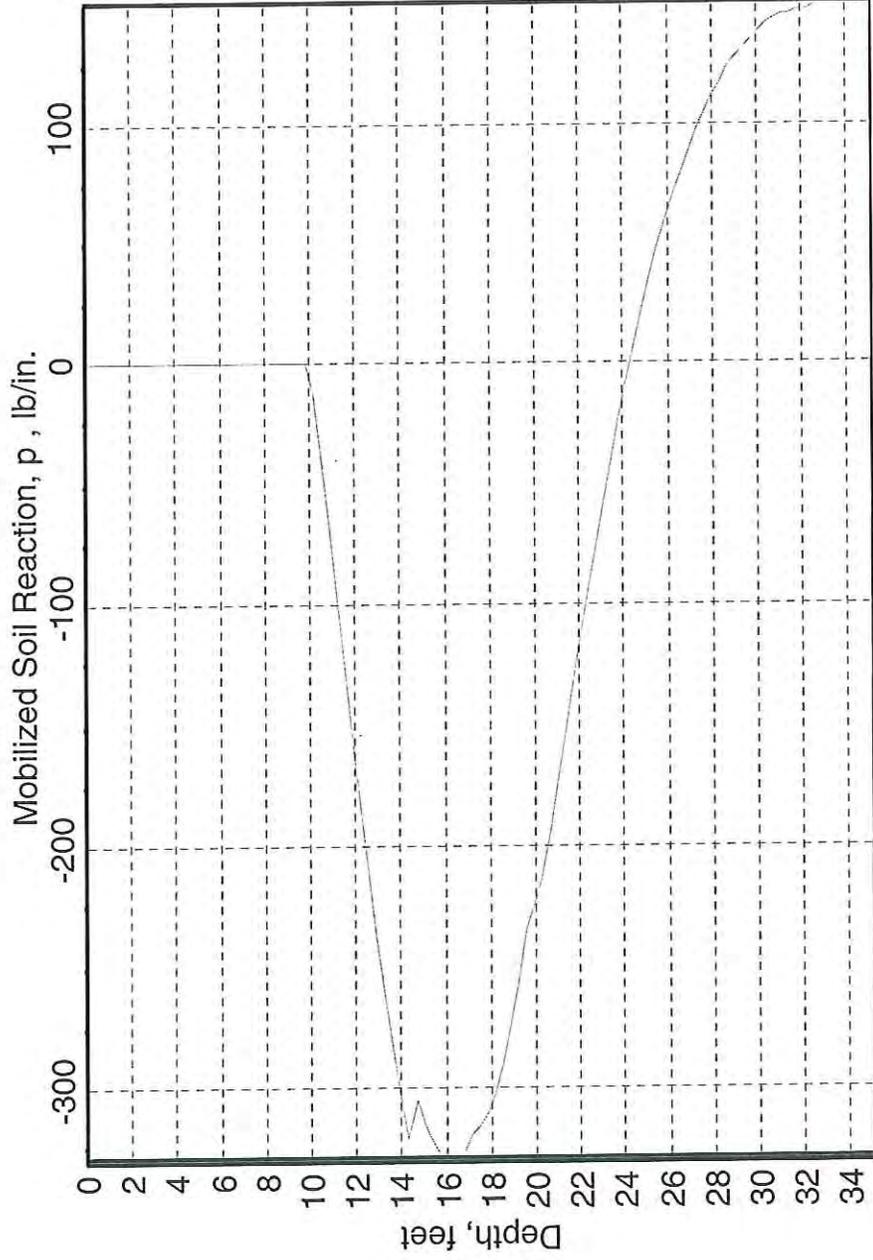
LPILE Plus 5.0, (c) 2008 by Ensoft, Inc.

**Shear Force vs. Depth
I-84 Sandy River Bridge - MUP Wall
Strength (factored) Case**

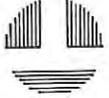


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**Mobilized Soil Reaction vs. Depth
I-84 Sandy River Bridge - MUP Wall
Strength (factored) Case**



LPILE Plus 5.0, (c) 2008 by Ensoft, Inc.



Date: July 1, 2009
To: Doug Johnson, P.E.
David Evans and Associates, Inc. 
From: Timothy J. Pfeiffer, P.E.
Subject: Revised Geotechnical Memorandum for Hillside Development
Project: Bundle 210: I-84 - Sandy River to Jordan Road
FEI Project 2072027

Foundation Engineering (FEI) has completed a geotechnical investigation and prepared geotechnical design recommendations for the Bundle 210: I-84 - Sandy River to Jordan Road project. The project involves replacement bridges for I-84 across the Sandy River and widening and repair of the I-84 bridges over Jordan Road. Embankment widening is planned for the bridge approaches and for the embankments between the Sandy River Bridges and the Jordan Road Bridges. This memorandum is intended to summarize the findings of these investigations for the Hillside Development Permit application.

Existing Conditions

Slopes affected by this project are limited to the existing embankment slopes. Existing slopes are typically 2(H):1(V), with vegetation covering of grass, brush and some deciduous trees. The subsurface conditions of the embankments were investigated with borings by Cornforth Consultants, Inc (Cornforth) and Foundation Engineering, Inc. (FEI). The Cornforth exploration results were provided in Geotechnical Data Reports dated January 2006. Foundation Engineering completed additional borings, cone penetration testing and laboratory testing reported in the Supplemental Geotechnical Data Reports dated March 6, 2008. The subsurface investigation showed the existing embankments were constructed predominately of sand and sand with some silt. The native material under the west approach to the Sandy River Bridge consisted of loose fine sand and silt. Soft to medium stiff silt and clayey silt was observed under the east approach embankments. The Jordan Road approach embankments were underlain by medium dense sand with trace silt.

Proposed Slope Development

The proposed slope development involves widening the embankment by up to 30 feet. Proposed embankment slopes will include matching the existing slopes at 2(H):1(V) and constructing new slopes at up to 1.5(H):1(V). The steeper embankment slopes will be constructed of riprap with soil cover and vegetation. The proposed 1.5(H):1(V) slopes will be keyed in or supported by a buried retaining structure to provide for global stability. Details of the slope stability analysis performed to date are included in the Foundation Report dated January 9, 2009. The proposed embankment slopes will be designed with a calculated factor of safety of greater than 1.5.

Construction Recommendations and Standards

Embankments will be constructed following the Oregon Standard Specifications for Construction (2008). The footprint for the embankment construction will be cleared and grubbed (00320) avoiding disruption to the vegetation outside of the embankment footprint. We recommend construction the embankments of Select Granular Backfill (00330.14) from the existing embankments or similar imported material. This material is typically sandy and susceptible to erosion. Therefore, erosion control matting along with seeding and mulch is typically required.

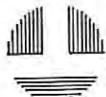
Construct the embankments following the specifications for Embankment Fills and Backfills (00330.42). Prepare the embankment foundation area per 00330.42 (a) and bench the additional embankments into the existing embankments per Foundation Benching (00330.42(a-7)). Place and compact the embankments to 95% relative compaction (Standard proctor ASTM 698) following 00330.42 (c) and 00330.43 (b).

We understand the project erosion control needs and the required site plan will be developed by David Evans and Associates, Inc.

Conclusions

In our opinion, the site is suitable for the proposed road bridge and embankment construction provided the geotechnical recommendations are followed. The slope stability analysis shows the proposed embankments are within a generally acceptable factor of safety.

Please contact us if you require additional information.



Date: January 2, 2009
To: Doug Johnson, P.E.
David Evans and Associates, Inc.
From: Timothy J. Pfeiffer, P.E.
David L. Running, P.E., G.E.
Subject: Liquefaction Mitigation Design
Project: Bundle 210: I-84 - Sandy River Bridges (EB 06875, WB 06875A)
FEI Project 2072027

Foundation Engineering (FEI) has completed additional analysis to evaluate the use of stone columns for liquefaction and lateral spreading mitigation at the west abutments of the I-84 - Sandy River Bridges. This memorandum includes a discussion of the analysis and recommendations for mitigation using stone columns. Mitigation is not planned for the interior bents or the east abutments.

BACKGROUND

The Oregon Department of Transportation (ODOT) plans to replace the existing I-84 eastbound and westbound bridges crossing the Sandy River at Mile Point 17.68, in Multnomah County. The new abutments are planned near the existing abutments. The new interior bents will be constructed in the riverbed. The proposed foundations consist of driven piles at the abutments and drilled shafts at the interior bents.

ODOT is the project owner and Oregon Bridge Delivery Partners (OBDP) is the contract administrator. David Evans and Associates, Inc. (DEA) is the prime designer. FEI was retained by DEA as the geotechnical consultant.

Cornforth Consultants, Inc. completed subsurface explorations at the site including 10 geotechnical borings (B-1 through B-10) and one pressuremeter test boring. The explorations were summarized in Geotechnical Data Reports dated January 2006. FEI completed additional subsurface explorations in September 2007, including 6 borings and 4 CPT tests. The explorations and associated laboratory testing were summarized in a Supplemental Geotechnical Data Report dated March 6, 2008. An additional boring was completed in the summer of 2008, and reported in a Supplemental Geotechnical Data Report dated September 24, 2008.

Seismic-induced liquefaction and lateral spreading was identified as a significant hazard at the west abutments of the bridges. FEI completed a preliminary assessment of liquefaction and lateral spread mitigation options. The information was summarized in a memorandum dated November 11, 2008. Based on that work, stone columns were selected as the preferred mitigation option.

The eastern limit of mitigation corresponds to the ordinary high water level on the river bank. FEI completed additional analysis to evaluate the mitigation approach for this boundary condition. A discussion of the site conditions and analysis are provided

below. Recommendations for evaluating the effectiveness of the mitigation approach are also provided.

