# CITY OF WEST LINN OPERATIONS COMPLEX

## CLASS II DESIGN REVIEW & CONDITIONAL USE PERMIT APPLICATION

FILE: PA-25-09

*REVISED DECEMBER 1, 2025*

December 1, 2025

City of West Linn
Planning & Development • 22500 Salamo Rd #1000 • West Linn, Oregon 97068
Telephone 503.656-3535 • westlinnoregon.gov

# DEVELOPMENT REVIEW APPLICATION

| For Office Use Only | | |
|---|---|---|
| STAFF CONTACT | PROJECT NO(S). | PRE-APPLICATION NO. |
| NON-REFUNDABLE FEE(S) | REFUNDABLE DEPOSIT(S) | TOTAL |

**Type of Review** (Please check all that apply):

- ☐ Annexation (ANX)
- ☐ Appeal (AP)
- ☐ CDC Amendment (CDC)
- ☐ Code Interpretation (MISC)
- ☒ Conditional Use (CUP)
- ☐ Design Review (DR
- ☐ Tree Easement Vacation (MISC)
- ☐ Expediated Land Division (ELD)
- ☐ Extension of Approval (EXT)
- ☐ Final Plat (FP) Related File#_____
- ☐ Flood Management Area (FMA)
- ☐ Historic Review (HDR)
- ☐ Lot Line Adjustment (LLA)
- ☐ Minor Partition (MIP)
- ☐ Modification of Approval (MOD)
- ☐ Non-Conforming Lots, Uses & Structures
- ☐ Planned Unit Development (PUD)
- ☐ Street Vacation
- ☐ Subdivision (SUB)
- ☐ Temporary Uses (MISC)
- ☐ Time Extension (EXT)
- ☐ Right of Way Vacation (VAC)
- ☐ Variance (VAR)
- ☐ Water Resource Area Protection/Single Lot (WAP)
- ☐ Water Resource Area Protection/Wetland (WAP)
- ☐ Willamette & Tualatin River Greenway (WRG)
- ☐ Zone Change (ZC)

Pre-Application, Home Occupation, Sidewalk Use, Addressing, and Sign applications require different forms, available on the website.

| **Site Location/Address:** | Assessor's Map No.: |
|---|---|
| EAST OF SALAMO RD. AT INTERSECTION OF SALAMO RD. AND GREENE STREET | Tax Lot(s): 21E35D5400 & 21E3602300 |
| | Total Land Area: 33.02 ACRES |

**Brief Description of Proposal:**
THE CITY OF WEST LINN PROPOSES THE CONSTRUCTION OF A NEW OPERATIONS COMPLEX SERVING PUBLIC WORKS, ENVIRONMENTAL SERVICES, PARKS & RECREATION, WATER AND STREETS DIVISIONS. IMPROVEMENTS INCLUDE THREE NEW BUILDINGS, LANDSCAPING, PARKING, AND A PAVED LOT WITH FUELING, TRUCK WASH , DEWATERING AND DECANT FUNCTIONS.

| | | |
|---|---|---|
| **Applicant Name*:** | JEFF DUNN, PROJECT MGR | Phone: 503-896-5388 |
| Address: | SCOTT EDWARDS ARCHITECTURE | Email: JDUNN@SEALLP.COM |
| City State Zip: | 2525 E. BURNSIDE ST.<br>PORTLAND, OR 97214 | |
| **Owner Name** (required): | ERICH LAIS, PUBLIC WORKS DIRECTOR | Phone: 503-722-3434 |
| Address: | CITY OF WEST LINN | Email: ELAIS@WESTLINNOREGON.GOV |
| City State Zip: | 22500 SALAMO RD.<br>WEST LINN, OR 97068 | |
| **Consultant Name:** | ALEX SIMPSON, PE | Phone: 503-221-1131 EXT. 117 |
| Address: | HARPER HOUF PETERSON RIGHELLIS, INC. | Email: ALEX@HHPR.COM |
| City State Zip: | 205 SE SPOKANE ST, SUITE 200<br>PORTLAND, OR 97202 | |

1. Application fees are non-refundable (excluding deposit). Applications with deposits will be billed monthly for time and materials above the initial deposit. ***The applicant is financially responsible for all application costs**.
2. All information provided with the application is considered a public record and subject to disclosure.
3. The owner/applicant or their representative should attend all public hearings related to the application.
4. A decision may be reversed on appeal. The decision will become effective once the appeal period has expired.
5. Submit this form, application narrative, and all supporting documents as a single PDF through the web page: https://westlinnoregon.gov/planning/submit-land-use-application

The undersigned property owner authorizes the application and grants city staff the **right of entry** onto the property to review the application. The applicant and owner affirm that the information provided in this application is true and correct. Applications with deposits will be billed monthly for time and materials incurred above the initial deposit. The applicant agrees to pay additional billable charges.

| Applicant's signature | Date | Owner's signature ***(required)*** | Date |
|---|---|---|---|
| | 07/15/25 | | Jul 15, 2025 |

City of West Linn
Planning & Development • 22500 Salamo Rd #1000 • West Linn, Oregon 97068
Telephone 503.656-3535 • westlinnoregon.gov

# DEVELOPMENT REVIEW APPLICATION

| For Office Use Only | | |
|---|---|---|
| STAFF CONTACT | PROJECT NO(S). | PRE-APPLICATION NO. |
| NON-REFUNDABLE FEE(S) | REFUNDABLE DEPOSIT(S) | TOTAL |

**Type of Review** (Please check all that apply):

- ☐ Annexation (ANX)
- ☐ Appeal (AP)
- ☐ CDC Amendment (CDC)
- ☐ Code Interpretation (MISC)
- ☒ Conditional Use (CUP)
- ☐ Design Review (DR
- ☐ Tree Easement Vacation (MISC)
- ☐ Expediated Land Division (ELD)
- ☐ Extension of Approval (EXT)
- ☐ Final Plat (FP) Related File#_____
- ☐ Flood Management Area (FMA)
- ☐ Historic Review (HDR)
- ☐ Lot Line Adjustment (LLA)
- ☐ Minor Partition (MIP)
- ☐ Modification of Approval (MOD)
- ☐ Non-Conforming Lots, Uses & Structures
- ☐ Planned Unit Development (PUD)
- ☐ Street Vacation
- ☐ Subdivision (SUB)
- ☐ Temporary Uses (MISC)
- ☐ Time Extension (EXT)
- ☐ Right of Way Vacation (VAC)
- ☐ Variance (VAR)
- ☐ Water Resource Area Protection/Single Lot (WAP)
- ☐ Water Resource Area Protection/Wetland (WAP)
- ☐ Willamette & Tualatin River Greenway (WRG)
- ☐ Zone Change (ZC)

Pre-Application, Home Occupation, Sidewalk Use, Addressing, and Sign applications require different forms, available on the website.

| **Site Location/Address:** | Assessor's Map No.: |
|---|---|
| EAST OF SALAMO RD. AT INTERSECTION OF SALAMO RD. AND GREENE STREET | Tax Lot(s): 21E35D5400 & 21E3602300 |
| | Total Land Area: 33.02 ACRES |

**Brief Description of Proposal:**
THE CITY OF WEST LINN PROPOSES THE CONSTRUCTION OF A NEW OPERATIONS COMPLEX SERVING PUBLIC WORKS, ENVIRONMENTAL SERVICES, PARKS & RECREATION, WATER AND STREETS DIVISIONS. IMPROVEMENTS INCLUDE THREE NEW BUILDINGS, LANDSCAPING, PARKING, AND A PAVED LOT WITH FUELING, TRUCK WASH , DEWATERING AND DECANT FUNCTIONS.

| | | |
|---|---|---|
| **Applicant Name*:** | JEFF DUNN, PROJECT MGR | Phone: 503-896-5388 |
| Address: | SCOTT EDWARDS ARCHITECTURE | Email: JDUNN@SEALLP.COM |
| City State Zip: | 2525 E. BURNSIDE ST.<br>PORTLAND, OR 97214 | |
| **Owner Name** (required): | ERICH LAIS, PUBLIC WORKS DIRECTOR | Phone: 503-722-3434 |
| Address: | CITY OF WEST LINN | Email: ELAIS@WESTLINNOREGON.GOV |
| City State Zip: | 22500 SALAMO RD.<br>WEST LINN, OR 97068 | |
| **Consultant Name:** | ALEX SIMPSON, PE | Phone: 503-221-1131 EXT. 117 |
| Address: | HARPER HOUF PETERSON RIGHELLIS, INC. | Email: ALEX@HHPR.COM |
| City State Zip: | 205 SE SPOKANE ST, SUITE 200<br>PORTLAND, OR 97202 | |

1. Application fees are non-refundable (excluding deposit). Applications with deposits will be billed monthly for time and materials above the initial deposit. ***The applicant is financially responsible for all application costs**.
2. All information provided with the application is considered a public record and subject to disclosure.
3. The owner/applicant or their representative should attend all public hearings related to the application.
4. A decision may be reversed on appeal. The decision will become effective once the appeal period has expired.
5. Submit this form, application narrative, and all supporting documents as a single PDF through the web page: https://westlinnoregon.gov/planning/submit-land-use-application

The undersigned property owner authorizes the application and grants city staff the **right of entry** onto the property to review the application. The applicant and owner affirm that the information provided in this application is true and correct. Applications with deposits will be billed monthly for time and materials incurred above the initial deposit. The applicant agrees to pay additional billable charges.

| Applicant's signature | Date | Owner's signature ***(required)*** | Date |
|---|---|---|---|
| | 07/15/25 | | Jul 15, 2025 |

Attn: Aaron Gudelj, Associate Planner

West Linn Planning Department
22500 Salamo Road
West Linn, OR 97068

Dear Aaron,

It is with utmost enthusiasm that we submit this updated application for Class II Design Review and Conditional Use Permit for the development of the West Linn Operations Complex. The City and design teams have made adjustments to the design since our initial application, though the programming remains essentially the same. The major component of the changes was moving the office building to become the second floor of the fleet maintenance building. There is also a pedestrian bridge connecting the upper parking lot to the building. You will see these changes reflected in the site plan, floor plans, and elevations included. All text which has been updated since the first submission in the responses to CDC sections is shown here as *italicized*. A pre-application meeting has been completed, along with a Neighborhood Association meeting as required for the proposed development. Records and proof of proper notifications can be found within this application. Also included is the checklist provided from the pre-application meeting, required architectural drawings, civil drawings, letters of service and other supporting documents as required.

We understand that a completeness review will be conducted ensuring that all application materials have been provided and is acceptable per the application requirements. We look forward to engaging with you further in moving this ambitious project forward on behalf of the City and staff of West Linn.

Sincerely,
Jeff Dunn
Project Manager

**SCOTT | EDWARDS ARCHITECTURE, L.L.P.**
(503)-226-3617
jdunn@seallp.com

**West Linn Operations Complex**

**Class II Design Review & Conditional Use Permit Application: PA-25-09**

| | |
|---|---|
| **Owner** | City of West Linn<br>Public Works Director/City Engineer<br>Erich Lais, PE<br>22500 Salamo Rd<br>West Linn, OR 97068<br>Elais@westlinnoregon.gov<br>503.722.3434 |
| **Applicant** | Jeff Dunn, Architect<br>Scott Edwards Architecture<br>2525 E. Burnside St.<br>Portland, OR 97214<br>jdunn@seallp.com<br>503.896.5388 |
| **Civil Engineer** | Harper Houf Peterson Righellis, Inc.<br>Alex Simpson, PE<br>205 SE Spokane St, Suite 200<br>Portland, OR 97202<br>alex@hhpr.com<br>503.221.1131 ext. 117 |
| **Landscape Architect** | Harper Houf Peterson Righellis, Inc.<br>Dan Chin, RLA, ASLA<br>205 SE Spokane St, Suite 200<br>Portland, OR 97202<br>danchin@hhpr.com<br>503.221.1131 |
| **Site Address** | Intersection of Salamo Rd and Greene St |

| | |
|---|---|
| **Tax Lots** | 21E35D5400 & 21E3602300 |
| **Project Size** | Total area of parcels: 33.02 acres<br>Total project area: 39,269 sf |
| **Zone** | R-10 |
| **Summary of Request** | The City of West Linn proposes to construct a new Operations Complex east of Salamo Road at its intersection with Greene Street. This facility will serve Public Works, Environmental Services, Parks & Recreation, Water and Streets divisions. Improvements will include three new structures, landscaping, parking, and an upper paved lot with fueling island, truck wash, dewatering and decant functions serving the Operations Complex. |
| **Type of Application** | Conditional Use Permit and Class II Design Review |
| **Date** | July 15, 2025 |
| **Revised** | November 24, 2025 |

Contents

**Revised sections noted in italics with resubmittal*


1. Summary of Proposal
    a. Project Background
    b. Project Narrative
2. Design Drawings & Exhibits (see additional plans, reports and permits under “appendix” below)
    a. Site Plan & Vicinity Map
    b. Architectural Drawings
        i. Floor Plans
        ii. Building Elevations
3. Community Development Code Standards & Responses
    a. Chapter 2: Definitions
    b. Chapter 11: Residential R-10 (Low Density)
        i. 11.020 Procedures and Approval Process
        ii. 11.030 Permitted Uses
        iii. 11.060 Conditional Uses
        iv. 11.080 Dimensional Requirements, Conditional Uses
    *c. Chapter 32 Water Resource Area Protection (this section added per Planner direction)*
    d. Chapter 41: Building Height, Structures on Steep Lots, Exceptions
        *i. 41.005 Determining Height of Building--Revised*
        ii. 41.020 Height Exceptions
        *iii. 41.040 Places of Worship and Government Buildings--Revised*
    e. Chapter 42: Clear Vision Areas
        i. 42.020 Clear Vision Areas Required
        *ii. 42.040 Computation; Street and Accessway 24 Feet or More in Width--Revised*
    f. Chapter 46: Off-Street Parking, Loading, and Reservoir Areas
        i. 46.020 Applicability and General Provisions
        ii. 46.030 Submittal Requirements
        iii. 46.070 Maximum Distance Allowed Between Parking Area and Use
        *iv. 46.090 Computation of Required Parking Spaces (Maximum)--Revised*
        v. 46.110 Reservoir Areas Required for Drive-in Uses (car wash is listed)
        vi. *46.150 Design and Improvement Standards--Revised*
    g. Chapter 48: Access, Egress, and Circulation
        i. 48.020 Applicability and General Provisions
        *ii. 48.025 Access Control--Revised*
        iii. 48.040 Minimum Vehicle Requirements for Non-Residential Uses
        iv. 48.050 One-Way Vehicular Access Points
        v. 48.080 Bicycle and Pedestrian Circulation
    h. Chapter 52: Signs
        i. 52.300 Permanent Sign Design Standards
    i. Chapter 54 Landscaping
        i. 54.020 Approval Criteria
    j. Chapter 55: Design Review
        i. 55.020 Classes of Design Review (Class II)
        ii. 55.030 Administration and Approval Process
        iii. 55.070 Submittal Requirements
        *iv. 55.100 Approval Standards – Class II Design Review – General Discretionary--Revised*
        v. 55.110 Site Analysis
        vi. 55.120 Site Plan

vii. 55.125 Transportation Analysis
viii. 55.140 Architectural Drawings
ix. 55.150 Landscape Plan

k. Chapter 60: Conditional Uses
i. 60.030 Administration and Approval Process
ii. 60.070 Approval Standards and Conditions
iii. 60.080 Site Plan and Map

l. Chapter 96: Street Improvement Construction
i. 96.010 Construction Required
ii. 96.020 Fee-In-Lieu 96.030 Standards

m. Chapter 99: Procedures for Decision Making: Quasi-Judicial
i. 99.030 Application Process
ii. 99.038 Neighborhood Contact Required
iii. 99.060 Approval Authority (Planning Commission)

4. Appendix: Supplemental Drawings & Reports
a. Civil Drawings
i. Civil Cover
ii. Paving Plan
iii. Stormwater & Grading Plan
iv. Utility Plan
v. Landscape Plan
vi. Tree Protection & Removal Plan

b. Arborist Report
c. Stormwater Management Report
d. Site Lighting Plan
e. TVF&R Permit & Fire Service Plan
f. Neighborhood Association Outreach Documentation
i. Meeting notes from Neighborhood Association public meeting
ii. Letter of notification of public meeting to Neighborhood Associations
iii. Certified mail receipts

g. Water Resource Area Report
h. Geotechnical Report

Project Background

The City of West Linn, Oregon has been undergoing steady population growth for decades and the Public Works Department currently operates out of substandard facilities dispersed across the City while providing services to its roughly 30,000 residents. West Linn was on the CNN/Money Magazine ‘Best Places to Live’ list in 2011 and has been praised for its views of the Cascade Mountains, proximity to the Willamette River, cultural opportunities like the Farmer’s Market and Street Dance, among other things. In order to continue providing a high quality of life for its residents, the City of West Linn is investing in this critical support facility to serve the community for decades to come.

The site (tax lots 21E35D5400 and 21E3602300) is not currently zoned but it was noted in the pre-application conference that the property has a zoning designation given by City Council on December 14, 1983 of low-density residential. The neighboring parcels are zoned as low-density residential zoning (R-10) and although there is no specific neighborhood association designated for the parcel, the neighboring Barrington Heights, Willamette and Savannah Oaks associations have been contacted for engagement which occurred in June of 2025 in the West Linn City Hall council chambers.

Design work has been underway since the fall of 2023 and the City has guided the design team toward solutions which embody the utility required of Public Works, environmental sensitivity, efficiency, durability and resiliency for a forward-looking facility.

Project Narrative

A very steeply sloped 33.02 acres site and large existing wetland made this design challenging, in which the design team and City staff imagined a set of smaller, separated buildings that terrace down the steep grades and celebrate the views of the wetlands to the southeast, visually relating to the context of residential structures directly to the north of the site and agricultural sheds more broadly. The office/maintenance building (easternmost on the site plan) is intended to be constructed using a CLT mass-plywood hybrid structural frame and roof panels, further relating to the pacific northwest palette and offering visitors and staff a more biophilic and calming environment. The western building i intended to be constructed of a pre-engineered metal frame for cost-savings but clad with the same gray metal panel system for aesthetic consistency across the site.

The project is located on the east side of Salamo Road, near the intersection of Salamo Road and Greene Street (tax lots 21E35D5400 and 21E3602300). Within the umbrella of Public Works, the project consists of Environmental Services, Water, Streets, and Parks & Recreation. City fleet vehicles will be serviced and maintained here while crews from Streets, Environmental Services, Parks/Rec and Water will have modern office spaces and warehouse spaces to carry out their daily tasks in combination with serving the community in the field. Centralizing these services will make all divisions more efficient but also allow for the long-term resiliency that the city can rely on moving into the future.

More specifically, the improvements will consist of a new paved drive from Salamo Rd which will descend into a series of paved lots and structures. As shown in the included landscape plans, re-grading and new landscape/tree preservation plan is included with this application. The lowest paved pad is intended for ultimate flexibilty for moving trucks of all sizes to maneuver and be serviced. There is will be a warehouse building (Building A) for City vehicle and material storage. On the same pad there will be a second structure for fleet maintenance on level 1 and office on level 2 (Building B.) Also shown on this lower lot is a covered vehicle port for fleet trucks. There is a smaller parking lot higher up on the slope with a pedestrian bridge to the 2$^{nd}$ floor of Building B. Bike parking is shown here and at the lower lot as well. A third lot is shown to the east for bulk storage, de-watering, truck wash, fueling and dumpster storage.

**PARKING SUMMARY**

USE BREAKDOWN:
EMPLOYEE/VISITOR: 45
FLEET (TRUCKS & EQUIPMENT): 51
TOTAL PROJECT SPACES: 96

EMPLOYEE/VISITOR LOT BREAKDOWN:
STANDARD SPACES: 38
ADA SPACES: 2
CARPOOL: 5

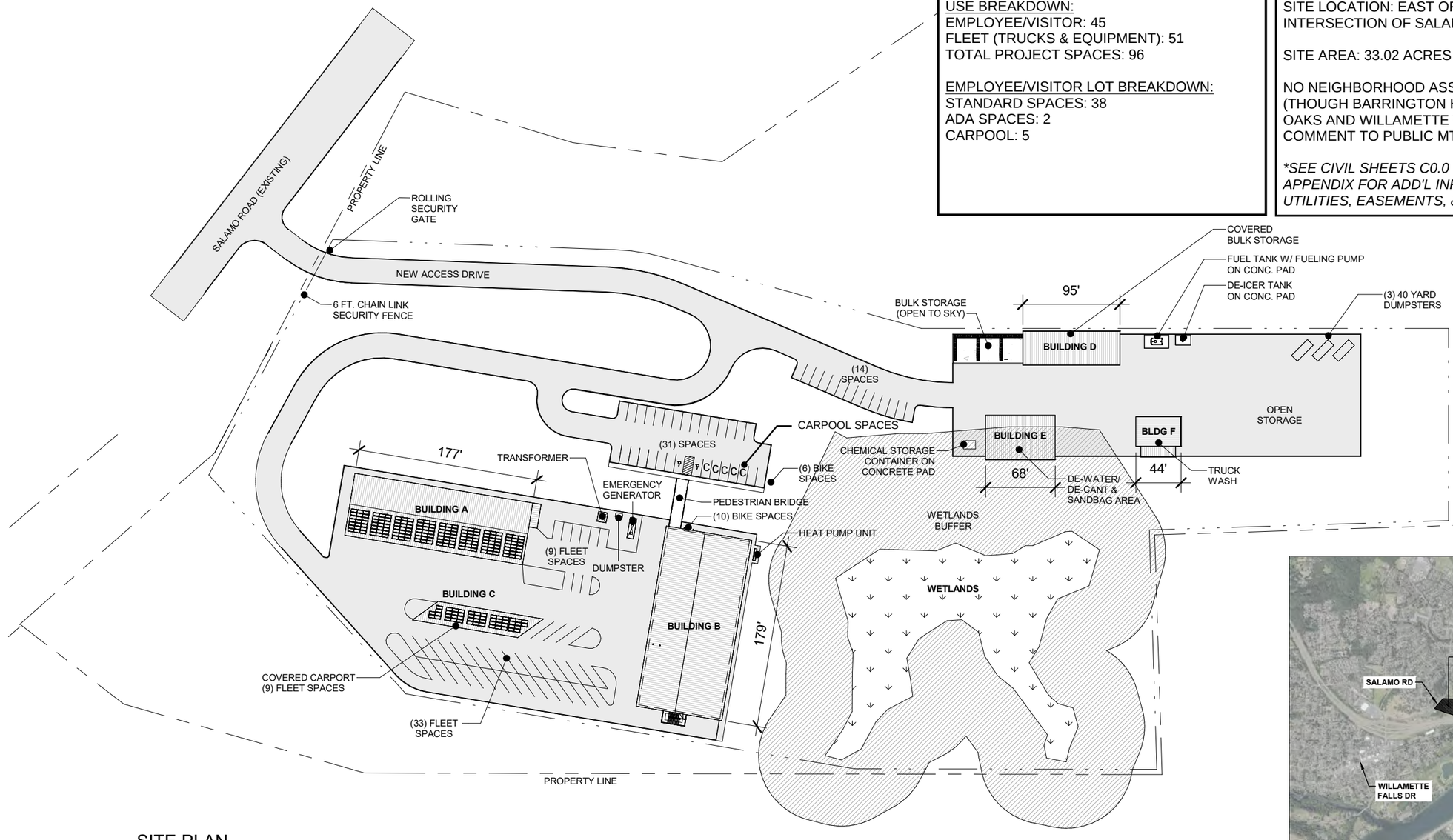
**GENERAL PROJECT INFORMATION**

SITE LOCATION: EAST OF SALAMO RD NEAR INTERSECTION OF SALAMO AND GREENE ST.