SITE CONDITIONS

The subsurface conditions near the west abutments were explored with borings B-1, B-6 and BH-2007-5, and cone penetrometer test CPT-2007-4. The explorations encountered embankment fill including soft to medium stiff, silt and sandy silt and very loose to loose, silty sand extending to ± 21 to 23 feet (\pm El. 18 to \pm El. 20). A ± 5 to 10.5-foot thick layer of soft to very soft, silt, silty clay and clayey silt (overbank deposits) underlies the fill. The overbank deposits are underlain by alluvium including layers of very loose, silty sand, loose sand with trace silt and medium stiff silt. Very dense gravel (Troutdale Formation) was encountered at ± 42.5 feet (\pm El. -3.5) in B-1 located south of the existing embankment and at ± 53.0 to 57.5 feet (\pm El. -14 to \pm El. -16) in BH-2007-5 and B-6 located in the center median. The split-spoon sampler was driven to refusal (>50 blows/6 inches) for all samples taken in the Troutdale Formation.

CPT seismic shear wave velocity (V_s) testing in the fill indicated V_s values between ± 425 and ± 575 feet/second. Within the overbank deposits, the testing showed saturated sand, silt and clay with V_s values between ± 500 and ± 625 feet/second. Below the overbank deposits the CPT test showed sand and silt with V_s values between ± 500 and ± 600 feet/second. This CPT test was terminated upon encountering very dense, gravelly sand (Troutdale Formation) at \pm El. -16 .

Ground Water

We anticipate that the local ground water elevation will fluctuate seasonally and will closely follow the water level of the Sandy River. Ground water will generally be at its highest levels during the wet winter months and lowest levels during the late summer and early fall. For design purposes, we have assumed a river and ground water level of El. 15.

LIQUEFACTION AND LATERAL SPREADING ASSESSMENT

The west abutment is underlain by layers of potentially liquefiable soils including loose sands and non-plastic silt below the ground water table. An analysis was conducted using SPT and CPT data to evaluate the liquefaction hazard at the bridge site based on the approach outlined in the report, "Assessment and Mitigation of Liquefaction Hazards to Bridge Approach Embankments in Oregon" by Dickenson et al. 2002. A detailed discussion of the seismic and liquefaction analysis is included in the Draft Foundation Report, dated July 1, 2008.

At the west abutment (profile based on B-6, BH-2007-5 and CPT-2007-4), the sand and interbedded non-plastic silt encountered from ± 27 to 52 feet was identified as being likely to liquefy during the long-duration subduction earthquake. The analysis suggests up to ± 12 inches of potential liquefaction-induced settlement is possible. Liquefaction and liquefaction-induced settlement is also anticipated during a crustal earthquake although to a lesser degree.

Following the displacement based approach in Section 6.5.5.4 of the ODOT GDM, slope stability analysis was performed using XSTABL software for static and

post-earthquake conditions. An average winter ground water level of \pm EI. 15 was assumed. Appropriate soil parameters were selected for the foundation soils based on correlations with the SPT N-values and the laboratory test results. The assumed soil parameters are summarized on Table 1, (attached). Figure 1 (attached) includes a schematic of the proposed eastbound structure at the west abutment, as well as the soil profile assumed for the analysis. The static analysis was completed using effective stress parameters for the soils assuming drained conditions. The results, shown on Figure 2, suggest a factor of safety of 1.36 for failure surfaces extending behind the abutment and 1.01 for shallow failure on the face of the embankment slope.

For the post-earthquake analysis, we assumed the loose sand alluvium would liquefy, and the soft silt overbank deposits would lose strength due to cyclic strain-softening. We used correlations with the average corrected SPT N-values (Seed and Harder 1990) to estimate residual, liquefied strengths of \pm 200 psf for the sandy alluvium beneath the abutment and \pm 400 psf for the sandy alluvium beneath the river channel. An undrained shear strength of \pm 500 psf was used to model the overbank deposits. The assumed residual strengths are summarized on Table 2, (attached). Non-liquefied soil layers (i.e., sands and gravels above the ground water level) were modeled using effective stress parameters. The results of the analysis, shown on Figure 3, suggest a static factor of safety of 0.37 to 0.68 for post-earthquake slope stability. Therefore, we concluded that lateral spreading is likely to occur during the design subduction zone earthquake.

Lateral spread displacement of the approach embankment was estimated using empirical regression equations of Youd et al. 2002 described in Section 6.5.2.5 of the GDM. The results suggest displacements between \pm 14 and 40 inches for the design earthquake. ODOT recommends mitigation or design for liquefaction if displacements exceeding 12 inches will result in loss of service to the structure. At this site, lateral spread-induced lateral earth forces at the west abutments are expected to be sufficient to damage the support piles and result in loss of service. Therefore, ground improvement options were considered for liquefaction mitigation and to improve the embankment stability.

EVALUATION OF LIQUEFACTION MITIGATION USING STONE COLUMNS

Typical mitigation options for liquefaction and lateral spreading include compaction grouting, jet grouting or soil mixing and stone columns. After discussion with the design team and preliminary analysis, stone columns were selected as the preferred option. Stone columns installed by vibro-replacement are likely to be the most effective method to densify and reinforce the embankment soils; therefore, reducing the risk of liquefaction and lateral spread. The relatively clean stone backfill also improves drainage. We anticipate that this method will also be significantly less expensive and faster to complete than the other alternatives.

Stone columns are typically installed on a square or triangular grid spaced \pm 6 to 8 feet apart. Our analysis was completed assuming the stone columns would have a nominal diameter of \pm 3.5 feet and would be installed on \pm 6.5 foot centers in a triangular distribution. It was assumed the stone columns would extend down through the liquefiable soils to the top of the Troutdale Formation.

The required limits for ground improvement were evaluated following the displacement-based approach in Section 6.5.5.4 of the ODOT GDM with slope stability analysis performed using XSTABL software for post-earthquake conditions. Figure 6-15 of the ODOT GDM recommends mitigation limits extending from the toe of the embankment west to a distance established using a 1:1 slope projecting downward from the end of the bridge approach panels. At this site, this would require ground mitigation from the edge of the river to a point ± 135 feet west.

We understand that ODOT wishes to minimize the mitigation area for this project. The easternmost extent of the mitigation area is limited to where the existing slope meets the ordinary high water level (OHWL) at \pm El. 23.3. We assumed the mitigation area would extend ± 76 feet west from this point to approximately the end of the approach panel. It is also assumed that the limits of the mitigation area would span the width of the embankment. Figure 4 (attached) includes a schematic of the proposed eastbound structure at the west abutment, as well as the planned slope profile and proposed limits of soil improvement.

Our analysis was completed assuming the stone columns would have a nominal diameter of ± 3.5 feet and would be installed on ± 6.5 foot centers in a triangular distribution. Therefore, a stone area replacement ratio (a_s) of 0.26 was assumed. Mitigation will require the stone columns extend down through the liquefiable soils to the top of the Troutdale Formation.

Composite unit weights and friction angles for the mitigated zone are summarized in Table 3, (attached). These values were established using a weighted average of the stone column material and reinforced soil following the recommendations in the Design and Construction of Stone Columns manual (FHWA RD-83/026). A friction angle of 42 degrees and a unit weight of 125 pcf was assumed for the stone columns. An analysis was completed using composite soil parameters calculated assuming a weighted average of improved soil strengths and the strength of the columns (i.e., assuming the vibrations and installation of the stone columns will densify the loose sandy soils sufficiently to increase the friction angles by ± 3 to 4 degrees and the unit weights by ± 3 to 5 pcf). Only minor improvement was assumed in the soft, silty overbank deposits.

Slope stability analysis for the improved ground was performed using XSTABL software. An average winter ground water level of \pm El. 15 was assumed. Static analysis was completed assuming composite strengths in the mitigated zone with effective stress parameters for the soils assuming drained conditions. The results, shown on Figure 5, suggest a factor of safety of 1.60 for failure surfaces extending behind the abutment and 1.18 for shallow failure surfaces on the face of the embankment slope.

For the post-earthquake conditions, we assumed composite strengths and drained conditions within the mitigated zone. We assumed residual strengths for the loose sands and overbank deposits outside the mitigated zone assuming these soils will liquefy or soften during the design earthquake. Static analyses were completed for these conditions. The results, shown on Figure 6, suggest a factor of safety of 1.43 for failure surfaces extending behind the abutment and 1.23 for shallow failure surfaces on the face of the embankment slope. This indicates that the embankment would remain stable after the

earthquake provided it did not fail during the earthquake. However, some displacement is anticipated even with a factor of safety greater than 1.

Following the displacement based approach in Section 6.5.5.4 of the ODOT GDM, pseudo static analysis was completed using XSTABL to establish the yield acceleration (K_y) for the improved embankment. The results, shown on Figure 7, suggest a K_y of 0.11g. Newmark analysis (Jibson and Jibson 2003) was completed to estimate the lateral movement for a M_w of 8.5 and a PGA in the range of 0.12g to 0.17g (based on the 1,000-yr CSZ design earthquake). Figure 7.8 presented in Dickenson, et al. (2002) was also used to estimate lateral displacements.

The different analysis tools suggest varying estimates of total settlement ranging from less than 1 inch to greater than 1 foot for the proposed ground improvement scenario. However, because the yield acceleration (K_y) is relatively high compared to the design seismic acceleration, we believe the risk of developing lateral movement of the embankment greater than a few inches is relatively low. Since the critical failure surface involves a small wedge behind the abutment wall, the additional load on the abutment is expected to be similar to the load previously calculated for the abutment wall using Mononobe-Okabe.

CONSTRUCTION OF STONE COLUMNS

The east extent of the mitigation should extend from the OHWL at El. 23.3 on the riverbank west to the end of the approach panels. We recommend that the ground improvement extend at least 40 feet beyond the north and south edges of the abutments. The approximate limits of the ground improvement are shown on Figure 8. This encompasses a plan area of 23,000 ft². The stone columns should extend down through the liquefiable soils to the top of the dense Troutdale Formation. The available subsurface data indicates the top of the Troutdale Formation varies with location and may be deeper towards the river. Based on the available information, we anticipate stone column depths ranging from ±45 to 55 feet with an average of ±50 feet.

A stone replacement ratio of 0.26 is recommended. Our analysis was completed assuming the stone columns would have a nominal diameter of ±3.5 feet and would be installed on ±6.5 foot centers in a triangular distribution. Other column diameter and layout configurations may be proposed by the ground improvement contractor that satisfies the area replacement ratio. A stone backfill volume of ±300,000 ft³ was calculated based on the limits of the ground improvement area, the recommended area replacement ratio and the average stone column depth. This corresponds to ±18,500 to 20,000 tons of backfill assuming a unit weight between ±125 pcf and 130 pcf for the completed columns.