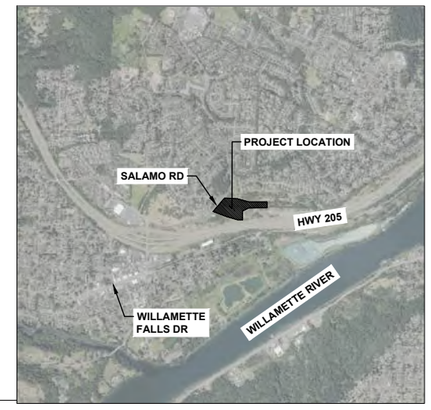
SITE AREA: 33.02 ACRES

NO NEIGHBORHOOD ASSOCIATION ASSIGNED (THOUGH BARRINGTON HEIGHTS, SAVANNAH OAKS AND WILLAMETTE WERE INVITED FOR COMMENT TO PUBLIC MTG)

**SEE CIVIL SHEETS C0.0 THROUGH C3.0 IN APPENDIX FOR ADD'L INFO REGARDING LOTS, UTILITIES, EASEMENTS, & DRAINAGE*




SITE PLAN
1" = 100'-0"




**VICINITY MAP**
NTS

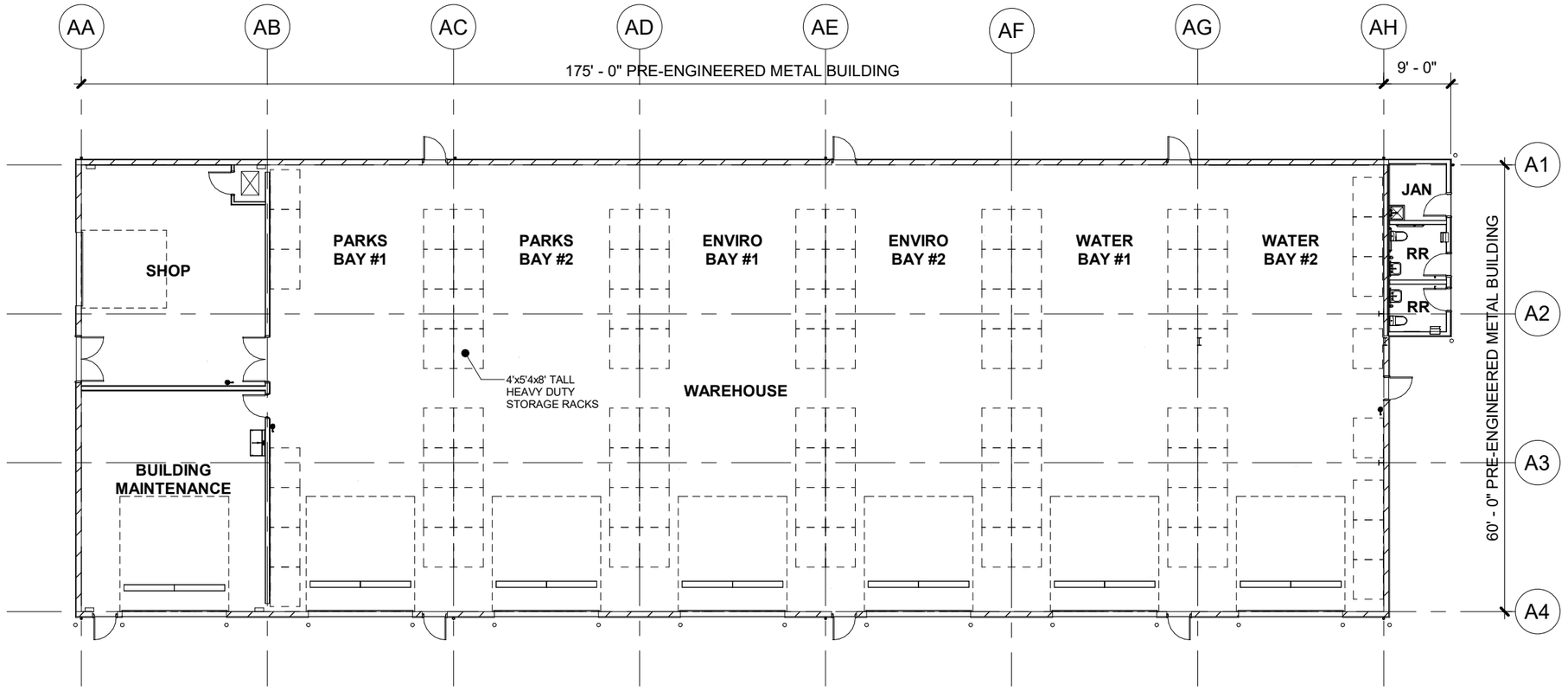
**PROPOSED SITE PLAN**

SHEET No:
A1.0

0' 50' 100' 200'

**WEST LINN OPERATIONS COMPLEX**
**23028 11/24/25**

Scott Edwards Architecture




BUILDING A - FLOOR PLAN (11,073 S.F.)

1/16" = 1'-0"

**BUILDING A FLOOR PLAN**

SHEET No:

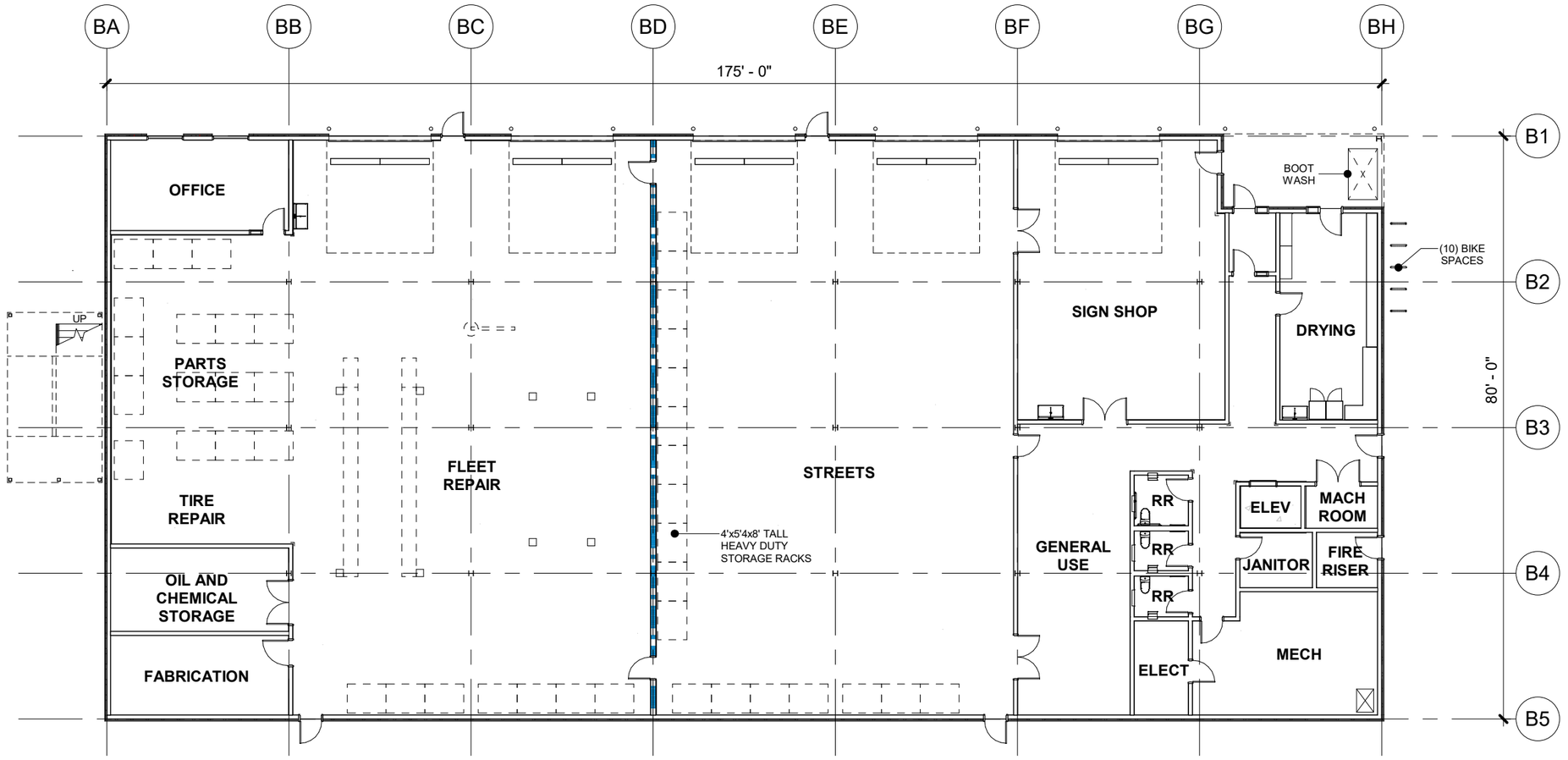
A2.1

0' 50' 100' 200'

**WEST LINN OPERATIONS COMPLEX**

**23028 11/24/25**

Scott Edwards Architecture




BUILDING B - FIRST FLOOR PLAN (14,106 S.F.)
1/16" = 1'-0"

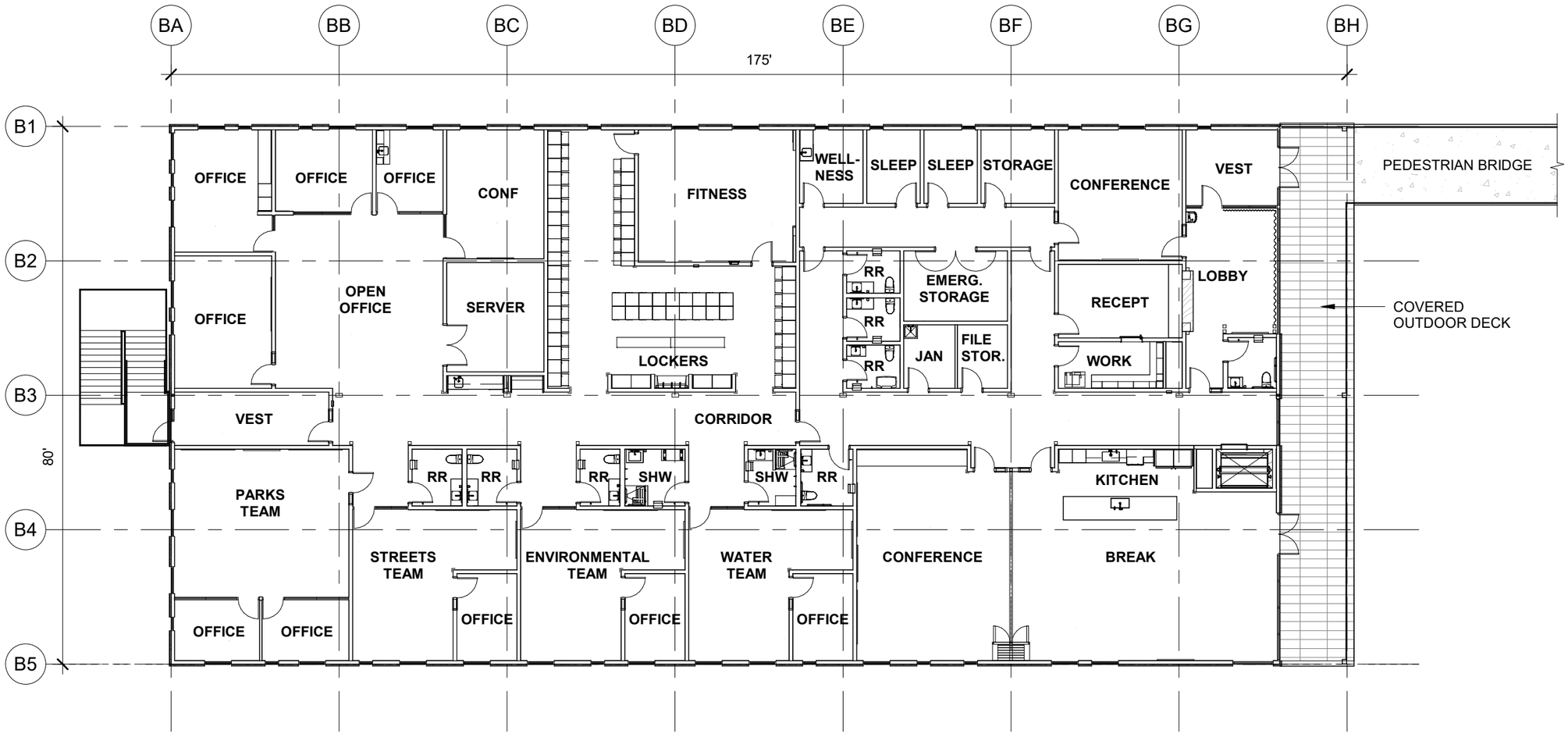
**BUILDING B - FIRST FLOOR PLAN**

SHEET No:
A2.2

0' 50' 100' 200'

**WEST LINN OPERATIONS COMPLEX**
**23028 11/24/25**

Scott Edwards Architecture




BUILDING B - SECOND FLOOR PLAN (14,090 S.F. (DOES NOT INCLUDE PEDESTRIAN BRIDGE)
1/16" = 1'-0"

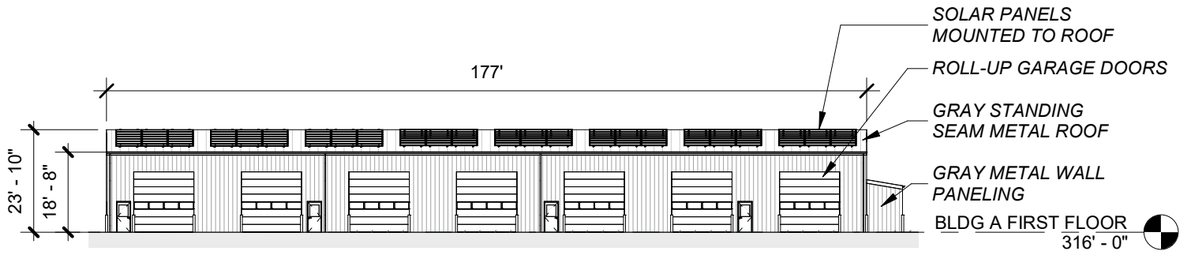
**BUILDING B - SECOND FLOOR PLAN**

SHEET No:
A2.3

0' 50' 100' 200'

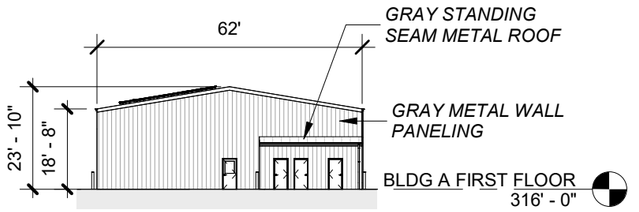
**WEST LINN OPERATIONS COMPLEX**
**23028 11/24/25**

Scott Edwards Architecture



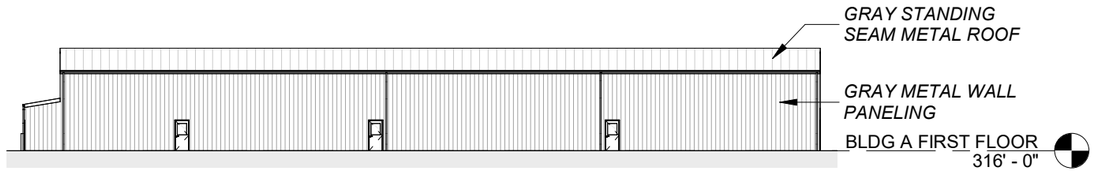

*facade area = 3,392 s.f.*
*transparency = 194 s.f. = .6%*

## BUILDING A - SOUTH ELEVATION
1/32" = 1'-0"



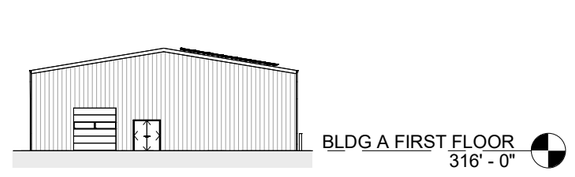

*facade area = 1,308 s.f.*
*transparency = 6 s.f. = .5%*

## BUILDING A - EAST ELEVATION
1/32" = 1'-0"




*facade area = 3,392 s.f.*
*transparency = 17 s.f. = .05%*

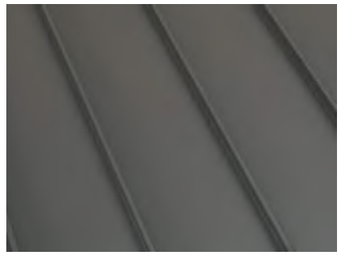
## BUILDING A - NORTH ELEVATION
1/32" = 1'-0"




*facade area = 1,308 s.f.*
*transparency = 16 s.f. = .1%*

## BUILDING A - WEST ELEVATION
1/32" = 1'-0"

ROLL-UP GARAGE DOORS - GRAY



STANDING SEAM METAL ROOF - GRAY

METAL WALL PANELING - GRAY

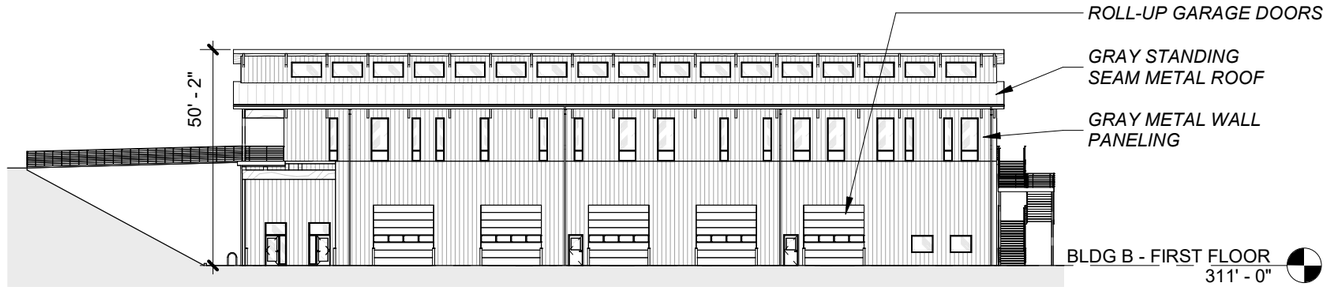
**ELEVATIONS - BUILDING A**

SHEET No:
A3.1

0' 50' 100' 200'

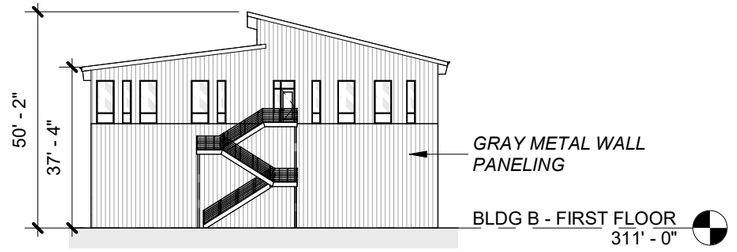
**WEST LINN OPERATIONS COMPLEX**
**23028 11/24/25**

Scott Edwards Architecture



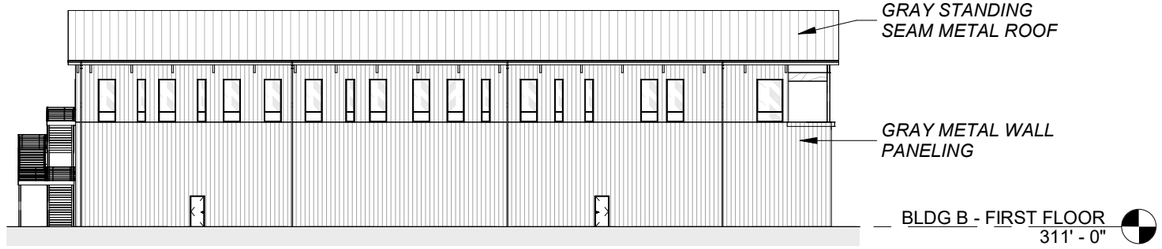

*facade area = 8,813 s.f.*
*transparency = 1,595 s.f. = 18%*

BUILDING B - WEST ELEVATION
1/32" = 1'-0"



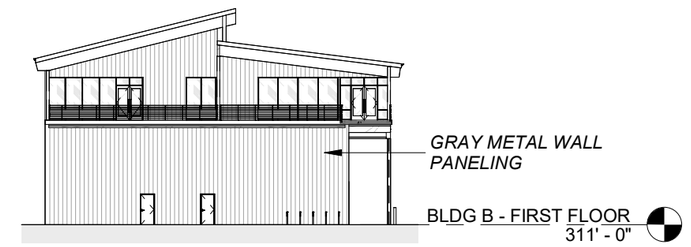

*facade area = 3,430 s.f.*
*transparency = 330 s.f. = 9%*

BUILDING B - SOUTH ELEVATION
1/32" = 1'-0"




*facade area = 8,813 s.f.*
*transparency = 724 s.f. = 8%*

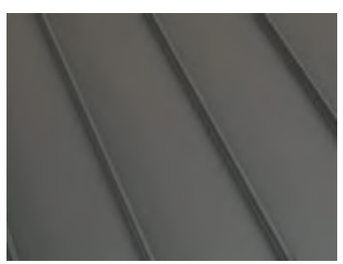
BUILDING B - EAST ELEVATION
1/32" = 1'-0"



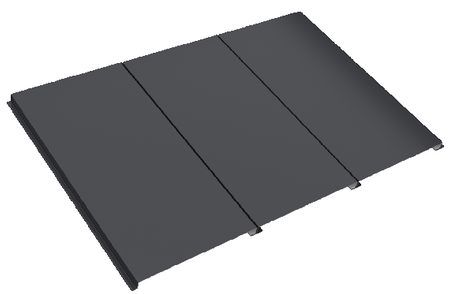

*facade area = 3,423 s.f.*
*transparency = 770 s.f. = 22%*

BUILDING B - NORTH ELEVATION
1/32" = 1'-0"

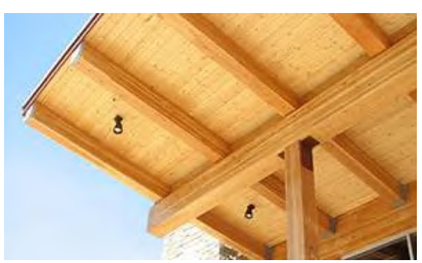
ROLL-UP GARAGE DOORS - GRAY



STANDING SEAM METAL ROOF - GRAY



METAL WALL PANELING - GRAY



GLUE-LAMINATED WOOD BEAMS

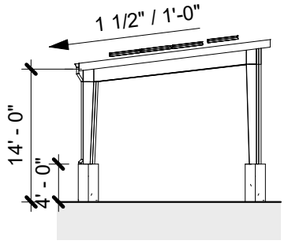
**ELEVATIONS - BUILDING B**

SHEET No:
A3.2

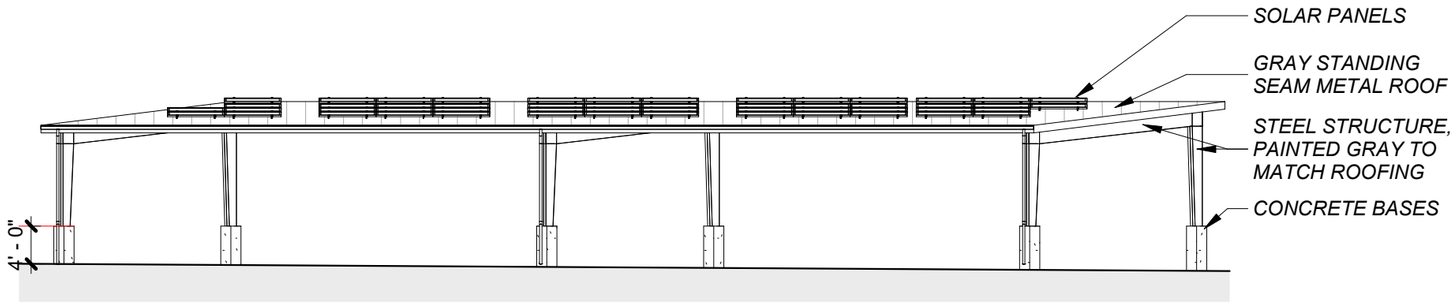
0' 50' 100' 200'

**WEST LINN OPERATIONS COMPLEX**
**23028 11/24/25**

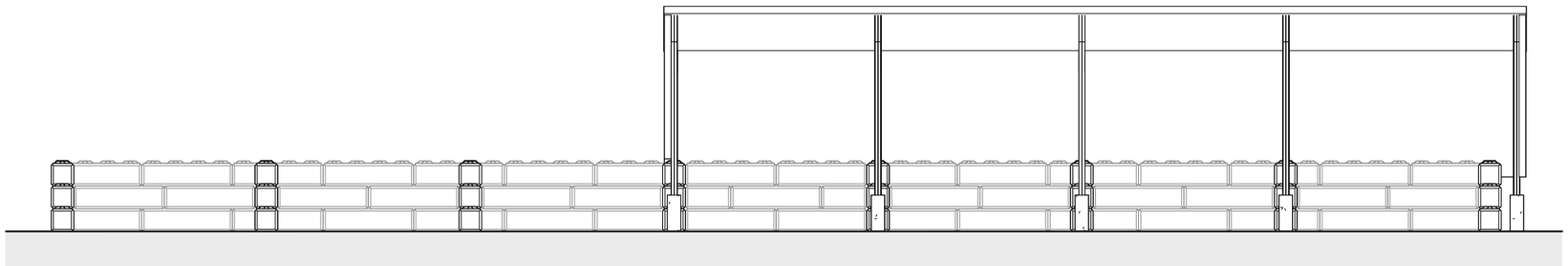
Scott Edwards Architecture



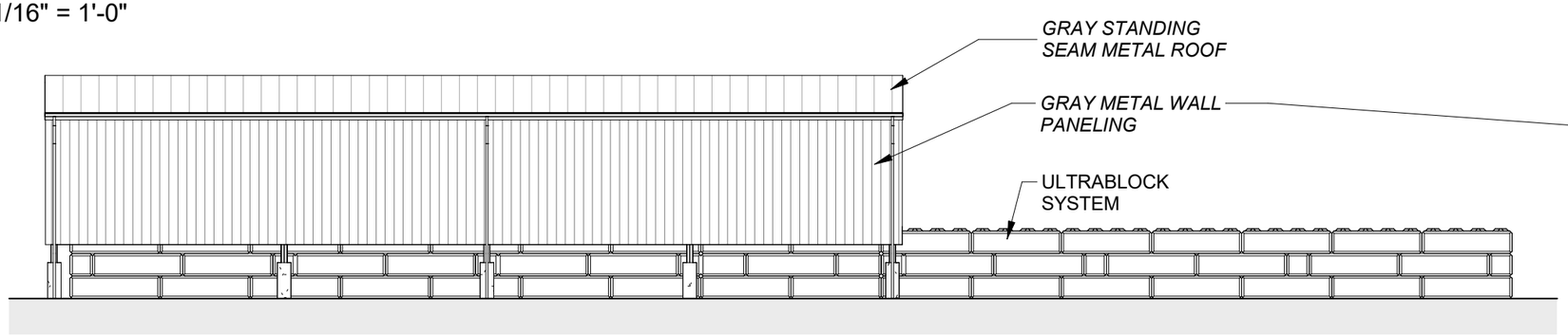

BUILDING C - EAST ELEVATION
1/16" = 1'-0"



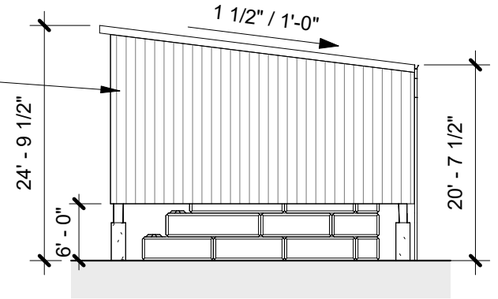

BUILDING C - SOUTH ELEVATION
1/16" = 1'-0"



BUILDING D - SOUTH ELEVATION
1/16" = 1'-0"




LU-BUILDING D - NORTH ELEVATION
1/16" = 1'-0"




BUILDING D- EAST ELEVATION
1/16" = 1'-0"

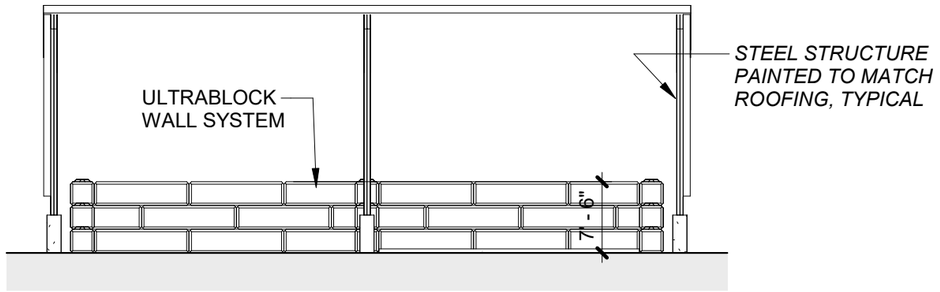
**ELEVATIONS - BUILDINGS C & D**

SHEET No:
A3.3

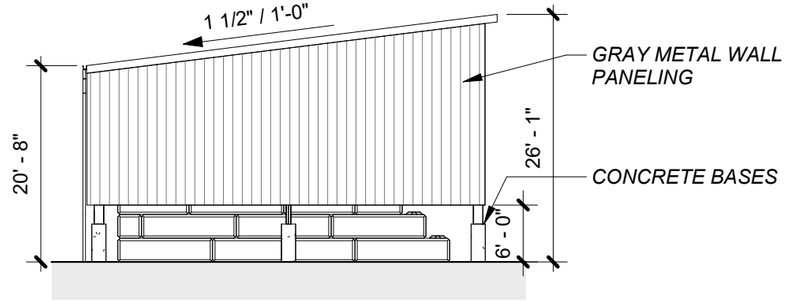
0' 50' 100' 200'

**WEST LINN OPERATIONS COMPLEX**
**23028** **01/14/26**

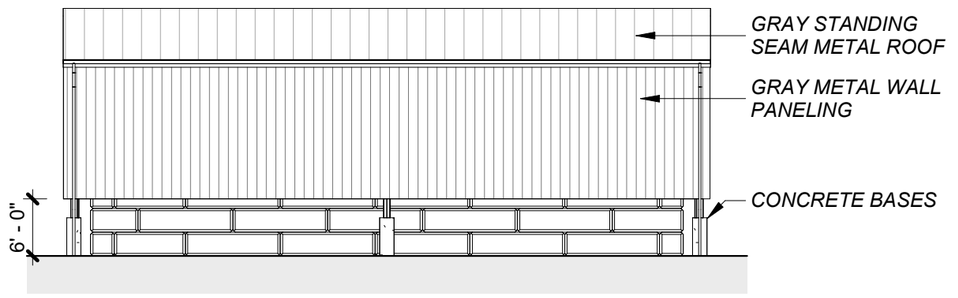
Scott Edwards Architecture



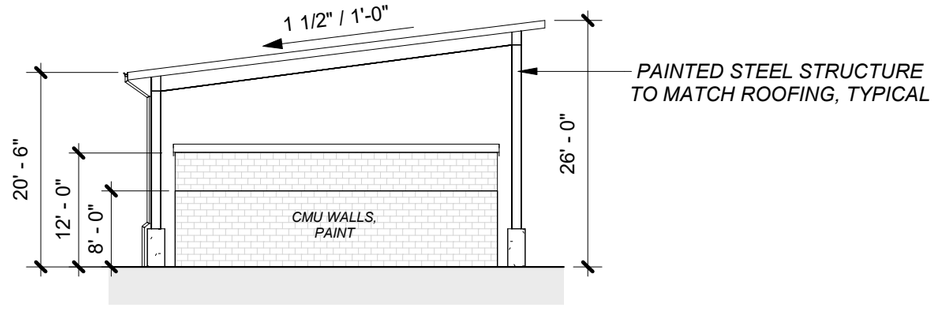

BUILDING E - NORTH ELEVATION
1/16" = 1'-0"



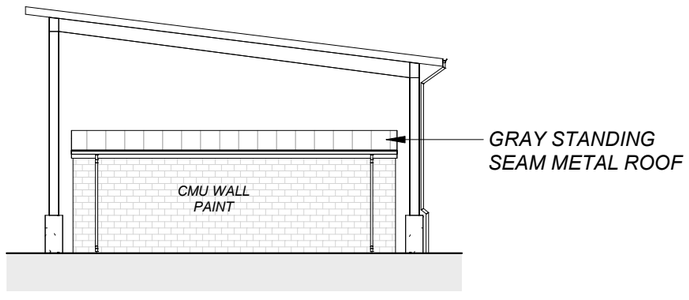

BUILDING E - EAST ELEVATION (WEST ELEVATION SIM)
1/16" = 1'-0"



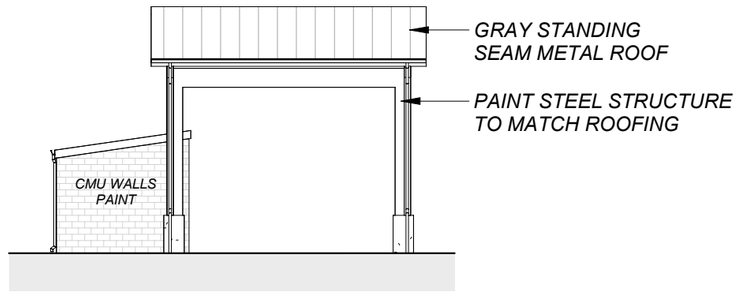

BUILDING E - SOUTH ELEVATION
1/16" = 1'-0"




BUILDING F - NORTH ELEVATION
1/16" = 1'-0"




BUILDING F - SOUTH ELEVATION
1/16" = 1'-0"




BUILDING F - EAST ELEVATION
1/16" = 1'-0"

**ELEVATIONS - BUILDINGS E & F**

SHEET No:
A3.4

0' 50' 100' 200'

**WEST LINN OPERATIONS COMPLEX**
**23028** **01/14/26**

Scott Edwards Architecture

Applicable Community Development Code Sections

Chapter 2: Definitions

**Applicant's Response:**

**Below is a list of selected terms defined within Chapter 2 that apply to this project and are referenced in subsequent responses below:**

**Public Support Facilities: Public services that deal directly with citizens, to include meeting and hearing rooms, together with incidental storage and maintenance of necessary vehicles, and exclude commercial use type "professional and administrative services." Typical use types are associated with governmental offices.**

Chapter 11: Residential R-10 (Low Density)

11.020 Procedures and Approval Process

A. A use permitted outright, CDC 11.030, is a use which requires no approval under the provisions of this code, except that some uses require design review pursuant to CDC 11.090(B). If a use is not listed as a use permitted outright, it may be held to be a similar unlisted use under the provisions of Chapter 80 CDC.

B. A use permitted under prescribed conditions (CDC 11.050) is a use for which approval will be granted provided all conditions are satisfied, and:

1. The Planning Director shall make the decision in the manner provided by CDC 99.060(A)(2), Administrative Procedures, except that no notice shall be required; and

2. The decision may be appealed by the applicant to the Planning Commission as provided by CDC 99.240(A).

C. A conditional use (CDC 11.060) is a use the approval of which is discretionary with the Planning Commission. The approval process and criteria for approval are set forth in Chapter 60 CDC, Conditional Uses. If a use is not listed as a conditional use, it may be held to be a similar unlisted use under the provisions of Chapter 80 CDC.

D. The following code provisions may be applicable in certain situations:

1. Chapter 65 CDC, Non-conforming Uses Involving a Structure.

2. Chapter 66 CDC, Non-conforming Structures.

3. Chapter 67 CDC, Non-conforming Uses of Land.

4. Chapter 68 CDC, Non-conforming Lots, Lots of Record.

5. Chapter 75 CDC, Variance. (Ord. 1745 § 1 (Exh. A), 2023)

**Applicant's Response:**

**A) This project is not listed as a use permitted outright within the R-10 zone under 11.030.**

**B) This project is not listed as a use and development permitted under prescribed conditions within the R-10 zone under 11.050.**

**C) The Operations Complex is considered a conditional use within the R-10 zoning designation as described below within CDC 11.060 item #4, Public Support Facilities.**

**D) The applicant understands that the provisions listed may be applicable in certain situations.**

11.030 Permitted Uses

The following are uses permitted outright in this zoning district:

1. Single-family attached or detached residential unit.
    a. Duplex residential units.
    b. Triplex residential units.
    c. Quadplex residential units.
2. Cottage clusters.
3. Townhouse.
4. Community recreation.
5. Family day care.
6. Residential home.
7. Utilities, minor.
8. Transportation facilities (Type I).
9. Manufactured home.
10. Community building on City-owned property at 3706 Cedaroak Drive and indicated on the map below.

**Applicant's Response:**

**The project is not defined within any of the uses listed within 11.030 (see conditional uses 11.060 below.)**

11.060 Conditional Uses

The following are conditional uses which may be allowed in this zoning district subject to the provisions of Chapter 60 CDC, Conditional Uses.

1. Cultural exhibits and library services.
2. Lodge, social, community center and civic assembly.
3. Public safety facilities.
4. Public support facilities.
5. Recycle collection center.
6. Religious institution.
7. Schools.
8. Senior center.
9. Utilities, major.
10. Transportation facilities (Type II). See CDC 60.090 for additional approval criteria.

**Applicant's Response:**

**The project is defined in section 02.030 Definitions as #4 Public Support Facility: Public services that deal directly with citizens, to include meeting and hearing rooms, together with incidental storage and maintenance of necessary vehicles, and exclude commercial use type "professional and administrative services." Typical use types are associated with governmental offices.**

11.080 Dimensional Requirements, Conditional Uses

Except as may otherwise be established by this code, the appropriate lot or parcel size for a conditional use shall be determined by the approval authority at the time of consideration of the application based upon the criteria set forth in CDC 60.070(A) and (B)

**Applicant's Response:**

**The applicant understands that the appropriate lot or parcel size for a conditional use shall be determined based upon criteria set forth in CDC 60.070 (A) and (B) and a response is included within this section later in this document.**

## Chapter 32: Water Resource Area Plan

A Water Resource Area Review (which includes the Wetland Delineation Report included in the submission) identifies 2 features (Wetland A and Stream 1) and assigns the required Water Resource Areas (WRA) to each in accordance with CDC Chapter 32. Figure 1 of the Water Resources Area Review shows the extent of wetlands, streams, WRAs, and unavoidable impacts and the proposed mitigation. The report addresses pertinent sections of Chapter 32.

Chapter 41: Building Height, Structures on Steep Lots, Exceptions

41.005 Determining Height of Building

A. For all zoning districts, building height shall be the vertical distance above a reference datum measured to the highest point of a flat roof or to the deck line of a mansard roof or to the highest gable, ridgeline or peak of a pitched or hipped roof, not including projections not used for human habitation, as provided in CDC 41.030. The reference datum shall be selected by either of the following, whichever yields a greater height of building.

1. For relatively flat sites where there is less than a 10-foot difference in grade between the front and rear of the building, the height of the building shall be measured from the proposed finished grade five feet out from the exterior wall at the front of the building (Figure 1); or

2. For steeper lots where there is more than a 10-foot difference in grade between the front and rear of the building, the height of the building is measured from the proposed finished grade at a point five feet out from the exterior wall on the lowest side (front or rear) of the building. One then measures vertically to the peak or ridgeline of the roof to determine the height (Figure 2).

3. Buildings on cross slopes or side slopes are measured at either the front or rear of the building using methods described in subsections (A)(1) and (2) of this definition only (Figure 3).

Even if the cross slope creates a tall elevation on the side, the method of determining height is not modified.

Also see CDC 41.020, Height Exceptions.

**Applicant's Response:**

**A. Applicant understands that building height shall be measured in this way per subsections 1, 2 and 3. *Building A and Building B will be measured according to method #1 for flat sites as shown in 41.005 (A). Building B will be measured using method #2 for steeper lots.* See building elevations included in application.**

41.020 Height Exceptions

A. Exceptions to the maximum building height standards provided in the underlying zone shall be permitted on sloped lots under the circumstances specified in subsections B and C of this section.

B. Buildings on sites that front onto the downslope side of a street may exceed the building height standard, provided the following are met:

1. The highest grade of the building site is greater than 10 feet above the lowest grade, as measured along the planes of the proposed structure;

2. The total building height does not exceed 45 feet, as measured from the lowest grade at a point five feet downhill from the rear of the building (or 50 feet in the R-15, R-20, and R-40 zones); and

3. The building height does not project more than 24 feet above the average grade of the street.

C. Buildings on sites that front onto the upslope side of a street may exceed the building height standard, provided the following are met:

1. The highest grade of the building site is greater than 10 feet above the lowest grade, as measured along the planes of the proposed structure;

2. The total building height does not exceed 45 feet, as measured from a point five feet downhill from the front of the building (or 50 feet in the R-15, R-20, and R-40 zones).

**Applicant's Response:**

**A. Applicant understands this exception as noted below**

**B. These buildings are on the downslope side of Salamo Rd and for Building B, the highest grade of the building site is greater than 10 feet above the lowest grade per subsection 1, the total building height is less than 45 feet per subsection 2, and the building does not project more than 24 feet above Salamo Road.**

**C. The building does not meet section C**

41.040 Places of Worship and Government Buildings

The height of a place of worship or governmental building may be built to a maximum height of 50 feet provided:

A. The total floor area of the building does not exceed one and one-half times the area of the site;

B. The yard dimensions in each case are equal to at least two-thirds of the building height of the principal structure; and

C. The approval of this exception is a part of the approval of the conditional use allowed under Chapter 60

**Applicant's Response:**

**This government building may be built to 50 feet as it meets the subsections listed below:**

**A. Total floor area is far below 1.5X area of the site (47,600 sf building area, 33.02 acres site area)**

**B. Yard dimensions in all cases far exceed the building heights of the 3 principal structures. *See civil sheet C1.0 showing dimensioned setbacks of principal structures from property lines and neighboring residences.***

**C. This use is allowed as a conditional use under chapter 60**

Chapter 42: Clear Vision Areas

42.020 Clear Vision Areas Required

A. A clear vision area shall be maintained on the corners of all property adjacent to an intersection as provided by CDC 42.040 and 42.050.

B. A clear vision area shall contain no planting, fence, wall, structure or temporary or permanent obstruction (except for an occasional utility pole or tree) exceeding three feet in height, measured from the top of the curb, or, where no curb exists, from the street centerline grade, except that trees exceeding this height may be located in this area, provided all branches below eight feet are removed.

**Applicant's Response:**

**Applicant understands the requirement for clear vision areas and there is no construction intended within the 30 ft x 30 ft triangular areas described in these areas as part of this project.**

42.040 Computation; Street and Accessway 24 Feet or More in Width

The clear vision area for all street intersections and street and accessway intersections (accessways having 24 feet or more in width) shall be that triangular area formed by the right-of-way or property lines along such lots and a straight line joining the right-of-way or property line at points which are 30 feet distant from the intersection of the right-of-way line and measured along such lines.

**Applicant's Response:**

**Applicant understands the requirement for clear vision areas and there is no construction intended within the 30 ft x 30 ft triangular areas described in these areas as part of this project.** ***See civil sheet C1.0 showing 30 ft x 30 ft clear vision area. The site driveway extends beyond the existing right of way at Salamo Road – therefore the clear vision area is based on the proposed and existing curb lines at Salamo Road. The site entrance profile showing the entire right of way of approach is shown on sheet C2.0.***

Chapter 46: Off-Street Parking, Loading, and Reservoir Areas

46.020 Applicability and General Provisions

A. At the time a structure is erected or enlarged, or the use of a structure or unit of land is changed within any zone, loading areas and reservoir areas shall be provided in accordance with the requirements of this chapter unless other requirements are otherwise established as a part of the development approval process.

B. The provision and maintenance of off-street parking and loading spaces are the continuing obligation of the property owner.

C. No building or other permit shall be issued until plans are approved that show the property that is and will remain available for exclusive use as loading space as required by this chapter.

D. Parking spaces and loading areas shall be improved to the standards contained in this chapter and shall be available for use at the time of the final building inspection except as provided in CDC 46.150.

**Applicant's Response:**

**Parking spaces and loading areas will be improved per standards within this chapter as detailed below in section 46.090.**

46.030 Submittal Requirements

For any application requiring design review approval, which includes parking areas, the applicant shall submit, within the design review package, a plan drawn to scale showing all the elements necessary to indicate that the requirements of Chapter 55 CDC are met and it shall include but not be limited to:

A. The delineation of individual parking and loading spaces and their dimensions;

B. The identification of compact parking spaces;

C. The location of the circulation area necessary to serve spaces;

D. The access point(s) to streets, alleys, and properties to be served;

E. The location of curb cuts;

F. The location and dimensions of all landscaping, including the type and size of plant material to be used, as well as any other landscape material incorporated into the overall plan;

G. The proposed grading and drainage plans and the slope (percentage) of parking lot;

H. Specifications as to signs and bumper guards;

I. Identification of disabled parking spaces;

J. Location of pedestrian walkways and crossings;

K. Location of bicycle racks;

L. A tree canopy plan developed in coordination with the local electric utility, including pre-design, design, and building and maintenance phases that includes:

1. Confirmation, such as a signature or email, from electric utility showing they reviewed and support the plan.

2. Site plan depicting canopy coverage at maturity to meet CDC 46.150(F).

3. Planting specifications to meet CDC 46.150(F).

4. Narrative responses to show compliance with CDC 46.150(F); and

M. Narrative responses and site plan depicting location of required electric vehicle charging conduit per CDC 46.150(G).

**Applicant's Response:**

**For items A through M, see Architectural Proposed Site Plan within this package, civil plans C0.0 through C3.0, and landscape plans L1.0 through L2.0 included within the appendix. These plans show parking stall dimensions, locations, types, curb cuts, plantings, grading, drainage, pedestrian walkways, bike racks, tree protection and removal plan.**

46.070 Maximum Distance Allowed Between Parking Area and Use

A. Off-street parking spaces for single-family dwellings shall be located on the same lot with the dwelling.

B. Parking areas must provide the following, wherever applicable:

1. Employee parking areas for carpools and vanpools shall be located closer to the entryway to the building than general employee parking.

2. Stacked or valet parking is allowed if an attendant is present to move vehicles. If stacked parking is used for parking spaces, the applicant shall ensure that an attendant will always be present when the lot is in operation. The requirements for maximum spaces and all parking area development standards continue to apply for stacked parking.

3. All disabled parking shall be placed closest to building entrances than all other parking. Appropriate ADA curb cuts and ramps to go from the parking lot to the ADA-accessible entrance shall be provided unless exempted by ADA code.

4. Parking for cottage clusters may be further than 200 feet, if a pedestrian pathway is provided with the following conditions:

a. Pedestrian walkways from the parking area to the main entrances of cottages is paved and meets standard ADA width and slopes to ensure the most direct path.

b. Pedestrian scaled lighting is provided along the path.

**Applicant's Response:**

**A. This is not a residential project**

**B. ADA spaces shall be located closest to the building, followed by carpool spaces and then regular spaces. There is no stacked or valet parking as part of this project. There are no cottage clusters as part of this project.**

46.090 Computation of Required Parking Spaces (Maximum)

A. Maximum parking. Parking spaces shall not exceed the following amounts:

| 01 Land Use | 02 Maximum Spaces (spaces per 1,000 sq. ft. of gross leasable area unless otherwise stated) |
|---|---|
| Multifamily studio unit (spaces per unit) | 1.2 |
| Multifamily non-studio (spaces per unit) | 2.0 |
| General office (includes office park, “flex-space,” government office and misc. services) | 3.0 |
| Warehouse (gross square feet; parking ratios apply to warehouses 150,000 gsf or greater) | 0.4 |
| Schools: college/university & high school (spaces/# of students and staff) | 0.3 |
| Tennis/racquetball court | 1.3 |
| Sports club/recreation facilities | 4.8 |
| Retail/commercial, including shopping centers | 4.6 |
| Bank with drive-in | 3.0 |
| Movie theater | 0.4 |
| Fast food with drive-through | 11.0 |
| Other restaurants | 11.0 |
| Place of worship (spaces/seats) | 0.6 |
| Medical/dental clinic | 4.4 |
| Other commercial uses | 5.0 |

1. For land uses with more than 65,000 square feet of floor area, surface parking may not consist of more area than the floor area of the building.

2. Non-surface parking, such as tuck-under parking, underground and subsurface parking, and parking structures may be exempted from the calculations in this section.

3. For land uses not listed in the table above, maximum parking will be calculated based on the most similar land use in the table.