Prior to installation of the production columns, we recommend completing a test section to evaluate the suitability of the contractor's equipment and methods to construct stone columns meeting the required depths and area replacement ratio. The test columns should be constructed using the same methods proposed for the production columns.

We recommend completing two CPT tests in the test area prior to construction of the stone columns to establish a base line for the soil conditions. The CPT's should extend to the full depth of the stone column construction. Two additional CPT tests should be

completed after the construction of the test columns to determine the post-construction soil conditions and evaluate the effectiveness of the stone columns at densifying the sandy soils. The tests should be performed equidistant between two stone columns near locations where CPT testing was completed prior to stone column construction. The test area should be trenched exposing the tops of the test columns to determine the typical stone column diameter and verify conformance with the required area replacement ratio. Based on a review of the test section results, the stone column spacing or construction methods may be adjusted to achieve the ground improvement goals.

Once the contractor's construction equipment and procedures have been satisfactorily demonstrated in the test section, the production columns should be installed using the same procedures. The test columns may be used as production columns provided they satisfy the specifications. Additional CPT explorations should be done after the ground improvement is completed to supplement the current data and provide subsurface information in areas that could not be accessed at the time the previous investigations. The information will also help establish the effectiveness of the ground improvement. We recommend completing one CPT for every 50 production stone columns.

We anticipate that the stone columns will need to be installed in three stages due to the staging of the bridge construction and the need to remove the existing bridge abutments before placing the stone columns.

The ground improvement area includes flat terrain and sloping ground. Therefore, construction of stone columns on slopes will be required. Due to the presence of fill and natural river alluvium, obstructions should be anticipated at some locations. Obstructions may include rip rap on the surface of the embankment slope, cobble to boulder-sized material in the fill and buried wood debris in the alluvium. The contractor should be prepared to excavate or pre-auger as needed to remove the obstructions.

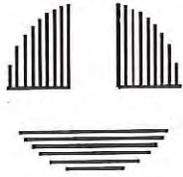
It has been a pleasure assisting you with this phase of your project. Please do not hesitate to contact us if you have any questions or if you require further assistance.

REFERENCES

- Dickenson, S., McCullough, N., Barkau, M. and Wavra, B., 2002; Assessment and Mitigation of Liquefaction Hazards to Bridge Approach Embankments in Oregon, ODOT Final Report SPR 361.
- Jibson, R. and Jibson, M. 2003; Java Program for Using Newmark's Method and Simplified Decoupled Analysis to Model Slope Deformations During Earthquakes, Computer Software, USGS Open-File Rport 03-005.
- Oregon Department of Transportation, Geo-Environmental Section, April 2008; Geotechnical Design Manual.
- Seed, R.B. and Harder, L.F., 1990; SPT-Based Analysis of Cyclic Pore Pressure Generation and Undrained Residual Strength. Proceedings, H. Bolton Seed Memorial Symposium, University of California, Berkeley, Vol., 2, pp. 351-376.
- Youd, T.L., Hansen, C.M., and Bartlett, S.F. 2002, Revised Multilinear Regression Equations for Prediction of Lateral Spread Displacement, ASCE Journal of Geotechnical and Geoenvironmental Engineering, Vol. 128, No. 12, pp. 1007-0117

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Tables & Figures

*Professional
Geotechnical
Services*

Foundation Engineering, Inc.

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TABLE 1: ASSUMED UNIT WEIGHTS AND DRAINED STRENGTHS FOR UNMITIGATED SOIL

Soil Unit	Soil Description	Unmitigated Soil		
		ϕ soil	γ_m soil (pcf)	γ_b soil (pcf)
1	SAND and GRAVEL (Fill)	34	120	57.6
2	V. loose to loose, SAND, Silty SAND and Sandy SILT	32	110	47.6
3	Soft SILT, Silty CLAY and Clayey SILT	30	110	47.6
4	V. loose to loose SAND and Silty SAND	32	110	47.6
5	Dense GRAVEL (Troutdale Fm.)	38	125	62.6
6	Loose SAND	35	115	52.6

TABLE 2: ASSUMED UNIT WEIGHTS AND RESIDUAL STRENGTHS FOR LIQUEFIED SOIL

Soil Unit	Soil Description	Unmitigated Soil	
		S_u (psf)	γ_b soil (pcf)
3	Soft SILT, Silty CLAY and Clayey SILT	500	110
4	V. loose to loose, SAND and Silty SAND	200	110
6	Loose SAND	400	115

TABLE 3: COMPOSITE UNIT WEIGHTS AND DRAINED STRENGTHS FOR MITIGATED SOIL
 (ASSUMES SOME DENSIFICATION IN SANDY SOIL)

Soil Unit	Mitigated Soil			Stone Columns			Assumed Column Dia (ft)	Stone Col. Spacing (ft)	Soil Ratio a_c	Stone Repl Ratio a_s	Composite Parameters		
	ϕ soil	γ_m soil (pcf)	γ_b soil (pcf)	ϕ stone	γ_m stone	γ_b stone (pcf)					γ_{ave}	$\gamma_{b\ ave}$	ϕ_{ave}
7	38	123	60.6	42	125	62.6	3.5	6.5	0.74	0.26	124	61	39
8	35	115	52.6	42	125	62.6	3.5	6.5	0.74	0.26	118	55	37
9	32	110	47.6	42	125	62.6	3.5	6.5	0.74	0.26	114	52	35
10	35	115	52.6	42	125	62.6	3.5	6.5	0.74	0.26	118	55	37
11	38	115	52.6	42	125	62.6	3.5	6.5	0.74	0.26	118	55	39

1. Stone replacement ratio assumes triangular spacing
2. ϕ_{ave} calculations use buoyant unit weights for Layers 10 through 12.
2. Soil Ratio, Stone Replacement Ratio, and Composite soil parameters are based on Design and Construction of Stone Columns Vol. 1, FHWA/RD-83/026.

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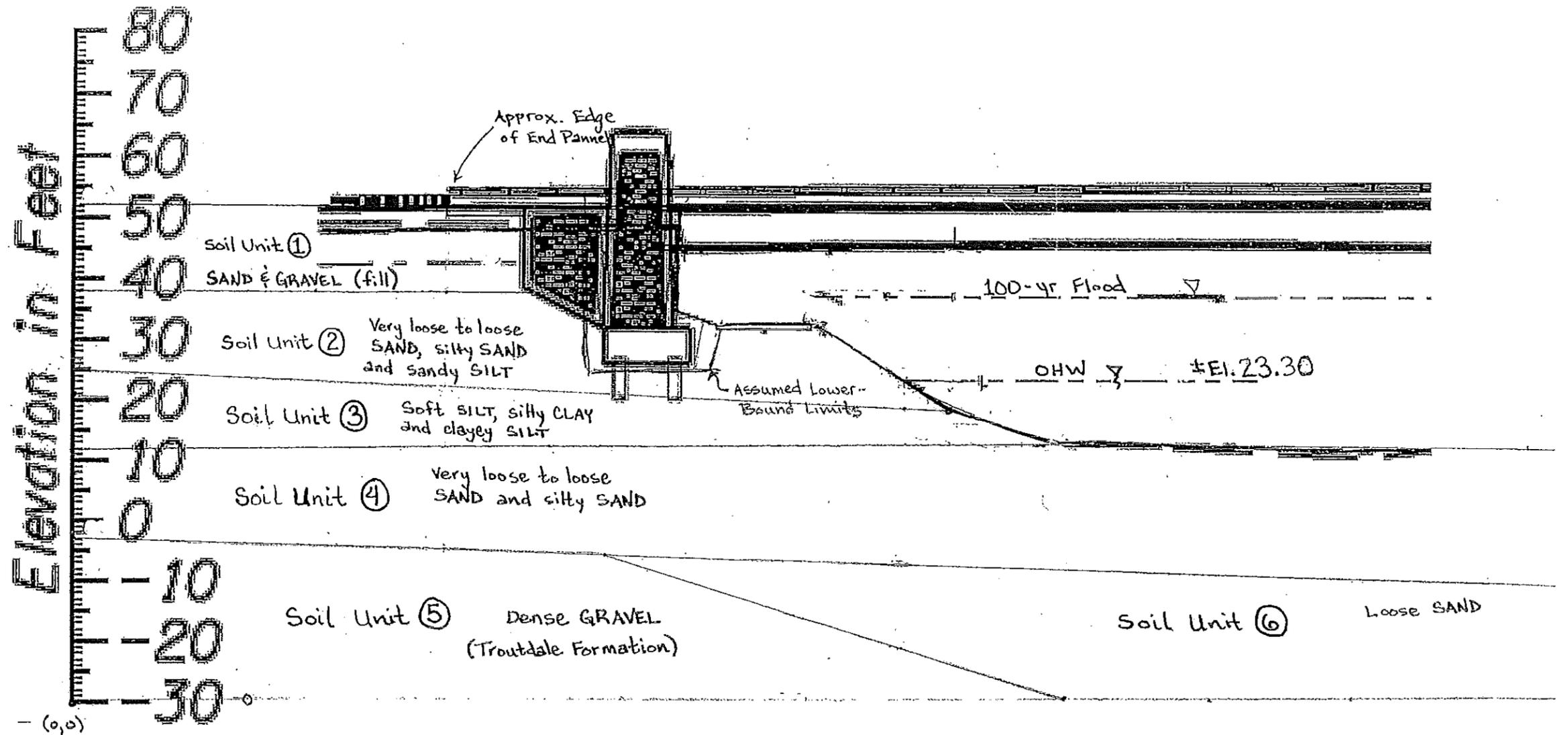
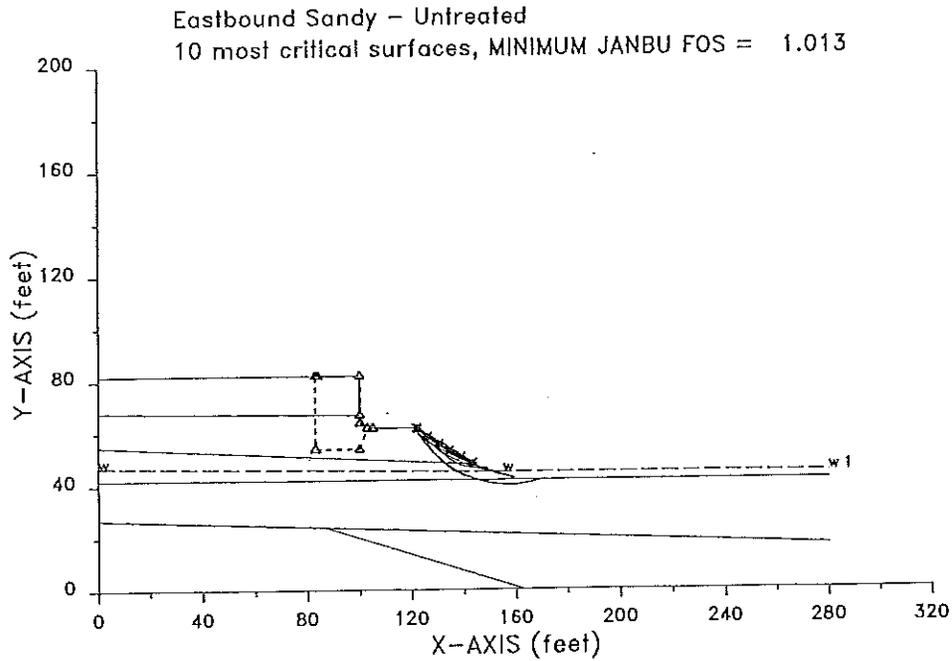
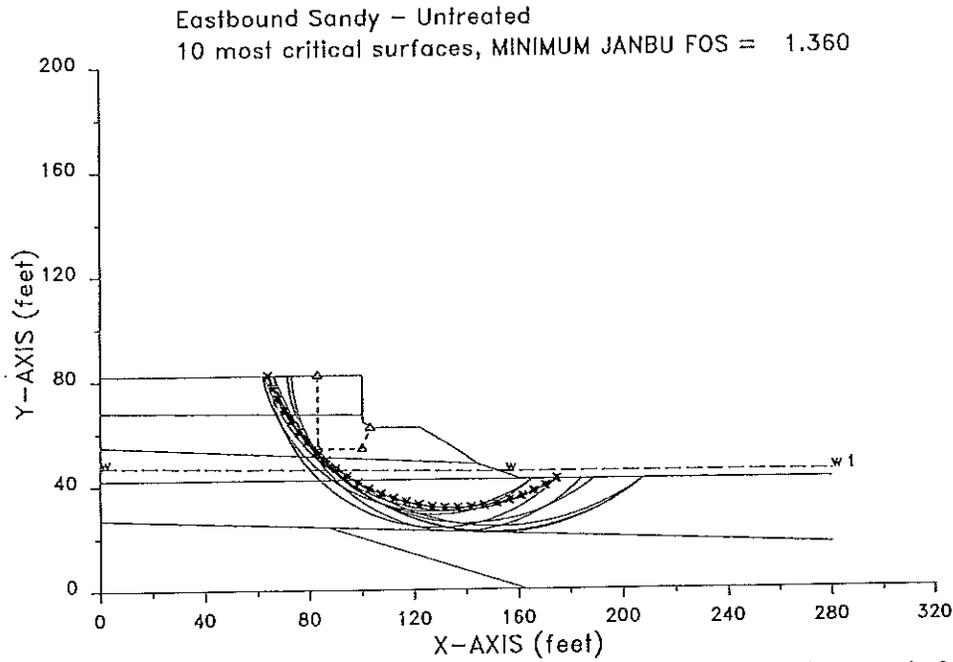