B. For office, industrial, and public uses where there are more than 20 parking spaces for employees on the site, at least 10 percent of the employee parking spaces shall be reserved for carpool use before 9:00 a.m. on weekdays. The spaces will be the closest to the building entrance, except for any disabled parking and those signed for exclusive customer use. The carpool/vanpool spaces shall be clearly marked “Reserved – Carpool/Vanpool Before 9:00 a.m.”

C. Existing developments along transit streets or near transit stops may redevelop the existing parking spaces to provide transit-oriented facilities, including bus pullouts, bus stops and shelters, park and ride stations, and other similar facilities.

***Applicant's Response:***

***<u>Allowable Parking Summary:</u>***
***The two most similar land uses listed are "General Office" and "Warehouse."***
***Building B 2nd Floor (Office use): 14.09K sf x 3.0 = 42 spaces***
***Building B 1st Floor (Fleet Maintenance): 14.1K sf x 0.4 = 6 spaces***
***Buildings A (Warehouse): 11.07 sf x 0.4 = 4 spaces***
***Total max employee/visitor spaces: 52 allowed per CDC***

***<u>Project Proposal Parking Summary:</u>***
***<u>Use Breakdown:</u>***
***Employee/Visitor: 45***
***Fleet (Trucks & Equipment): 51***
***Total Project Spaces: 96***

***<u>Employee/Visitor Lot Breakdown:</u>***
***Standard Spaces: 38***
***ADA Spaces: 2***
***Carpool Spaces: 5 (shown as "C" in architectural site plan A1.0)***

***Applicant understands that 45 employee/visitor spaces provided will serve everyday staff and visitor needs and falls within the 52 allowable per CDC summary above. The 51 fleet-designated spaces (indicated as such on A1.0 site plan) are necessary to the functioning of the public works facility and are intended for things like vacuum trucks, dumpster trucks, trailers, heavy equipment/machinery and other such similar vehicles/equipment required and are excluded from the maximums established above.***

46.110 Reservoir Areas Required for Drive-in Uses (car wash is listed)

All uses providing drive-in service as defined by this code shall provide, on the same site, a reservoir space a minimum of 15 feet long for each car, as follows:

| Use | Reservoir Requirement |
|---|---|
| Drive-in banks. | 3 spaces/service terminal. |
| Drive-in restaurants. | 10 spaces/service window (measured from the last service window). |
| Drive-in theaters. | 10 percent of the theater capacity. |
| Gasoline service stations. | 2 spaces (25 feet long each) on each side of fueling island to include 2 spaces at each end of the island. |
| Mechanical car washes. | 3 spaces/washing unit. |
| Parking facilities – free flow (no stop required) entry. | 1 space/entry driveway. |
| Automated ticket dispense entry. | 2 spaces/entry driveway. |
| Attendant ticket dispensing. | 5 spaces/entry driveway. |

**Applicant's Response:**

**This building will not be accessible to the general public and has no commercial function. The car wash and fueling island are for government personnel only and does not provide public "drive-in service."**

46.150 Design and Improvement Standards

The following standards apply to the design and improvement of areas used for vehicle parking, storage, loading, and circulation:

A. Design standards.

1. "One standard parking space" means a minimum for a parking stall of eight feet in width and 16 feet in length. These stalls shall be identified as "compact." To accommodate larger cars, 50 percent of the parking spaces shall have a minimum dimension of nine feet in width and 18 feet in length (nine feet by 18 feet). When multifamily parking stalls back onto a driveway, as opposed to a drive aisle within a parking lot, the stalls shall be nine feet by 20 feet. Parking for development in water resource areas may have 100 percent compact spaces.

2. Disabled parking and maneuvering spaces shall be consistent with current federal dimensional standards and subsection B of this section and placed nearest to accessible building entryways and ramps.

3. *Repealed by Ord. 1622.*

4. Service drives for non-residential development shall be designed and constructed to facilitate the flow of traffic, provide maximum safety of traffic access and egress, and maximum safety of pedestrians and vehicular traffic on the site.

5. Each parking and/or loading space shall have clear access, whereby the relocation of other vehicles to utilize the parking space is not required, except where stacked parking is permitted pursuant to CDC 46.070(B)(4) or 46.090(A).

6. Except for single-family attached and detached residences, any area intended to be used for off-street parking as contained in this chapter shall have all parking spaces clearly marked using a permanent paint. All interior drives and access aisles shall be clearly marked and signed to show direction of flow and maintain vehicular and pedestrian safety. Permeable parking surface spaces may have an alternative delineation for parking spaces.

7. Except for residential parking, and parking for public parks and trailheads, at least 50 percent of all areas used for the parking and/or storage and/or maneuvering of any vehicle, boat and/or trailer shall be improved with asphalt or concrete surfaces according to the same standards required for the construction and acceptance of City streets. The remainder of the areas used for parking may use a permeable paving surface designed to reduce surface runoff. Parking for public parks or trailheads may use a permeable paving surface designed to reduce surface runoff for all parking areas. Where a parking lot contains both paved and unpaved areas, the paved areas shall be located closest to the use which they serve.

8. Off-street parking spaces for single-family attached and detached residences shall be improved with a paved surface. Other parking facilities for single-family homes that are to accommodate additional vehicles, boats, recreational vehicles, and trailers, etc., need not be paved. All parking for multifamily residential development shall be paved with concrete or asphalt. Driveways shall measure at least 20 feet from the back of sidewalk to garage or the end of the parking pad to accommodate cars and sport utility vehicles without the vehicles blocking the public sidewalk.

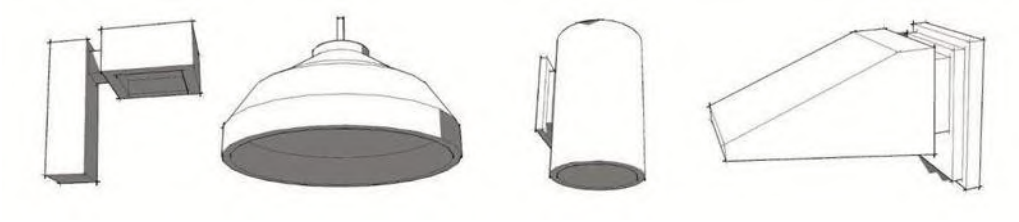
9. Access drives from the street to off-street parking or loading areas for non-residential development shall be designed and constructed to facilitate the flow of traffic and provide maximum safety for pedestrian and vehicular traffic on the site. The number of access drives shall be limited to the minimum that will allow the property to accommodate and service the anticipated traffic. Access drives for all development shall be clearly and permanently marked and defined through use of rails, fences, walls, or other barriers or markers on frontage not occupied by service drives.

10. Access drives shall have a minimum vision clearance as provided in Chapter 42 CDC, Clear Vision Areas.

11. Parking spaces along the boundaries of a parking lot or adjacent to interior landscaped areas or sidewalks shall be provided with a wheel stop at least four inches high located two feet back from the front of the parking stall. Such parking spaces may be provided without wheel stops if the sidewalks or landscaped areas adjacent the parking stalls are two feet wider than the minimum width.

12. Off-street parking and loading areas shall be drained in accordance with City of West Linn Public Works Design Standards. Storm drainage at commercial sites may also have to be collected to treat oils and other residue.

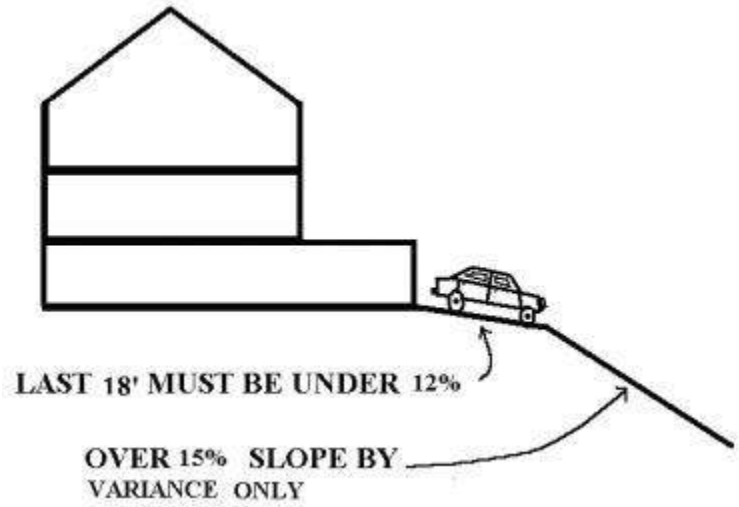
13. Artificial lighting on all off-street parking facilities shall be concealed or shielded with an Illuminating Engineering Society of North America (IESNA) full cut-off style fixture with an angle not exceeding 90 degrees to minimize the potential for glare and unnecessary diffusion on adjacent property and so as not to create a hazard to the public use of any road or street. Examples of shielded light fixtures are shown below.



**Examples of shielded light fixtures**

14. Directional arrows and traffic control devices which are placed on parking lots shall be identified.

15. The maximum driveway grade for single-family housing shall be 15 percent. The 15 percent shall be measured along the centerline of the driveway only. Grades elsewhere along the driveway shall not apply. Variations require approval of a Class II variance by the Planning Commission pursuant to Chapter 75 CDC. Regardless, the last 18 feet in front of the garage must maintain a maximum grade of 12 percent as measured along the centerline of the driveway only. Grades elsewhere along the driveway shall not apply.




16. Visitor or guest parking must be identified by painted “GUEST” or “VISITOR.”

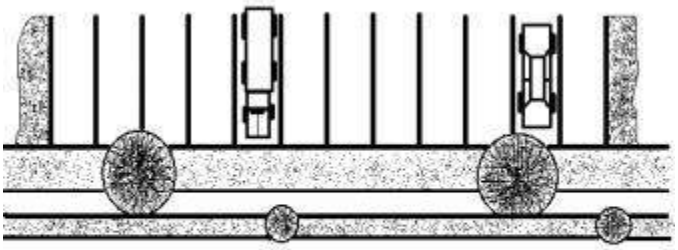
17. Parking spaces shall have less than a five percent grade. No drainage across adjacent sidewalks or walkways is allowed.

18. Commercial, office, industrial, and public parking lots may not occupy more than 50 percent of the main lot frontage of a development site. The remaining frontage shall comprise buildings or landscaping. If over 50 percent of the lineal frontage comprises parking lot, the landscape strip between the right-of-

way and parking lot shall be increased to 15 feet wide and shall include terrain variations (e.g., one-foot-high berm) plus landscaping. The defensible space of the parking lot should not be compromised.

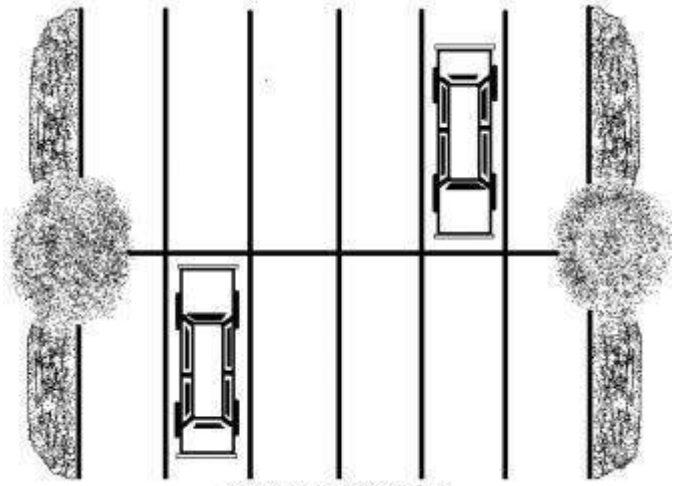
19. Areas of the parking lot improved with asphalt or concrete surfaces shall be designed into areas of 12 or less spaces through the use of defined landscaped area. Groups of 12 or less spaces are defined as:

a. Twelve spaces in a row, provided there are no abutting parking spaces, as in the case when the spaces are abutting the perimeter of the lot; or



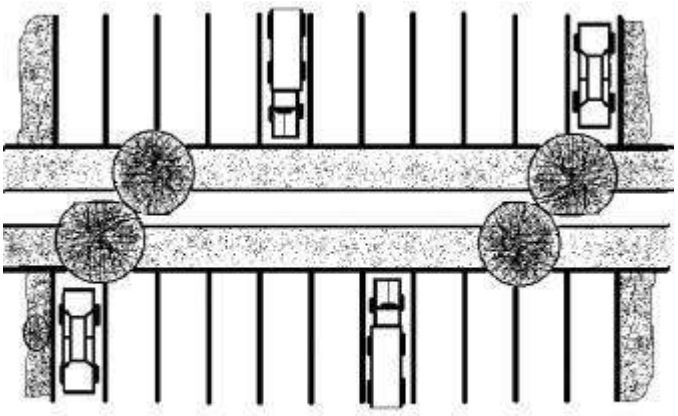
**12 SPACES IN A ROW**

b. Twelve spaces in a group with six spaces abutting together; or



**6 SPACES X 2 = 12**

c. Two groups of 12 spaces abutting each other, but separated by a 15-foot-wide landscape area including a six-foot-wide walkway.



12 SPACES X2 WITH LANDSCAPING

d. Parking areas improved with a permeable parking surface may be designed using the configurations shown in subsections (A)(19)(a), (b) and (c) of this section except that groups of up to 18 spaces are allowed.

e. The requirements of this chapter relating to total parking lot landscaping, landscaping buffers, perimeter landscaping, and landscaping the parking lot islands and interior may be waived or reduced pursuant to CDC 32.110(F) in a WRA application without a variance being required.

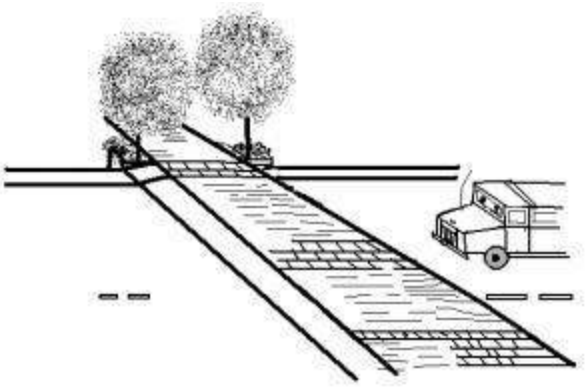
20. Pedestrian connections through parking areas.

a. Pedestrian walkways shall be provided in parking areas that are larger than one-half acre. The pedestrian walkways or sidewalks should provide access to building entrances, existing or planned pedestrian facilities in the public right-of-way, and to accessible parking spaces.

b. Walkways or sidewalks shall be constructed through parking lots where such parking lots lie between major buildings/activity areas (an example in multifamily housing: between recreation center, swimming pool, manager's office, park or open space areas, parking lots, etc.) within a development and adjacent streets or adjacent transit stops. The walkways or sidewalks should also provide access to building entrances, existing or planned pedestrian facilities in the public rights-of-way, and to accessible parking spaces.

c. Walkways through parking lots shall be constructed using a material that visually contrasts with the parking lot and driveway surface and that may have a contrasting surface texture (surface texture shall not interfere with safe use of wheelchairs, baby carriages, shopping carts, etc.). Walkways shall be physically separated from adjacent vehicle parking and parallel vehicle traffic through the use of grade separation, walls, curbs, and/or landscaping.

d. Walkways shall be a minimum of six feet wide.



RAISED SIDEWALK/TEXTURED SURFACE
AUTOMOBILE BECOMES SUBSERVIENT
TO THE PEDESTRIAN

21. Parking and circulation patterns shall be easily comprehended and defined. The patterns shall be clear to minimize traffic hazards and congestion and to facilitate emergency vehicles. Residential developments which are exempt from design review or subject to only clear and objective design review are not required to comply with this design standard.

22. Parking spaces for residential development subject to clear and objective review shall be provided on the same lot. Parking spaces for non-residential development or for residential development subject to discretionary review shall be close to the related use.

23. Permeable parking spaces shall be designed and built in compliance with the West Linn Public Works Design Standards.

B. Accessible parking standards for persons with disabilities. If any parking is provided for the public or visitors, or both, the needs of the people with disabilities shall be based upon the following standards or current applicable federal standards, whichever are more stringent:

1. Minimum number of accessible parking space requirements (see following table):

| NUMBER OF TOTAL PARKING SPACES | TOTAL NUMBER OF ACCESSIBLE SPACES | NUMBER OF VAN-ACCESSIBLE SPACES REQUIRED, OF TOTAL | SPACES SIGNED "WHEELCHAIR USE ONLY" |
|---|---|---|---|
| 1 – 25 | 1 | 1 | – |
| 26 – 50 | 2 | 1 | – |
| 51 – 75 | 3 | 1 | – |
| 76 – 100 | 4 | 1 | – |
| 101 – 150 | 5 | – | 1 |
| 151 – 200 | 6 | – | 1 |
| 201 – 300 | 7 | – | 2 |

| NUMBER OF TOTAL PARKING SPACES | TOTAL NUMBER OF ACCESSIBLE SPACES | NUMBER OF VAN-ACCESSIBLE SPACES REQUIRED, OF TOTAL | SPACES SIGNED "WHEELCHAIR USE ONLY" |
|---|---|---|---|
| 301 – 400 | 8 | – | 2 |
| 401 –500 | 9 | – | 2 |
| 501 – 999 | 2 percent of total spaces | – | 1 in every 6 accessible spaces or portion thereof |
| Over 1,000 | 20 spaces plus 1 for every 100 spaces, or fraction thereof, over 1,000 | – | 1 in every 6 spaces or portion thereof |

2. Location of parking spaces. Parking spaces for the individual with a disability that serve a particular building shall be located on the shortest possible accessible circulation route to an accessible entrance to a building. In separate parking structures or lots that do not serve a particular building, parking spaces for the persons with disabilities shall be located on the shortest possible circulation route to an accessible pedestrian entrance of the parking facility.

3. Accessible parking space and aisle shall meet ADA vertical and horizontal slope standards.

4. Where any differences exist between this section and current Federal standards, those Federal standards shall prevail over this code section.

5. One in every eight accessible spaces, but not less than one, shall be served by an access aisle 96 inches wide.

6. Van-accessible parking spaces shall have an additional sign marked "Van Accessible" mounted below the accessible parking sign. A van-accessible parking space reserved for wheelchair users shall have a sign that includes the words "Wheelchair Use Only." Van-accessible parking shall have an adjacent eight-foot-wide aisle. All other accessible stalls shall have a six-foot-wide aisle. Two vehicles may share the same aisle if it is between them. The vertical clearance of the van space shall be 96 inches.

C. Landscaping in parking areas. Reference Chapter 54 CDC, Landscaping.

D. Bicycle facilities and parking.

1. Provisions shall be made for pedestrian and bicycle ways if such facilities are identified on pages 24-26 of the West Linn Transportation System Plan or in the 2013 West Linn Trails Plan.

2. Bicycle parking improvements and location.
a. Bicycle parking facilities shall either be lockable enclosures in which the bicycle is stored, or secure stationary racks which accommodate bicyclists' locks securing the frame and both wheels.
b. The nearest bicycle parking space shall be no more than 50 feet from the entrance to the building and shall be visible from the building entrance.
c. Required parking shall be signed and reserved for bicycle parking only. If a bicycle parking area is not visible from the main building entrance, a directional sign shall be posted at the building entrance indicating the location of the bicycle parking area.
d. Required bicycle parking shall be lighted to a minimum three foot-candles to allow secure use at night.
3. Bicycle parking must be provided in the following amounts:

| LAND USE CATEGORY | MINIMUM REQUIRED BICYCLE PARKING SPACES | MINIMUM COVERED AMOUNT |
|---|---|---|
| Residential | | |
| Multifamily Residential | 1 space per unit | 50% |
| Institutional | | |
| Schools – Elementary | 2 spaces per classroom | 50% |
| Schools – Jr. High or Middle Schools | 4 spaces per classroom | 50% |
| Schools – Sr. High | 2 spaces per classroom | 50% |
| College | 1 space per 4 students | 50% |
| Transit Centers/Park & Ride Lots | 5% of auto spaces, or 100% of demand, depending on location/accessibility to bicyclists | 100% |
| Religious Institutions | 1 space per 40-seat capacity | 25% |
| Hospitals | 1 space per 5 beds | 50% |
| Doctor, Dentist Offices | 2, or 0.5 spaces per 1,000 gross sq. ft., whichever is greater | 25% |
| Libraries, Museums, Government Offices, etc. | 2, or 1.5 spaces per 1,000 gross sq. ft., whichever is greater | 25% |
| Commercial | | |
| Retail Sales | 0.33 spaces per 1,000 gross sq. ft. | 50% |
| Auto-oriented Services (including 7-11s) | 2, or 0.33 spaces per 1,000 gross sq. ft., whichever is greater | 10% |
| Groceries/Supermarkets | 0.33 spaces per 1,000 gross sq. ft./bldg. | 10% |
| Office | 2, or 0.5 spaces per 1,000 gross sq. ft., whichever is greater | 10% |
| Quality Restaurant | 1 space per 1,000 gross sq. ft. | 25% |
| Drive-in Restaurant | 2 spaces per 1,000 gross sq. ft. | 25% |
| Shopping Center (by size) | 0.33 spaces per 1,000 gross sq. ft./bldg. | 50% |
| Financial Institutions | 2, or 0.33 spaces per 1,000 gross sq. ft. | 25% |
| Theaters, Auditoriums, etc. | 1 space per 30 seats | 25% |

| LAND USE CATEGORY | MINIMUM REQUIRED BICYCLE PARKING SPACES | MINIMUM COVERED AMOUNT |
|---|---|---|
| Industrial | | |
| Industrial Park | 2, or 0.5 spaces per 1,000 gross sq. ft. | 50% |
| Warehouse | 2, or 0.1 spaces per 1,000 gross sq. ft. | 50% |
| Manufacturing, etc. | 2, or 0.15 spaces per 1,000 gross sq. ft. | 50% |

E. (See Figures 1 and 2 below.)

Figure 1. MINIMUM STANDARDS FOR PARKING LOT LAYOUT

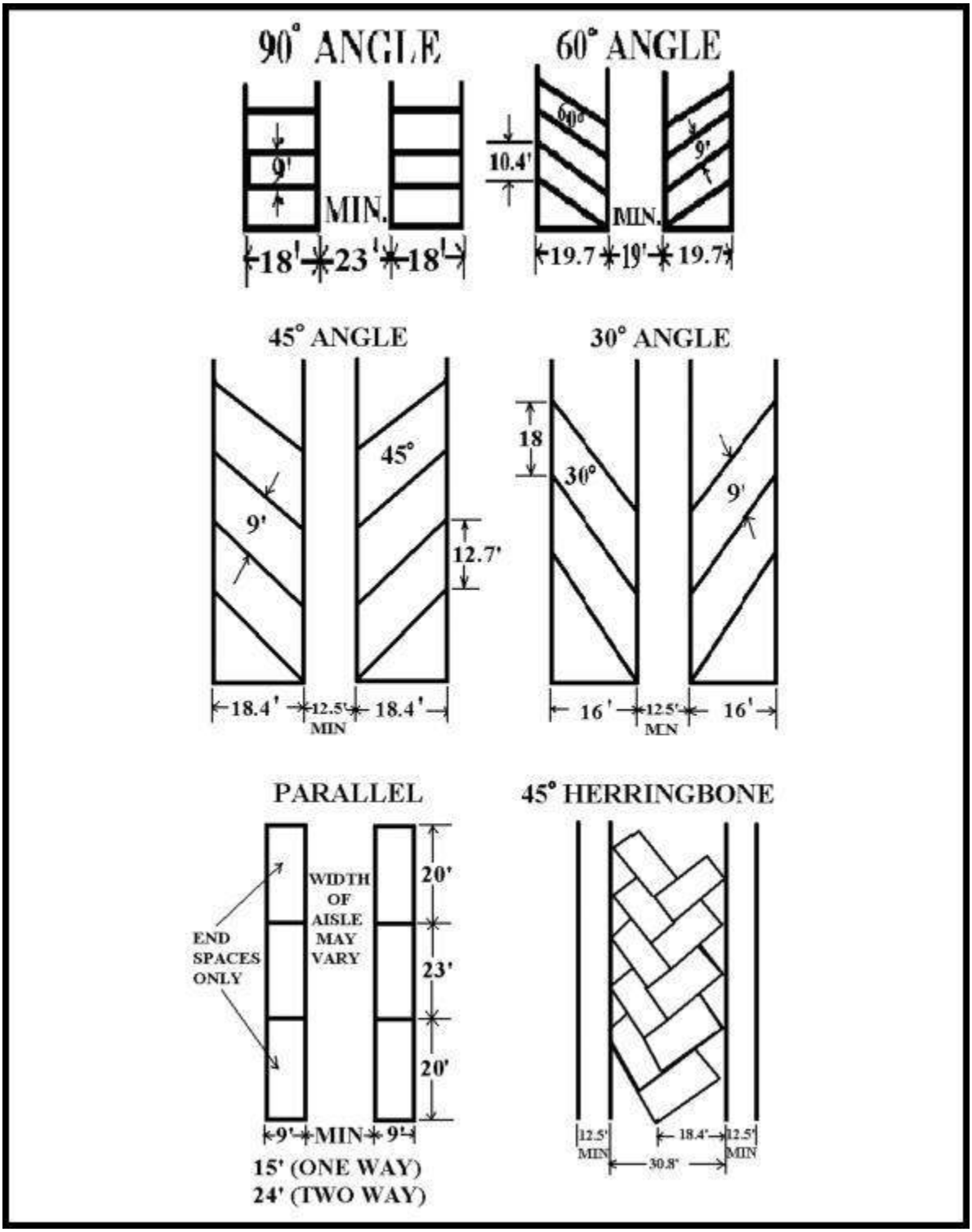
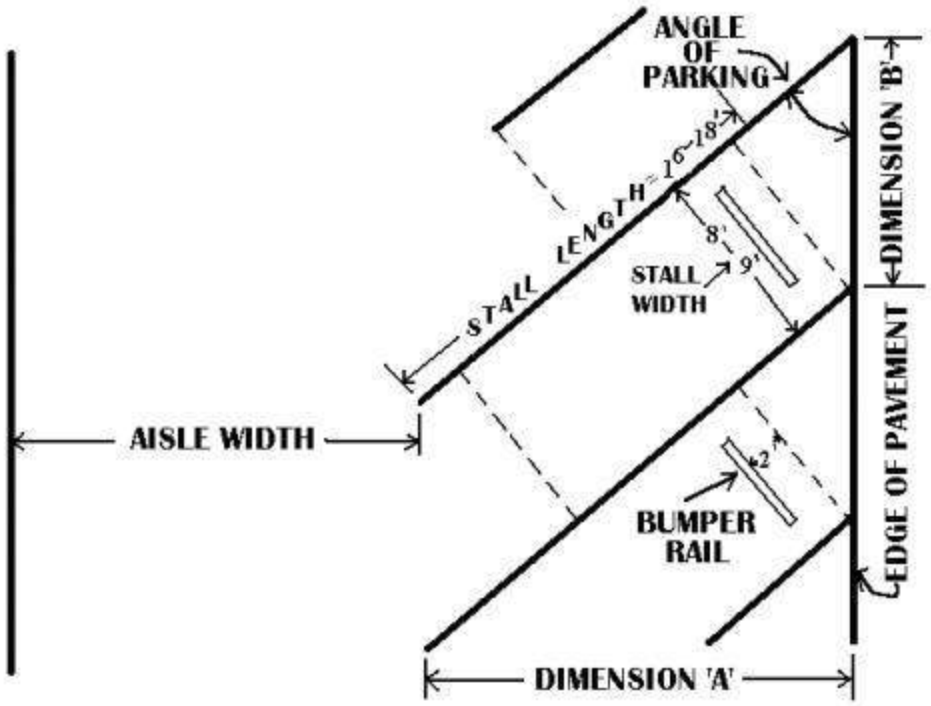


Figure 2. MINIMUM DISTANCE FOR PARKING STALLS




| ANGLE OF PARKING | DIRECTION OF PARKING | AISLE WIDTH | | DIMENSION 'A' | | DIMENSION 'B' | |
|---|---|---|---|---|---|---|---|
| | | STALL WIDTH | | STALL WIDTH | | STALL WIDTH | |
| | | 9.0' | 8.0' | 9.0' | 8.0' | 9.0' | 8.0' |
| 30° | DRIVE-IN | 12.5' | 12.5' | 16.8' | 13.8' | 18.0' | 16.0' |
| 45° | DRIVE-IN | 12.5' | 12.5' | 19.1' | 17.0' | 12.7' | 11.3' |
| 60° | DRIVE-IN | 19.0' | 18.0' | 20.1' | 17.8' | 10.4' | 9.2' |
| 60° | BACK-IN | 17.0' | 17.0' | 20.1' | 17.8' | 10.4' | 9.2' |
| 90° | DRIVE-IN | 23.0' | 23.0' | 18.0' | 16.0' | 9.0' | 8.0' |
| 90° | BACK-IN | 22.0' | 22.0' | 18.0' | 16.0' | 9.0' | 8.0' |

F. The following requirements apply to any new development that includes more than one-half acre of new off-street surface parking on a lot or parcel. The new surface parking area shall be measured based on the perimeter of all new off-street parking spaces, maneuvering lanes, and maneuvering areas, including driveways and drive aisles:

Tree canopy covering at least 40 percent of the new parking lot area at maturity but no more than 15 years after planting. Trees planted or preserved to meet parking area landscaping requirements in CDC 54.020 may count toward the tree canopy cover percentage.
At a minimum, trees planted to meet canopy cover requirements must be planted at the standards and specifications no lower than the 2021 American National Standards Institute A300 standards.

G. New construction or redevelopment for the following uses must include provision of electric service capacity, as defined in ORS 455.417 and in this Code, for a minimum percentage of vehicle parking spaces:

| | | |
|---|---|---|
| 1. | Commercial buildings under private ownership | 20% |
| 2. | Multifamily buildings (5 or more units) | 40% |
| 3. | Mixed-use buildings consisting of privately owned commercial space and five or more residential dwelling units | 40% |

**Applicant's Response:**

**A. Design Standards**

**Items 1 through 18: Applicant understands the dimensional, circulation, visibility, material, grading, and other parking requirements related to this project.**

***46.150(A)(7): 100% of paved areas for parking within the project shall be improved with non-pervious asphalt according to the same standards required for construction of City streets.***

***46.150(A)(13): All artificial lighting serving off-street parking as part of the project will be full cut-off fixtures per description in item 13.***

***46.150(A)(17): All parking will have less than 5% grade and no drainage will be directed across adjacent sidewalks/walkways.***

***46.150(A)(18): None of the lot frontage for this project is occupied by parking. As shown on civil plans C1.0 and C2.0 the visitor and staff parking is a minimum of 200 feet from Salamo Road.***

***46.150 (C): A Water Resource Area Review (which includes the Wetland Delineation Report) identifies 2 features (Wetland A and Stream 1) and assigns the required Water Resource Areas (WRA) to each in accordance with CDC Chapter 32. Figure 1 of the Water Resources Area Review shows the extent of wetlands, streams, WRAs, and unavoidable impacts and the proposed mitigation. The report addresses pertinent sections of Chapter 32.***

**46.150 (A) Items 19 and 20: The lowest paved area (surrounding Building A) shows striping for a number of surface parking spaces but this entire lower area will be used as a storage, laydown, and fleet maneuvering space. Occasionally it may be used for truck, trailer, or City vehicle parking and the striping is shown to organize that occasional use. This ability to use the paved area with 100% flexibility is a normal and essential component of any functioning public works facility. It cannot be interrupted with landscape strips, plantings or trees in order to function. For the upper lot, existing trees are preserved at additional expense to the project on the edges of the lot to provide tree canopy and shading of the lot in lieu of interruption by a planting strip. See (2) large existing trees at NW and SW corners of the lot on sheet L1.0 in the appendix.**

**Items 21 through 23: Applicant understands the requirements of this section as related to this project.**

**B. Accessible Parking Standards**

**1. The two upper lots (adjacent to Building B) total 45 spaces and the site plan shows two ADA spaces with access aisle in the site plan.**

**2. The 2 ADA spaces are located the closest to the main building entry.**

**Items 3 through 6: Applicant understands the requirements of this section as related to this project.**

**C. Landscaping in Parking Areas**

**Applicant understands the requirements of this section as related to this project.**

**D. Bicycle Facilities**

**1. No pedestrian or bicycle ways are planned for this project. The west side of Salamo Rd was recently improved with a multi-use pathway for pedestrians and cyclists. Additional pathways would also be extremely difficult to achieve due to steepness of grade along the west edge of the site.**

**2. Applicant understands the requirements of this section as related to this project.**

**3. Required Bicycle Parking**

***Building A (Warehouse): 11,073 sf***

***11,073/1,000 x 0.1 = 1 bike space***

***Building B 1st Floor (Warehouse): 14,106 sf***

***14,106/1,000 x 0.1 = 1 bike space***

***Building B 2nd Floor (Office use): 14,090 sf***

***14,090/1,000 x 0.5* = 7 bike spaces***

***Bike Spaces Total: 9 (shown on architectural site plan)***

***1 spaces covered (per 10% requirement in table under 46.150 D (3))***

****The Office portion of this project has a less dense staffing expectation than the "libraries, museums, government office" designation such as city halls, community developments, court houses, etc., so the 0.5 spaces per 1,000 has been applied per the "office" category. This is because the staffing and occupancy is primarily constrained to the small number of public works staff who will occupy the building with very few visitors or changeover in permanent users.***

**E. Layout**

**Applicant understands dimensional and angular requirements of this section as related to this project.**

**F.**

**The two upper lots don't include more than a half acre of parking and the lower (larger) lot must maintain complete continuity (no interruptions in the surface) for truck maneuverability and flexibility given it's use as storage, maintenance and truck movements.**

**G.**

**This project does not fall within any of the use categories listed.**

Chapter 48: Access, Egress, and Circulation

48.020 Applicability and General Provisions

A. The provisions of this chapter do not apply where the provisions of the Transportation System Plan or land division chapter are applicable and set forth differing standards.

B. All lots shall have access from a public street or from a platted private street approved under the land division chapter.

C. No building or other permit shall be issued until scaled plans are presented to the City and approved by the City as provided by this chapter, and show how the access, egress, and circulation requirements are to be fulfilled. Access to State or County roads may require review, approval, and permits from the appropriate authority.

D. Should the owner or occupant of a lot, parcel or building enlarge or change the use to which the lot, parcel or building is put, resulting in increasing any of the requirements of this chapter, it shall be unlawful and a violation of this code to begin or maintain such altered use until the provisions of this chapter have been met, and, if required, until the appropriate approval authority under Chapter 99 CDC has approved the change.

E. Owners of two or more uses, structures, lots, parcels, or units of land may agree to utilize jointly the same access and egress when the combined access and egress of both uses, structures, or parcels of land satisfies the requirements as designated in this code; provided, that satisfactory legal evidence is presented to the City Attorney in the form of deeds, easements, leases, or contracts to establish joint use. Copies of said instrument shall be placed on permanent file with the City Recorder.

F. Property owners with access to their property via platted stems of flag lots may request alternate access as part of a discretionary review if other driveways and easements are available and approved by the City Engineer.

**Applicant's Response:**

**Applicant understands the requirements of these sections as related to this project.**

48.025 Access Control

A. Purpose. The following access control standards apply to public, industrial, commercial and residential developments including land divisions. Access shall be managed to maintain an adequate level of service and to maintain the functional classification of roadways as required by the West Linn Transportation System Plan.

B. Access control standards.

1. Traffic impact analysis requirements. A traffic analysis prepared by a qualified professional may be required to determine access, circulation and other transportation requirements. The purpose, applicability and standards of this analysis are found in CDC 85.170(B)(2).

2. In order to comply with the access standards in this chapter, the City or other agency with access permit jurisdiction may require the closing or consolidation of existing curb cuts or other vehicle access points, recording of reciprocal access easements (i.e., for shared driveways), development of a frontage street, installation of traffic control devices, and/or other mitigation as a condition of granting an access permit. Access to and from off-street parking areas shall not permit backing onto a public street.

3. Access options. When vehicle access is required for development (i.e., for off-street parking, delivery, service, drive-through facilities, etc.), access shall be provided from a public street adjacent to the development lot or parcel. Street accesses shall comply with access spacing standards in subsection (B)(6) of this section, the West Linn Public Works Design Standards, and TSP. As an alternative, the applicant may request alternative access provisions listed below as Option 1 and Option 2, subject to approval by the City Engineer through a discretionary process.

a) Option 1. Access is from an existing or proposed alley or mid-block lane. If a property has access to an alley or lane, direct access to a public street is not permitted. For the purpose of this subsection, a mid-block lane is a narrow private drive providing lot frontage and access for rear lot development.

b) Option 2. Access is from a private street or driveway connected to an adjoining property that has direct access to a public street (i.e., “shared driveway”). A public access easement covering the driveway shall be recorded in this case to ensure access to the closest public street for all users of the private street/drive.

4. Subdivisions fronting onto an arterial street. New residential land divisions fronting onto an arterial street shall be required to provide alleys or secondary (local or collector) streets for access to individual lots. When alleys or secondary streets cannot be constructed due to topographic or other physical constraints, access may be provided by consolidating driveways for clusters of two or more lots.

5. Double-frontage lots. When a lot or parcel has frontage onto two or more streets, access shall be provided first from the street with the lowest classification. For example, access shall be provided from a local street before a collector or arterial street.

6. Access spacing.

a. The access spacing standards found in Tables 14 and 15 of the TSP and in CDC 48.060 shall be applicable to all newly established public street intersections, non-traversable medians, and curb cuts. Deviation from the access spacing standards may be granted by the City Engineer as part of a discretionary review if the applicant demonstrates

that the deviation will not compromise the safe and efficient operation of the street and highway system.

b. Private drives and other access ways are subject to the requirements of CDC 48.060.

7. Number of access points. For single-family (detached and attached) housing types, one street access point is permitted per lot or parcel when alley access cannot otherwise be provided; except that two access points may be permitted corner lots (i.e., no more than one access per street), subject to the access spacing standards in CDC 48.060. The number of street access points for multiple family development is subject to the access spacing standards in CDC 48.060. The number of street access points for commercial, industrial, and public/institutional developments shall be minimized to protect the function, safety and operation of the street(s) and sidewalk(s) for all users. Shared access may be required, in conformance with subsection (C)(8) of this section, in order to maintain the required access spacing, and minimize the number of access points.

8. Shared driveways. For residential development, shared driveways may be required in order to meet the access spacing standards in subsection (C)(6) of this section. For non-residential development, the number of driveway and private street intersections with public streets shall be minimized by the use of shared driveways with adjoining lots where feasible. The City shall require shared driveways as a condition of land division or site design review, as applicable, for traffic safety and access management purposes in accordance with the following standards:

a. When necessary pursuant to this subsection (C)(8), shared driveways and/or frontage streets shall be required to consolidate access onto a collector or arterial street. When shared driveways or frontage streets are required, they shall be stubbed to adjacent developable parcels to indicate future extension. “Stub” means that a driveway or street temporarily ends at the property line, but may be extended in the future as the adjacent lot or parcel develops. “Developable” means that a lot or parcel is either vacant or it is likely to receive additional development (i.e., due to infill or redevelopment potential).

b. Access easements (i.e., for the benefit of affected properties) shall be recorded for all shared driveways, including pathways, at the time of final plat approval or as a condition of site development approval.

c. Exception. Exceptions to the shared driveway or frontage street requirements may be granted as part of a discretionary review if the City determines that existing development patterns or physical constraints (e.g., topography, lot or parcel configuration, and similar conditions) prevent extending the street/driveway in the future.

C. Street connectivity and formation of blocks required. In order to promote efficient vehicular and pedestrian circulation throughout the City, land divisions and site developments shall produce complete blocks bounded by a connecting network of public and/or private streets, in accordance with the following standards:

1. Block length and perimeter. The maximum block length shall not exceed 800 feet along a collector, neighborhood route, or local street, or 1,800 feet along an arterial, unless a smaller block length is required pursuant to CDC 85.200(B)(2).

2. Street standards. Public and private streets shall also conform to Chapter 92 CDC, Required Improvements, and to any other applicable sections of the West Linn Community Development Code and approved TSP.

3. Exception. Exceptions to the above standards may be granted as part of a discretionary review when blocks are divided by one or more pathway(s), in conformance with the provisions of CDC 85.200(C), Pedestrian and bicycle trails, or cases where extreme topographic (e.g., slope, creek, wetlands, etc.) conditions or compelling functional limitations preclude implementation, not just inconveniences or design challenges.

***Applicant's Response:***

***48.025 (B) (1):***

***A letter from Kittelson & Associates, a transportation engineering firm, has been added to this land use application describing trip generation characteristics, vehicle weights, sight distance and access spacing of the proposed project and background information as to why a full TIA is not recommended.***

48.040 Minimum Vehicle Requirements for Non-Residential Uses

Access, egress, and circulation system for all non-residential uses shall not be less than the following:

A. Service drives for non-residential uses shall be fully improved with hard surface pavement:

1. With a minimum of 24-foot width when accommodating two-way traffic; or

2. With a minimum of 15-foot width when accommodating one-way traffic. Horizontal clearance shall be two and one-half feet wide on either side of the driveway.

3. Meet the requirements of CDC 48.030(E)(3) through (6).

4. Pickup window driveways may be 12 feet wide unless the Fire Chief determines additional width is required.

B. All non-residential uses shall be served by one or more service drives as determined necessary to provide convenient and safe access to the property and designed according to CDC 48.030(A). In no case shall the design of the service drive or drives require or facilitate the backward movement or other maneuvering of a vehicle within a street, other than an alley.

C. All on-site maneuvering and/or access drives shall be maintained pursuant to CDC 46.130.

D. Gated accessways to non-residential uses are prohibited unless required for public safety or security.

**Applicant's Response:**

**A. The main service drive accessing Salamo Rd from this project, connecting all paved areas, parking lots, and buildings is designed as a minimum 24 feet in width and improved with hard surface pavement.**
**B. No back-up movements are required within a public street.**
**C. Applicant understands requirements cited here.**
**D. A security gate is required at the access point from Salamo Rd for securing the buildings and site after hours. The security gate will be opened during regular business hours.**

48.050 One-Way Vehicular Access Points

Where a proposed parking facility plan indicates only one-way traffic flow on the site, it shall be accommodated by a specific driveway serving the facility, and the entrance drive shall be situated closest to oncoming traffic, and the exit drive shall be situated farthest from oncoming traffic.

**Applicant's Response:**

**All access roads within this project is two-way and does not require any one-way movement.**

48.080 Bicycle and Pedestrian Circulation

A. Within all multifamily developments, each residential dwelling shall be connected to vehicular parking stalls, common open space, and recreation facilities by a pedestrian pathway system having a minimum width of six feet and constructed of concrete, asphalt, brick or masonry pavers, or other hard surface. The pathway material shall be of a different color or composition from the driveway. (Bicycle routes adjacent to the travel lanes do not have to be of different color or composition.)

B. Bicycle and pedestrian ways within a subdivision shall be constructed according to the provisions in CDC 85.200(C).

C. Bicycle and pedestrian ways at commercial or industrial sites shall be provided according to the provisions of Chapter 55 CDC, Design Review.

**Applicant's Response:**

**This project contains no residential components. Applicant understands the requirements of section C as related to this project.**

| | | | FREESTANDING SIGNS | | | | ON-WALL SIGNS | | | PROJECTING SIGNS[4] | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | City Appvl. Reqd. | Illumination | No. Allowed | Max. Sq. Ft. | Max Ht. (ft.) | ROW Setback (ft.) | No. Allowed | Max Sq. Ft. | Max Ht. (ft.) | No. Allowed | Max Sq. Ft. |
| Residential Uses Including Home Occupations | No | No | 1 | 2 | 4 | 5 | or 1^ | 2 | 12 | n/a | n/a |
| Multi-family Complex | Yes | Yes | 2 | 24 total* | 8 | 5 | or 2^ | 24 total* | 12 | n/a | n/a |
| Subdivision Monument | Yes | Yes | 5 per subdivision | 32 total* | 8 | 5 | n/a | n/a | n/a | n/a | n/a |
| Industrial Zone Uses | Yes | Yes | 10 | 32 | 8 | 5 | 3 | 10% | 25 | n/a | n/a |
| Commercial Uses in Residential Zone | Yes | Yes | 1 | 16 | 8 | 10 | 2 | 5%* | 12 | n/a | n/a |
| Commercial Zone | Yes | Yes | 1[1] | 32[2] | 8 | 5 | 3 | 10%* | 25 | 1 sign per each business frontage with a customer entrance[4] | 12 |
| Business Center | Yes | Yes | 1 | 150[3] | 20 | 15 | 3 | 10%* | 25 | 1 sign per each business frontage with a customer entrance[4] | 12 |
| Business Center Entryway | Yes | Yes | 1 per entry | 4 | 3 | 5 | n/a | n/a | n/a | n/a | n/a |
| Public Uses | Yes | Yes | 1[5] | 24 | 20 | 5 | No limit | 18 total | 25 | n/a | n/a |

Notes for Permanent Sign Design Standards

* To calculate maximum area, numbers followed with the word “total” are the maximum total area of all signs combined. Standards expressed as a percentage represent the allowed percentage of area on a single building face that may be used as a wall sign. For example, a wall 10 feet tall by 30 feet wide has 300 square feet. If the standard is 10 percent, signs totaling 30 square feet are permitted. The maximum percentage is for the building – a building with multiple occupants is restricted to the stated percentage per building, not per occupant.

^ For number of signs allowed, “or 1” and “or 2” designate that the total number of freestanding and wall signs cannot exceed the number stated. If the standard is “or 1,” the applicant may have one freestanding sign or one wall sign, but not both.

[1]Gas stations may have two freestanding signs.

[2]Restaurants with drive-through or take-out windows may have an additional 32 square feet.

[3]Up to 35 percent of the total sign area may be used as a changeable copy sign. Where business centers are located within 200 feet of I-205 right-of-way, the freestanding sign may be freeway-oriented. Freeway-oriented signs shall have a maximum total sign area of 210 square feet and a maximum height of 20 feet above the grade of the nearest

lane or I-205 or 60 feet, whichever is less. Freeway-oriented signs shall be oriented to view from I-205. Freeway-oriented signs shall not be smaller than 80 square feet. The approval authority may allow a 10 percent increase in the total square footage in order to accommodate unique design problems.

[4]Projecting signs shall not extend above the roofline at the wall or the top of a parapet wall, whichever is higher. They shall not be located within 20 feet of another projecting sign in the same horizontal plane or project within two feet of the curb or, if there is no curb, the edge of the pavement. All projecting signs shall have clearance above the sidewalk consistent with CDC 52.210(D). Any illumination shall be external.

[5]Parks may have two signs per frontage. Signs in parks directed at pedestrians or cyclists within the parks are not limited in number or size. Schools may have two signs.

N/a means not applicable.

**Applicant's Response:**

**Applicant understands the requirements of this section as related to this project.**

Chapter 54 Landscaping

54.020 Approval Criteria

A. Tree preservation.

1. Intent and guidance. In designing the new project, every reasonable attempt should be made to preserve and protect existing trees and to incorporate them into the new landscape plan. Similarly, significant landscaping (e.g., bushes, shrubs) should be integrated. The rationale is that saving a 30-foot-tall mature tree helps maintain the continuity of the site, they are qualitatively superior to two or three two-inch caliper street trees, they provide immediate microclimate benefits (e.g., shade), they soften views of the street, and they can increase the attractiveness, marketability, and value of the development.

2. Inventory required. Every development proposal shall submit an inventory of existing site conditions, which includes significant trees and heritage trees.

3. *Repealed by Ord. 1754.*

4. Developers must also comply with the municipal code chapter on tree protection and, if applicable, with CDC 55.100(B) or 55.105(B).

5. Heritage trees. Heritage trees are trees which, because of their age, type, notability, or historical association, are of special importance. Heritage trees are trees designated by the City Council following review of a nomination. A heritage tree may not be removed without a public hearing at least 30 days prior to the proposed date of removal. Development proposals involving land with heritage tree(s) shall be required to protect and save the tree(s). Further discussion of heritage trees is found in the municipal code.