Figure 1. Assumed Subsurface Profile - Unmitigated Conditions

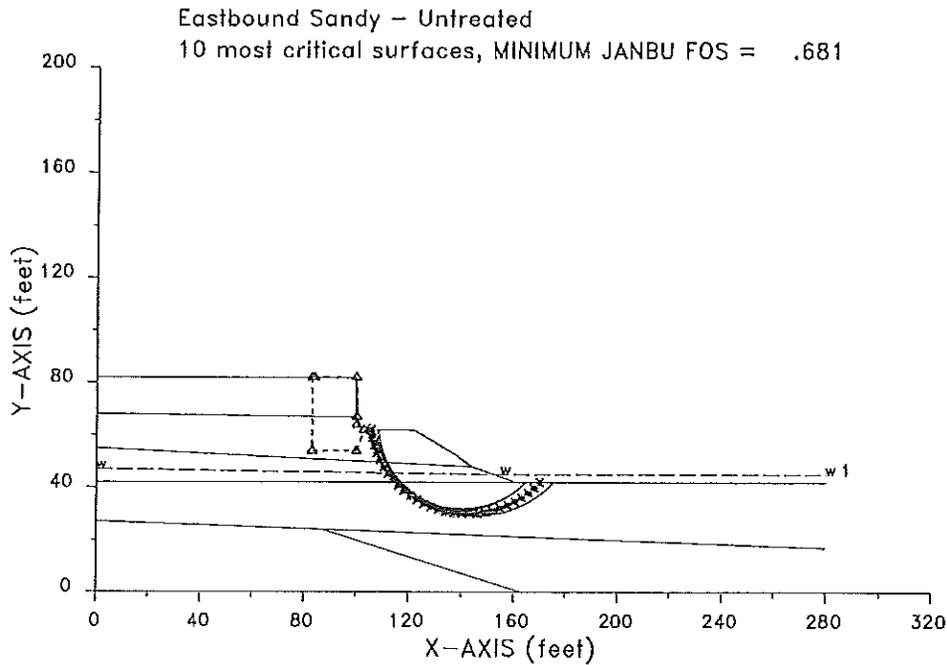


Untreated Slope - Shallow Failure Surface, Static Conditions

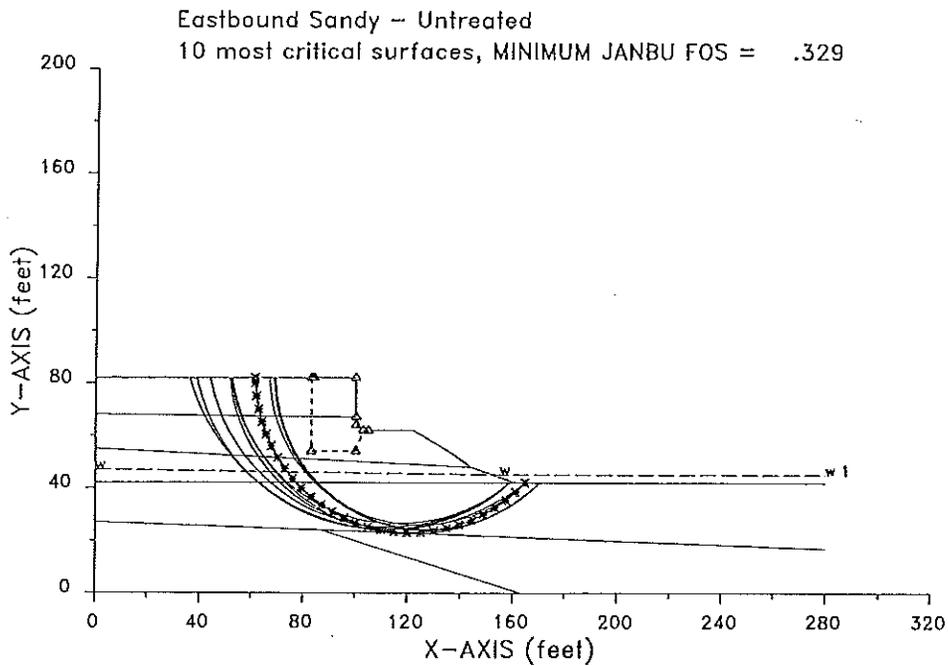


Untreated Slope - Deep-Seated (Failure Surface Forced Behind Abutment), Static Conditions

Figure 2. Static Analysis of Unmitigated Slope with No Liquefaction



Untreated Slope - Shallow Failure Surface, Liquefied Soil Strengths



Untreated Slope - Deep-Seated Failure, Liquefied Soil Strengths

Figure 3. Static Analysis of Unmitigated Slope Assuming Residual Strengths in Liquefied Soils

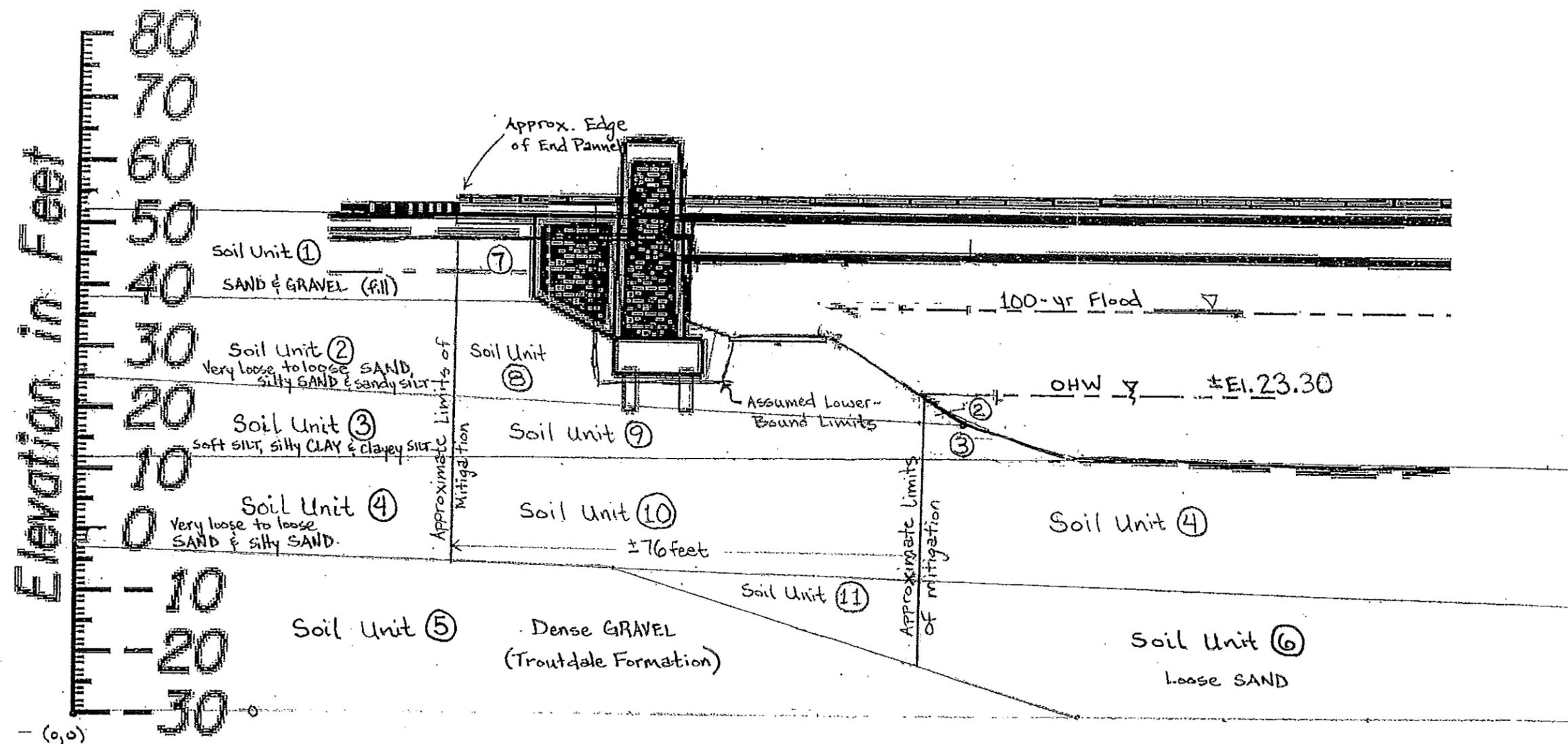
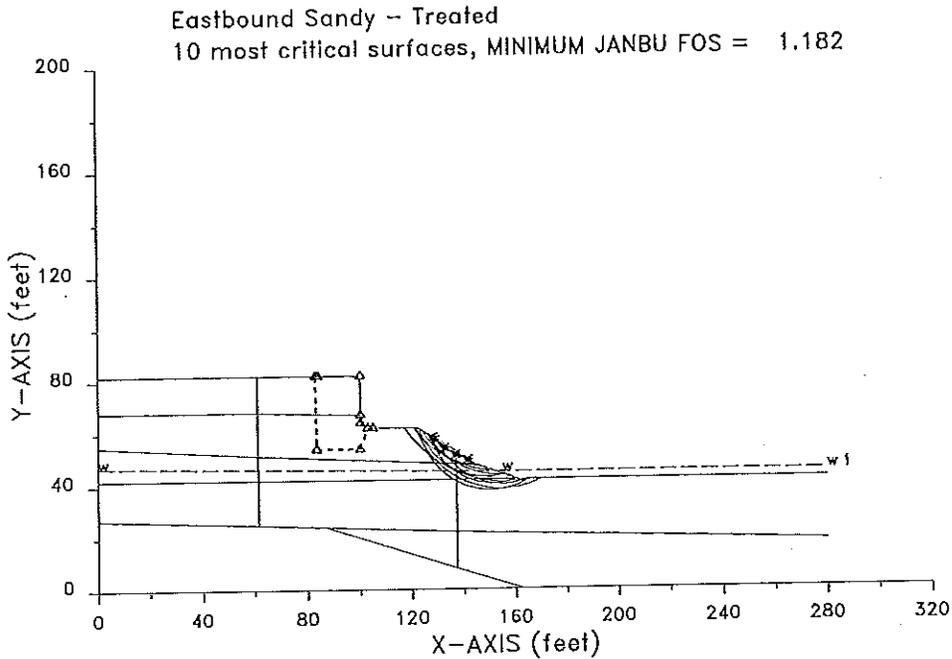
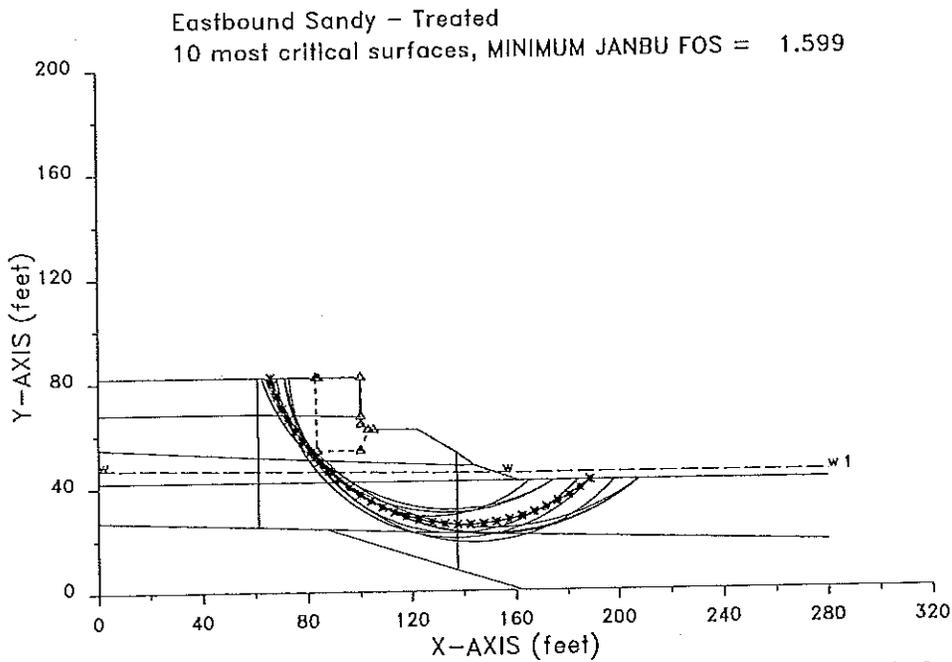


Figure 4. Assumed Subsurface Profile with Stone Column Mitigation

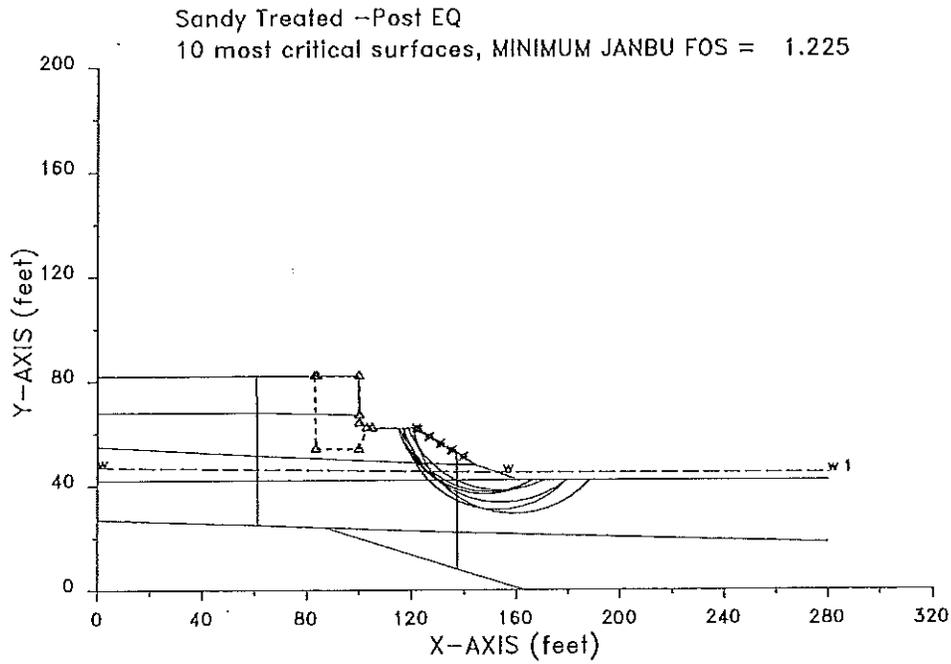


Improved Slope - Shallow Failure Surface, Static Conditions

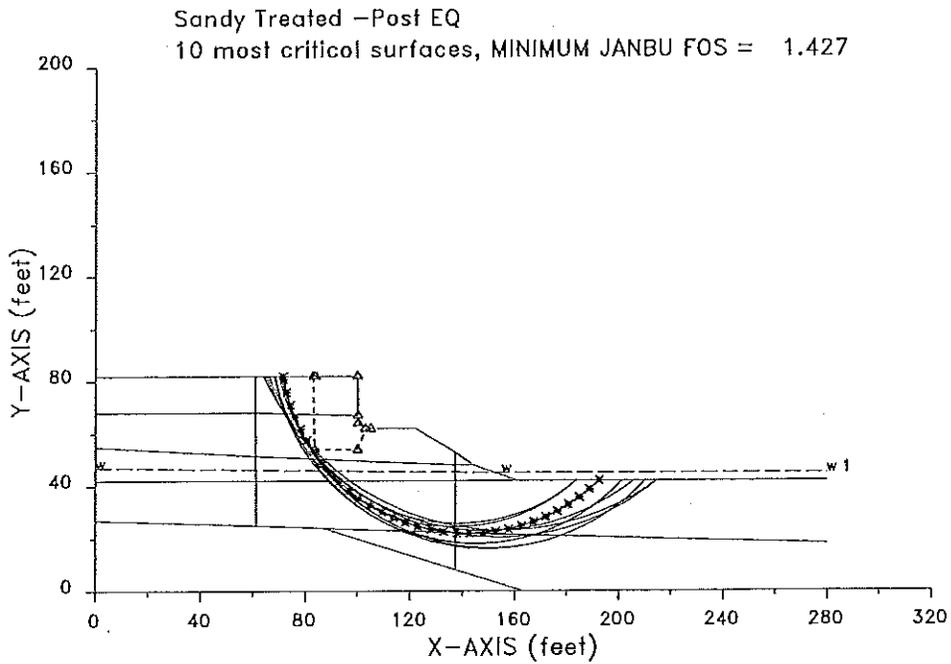


Improved Slope - Deep-Seated (Failure Surface Forced Behind Abutment), Static Conditions