B. Landscaping – By type, location and amount.

1. Residential uses (non-single-family). A minimum of 25 percent of the gross site area including parking, loading and service areas shall be landscaped, and may include the open space and recreation area requirements under CDC 55.100 or 55.105, as applicable. Parking lot landscaping may be counted in the percentage.

2. Non-residential uses. A minimum of 20 percent of the gross site area shall be landscaped. Parking lot landscaping may be counted in the percentage.

3. Parking area landscaping – All uses (residential uses (non-single-family) and non-residential uses):

a. There shall be one shade tree planted for every eight parking spaces, except as required under subsection (B)(3)(d) of this section. Shade trees are defined as medium to large trees with a canopy, at maturity, at least 40 feet in diameter. These trees shall be evenly distributed throughout the parking lot to provide shade.

b. Parking lots with over 20 spaces shall have a minimum 10 percent of the interior of the parking lot devoted to landscaping. Pedestrian walkways in the landscaped areas are not to be counted in the percentage. The perimeter landscaping, as provided in subsection (B)(3)(h) of this section, shall not be included in the 10 percent figure.

c. Parking lots with 10 to 20 spaces shall have a minimum five percent of the interior of the parking lot devoted to landscaping. The perimeter landscaping, as provided in subsection (B)(3)(h) of this section, shall not be included in the five percent.

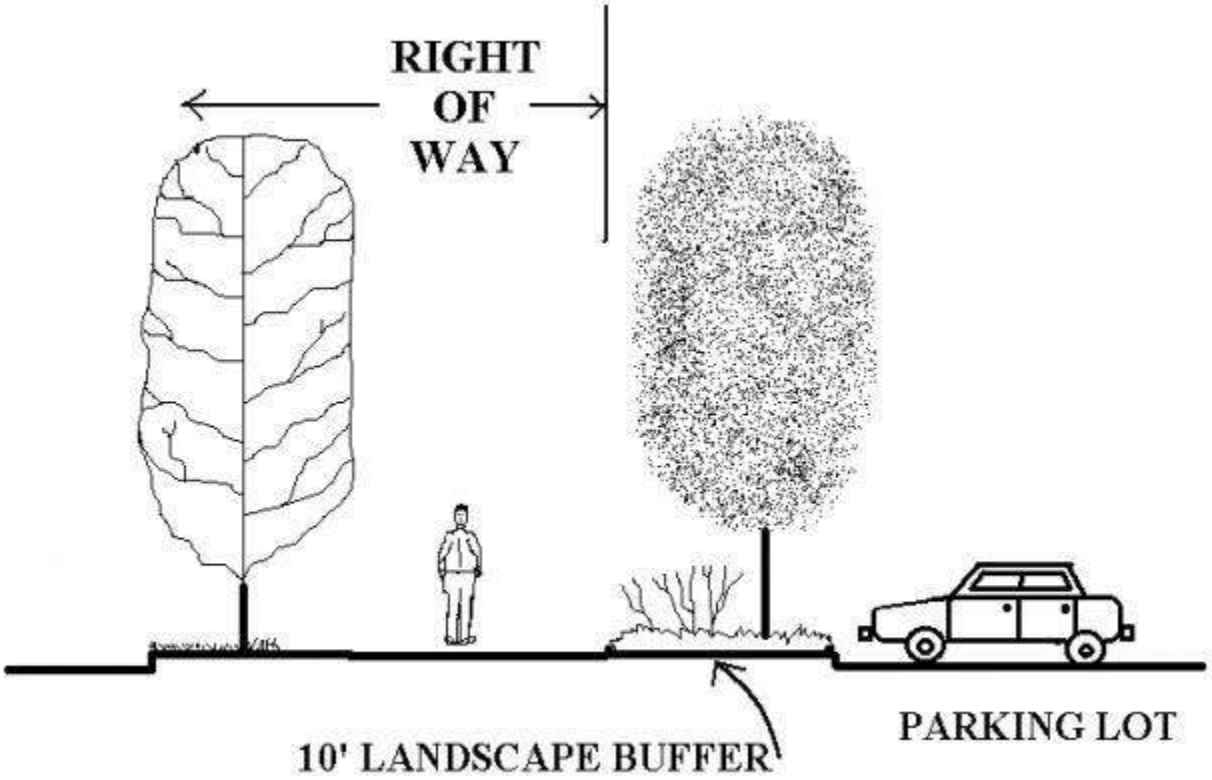
d. Parking lots with fewer than 10 spaces shall have perimeter landscaping, if required under subsection (B)(3)(h) of this section, and at least two shade trees.

e. Non-residential parking areas paved with a permeable parking surface may reduce the required minimum interior landscaping by one-third for the area with the permeable parking surface only.

f. The landscaped areas shall not have a width of less than five feet and shall be uniformly distributed throughout the parking or loading area.

g. The soils, site, proposed soil amendments, and proposed irrigation system shall be appropriate for the healthy and long-term maintenance of the proposed plant species.

h. A parking, loading, or service area which abuts a street shall be set back from the right-of-way line by perimeter landscaping in the form of a landscaped strip at least 10 feet in width. When a parking, loading, or service area or driveway is contiguous to an adjoining lot or parcel, there shall be an intervening five-foot-wide landscape strip. The landscaped area shall contain:




1) Trees spaced as appropriate to the species, not to exceed 30 feet apart on center, on the average;

2) Shrubs, not to reach a height greater than three feet, six inches, spaced no more than five feet apart on the average; and

3) Vegetative ground cover such as grass, wildflowers, or other landscape material to cover 100 percent of the exposed ground within two growing seasons. No bark mulch shall be allowed except under the canopy of low level shrubs.

i. If over 50 percent of the lineal frontage of the main street or arterial adjacent to the development site comprises parking lot, the landscape strip between the right-of-way and parking lot shall be increased to 15 feet in width and shall include terrain variations (e.g., one-foot-high berm) plus landscaping. This extra requirement only applies to one street frontage.

j. All areas in a parking lot not used for parking, maneuvering, or circulation shall be landscaped.

k. The landscaping in parking areas shall maintain minimum vision clearance as provided in Chapter 42 CDC, Clear Vision Areas.

4. Other landscaping standards – All uses (residential uses (non-single-family) and non-residential uses):

a. Outdoor storage areas, service areas (loading docks, refuse deposits, and delivery areas), and above-ground utility facilities shall be buffered and screened to obscure their view from adjoining properties and to reduce noise levels to acceptable levels at the property line. The adequacy of the buffer and screening shall be determined by the criteria set forth in CDC 55.100(C)(1) or 55.105(G), as applicable.

b. For non-residential development, crime prevention shall be considered and plant materials shall not be located in a manner which prohibits surveillance of public and semi-public areas (shared or common areas).

c. Irrigation facilities shall be located so that landscaped areas can be properly maintained and so that the facilities do not interfere with vehicular or pedestrian circulation.

d. For commercial, office, and other non-residential sites, the developer shall select trees that possess the following characteristics:

1) Provide generous “spreading” canopy for shade.

2) Roots do not break up adjacent paving.

3) Tree canopy spread starts at least six feet up from grade in, or adjacent to, parking lots, roads, or sidewalks unless the tree is columnar in nature.

4) No sticky leaves or sap-dripping trees (no honey-dew excretion).

5) No seed pods or fruit-bearing trees (flowering trees are acceptable).

6) Disease-resistant.

7) Compatible with planter size.

8) Drought-tolerant unless irrigation is provided.

9) Attractive foliage or form all seasons.

e. Plant materials (shrubs, ground cover, etc.) shall be selected for their appropriateness to the site, drought tolerance, year-round greenery and coverage, staggered flowering periods, and avoidance of nuisance plants (Scotch broom, etc.).

C. Landscaping (trees) in new subdivision.

1. Street trees shall be planted by the City within the planting strips (minimum six-foot width) of any new subdivision in conformity with the street tree plan for the area, and in accordance with the planting specifications of the Parks and Recreation Department. All trees shall be planted during the first planting season after occupancy. In selecting types of trees, the City Arborist may determine the appropriateness of the trees to local conditions and whether that tree has been overplanted, and whether alternate species should be selected. Street trees shall also conform to standards in Chapter 8 of the Municipal Code on tree protection.

2. The cost of street trees shall be paid by the developer of the subdivision.

3. The fee per street tree, as established by the City, shall be based upon the following:

a. The cost of the tree;

b. Labor and equipment for original placement;

c. Regular maintenance necessary for tree establishment during the initial two-year period following the City schedule of maintenance; and

d. A two-year replacement warranty based on the City’s established failure rate.

D. Landscaping requirements in water resource areas (WRAs). Pursuant to CDC 32.110(E)(3) the requirements of this chapter relating to total site landscaping, landscaping buffers, landscaping around parking lots, and landscaping the parking lot interior may be waived or reduced in a WRA application without a variance being required.

**Applicant’s Response:**

**A. Tree Preservation**

**Applicant understands that every reasonable attempt must be made to preserve existing trees. As part of this project, our tree preservation plan notes which existing large trees are to be maintained as part of the new development (subject to arborist approval.) A tree inventory is also included for all existing trees to be removed. Applicant understands sections 1-5 as part of this project.**

**B. Landscaping**

**1. This project is not residential**

**2. Minimum 20% of site area is landscaped as designed in this project.**

**3. a. For the 42 spaces in the upper lots, 6 trees would be required (at 1 per 8 spaces). As discussed previously, the lower lot cannot be broken up with landscape or trees due to maneuverbility concerns of the fleet vehicles. For the upper lots, it would be more beneficial to plant these 6 trees in close proximity to the upper lots than within them.**

**b. The upper lot contains 28 spaces, but as stated previously, this small flat area is not best used as planted area and the amount of landscaped area across the rest of the site far exceeds the 20% required. The intent is to protect existing trees directly adjacent to the parking area to provide shade and trees for this small parking lot.**

**Sections (C) through (I) do not apply**

**Sections (J) through (K): Applicant understands the requirements of this section as related to this project.**

**4. a. All loading, refuse and delivery areas in this project shielded from public street view by large trees and existing grade conditions.**

**Sections (B) through (D): Applicant understands the requirements of this section as related to this project.**

**C. Landscaping (trees) in new Sub-Division**

**This project is not a new subdivision and this section does not apply.**

**D. Landscaping Reqs in WRA**

**There is a WRA stream on site and applicant understands the requirements of this section as related to this project.**

## 55.020 Classes of Design Review (Class II)

A. Class I Design Review. The following are subject to Class I Design Review:

1. Modification of an office, commercial, industrial, public or multifamily structure for purposes of enhancing the aesthetics of the building and not increasing the interior usable space (e.g., covered walkways or entryways, addition of unoccupied features such as cupolas, clock towers, etc.).

2. Significant road realignment (when not part of a subdivision or partition plat process). “Significant” shall be defined by the length of the realignment and/or extent of redesign, and/or the natural features or human-made structures that will be impacted or removed.

3. Addition or reduction of less than five percent of total square footage of a commercial, office, public, multifamily, or industrial building.

4. Modification of a landscape plan (including water features, ponds, pergolas, arbors, artwork, sculptings, etc.).

5. Minor modifications and/or upgrades of pump stations, reservoirs, and storm detention facilities.

6. Americans with Disability Act compliance that significantly alters the exterior of the building (ramps are exempt).

7. Freestanding art and statuary over five feet tall.

8. Other land uses and activities may be added if the Planning Director makes written findings that the activity/use will not increase off-site impacts and is consistent with the type and/or scale of activities/uses listed above.

9. No design review is required if the applicant proposes to repair or replace one of the listed items. The Planning Director shall make the determination of whether an applicant is proposing a repair or replacement. However, Class I design review applies when one of the following improvements is part of a minor redesign or remodel.

   a. Sidewalks on private property.

   b. Loading docks.

   c. Addition or reduction of parking stalls.

   d. Revised parking alignment.

   e. Revised circulation.

   f. Revised points of ingress/egress to a site.

   g. Heating, ventilation, and air conditioners (HVAC) that are visible from the public right-of-way.

10. New development of a single-family detached dwelling (including a duplex, triplex, or quadplex), single-family attached dwelling (including a duplex, triplex, quadplex, or townhouse), or cottage cluster in the Willamette Neighborhood Mixed-Use Transitional Zone.

B. Class II Design Review. Class II design review applies to all uses/activities except those uses/activities listed under Class I design review, and the exemptions of CDC 55.025. Class II design review applies to the proposed improvements listed in this section when the proposed improvement (e.g., new sidewalk) is part of a major commercial, office, industrial, public, or multifamily construction project (e.g., a new shopping center).

**Applicant's Response:**

**A. Not-applicable to this project.**
**B. It is our understanding that this project requires Class II Design Review**

55.030 Administration and Approval Process

A pre-application conference is required before submitting a development plan application for design review as provided by CDC 99.030(B).

The application shall be submitted by the record owner(s) of the property, authorized agent, or condemnor.

Action on the development plan application shall be as provided by Chapter 99 CDC, Procedures for Decision-Making: Quasi-Judicial, and the following:

1. The Planning Director for Class I design review applications, or Planning Commission for Class II design review applications, shall approve, approve with conditions, or deny the application based on findings related to the applicable criteria set forth in CDC 99.110 and this chapter.

2. A decision by the Planning Director may be reviewed by the City Council.

Substantial modifications made to the approved development plan will require reapplication (e.g., more or fewer lots, different architectural design, etc.).

**Applicant's Response:**

**This project has already undergone a pre-application conference. Applicant understands the remainder of requirements of this section as related to this project.**

55.070 Submittal Requirements

A. The design review application shall be initiated by the property owner or the owner's agent, or condemnor.

B. A pre-application conference, per CDC 99.030(B), shall be a prerequisite to the filing of an application.

C. Documentation of any required meeting with the respective City-recognized neighborhood association per CDC 99.038.

D. The applicant shall submit a completed application form and:

1. The development plan for a Class I design review shall contain the following elements:

a. A site analysis (CDC 55.110) only if the site is undeveloped;

b. A site plan (CDC 55.120);

c. Architectural drawings, including building envelopes and all elevations (CDC 55.140) only if exterior architectural construction, remodeling, or changes are proposed;

d. Tualatin Valley Fire and Rescue service provider permit; and

e. Pursuant to CDC 55.085, additional submittal material may be required.

One original application form must be submitted. One copy at the original scale and one copy reduced to 11 inches by 17 inches or smaller of all drawings and plans must be submitted. One copy of all other items must be submitted. The applicant shall also submit one copy of the complete application in a digital format acceptable to the City. When the application submittal is determined to be complete, additional copies may be required as determined by the Community Development Department.

2. The development plan for a Class II design review shall contain the following elements:

a. A site analysis (CDC 55.110);

b. A site plan (CDC 55.120);

c. A grading plan (CDC 55.130);

d. Architectural drawings, indicating floor plan and elevation (CDC 55.140);

e. A landscape plan (CDC 55.150);

f. A utility plan appropriate to respond to the approval criteria of CDC 55.100(I)(1) through (5) relating to streets, drainage, municipal water, sanitary sewers, solid waste, and recycling storage;

g. A light coverage plan with photometric data, including the location and type of outdoor lighting, with specific consideration given to compliance with CDC 55.100(J) pertaining to crime prevention and, if applicable, CDC 46.150(A)(13) pertaining to parking lot lighting;

h. If staff determines before or during the pre-application conference that the land use is expected to generate noise that may exceed DEQ standards, the application shall include a noise study conducted by a licensed acoustical engineer that demonstrates that the application and associated noise sources will meet DEQ standards. Typical noise sources of concern include, but are not limited to, vehicle drive-throughs, parking lots, HVAC units, and public address systems; and

i. Documents as required per the Tree Technical Manual.

j. Tualatin Valley Fire and Rescue service provider permit.

3. A narrative, based on the standards contained in this code, which supports any requested exceptions as provided under CDC 55.170.

4. Submit full written responses to approval criteria of CDC 55.100 for Class II design review, or CDC 55.090 for Class I design review, plus all applicable referenced approval criteria.

E. The applicant shall submit samples of all exterior building materials and colors in the case of new buildings or building remodeling.

F. The applicant shall pay the required deposit and fee.

**Applicant's Response:**

**A. Applicant understands the requirements of this section as related to this project**

**B. Pre-application conference has already taken place for this project on 4/3/25**

**C. Neighborhood Meeting has already taken place for this project on 6/9/25**

**D. Class I Does not apply. Class II application requirements are understood and included as part of this application.**

**Sections (E) and (F): applicant understands the need to submit material samples and fees.**

55.100 Approval Standards – Class II Design Review – General Discretionary

Except for applications subject to CDC 55.105, the approval authority shall make findings with respect to the following criteria when approving, approving with conditions, or denying a Class II design review application:

A. The provisions of the following chapters shall be met:

Chapter 34 CDC, Accessory Structures, Accessory Dwelling Units, and Accessory Uses.

Chapter 38 CDC, Additional Yard Area Required; Exceptions to Yard Requirements; Storage in Yards; Projections into Yards.

Chapter 41 CDC, Building Height, Structures on Steep Lots, Exceptions.

Chapter 42 CDC, Clear Vision Areas.

Chapter 44 CDC, Fences.

Chapter 46 CDC, Off-Street Parking, Loading and Reservoir Areas.

Chapter 48 CDC, Access, Egress and Circulation.

Chapter 52 CDC, Signs.

Chapter 54 CDC, Landscaping.

B. Relationship to the natural and physical environment.

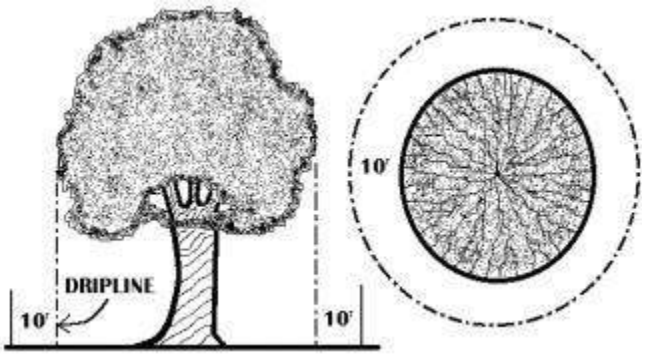
1. The buildings and other site elements shall be designed and located so that all heritage trees, as defined in the municipal code, shall be saved. Diseased heritage trees, as determined by the City Arborist, may be removed at their direction.

**Applicant's Response:**

**No heritage trees appear to be present on the site according to the City's Tree Inventory map or the tree inventory included as part of this application.**

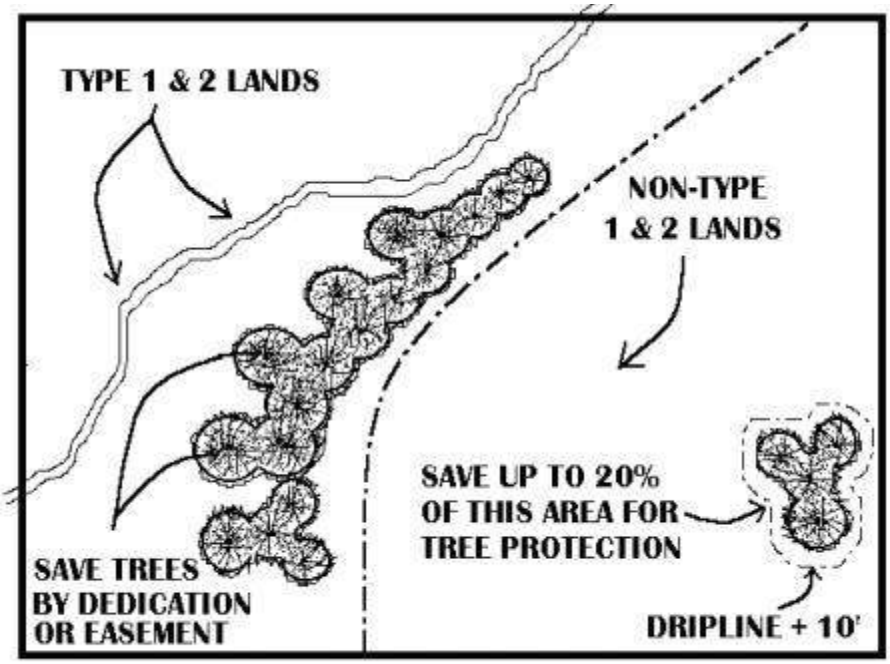
2. All heritage trees, as defined in the municipal code, all trees and clusters of trees ("cluster" is defined as three or more trees with overlapping driplines; however, native oaks need not have an overlapping dripline) that are considered significant by the City Arborist, either individually or in consultation with certified arborists or similarly qualified professionals, based on accepted arboricultural standards including consideration of their size, type, location, health, long term survivability, and/or numbers, shall be protected pursuant to the criteria of subsections (B)(2)(a) through (f) of this section. In cases where there is a difference of opinion on the significance of a tree or tree cluster, the City Arborist's findings shall prevail. It is important to acknowledge that all trees are not significant and, further, that this code section will not necessarily protect all trees deemed significant.

a. Non-residential and residential projects on Type I and II lands shall protect all heritage trees and all significant trees and tree clusters by limiting development in the protected area. The protected area includes the protected tree, its dripline, and an additional 10 feet beyond the dripline, as depicted in the figure below. Development of Type I and II lands shall require the careful layout of streets, driveways, building pads, lots, and utilities to avoid heritage trees and significant trees and tree clusters, and other natural resources pursuant to this code. The method for delineating the protected trees or tree clusters ("dripline plus 10 feet") is explained in subsection (B)(2)(b) of this section. Exemptions of subsections (B)(2)(c), (e), and (f) of this section shall apply.




**PROTECTED AREA = DRIPLINE + 10 FEET**

b. Non-residential and residential projects on non-Type I and II lands shall set aside up to 20 percent of the protected areas for significant trees and tree clusters, plus any heritage trees. Therefore, in the event that the City Arborist determines that a significant tree cluster exists at a development site, then up to 20 percent of the non-Type I and II lands shall be devoted to the protection of those trees by limiting development in the protected areas. The exact percentage is determined by establishing the driplines of the trees or tree clusters that are to be protected. In order to protect the roots which typically extend further, an additional 10-foot measurement beyond the dripline shall be added. The square footage of the area inside this "dripline plus 10 feet" measurement shall be the basis for calculating the percentage (see figure below). The City Arborist will identify which tree(s) are to be protected. Development of non-Type I and II lands shall also require the careful layout of streets, driveways, building pads, lots, and utilities to avoid significant trees, tree clusters, heritage trees, and other natural resources pursuant to this code. Exemptions of subsections (B)(2)(c), (e), and (f) of this section shall apply. Please note that in the event that more than 20 percent of the non-Type I and II lands comprise significant trees or tree clusters, the developer shall not be required to save the excess trees, but is encouraged to do so.




**METHOD OF PERCENTAGE CALCULATION**

**E.G., DRIPLINE + 10 FT. AREA = 2,500 SQ. FT. OR 18% OF TOTAL NON-TYPE I AND II LAND DENSITY CALCULATIONS FOR THIS PARCEL WILL BE BASED ON REMAINING NET SQ. FOOTAGE OF SITE (EXCLUDING THE 2,500 SQ. FT.)**

c. Where stubouts of streets occur on abutting properties, and the extension of those streets will mean the loss of significant trees, tree clusters, or heritage trees, it is understood that tree loss may be inevitable. In these cases, the objective shall be to minimize tree loss. These provisions shall also apply in those cases where access, per construction code standards, to a lot or parcel is blocked by a row or screen of significant trees or tree clusters.

d. For both non-residential and residential development, the layout shall achieve at least 70 percent of maximum density for the developable net area. The developable net area excludes all Type I and II lands and up to 20 percent of the remainder of the site for the purpose of protection of stands or clusters of trees as defined in subsection (B)(2) of this section.

e. For arterial and collector street projects, including Oregon Department of Transportation street improvements, the roads and graded areas shall avoid tree clusters where possible. Significant trees, tree clusters, and heritage tree loss may occur, however, but shall be minimized.

f. If the protection of significant tree(s) or tree clusters is to occur in an area of grading that is necessary for the development of street grades, per City construction codes, which will result in an adjustment in the grade of over or under two feet, which will then threaten the health of the tree(s), the applicant will submit evidence to the Planning Director that all reasonable alternative grading plans have been considered and cannot work. The applicant will then submit a mitigation plan to the City Arborist to compensate for the removal of the tree(s) on an “inch by inch” basis (e.g., a 48-inch Douglas fir could be replaced by 12 trees, each four-inch). The mix of tree sizes and types shall be approved by the City Arborist.