Figure 5. Static Analysis of Mitigated Slope with No Liquefaction

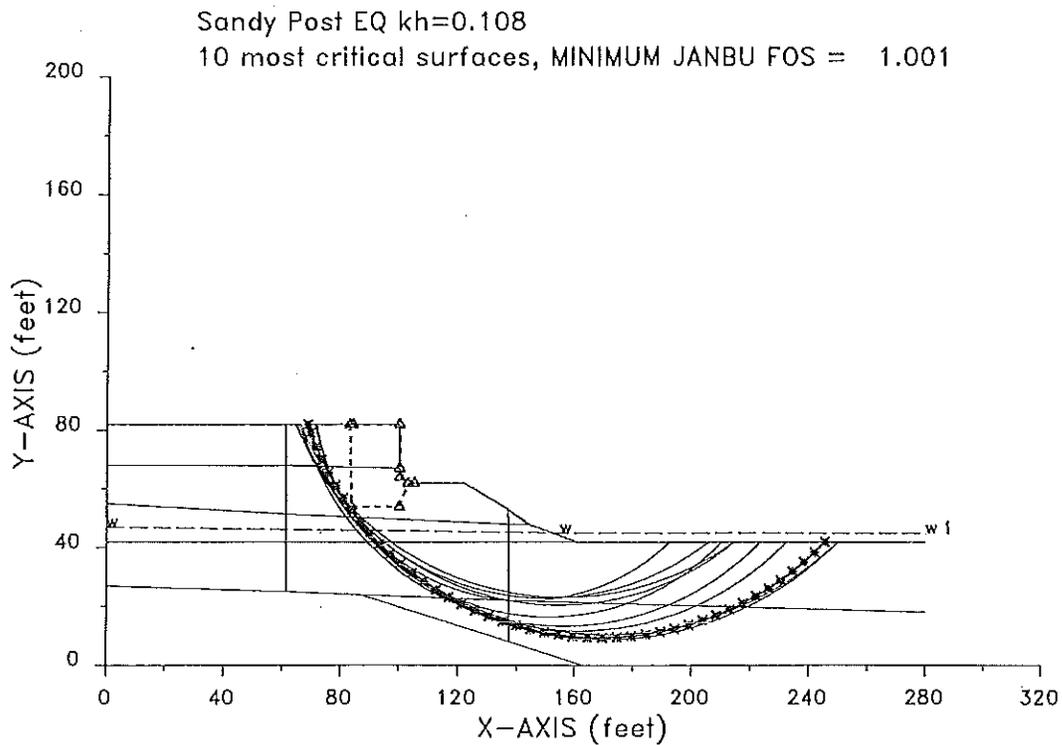


Improved Slope - Shallow Failure Surface, Liquefied Soil Strengths



Improved Slope - Deep-Seated (Failure Surface Forced Behind Abutment), Liquefied Soil Strengths

Figure 6. Static Analysis of Mitigated Slope Assuming Residual Strengths in Liquefied Soils



Improved Slope - Deep-Seated (Failure Surface Forced Behind Abutment), Liquefied Soil Strengths
Yield acceleration (k_v) of 0.108 established by finding FS = 1.0

Figure 7. Pseudo-static Analysis to Establish Yield Acceleration
(Assumes Residual Strengths in Liquefied Soils)

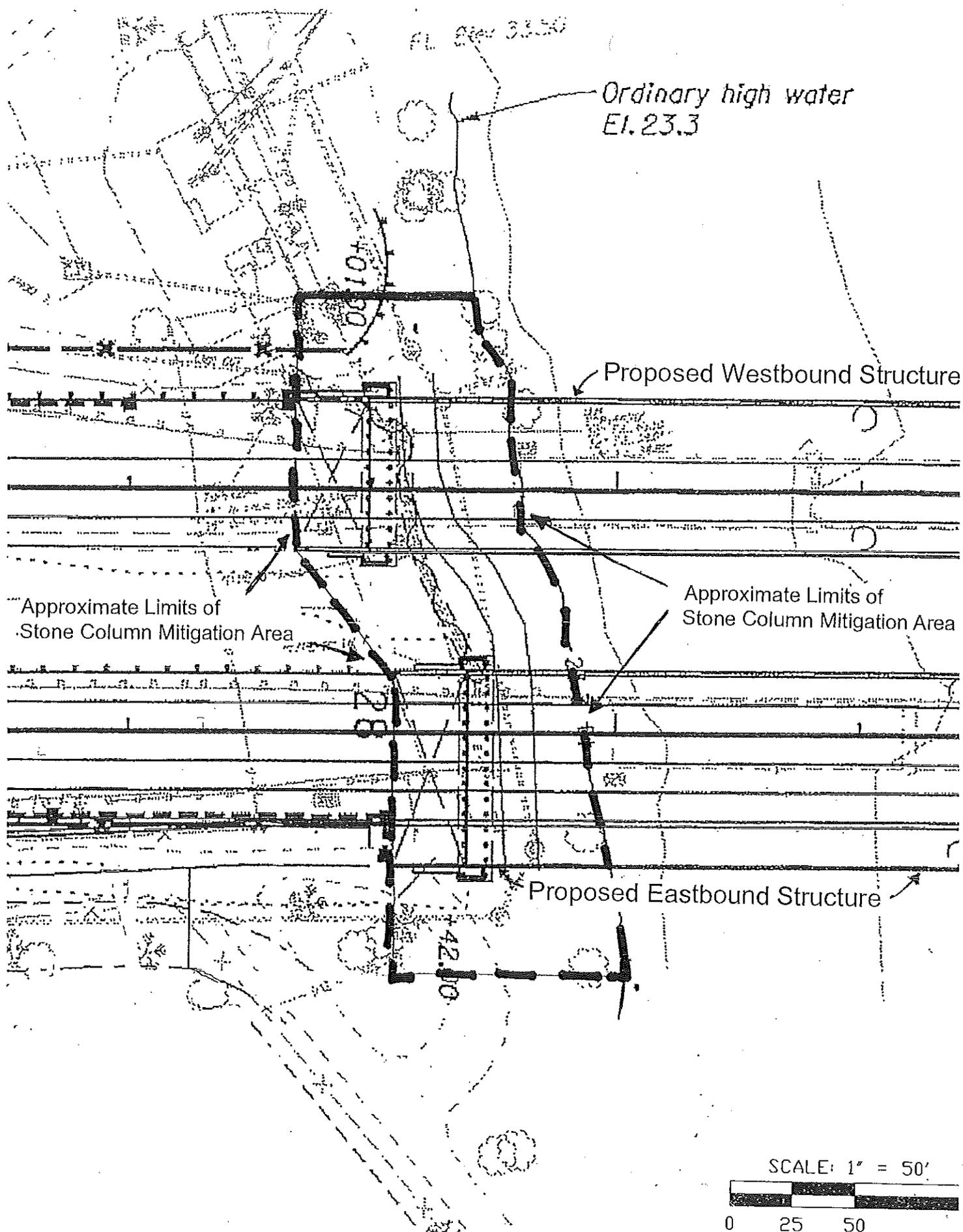
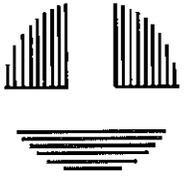


Figure 8. Approximate Limits of Stone Column Mitigation Area



Calculations

Displacement Calculations For Mitigated Embankment

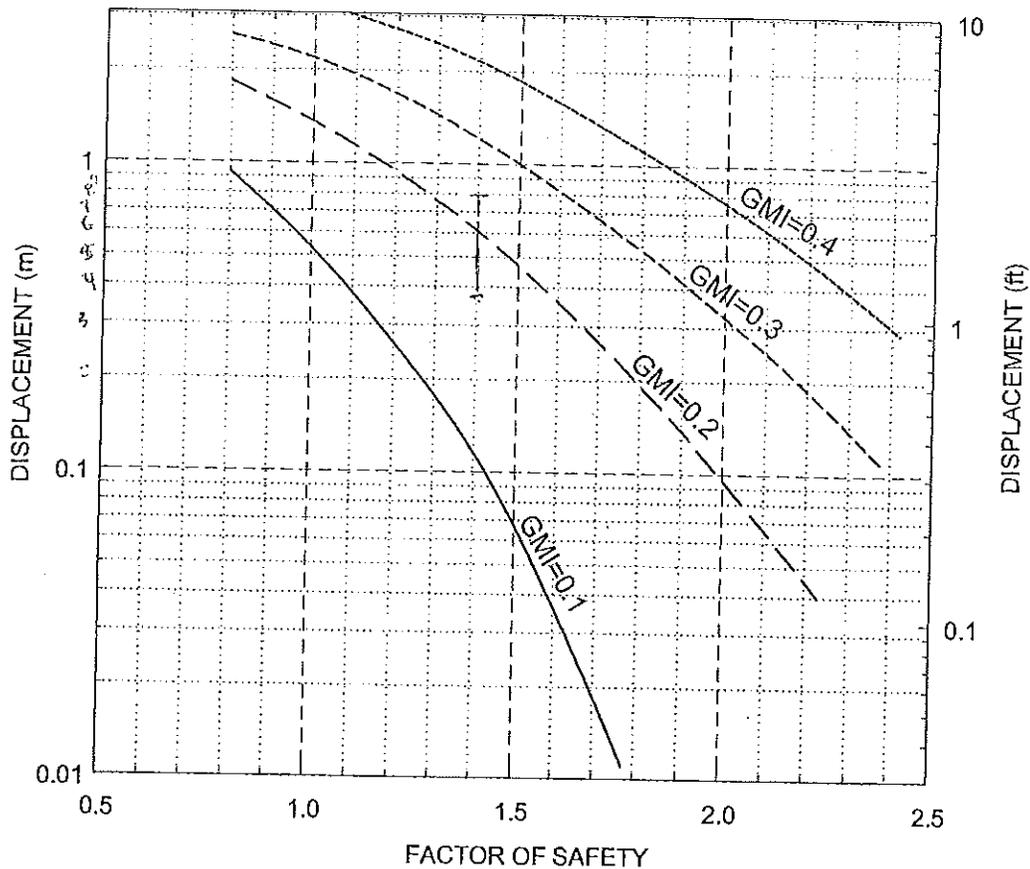


Figure 7.8: Displacement versus Static, Post-Earthquake Factor of Safety as a Function of Ground Motion Intensity Factor (GMI).

$M_w = 8.5g \quad 0.12 \leq PGA \leq 0.17$

$GMI = \frac{PGA}{MSF} = 0.17 \text{ to } 0.23 \checkmark$

$MSF = \left(\frac{M_w}{7.5}\right)^{-2.56} = 0.73 \checkmark$

Displacement @ toe = 0.4 to 0.8 m
= 1.3 to 2.6 ft \checkmark

Use Post EQ FS = 1.4 \checkmark
(liquefied strength, no kin)

[displacement at top = $\frac{\text{toe disp.}}{1.6}$]

\therefore Displacement @ top = 0.8 to 1.6 ft \checkmark

Newmark (Ambraseys & Menu)

$\log D_n = 0.90 + \log \left[\left(1 - \frac{\alpha_c}{a_{max}}\right)^{2.53} \left(\frac{\alpha_c}{a_{max}}\right)^{-1.09} \right]$

$\log D_n = 0.90 + \log \left[\left(1 - \frac{0.11}{0.17}\right)^{2.53} \left(\frac{0.11}{0.17}\right)^{-1.09} \right]$

$\log D_n = -0.0382$

$D_n = 0.92 \text{ cm} \checkmark = 0.36 \text{ in} \checkmark$

XSTABLE output :

Critical Acceleration
 $\alpha_c = 0.108$

\rightarrow USE $\alpha_c = 0.11$



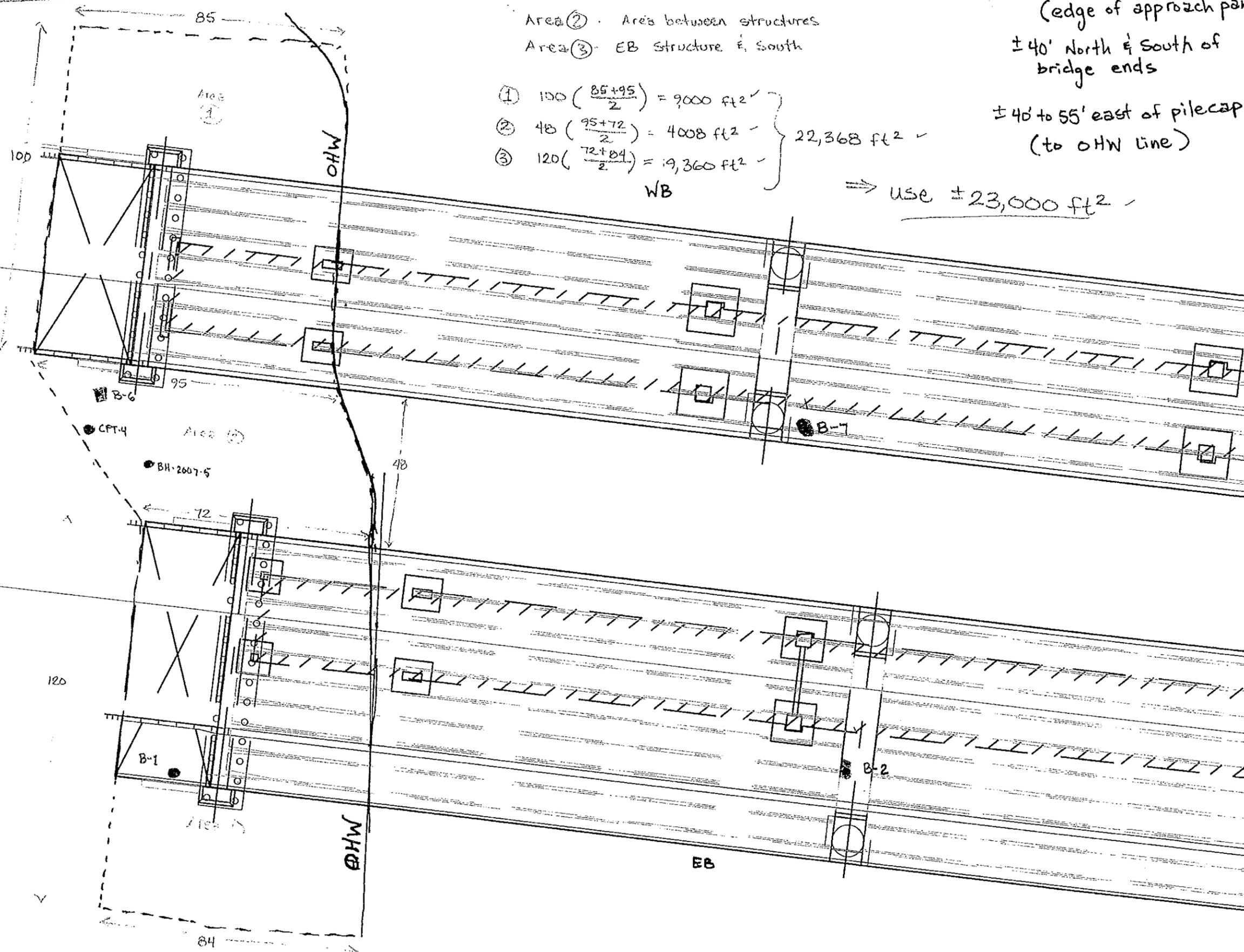
Estimate of Stone Column Mitigation Area

ESTIMATE OF STONE COLUMN MITIGATION AREA

Depth to Troutdale

B-1	42.5 ft
BH-2007-5	53 ft
CPT-4	55 ft
B-6	59 ft
B-2	58.5 ft
B-7	77 ft

for SHAKE analysis - depth to Troutdale
≈ 52.5 feet



- Area ① - WB structure & north
- Area ② - Area between structures
- Area ③ - EB structure & south

$$\begin{aligned} \text{① } & 100 \left(\frac{85+95}{2} \right) = 9,000 \text{ ft}^2 \\ \text{② } & 48 \left(\frac{95+72}{2} \right) = 4,008 \text{ ft}^2 \\ \text{③ } & 120 \left(\frac{72+84}{2} \right) = 19,360 \text{ ft}^2 \end{aligned} \quad \left. \begin{array}{l} \\ \\ \end{array} \right\} 22,368 \text{ ft}^2$$

WB

Area: ± 30' West of pile cap
(edge of approach panel)
± 40' North & South of
bridge ends
± 40' to 55' east of pile cap
(to OHW line)

⇒ use ± 23,000 ft²

SCALE 1"=30'

JCH 12-30-08

Reviewed by DUE 12-30-08

PROJECT NAME:

Sandy R. Bridge W. Abutment

PROJECT NO.

2072027

Volume Estimate of Rock for Stone Columns

$$\text{Treated Area} \approx \pm 23,000 \text{ ft}^2 \checkmark$$

$$\text{Treated Depth} \approx \pm 50 \text{ ft} \text{ (Average)} \checkmark$$

$$0.26 (23,000) = 5980 \text{ ft}^2$$

$$\text{Stone Column Area} = \frac{\pi (3.61)^2}{4} = 9.62 \text{ ft}^2$$

$$\frac{5980 \text{ ft}^2}{9.62 \text{ ft}^2/\text{column}} \approx 620 \text{ stone columns} \checkmark$$

$$\text{Volume} = (23,000) (50) = 1,150,000 \text{ ft}^3 \checkmark = 42,592 \text{ yd}^3 \checkmark$$

* 26% Replacement Ratio \checkmark

$$\text{Volume of Rock} = 0.26 (42,592) = 11,074 \text{ yd}^3 \checkmark$$

Weight:

$$\text{Assume Rock} = \pm 125 - 130 \text{ pcf}$$

$$11,074 \text{ yd}^3 = 299,000 \text{ ft}^3$$

$$\Rightarrow 125 \text{ pcf} (299,000 \text{ ft}^3) = 37,375,000 \text{ lb} \text{ (18,687.5 tons)} \checkmark$$

$$130 \text{ pcf} (299,000) = 38,870,000 \text{ lb} \text{ (19,435 tons)} \checkmark$$

Rock for Stone Columns: $\pm 11,000 \text{ yd}^3 \checkmark$ $\pm 18,560 - 20,000 \text{ tons} \checkmark$

$$620 [9.62 \text{ ft}^2 \times 50 \text{ ft}] = 298,255 \text{ ft}^3 \checkmark$$

$$= 11,046 \text{ yd}^3$$

reviewed by DCP 12-30-08



FOUNDATION ENGINEERING

JCH

BY

12/30/08

DATE

1/1

SHEET NO.

Appendix E No Net Rise Certificate

Memorandum



WEST Consultants, Inc.
2601 25th St. SE
Suite 450
Salem, OR 97302-1286
(503) 485 5490
(503) 485-5491 Fax
www.westconsultants.com

Name: Doug Johnson, P.E.
Company: David Evans and Associates, Salem, Oregon
Date: September 13, 2013
From: Hans R. Hadley, P.E., Senior Hydraulic Engineer
Subject: No-Rise Hydraulic Analysis Update for Modifications to Design of Proposed Sandy River Bridges, Highway 2 (I-84), Sandy River, Multnomah County, Oregon

Per your request, an update to the hydraulic analysis for the proposed I-84 Sandy River Bridges was performed to evaluate several changes to design since the model was last updated. The proposed conditions HEC-RAS model was updated with the following changes:

- Addition of an I-84 pedestrian undercrossing tunnel, located in the east overbank adjacent to the Jordan Road overpass.
- Reduction of east abutment fill slope riprap bench width located at elevation 33.0 feet. The width was reduced from 20 feet to 3 feet.
- Addition of pedestrian pathway under bridge at elevation 33.2 feet at west abutment fill slope riprap bench.

Hydraulic analysis results for the updated model are shown in Table 1. The results of the hydraulic evaluation indicate that there is **no-rise** in the 1-percent annual chance water surface elevations as a result of the above listed changes to the proposed design for the I-84 Sandy River Bridges. As seen in Table 1, the backwater elevation is reduced from 0.59 to 0.24 feet, a difference of 0.35 feet. A FEMA no-rise certification is provided in Figure 1.