***Applicant’s Response:***

***a. Applicant understanding is that this project is not proposed on type 1 and 2 lands.***
***b. This project retains 22.8% of existing significant trees, exceeding the required threshold of 20% as stated in this code. This is shown in table #2 within the included arborist report. See also Tree Protection and Removal Plan L1.0 showing which trees remain and are removed.***
***c. This condition does not exist on this proposal, but every effort has been made generally to protect as many significant trees as possible as part of this design.***
***d. 22.8% of existing significant trees to be retained—see section (b) above.***
***e. This is not an arterial or collector street project.***
***f. This project does not affect the grading of adjacent streets.***

3. The topography and natural drainage shall be preserved to the greatest degree possible.

***Applicant’s Response:***

***Though a significant area of the site will be re-graded to allow for the construction of a new private access road and building/vehicular pads necessary for a functioning public works facility, every effort has been made by the design and engineering team to maintain natural drainage and topography. The detailed grading and stormwater plan is shown on C2.0 for reference.***

4. The structures shall not be located in areas subject to slumping and sliding. The Comprehensive Plan Background Report’s Hazard Map, or updated material as available and as deemed acceptable by the Planning Director, shall be the basis for preliminary determination.

***Applicant's Response:***

***Per the project geotechnical engineer, Columbia West Engineering, the site background (including stabilization of the landslide triggered during original construction of Interstate 205), proposed development plans including the proposed cut and fill grading plans, proposed fill slopes with gradients of approximately 2horizontal:1vertical or flatter, proposed buildings and walls layout and estimated foundation loads, the composition of soil and rock and groundwater conditions encountered in our subsurface explorations, laboratory testing, and engineering and slope stability analyses, it is Columbia West's opinion that the proposed development can be safely constructed at the site, provided the geotechnical recommendations presented in Columbia West's geotechnical report are incorporated into the design and construction of the project.***

5. There shall be adequate distance between on-site buildings and on-site and off-site buildings on adjoining properties to provide for adequate light and air circulation and for fire protection.

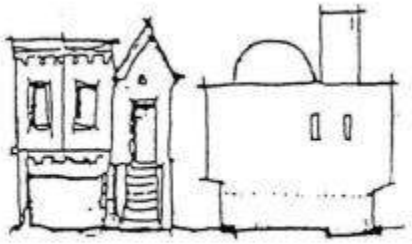
***Applicant's Response:***

***There are large distances separating all buildings and adjacent properties (hundreds of feet in most cases) but please see civil sheet C1.0 showing specific distances.***

6. Architecture.

a. The proposed structure(s) scale shall be compatible with the existing structure(s) on site and on adjoining sites. Contextual design is required. Contextual design means respecting and incorporating prominent architectural styles, building lines, roof forms, rhythm of windows, building scale and massing of surrounding buildings in the proposed structure. The materials and colors shall be complementary to the surrounding buildings.

*contextual design*

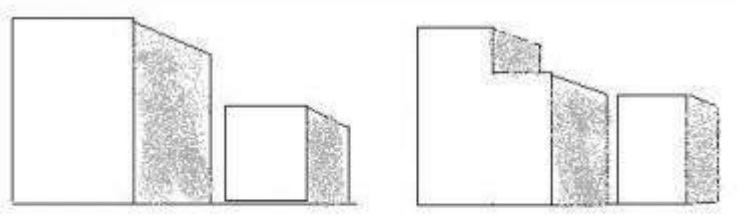


*contrasting design*

**Applicant's Response:**

**As shown in the plans, elevations and renderings of the project included as part of this application, the site is heavily wooded and steeply graded, with very little (if any) direct adjacency to existing buildings. Regardless, the design utilizes a simple material palette of dark gray metal panels, wood, and concrete with low gabled roof lines to relate contextually to the residential scale and formal qualities of buildings nearby.**

b. While there has been discussion in Chapter 24 CDC about transition, it is appropriate that new buildings should architecturally transition in terms of bulk and mass to work with, or fit, adjacent existing buildings. This transition can be accomplished by selecting designs that "step down" or "step up" from small to big structures and vice versa (see figure below). Transitions may also take the form of carrying building patterns and lines (e.g., parapets, windows, etc.) from the existing building to the new one.

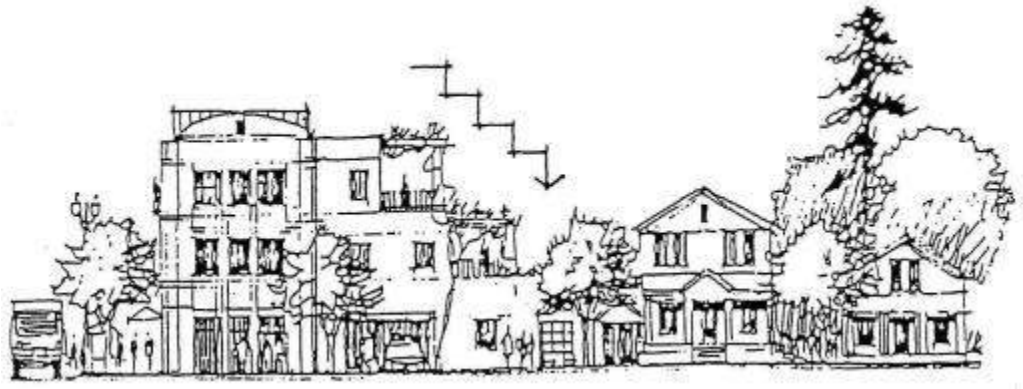


*mass/bulk overwhelms smaller building*

*mass/bulk effectively transitions*

**Applicant's Response:**

**As shown in the plans, elevations and renderings of the project included as part of this application, the site is heavily wooded and steeply graded, with very little (if any) direct adjacency to existing buildings. Still, the design is sensitive to the nearby residential context of one and two-story buildings with all 3 buildings remaining well below the height limit and with a one and two story height.**



c. Contrasting architecture shall only be permitted when the design is manifestly superior to adjacent architecture in terms of creativity, design, and workmanship, and/or it is adequately separated from other buildings by distance, screening, grade variations, or is part of a development site that is large enough to set its own style of architecture.

***Applicant's Response:***

***As shown on sheet C1.0 the buildings within this proposal are separated from roadways and adjacent residences by significant distances (hundreds of feet in most cases), steep slopes (both main buildings are at 311' and 316' while nearest residences to the north are above elevation 416') and off-site mature trees in all directions. Aside from that, the design of the two main structures (Buildings A & B) take their design cues from nearby residential and utility buildings, utilizing gabled roofs, clerestory windows, wood columns and beams, and standing seam metal roofs which are often used in residential construction. The design is proposed to blend into its natural hillside setting while also relating to nearby residential architecture both in terms of form and materials.***

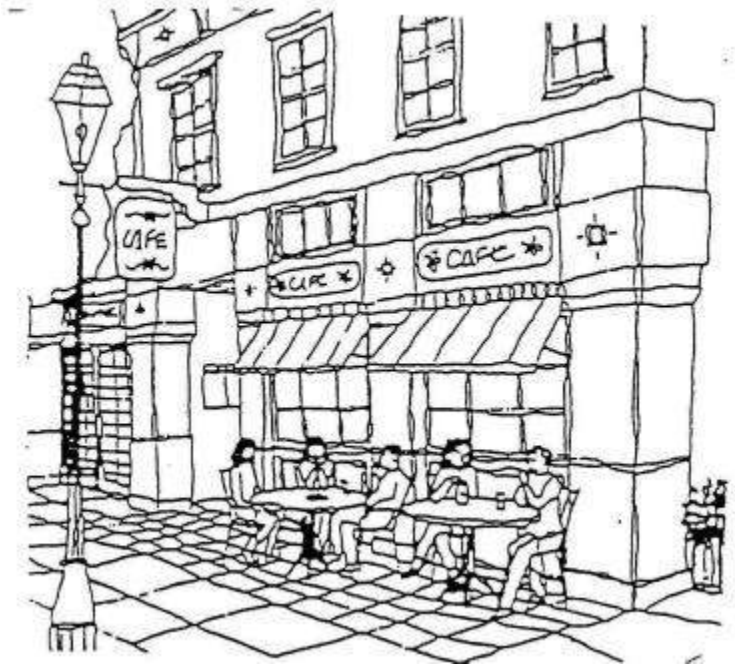
d. Human scale is a term that seeks to accommodate the users of the building and the notion that buildings should be designed around the human scale (i.e., their size and the average range of their perception). Human scale shall be accommodated in all designs by, for example, multi-light windows that are broken up into numerous panes, intimately scaled entryways, and visual breaks (exaggerated

eaves, indentations, ledges, parapets, awnings, engaged columns, etc.) in the facades of buildings, both vertically and horizontally.

The human scale is enhanced by bringing the building and its main entrance up to the edge of the sidewalk. It creates a more dramatic and interesting streetscape and improves the “height and width” ratio referenced in this section.

***Applicant’s Response:***

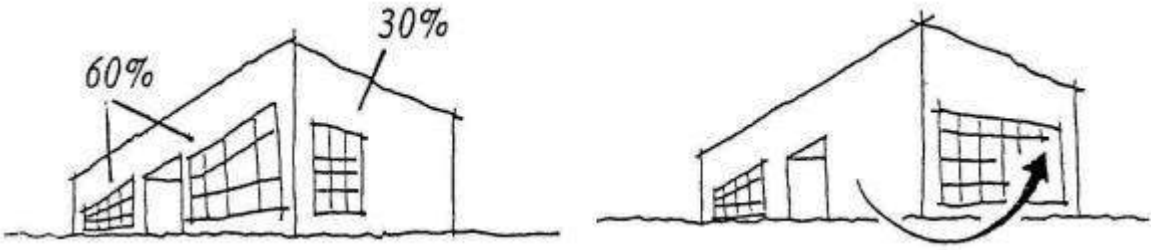
***The existing site is very steeply graded on the western edge, precluding the buildings from being located on or near Salamo Road. Instead, the new proposed access road will wind down the hillside to the new buildings which will be roughly 60 feet lower than the roadway access point and also more than 200 feet from the road. Thus, there is no significant sidewalk presence. Aside from that, the office building is designed with human scale in mind. The pedestrian bridge carries workers across from the upper parking lot and they arrive within a small, 10-foot deep covered deck area before entering through the main vestibule of the building. The gabled roof has a clerestory portion which further breaks down the scale and mass of the structure to allow natural daylight into the spaces within. Windows are also scaled and composed to relate to human scale, with a non-repeating pattern.***



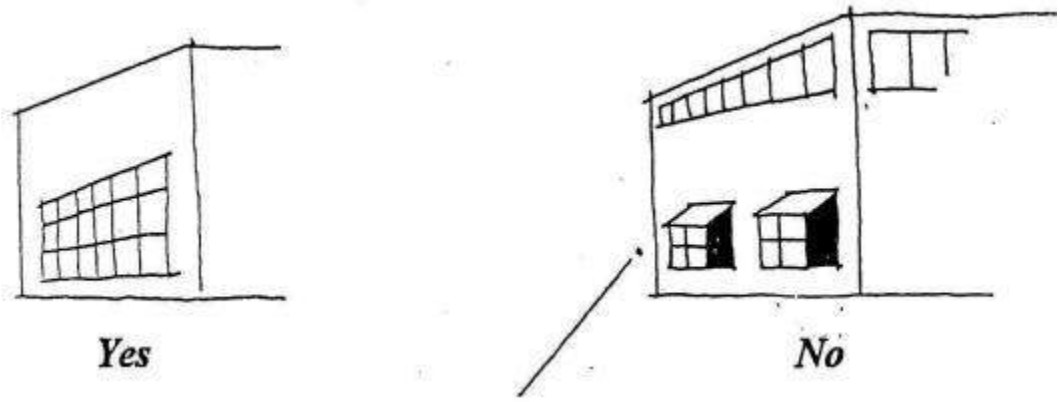

***human scale is captured in this example***

e. The main front elevation of commercial and office buildings shall provide at least 60 percent windows or transparency at the pedestrian level to create more interesting streetscape and window shopping opportunities. One side elevation shall provide at least 30 percent transparency. Any additional side or rear elevation, which is visible from a collector road or greater classification, shall also have at least 30 percent transparency. Transparency on other elevations is optional. The transparency is measured in lineal fashion. For example, a 100-foot-long building elevation shall have at least 60 feet (60 percent of 100 feet) in length of windows. The window height shall be, at minimum, three feet tall. The exception to transparency would be cases where demonstrated functional constraints or topography restrict that elevation from being used. When this exemption is

applied to the main front elevation, the square footage of transparency that would ordinarily be required by the above formula shall be installed on the remaining elevations at pedestrian level in addition to any transparency required by a side elevation, and vice versa. The rear of the building is not required to include transparency. The transparency must be flush with the building elevation.




***60 percent of lineal street facing or main elevation is windows. 30 percent of one side elevation is windows. You may transfer windows from the side to front, or vice versa.***




***(Windows not at eye level and/or not flush with building.)***

***Applicant's Response:***

***This project is a private City operations complex on a private drive, set back from the street by more than 200 feet and a drop in elevation of roughly 60 feet. Therefore, neither of the 2 buildings front onto a public street and there is no "streetscape" or "window shopping opportunity" in the traditional sense. The buildings do, however, contain a large amount of glazing for office workers, fleet maintenance crew, and warehouse crew to have ample access to daylight in the performance of their work. The transparency percentage of the north elevation of the office portion of Building B is 40% and the west elevation for the office portion is 20%.***

f. Variations in depth and roof line are encouraged for all elevations.

To vary the otherwise blank wall of most rear elevations, continuous flat elevations of over 100 feet in length should be avoided by indents or variations in the wall. The use of decorative brick, masonry, or stone insets and/or designs is encouraged. Another way to vary or soften this elevation is through terrain variations such as an undulating grass area with trees to provide vertical relief.

***Applicant's Response:***

***The main office structure (Building B) is designed with a clerestory roof which allows daylight into the center of the building, but from the exterior creates a unique roof line and profile, interrupting the gable form. The materiality of the building employs a standing seam metal roof and metal wall panels with reveal lines, which further provide texture and relief to the exterior surfaces.***

g. Consideration of the micro-climate (e.g., sensitivity to wind, sun angles, shade, etc.) shall be made for building users, pedestrians, and transit users, including features like awnings.

***Applicant's Response:***

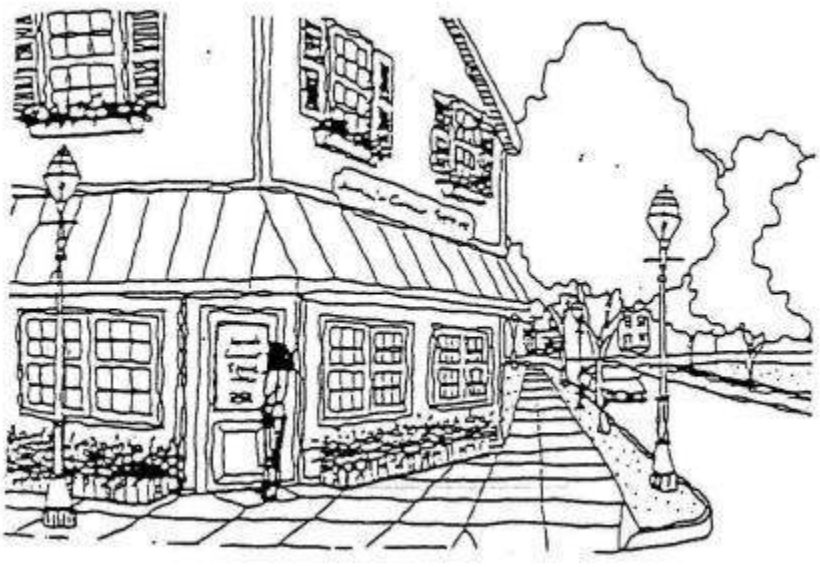
***The bridge and entry covered deck allow visitors to have shelter from sun and rain before entering the building. The larger roll-up garage doors on the lower fleet maintenance level also allow users to open them and experience breezes and daylight during their daily work while being shaded within from the sun.***

h. The vision statement identified a strong commitment to developing safe and attractive pedestrian environments with broad sidewalks, canopied with trees and awnings.

***Applicant's Response:***

***Because of the nature of the site's steep grade, the buildings are located deeply internal to the site and there is no frontage on a public right-of-way. The buildings are over 200 feet from Salamo Road at the closest. Once a visitor to the site is parked, there are sidewalks connecting the main parking area to the buildings.***

***That said, the existing access point at Salamo Road will maintain most of the existing trees (per tree protection plan L1.0) along the road, shading the existing sidewalk and limiting view into the maintenance yard below. Also shown on sheet C1.0 is the 30 ft x 30 ft clear vision area allowing drivers clear view to any traffic on Salamo Road.***



***trees, awnings, and building orientation enhance micro-climate***

i. Sidewalk cafes, kiosks, vendors, and street furniture are encouraged. However, at least a four-foot-wide pedestrian accessway must be maintained per Chapter 53 CDC, Sidewalk Use.

**Applicant's Response:**

**Applicant understands the requirements of this section, however, there is no real urban pedestrian experience given the building's use as a public works operations complex and distance from the street.**

Transportation. The automobile shall be shifted from a dominant role, relative to other modes of transportation, by the following means:

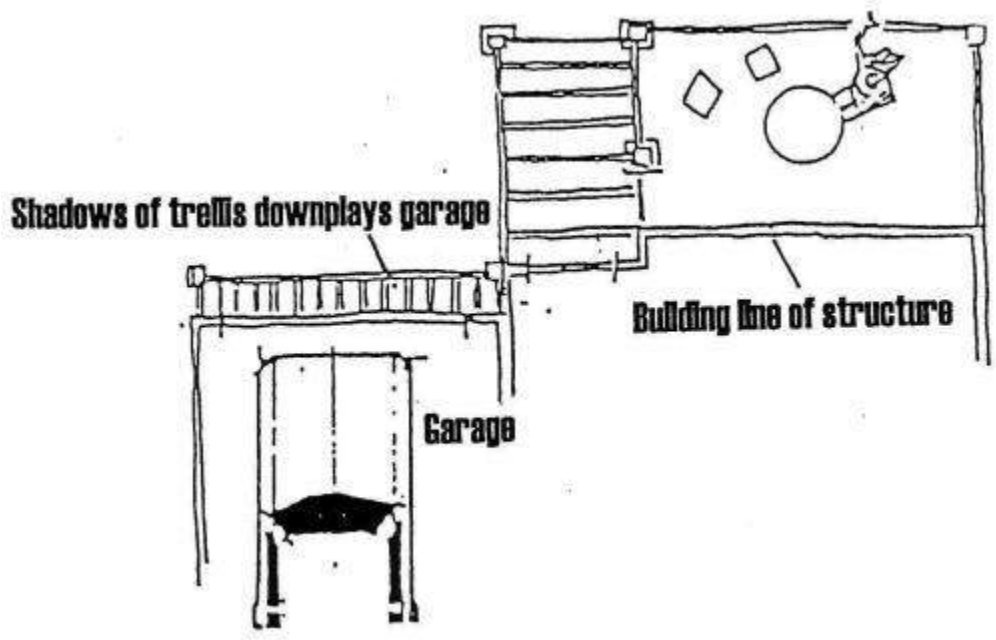
a. Commercial and office development shall be oriented to the street. At least one public entrance shall be located facing an arterial street; or, if the project does not front on an arterial, facing a collector street; or, if the project does not front on a collector, facing the local street with highest traffic levels. Parking lots shall be placed behind or to the side of commercial and office development. When a large and/or multi-building development is occurring on a large undeveloped tract (three plus acres), it is acceptable to focus internally; however, at least 20 percent of the main adjacent right-of-way shall have buildings contiguous to it unless waived per subsection (B)(7)(c) of this section. These buildings shall be oriented to the adjacent street and include pedestrian-oriented transparencies on those elevations.

For individual buildings on smaller individual lots, at least 30 lineal feet or 50 percent of the building must be adjacent to the right-of-way unless waived per subsection (B)(7)(c) of this section. The elevations oriented to the right-of-way must incorporate pedestrian-oriented transparency.

**Applicant's Response:**

**Applicant understands the requirements of this section and given the large and steeply-graded nature of the site, as well as a preexisting ravine, this project has positioned the main buildings internal to the site rather than fronting on the street, per subsection (C) below.**

b. Multifamily projects shall be required to keep the parking at the side or rear of the buildings or behind the building line of the structure as it would appear from the right-of-way inside the multifamily project. For any garage which is located behind the building line of the structure, but still facing the front of the structure, architectural features such as patios, patio walls, trellis, porch roofs, overhangs, pergolas, etc., shall be used to downplay the visual impact of the garage, and to emphasize the rest of the house and front entry.



The parking may be positioned inside small courtyard areas around which the units are built. These courtyard spaces encourage socialization, defensible space, and can provide a central location for landscaping, particularly trees, which can provide an effective canopy and softening effect on the courtyard in only a few years. Vehicular access and driveways through these courtyard areas is permitted.

**Applicant's Response:**

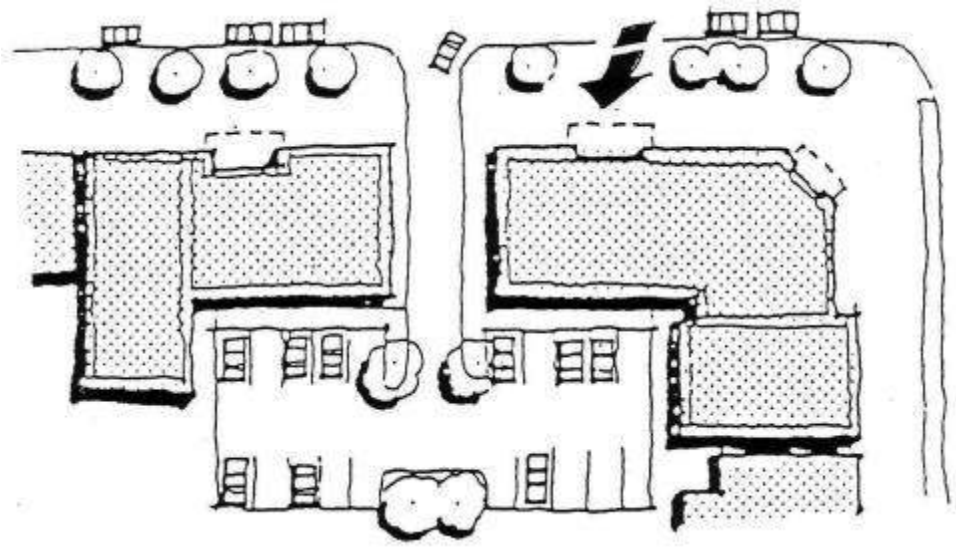
**This is not a multi-family project**

c. Commercial, office, and multifamily projects shall be built as close to the adjacent main right-of-way as practical to facilitate safe pedestrian and transit access. Reduced frontages by buildings on public rights-of-way may be allowed due to extreme topographic (e.g., slope, creek, wetlands, etc.) conditions or compelling functional limitations, not just inconveniences or design challenges.