Table 1. Hydraulic Data Sheet for Replacement Bridges

	Existing Conditions			Replacement Bridges		
	Design Flood	Base Flood	500-Year Flood	Design Flood	Base Flood	500-Year Flood
Discharge (ft ³ /s)	76,732	88,937	122,049	76,732	88,937	122,049
Recurrence Interval (yrs)	50	100	500	50	100	500
Approach Section H.W. Elevation with Natural Channel ¹ (ft)	34.07	36.38	40.62	34.07	36.38	40.62
Approach Section H.W. Elevation with Bridge (ft)	34.60	36.97	41.47	34.27	36.62	40.98
Backwater (ft)	0.53	0.59	0.85	0.20	0.24	0.36

FIGURE 1

CERTIFICATION OF A "NO-RISE" DETERMINATION
FOR A PROPOSED FLOODWAY DEVELOPMENT

Multnomah County
Community Name

Bridge Nos. 06875 & 06875A
Replacements

Development Name

Sandy River

Interstate 84 Bridges

Lot/Property Designation

State of Oregon

Property Owner

I hereby certify that the proposed replacement bridges (including the modification listed in the attached memo) for the Interstate 84 Bridges over the Sandy River will result in no increase in backwater, during the occurrence of the 1 percent annual chance exceedance (100-year flood) discharge.

I further certify that the data submitted herewith in support of this request are accurate to the best of my knowledge, that the analyses have been performed correctly and in accordance with sound engineering practice.

September 13, 2013

Date



Engineers Stamp

Appendix F List of Property Owners and Mailing Labels



**MULTNOMAH COUNTY, OREGON
PROPERTY RECORDS**

Property Information

Property Information	Tax Summary	Assessment History	Improvement Information	New Search	Search Results	Printable Summary	Logoff
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Search Results for R320621

Owner Name	Property ID Number
COLUMBIA RIDGE COMMUNITY	R320621
Owner Address	Situs Address
CHURCH P O BOX 4 TROUTDALE, OR 97060	E SIDE/ NE HARLOW RD TROUTDALE, OR 97060
Alternate Account Number	Neighborhood
R943251700	C700
Map Tax Lot	Levy Code Area - Taxing Districts
1N3E25B -00200	242
Portland Maps	Information on Ordering Copies
Click to Open Map	Click to Open Order Form

Property Description

Exemption		Expiration Date
Tax Roll Description	Map Number	
SECTION 25 1N 3E, TL 200 0.33 ACRES	251N3E OLD	1N3E25B -00200
Parcel		Account Status
		A - Active
Property Use	Year Built	Acreage
A - VACANT LAND		0.33
Related Accounts		Linked Accounts
Split/Merge Account		Split/Merge Account Message

Special Account Information

Sales Information

Deed	Grantor (Seller)	Grantee (Buyer)	Instrument	Date	Consideration Amount
WD	MEYER,JOHN R	COLUMBIA RIDGE COMMUNITY	2007012567	01/23/07	\$116,632
WD	Missing Owner Information	MEYER,JOHN R	96040650	03/01/96	\$49,685

2013 Land Information (Unedited and Uncertified)

ID	Type	Acres	Sq Ft
L1	IND - INDUSTRIAL LAND	0.63	27443



Property Information	Tax Summary	Assessment History	Improvement Information	New Search	Search Results	Printable Summary	Logoff
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Search Results for R320622

Owner Name	Property ID Number
HALL, MOLLY L & DEMPSEY, GARY E	R320622
Owner Address	Situs Address
PO BOX 492 FAIRVIEW, OR 97024	E SIDE/ NE HARLOW RD TROUTDALE, OR 97060
Alternate Account Number	Neighborhood
R943251710	C700
Map Tax Lot	Levy Code Area - Taxing Districts
1N3E25B -00300	242
Portland Maps	Information on Ordering Copies
Click to Open Map	Click to Open Order Form

Property Description

Exemption		Expiration Date
Tax Roll Description		Map Number
SECTION 25 1N 3E, TL 300 0.11 ACRES		251N3E OLD 1N3E25B -00300
Parcel		Account Status
		A - Active
Property Use	Year Built	Acreage
A - VACANT LAND		0.11
Related Accounts		Linked Accounts
Split/Merge Account		Split/Merge Account Message

Special Account Information

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Sales Information

Deed	Grantor (Seller)	Grantee (Buyer)	Instrument	Date	Consideration Amount
INST	HALL, MOLLY L &	HALL, MOLLY L &	BP27963101		\$0

2013 Land Information (Unedited and Uncertified)

ID	Type	Acres	Sq Ft
L1	IND - INDUSTRIAL LAND	0.11	4792

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Property Information	Tax Summary	Assessment History	Improvement Information	New Search	Search Results	Printable Summary	Logoff
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Search Results for R320521

Owner Name	Property ID Number
HALL, MOLLY L & DEMPSEY, GARY E	R320521
Owner Address	Situs Address
PO BOX 492 FAIRVIEW, OR 97024	NE HARLOW RD TROUTDALE, OR 97060
Alternate Account Number	Neighborhood
R943250450	C700
Map Tax Lot	Levy Code Area - Taxing Districts
1N3E25B -00400	242
Portland Maps	Information on Ordering Copies
Click to Open Map	Click to Open Order Form

Property Description

Exemption	Expiration Date	
Tax Roll Description	Map Number	
SECTION 25 1N 3E, TL 400 2.02 ACRES	251N3E OLD	1N3E25B -00400
Parcel	Account Status	
	A - Active	
Property Use	Year Built	Acreage
A - VACANT LAND		2.02
Related Accounts	Linked Accounts	
Split/Merge Account	Split/Merge Account Message	

Special Account Information

Sales Information

Deed	Grantor (Seller)	Grantee (Buyer)	Instrument	Date	Consideration Amount
INST	HALL, MOLLY L &	HALL, MOLLY L &	BP27963101		\$0

2013 Land Information (Unedited and Uncertified)

ID	Type	Acres	Sq Ft
L1	IND - INDUSTRIAL LAND	2.02	87991

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**MULTNOMAH COUNTY, OREGON
PROPERTY RECORDS**

Property Information	Tax Summary	Assessment History	Improvement Information	New Search	Search Results	Printable Summary	Logoff
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Search Results for R320513

Owner Name	Property ID Number
COLUMBIA RIDGE COMMUNITY	R320513
Owner Address	Situs Address
CHURCH P O BOX 4 TROUTDALE, OR 97060	801 NE HARLOW RD TROUTDALE, OR 97060
Alternate Account Number	Neighborhood
R943250350	C700
Map Tax Lot	Levy Code Area - Taxing Districts
1N3E25B -00500	242
Portland Maps	Information on Ordering Copies
Click to Open Map	Click to Open Order Form

Property Description

Exemption	Expiration Date	
Tax Roll Description	Map Number	
SECTION 25 1N 3E, TL 500 4.55 ACRES	251N3E OLD	1N3E25B -00500
Parcel	Account Status	
	A - Active	
Property Use	Year Built	Acreage
A - VACANT LAND		4.55
Related Accounts	Linked Accounts	
P587305		
Split/Merge Account	Split/Merge Account Message	

Special Account Information

Sales Information

Deed	Grantor (Seller)	Grantee (Buyer)	Instrument	Date	Consideration Amount
WD	MEYER,JOHN R	COLUMBIA RIDGE COMMUNITY	2007012568	01/23/07	\$818,450
WD	SCHULTE,THEODORE J	MEYER,JOHN R	96040649	03/01/96	\$295,315

2013 Land Information (Unedited and Uncertified)

ID	Type	Acres	Sq Ft
L1	IND - INDUSTRIAL LAND	4.55	198198



**MULTNOMAH COUNTY, OREGON
PROPERTY RECORDS**

Property Information

Property Information	Tax Summary	Assessment History	Improvement Information	New Search	Search Results	Printable Summary	Logoff
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Search Results for R320520

Owner Name	Property ID Number
TROUTDALE CITY OF	R320520
Owner Address	Situs Address
104 SE KIBLING ST TROUTDALE, OR 97060-2012	410 NW 257TH WAY TROUTDALE, OR 97060
Alternate Account Number	Neighborhood
R943250430	C700
Map Tax Lot	Levy Code Area - Taxing Districts
1N3E25BD -00400	931 - TROUTDALE UR - REYNOLDS & MHCC
Portland Maps	Information on Ordering Copies
Click to Open Map	Click to Open Order Form

Property Description

Exemption	Expiration Date	
(4) CITIES AND TOWNS		
(90) GOVERNMENT OWNED LEASED BY TAXABLE TENANT	2014	
Tax Roll Description	Map Number	
SECTION 25 1N 3E, TL 400 10.86 ACRES	251N3E OLD	1N3E25BD -00400
Parcel	Account Status	
	A - Active	
Property Use	Year Built	Acreage
UK - PUBLIC BLDG	1970	10.86
Related Accounts	Linked Accounts	
P638905, P640215, P641841, P654897, P655062		
Split/Merge Account	Split/Merge Account Message	

Special Account Information

Sales Information

Deed	Grantor (Seller)	Grantee (Buyer)	Instrument	Date	Consideration Amount
INST	TROUTDALE CITY OF	TROUTDALE CITY OF	BP19581229		\$0

2013 Land Information (Unedited and Uncertified)

ID	Type	Acres	Sq Ft
L1	IND - INDUSTRIAL LAND	10.86	473179

Owner Name	Mailing Address	Tax Assessor Number	Account Number
Columbia Ridge Community Church	PO Box 4 Troutdale, OR 97060	1N3E25B-00500	R320513
Columbia Ridge Community Church	PO Box 4 Troutdale, OR 97060	1N3E25B-00200	R320621
Molly & Dempsey Hall	PO Box 492 Fairview, OR 97024	1N3E25B-00400	R320521
Molly & Dempsey Hall	PO Box 492 Fairview, OR 97024	1N3E25B-00300	R320622
City of Troutdale	104 SE Kibling St Troutdale, OR 97060	1N3E25BD -00400	R320520