**Applicant's Response:**

**Applicant understands the requirements of this section and given the large and steeply-graded nature of the site, as well as a preexisting ravine, this project has positioned the main buildings internal to the site rather than fronting on the street.**

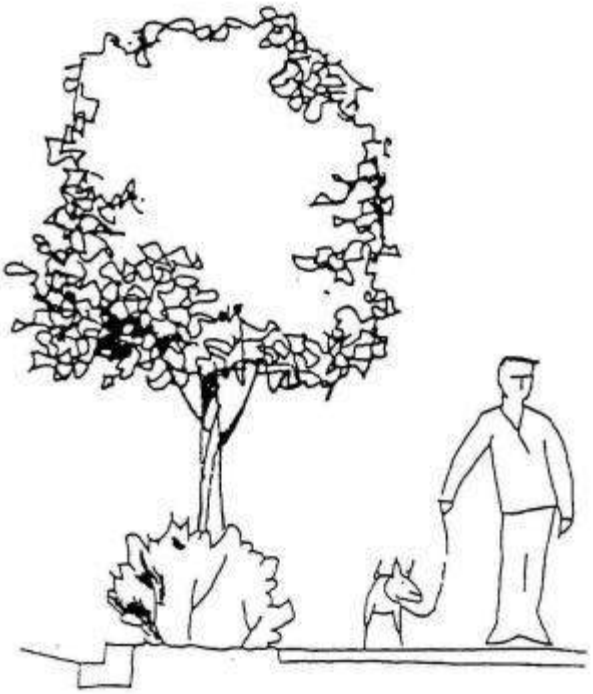
***entrance from right-of-way***



d. Accessways, parking lots, and internal driveways shall accommodate pedestrian circulation and access by specially textured, colored, or clearly defined footpaths at least six feet wide. Paths shall be eight feet wide when abutting parking areas or travel lanes. Paths shall be separated from parking or travel lanes by either landscaping, planters, curbs, bollards, or raised surfaces. Sidewalks in front of storefronts on the arterials and main store entrances on the arterials identified in CDC 85.200(A)(3) shall be 12 feet wide to accommodate pedestrians, sidewalk sales, sidewalk cafes, etc. Sidewalks in front of storefronts and main store entrances in commercial/OBC zone development on local streets and collectors shall be eight feet wide.

**Applicant's Response:**

**Sidewalks are shown between the upper parking lot and Building B to accommodate pedestrian movement to office spaces within.**

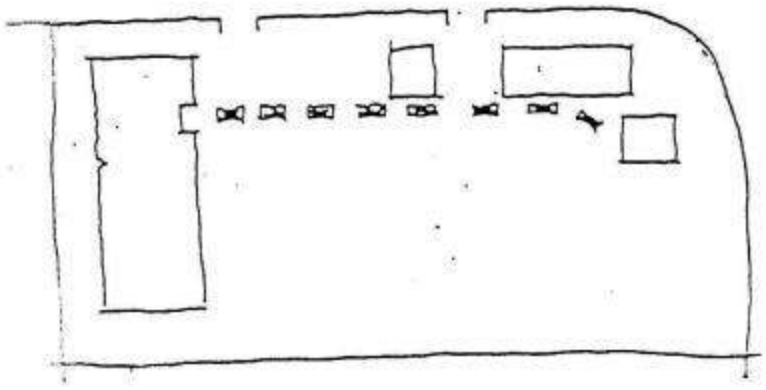


***landscaping***

e. Paths shall provide direct routes that pedestrians will use between buildings, adjacent rights-of-way, and adjacent commercial developments. They shall be clearly identified. They shall be laid out to attract use and to discourage people from cutting through parking lots and impacting environmentally sensitive areas.

**Applicant's Response:**

**Applicant understands the requirements of this section as related to this project.**



***direct pedestrian route required (- -)***

f. At least one entrance to the building shall be on the main street, or as close as possible to the main street. The entrance shall be designed to identify itself as a main point of ingress/egress.

**Applicant's Response:**

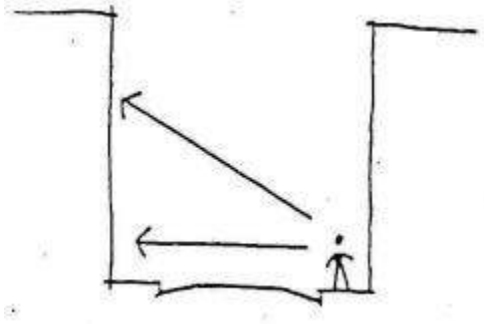
**The main entry to Building B is directly accessible and visible from the upper parking lot.**

g. Where transit service exists, or is expected to exist, there shall be a main entrance within a safe and reasonable distance of the transit stop. A pathway shall be provided to facilitate a direct connection.

***Applicant's Response:***

***The distance between the proposed project's entry/exit driveway and the closest transit stop is roughly 400 feet. This is the bus stop at Salamo Road and Barrington Drive.***

h. Projects shall bring at least part of the project adjacent to or near the main street right-of-way in order to enhance the height-to-width ratio along that particular street. (The "height-to-width ratio" is an architectural term that emphasizes height or vertical dimension of buildings adjacent to streets. The higher and closer the building is, and the narrower the width of the street, the more attractive and intimate the streetscape becomes.) For every one foot in street width, the adjacent building ideally should be one to two feet higher. This ratio is considered ideal in framing and defining the streetscape.



***1:1 height to width ratio is ideal***

**(example only)**

***Applicant's Response:***

***This project is proposed on a private access road and is over 200 feet from the closest public street, Salamo Road. It is also roughly 60 feet lower in elevation from the entry point at the grade of the main road entrance. Therefore, the height of the building related to the width of Salamo Road has little bearing on the streetscape experience.***

i. These architectural standards shall apply to public facilities such as reservoirs, water towers, treatment plants, fire stations, pump stations, power transmission facilities, etc. It is recognized that many of these facilities, due to their functional requirements, cannot readily be configured to meet these architectural standards. However, attempts shall be made to make the design sympathetic to surrounding properties by landscaping, setbacks, buffers, and all reasonable architectural means.

**Applicant's Response:**

**Applicant understands the requirements of this section and has made every effort to make the design sympathetic to surrounding properties per the description in this section.**

j. Parking spaces at trailheads shall be located so as to preserve the view of, and access to, the trailhead entrance from the roadway. The entrance apron to the trailhead shall be marked: “No Parking,” and include design features to foster trail recognition.

**Applicant’s Response:**

**No trailhead present on this site.**

C. Compatibility between adjoining uses, buffering, and screening.

In addition to the compatibility requirements contained in Chapter 24 CDC, buffering shall be provided between different types of land uses; for example, buffering between single-family homes and apartment blocks. However, no buffering is required between single-family homes and duplexes or single-family attached units. The following factors shall be considered in determining the adequacy of the type and extent of the buffer:

a. The purpose of the buffer, for example to decrease noise levels, absorb air pollution, filter dust, or to provide a visual barrier.

b. The size of the buffer required to achieve the purpose in terms of width and height.

c. The direction(s) from which buffering is needed.

d. The required density of the buffering.

e. Whether the viewer is stationary or mobile.

On-site screening from view from adjoining properties of such things as service areas, storage areas, and parking lots shall be provided and the following factors will be considered in determining the adequacy of the type and extent of the screening:

a. What needs to be screened?

b. The direction from which it is needed.

c. How dense the screen needs to be.

d. Whether the viewer is stationary or mobile.

e. Whether the screening needs to be year-round.

Rooftop air cooling and heating systems and other mechanical equipment shall be screened from view from adjoining properties.

***Applicant’s Response:***

***Fortunately, there are multiple preexisting natural buffers between the project building site and residences to the north and roadway to the west. First, there is a roughly 60-foot drop in grade between the closest road (Salamo Rd) and the building pad. Beyond that, there is a grade difference of over 100 feet vertically between the proposed building pad and residences to the north. These grades are shown on C2.0. Second, the buildings are over 200 feet from Salamo Road and over 350 feet from the closest residential property line to the north. Third, there are a number of large, mature trees between the proposed buildings and Salamo Rd and the residences to the north. These trees are shown on L1.0 though more exist on the adjacent properties but weren’t included in the tree plan because they don’t exist on the proposed site.***

D. Privacy and noise.

Structures which include residential dwelling units shall provide private outdoor areas for each ground floor unit which is screened from view from adjoining units.

Residential dwelling units shall be placed on the site in areas having minimal noise exposure to the extent possible. Natural-appearing sound barriers shall be used to lessen noise impacts where noise levels exceed the noise standards contained in West Linn Municipal Code Section 5.487.

Structures or on-site activity areas which generate noise, lights, or glare shall be buffered from adjoining residential uses in accordance with the standards in subsection C of this section where applicable.

Businesses or activities that can reasonably be expected to generate noise in excess of the noise standards contained in West Linn Municipal Code Section 5.487 shall undertake and submit appropriate noise studies and mitigate as necessary to comply with the code. (See CDC 55.110(B)(11) and 55.120(M).)

If the decision-making authority reasonably believes a proposed use may generate noise exceeding the standards specified in the municipal code, then the authority may require the applicant to supply professional noise studies from time to time during the user's first year of operation to monitor compliance with City standards and permit requirements.

**Applicant's Response:**

***There are multiple preexisting natural noise/light/glare buffers between the project building site and residences to the north. First, there is a grade difference of over 100 feet vertically between the proposed building pad and residences to the north. These grades are shown on C2.0. Second, the buildings are over 350 feet from the closest residential property line to the north. Third, there are a number of large, mature trees between the proposed buildings and Salamo Rd and the residences to the north. These trees are shown on L1.0 though more exist on the adjacent properties but weren't included in the tree plan because they don't exist on the proposed site.***

E. Private outdoor area. This section only applies to multifamily projects.

In addition to the requirements of residential living, unit shall have an outdoor private area (patio, terrace, porch) of not less than 48 square feet in area;

The outdoor space shall be oriented towards the sun where possible; and

The area shall be screened or designed to provide privacy for the users of the space.

Where balconies are added to units, the balconies shall not be less than 48 square feet, if they are intended to be counted as private outdoor areas.

**Applicant's Response:**

**Not a multi-family project.**

F. Shared outdoor recreation areas. This section only applies to multifamily projects and projects with 10 or more duplexes or single-family attached dwellings on lots under 4,000 square feet. In those cases, shared outdoor recreation areas are calculated on the duplexes or single-family attached dwellings only. It also applies to qualifying PUDs under the provisions of CDC 24.170.

In addition to the requirements of subsection E of this section, usable outdoor recreation space shall be provided in residential developments for the shared or common use of all the residents in the following amounts:

a. Studio up to and including two-bedroom units: 200 square feet per unit.

b. Three or more bedroom units: 300 square feet per unit.

2. The required recreation space may be provided as follows:

a. It may be all outdoor space; or

b. It may be part outdoor space and part indoor space; for example, an outdoor tennis court and indoor recreation room; and

c. Where some or all of the required recreation area is indoor, such as an indoor recreation room, then these indoor areas must be readily accessible to all residents of the development subject to clearly posted restrictions as to hours of operation and such regulations necessary for the safety of minors.

d. In considering the requirements of this subsection F, the emphasis shall be on usable recreation space. No single area of outdoor recreational space shall encompass an area of less than 250 square feet. All common outdoor recreational space shall be clearly delineated and readily identifiable as such. Small, marginal, and incidental lots or parcels of land are not usable recreation spaces. The location of outdoor recreation space should be integral to the overall design concept of the site and be free of hazards or constraints that would interfere with active recreation.

3. The shared space shall be readily observable to facilitate crime prevention and safety.

**Applicant's Response:**

**Not a multi-family project.**

G. Demarcation of public, semi-public, and private spaces. The structures and site improvements shall be designed so that public areas such as streets or public gathering places, semi-public areas, and private outdoor areas are clearly defined in order to establish persons having a right to be in the space, to provide for crime prevention, and to establish maintenance responsibility. These areas may be defined by:

A deck, patio, fence, low wall, hedge, or draping vine;

A trellis or arbor;

A change in level;

A change in the texture of the path material;

Sign; or

Landscaping.

Use of gates to demarcate the boundary between a public street and a private access driveway is prohibited.

**Applicant's Response:**

**Signage will be used to mark the separation between the public street and private zone of the project.**

H. Public transit.

1. Provisions for public transit may be required where the site abuts an existing or planned public transit route. The required facilities shall be based on the following:

a. The location of other transit facilities in the area.

b. The size and type of the proposed development.

c. The rough proportionality between the impacts from the development and the required facility.

2. The required facilities shall be limited to such facilities as the following:

a. A waiting shelter with a bench surrounded by a three-sided covered structure, with transparency to allow easy surveillance of approaching buses.

b. A turnout area for loading and unloading designed per regional transit agency standards.

c. Hard-surface paths connecting the development to the waiting and boarding areas.

d. Regional transit agency standards shall, however, prevail if they supersede these standards.

3. The transit stop shall be located as close as possible to the main entrance to the shopping center, public or office building, or multifamily project. The entrance shall not be more than 200 feet from the transit stop with a clearly identified pedestrian link.

4. All commercial business centers (over three acres) and multifamily projects (over 40 units) may be required to provide for the relocation of transit stops to the front of the site if the existing stop is within 200 to 400 yards of the site and the exaction is roughly proportional to the impact of the development. The commercial or multifamily project may be required to provide new facilities in those cases where the nearest stop is over 400 yards away. The transit stop shall be built per subsection (H)(2) of this section.

***Applicant's Response:***

***The proposed project is not a commercial business or multifamily project, though there is a bus stop at Salamo Road and Barrington Drive roughly 400 feet from the project entry driveway.***

I. Public facilities. An application may only be approved if adequate public facilities, as defined in CDC 2.030, will be available to provide service to the property prior to occupancy.

In situations where the level-of-service or volume-to-capacity performance standard for an affected City or State roadway is currently failing or projected to fail to meet the standard at a date determined within a traffic impact analysis, and an improvement project is not programmed, the development shall avoid further degradation of the affected transportation facility. Mitigation must be provided to bring the facility performance standard to existing conditions at the time of occupancy.

Streets. Sufficient right-of-way and slope easement shall be dedicated to accommodate all abutting streets to be improved to the City's Improvement Standards and Specifications. The City Engineer shall determine the appropriate level of street and traffic control improvements to be required, including any off-site street and traffic control improvements, based upon the transportation analysis submitted. The City Engineer's determination of developer obligation, the extent of road improvement and City's share, if any, of improvements and the timing of improvements shall be made based upon the City's systems development charge ordinance and capital improvement program, and the rough proportionality between the impact of the development and the street improvements.

In determining the appropriate sizing of the street in commercial, office, multifamily, and public settings, the street should be the minimum necessary to accommodate anticipated traffic load and needs and should provide substantial accommodations for pedestrians and bicyclists. Road and driveway alignment should consider and mitigate impacts on adjacent properties and in neighborhoods in terms of increased traffic loads, noise, vibrations, and glare.

The realignment or redesign of roads shall consider how the proposal meets accepted engineering standards, enhances public safety, and favorably relates to adjacent lands and land uses. Consideration should also be given to selecting an alignment or design that minimizes or avoids hazard areas and loss of significant natural features (drainageways, wetlands, heavily forested areas, etc.) unless site mitigation can clearly produce a superior landscape in terms of shape, grades, and reforestation, and is fully consistent with applicable code restrictions regarding resource areas.

Streets shall be installed per Chapter 85 CDC standards. The City Engineer has the authority to require that street widths match adjacent street widths. Sidewalks shall be installed per CDC 85.200(A)(3) for commercial and office projects, and CDC 85.200(A)(16) and 92.010(H) for residential projects, and applicable provisions of this chapter. Where streets bisect or traverse water resource areas (WRAs) the street width shall be reduced to the appropriate "constrained" cross-section width indicated in the TSP or alternate configurations which are appropriate to site conditions,

minimize WRA disturbance or are consistent with an adopted transportation system plan. The street design shall also be consistent with habitat friendly provisions of CDC 32.060(I).

Based upon the City Manager's or Manager's designee's determination, the applicant shall construct or cause to be constructed, or contribute a proportionate share of the costs, for all necessary off-site improvements identified by the transportation analysis commissioned to address CDC 55.125 that are required to mitigate impacts from the proposed development. Proportionate share of the costs shall be determined by the City Manager or Manager's designee, who shall assume that the proposed development provides improvements in rough proportion to identified impacts of the development.

Storm detention and treatment and geologic hazards. Per the submittals required by CDC 55.130 and 92.010(E), all proposed storm detention and treatment facilities must comply with the standards for the improvement of public and private drainage systems located in the West Linn Public Works Design Standards, there will be no adverse off-site impacts caused by the development (including impacts from increased intensity of runoff downstream or constrictions causing ponding upstream), and the applicant must provide sufficient factual data to support the conclusions of the submitted plan.

Per the submittals required by CDC 55.130(E), the applicant must demonstrate that the proposed methods of rendering known or potential hazard sites safe for development, including proposed geotechnical remediation, are feasible and adequate to prevent landslides or other damage to property and safety. The review authority may impose conditions, including limits on type or intensity of land use, which it determines are necessary to mitigate known risks of landslides or property damage.

**Applicant's Response:**

**Stormwater:**

**Stormwater for the proposed development will manage all new impervious areas per the City of West Linn stormwater management standards. This includes a new underground filter vault and detention system. Refer to the included Preliminary Stormwater Report for detailed exhibits and analysis.**

Municipal water. A registered civil engineer shall prepare a plan for the provision of water which demonstrates to the City Engineer's satisfaction the availability of sufficient volume, capacity, and pressure to serve the proposed development's domestic, commercial, and industrial fire flows. All plans will then be reviewed by the City Engineer.

Sanitary sewers. A registered civil engineer shall prepare a sewerage collection system plan which demonstrates sufficient on-site capacity to serve the proposed development. The City Engineer shall determine whether the existing City system has sufficient capacity to serve the development.

Solid waste and recycling storage areas. Appropriately sized and located solid waste and recycling storage areas shall be provided. Metro standards shall be used.

**Applicant's Response:**

**Municipal Water:**

**Proposed water and fire service will serve the site from the existing water main in Salamo Rd. Refer to sheet C3.0 for proposed water and fire service layouts.**

**Sanitary:**

**Sanitary sewer for the proposed development will be collected on-site and pumped through a privately owned and maintained sewer lift station into the existing public sewer main in Salamo Rd. Refer to sheet C3.0 for additional information.**

**Solid Waste:**

**Please see exhibits included in application package related to these sections. Sheet A1.01 shows the location of (3) large containers on upper lot for solid waste and recycling storage.**

J. Crime prevention and safety/defensible space.

1. Windows shall be located so that areas vulnerable to crime can be surveyed by the occupants.
2. Interior laundry and service areas shall be located in a way that they can be observed by others.
3. Mailboxes, recycling, and solid waste facilities shall be located in lighted areas having vehicular or pedestrian traffic.
4. The exterior lighting levels shall be selected and the angles shall be oriented towards areas vulnerable to crime.
5. Light fixtures shall be provided in areas having heavy pedestrian or vehicular traffic and in potentially dangerous areas such as parking lots, stairs, ramps, and abrupt grade changes.
6. Fixtures shall be placed at a height so that light patterns overlap at a height of seven feet which is sufficient to illuminate a person. All commercial, industrial, residential, and public facility projects undergoing design review shall use low or high pressure sodium bulbs and be able to demonstrate effective shielding so that the light is directed downwards rather than omni-directional. Omni-directional lights of an ornamental nature may be used in general commercial districts only.
7. Lines of sight shall be reasonably established so that the development site is visible to police and residents.
8. Security fences for utilities (e.g., power transformers, pump stations, pipeline control equipment, etc.) or wireless communication facilities may be up to eight feet tall in order to protect public safety. No variances are required regardless of location.

***Applicant's Response:***

1. ***Windows are located on all sides and throughout the length of the upper floor (office portion) of Building B. These windows have direct visual access to their immediate surroundings but also the yard and warehouse building below (Building A.)***
2. ***Interior laundry room in Building B is located within a locked building only accessible to users and not the general public.***
3. ***Mailboxes are within the locked interior of Building B while trash and recycling is all in lower and upper lots with ample site/safety lighting.***
4. ***Exterior lighting in the proposed development is aimed at exterior areas vulnerable to crime.***
5. ***Site lighting is ample and well-positioned for all parking areas, access roads and pedestrian movement zones from parking to entries and within exterior deck area north of Building B.***
6. ***All exterior fixtures are located, aimed and tuned so that they overlap at 7 feet and fixtures are to have full cut-off so that all light is directed downward and does not create light pollution outward/upward.***
7. ***The project will be removed from Salamo Road but still visible as a beacon, while also being readily visible from the street by way of building signage displaying its use.***
8. ***There is a 6 foot tall chain link fence surrounding the entire development as shown on sheet A1.0***

K. Provisions for persons with disabilities.

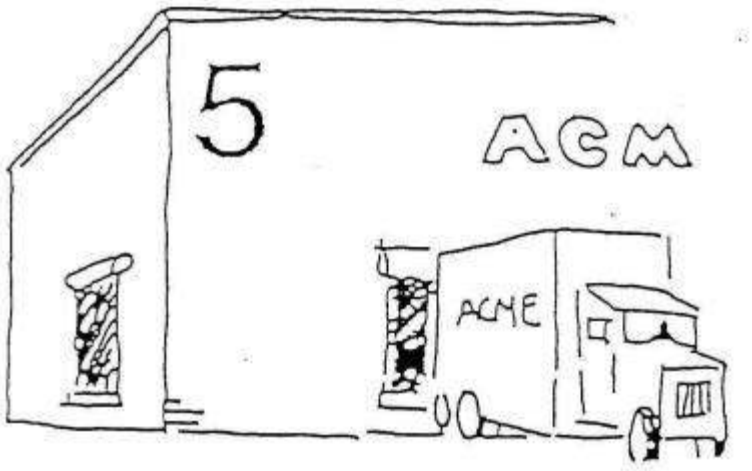
The needs of a person with a disability shall be provided for. Accessible routes shall be provided between all buildings and accessible site facilities. The accessible route shall be the most practical direct route between accessible building entries, accessible site facilities, and the accessible entry to the site. An accessible route shall connect to the public right-of-way and to at least one on-site or adjacent transit stop (if the area is served by transit). All facilities shall conform to, or exceed, the Americans with Disabilities Act (ADA) standards, including those included in the Uniform Building Code.

**Applicant's Response:**

**There is an accessible route designed from the main upper lot parking area, throughout the upper building, and down the elevator to both lower buildings and paved area.**

L. Signs.

Based on considerations of crime prevention and the needs of emergency vehicles, a system of signs for identifying the location of each residential unit, store, or industry shall be established.




***buildings shall be numbered for emergency identification***

The signs, graphics, and letter styles shall be designed to be compatible with surrounding development, to contribute to a sense of project identity, or, when appropriate, to reflect a sense of the history of the area and the architectural style.

The sign graphics and letter styles shall announce, inform, and designate particular areas or uses as simply and clearly as possible.

The signs shall not obscure vehicle driver's sight distance.

Signs indicating future use shall be installed on land dedicated for public facilities (e.g., parks, water reservoir, fire halls, etc.).

Signs and appropriate traffic control devices and markings shall be installed or painted in the driveway and parking lot areas to identify bicycle and pedestrian routes.

**Applicant's Response:**

**Signage will be used to identify the project from the street entry, all parking/loading areas and the identity of each of the buildings.**

M. Utilities. The developer shall make necessary arrangements with utility companies or other persons or corporations affected for the installation of underground lines and facilities. Electrical lines and other wires, including but not limited to communication, street lighting, and cable television, shall be placed underground, as practical. The design standards of Tables 1 and 2 above, and of subsection 5.487 of the West Linn Municipal Code relative to existing high ambient noise levels shall apply to this section.

**Applicant's Response:**

**Applicant understands the requirements of this section as related to this project.**

N. Wireless communication facilities (WCFs). (This section only applicable to WCFs.) WCFs as defined in Chapter 57 CDC may be required to go through Class I or Class II design review. The approval criteria for Class I design review is that the visual impact of the WCF shall be minimal to the extent allowed by Chapter 57 CDC. Stealth designs shall be sufficiently camouflaged so that they are not easily seen by passersby in the public right-of-way or from any adjoining residential unit. WCFs that are classified as Class II design review must respond to all of the approval criteria of this chapter.

**Applicant's Response:**

**Not a WCF.**

O. Refuse and recycling standards**.**

All commercial, industrial and multifamily developments over five units requiring Class II design review shall comply with the standards set forth in these provisions. Modifications to these provisions may be permitted if the Planning Commission determines that the changes are consistent with the purpose of these provisions and the City receives written evidence from the local franchised solid waste and recycling firm that they are in agreement with the proposed modifications.

Compactors, containers, and drop boxes shall be located on a level Portland cement concrete pad, a minimum of four inches thick, at ground elevation or other location compatible with the local franchise collection firm's equipment at the time of construction. The pad shall be designed to discharge surface water runoff to avoid ponding.

Recycling and solid waste service areas.

a. Recycling receptacles shall be designed and located to serve the collection requirements for the specific type of material.

b. The recycling area shall be located in close proximity to the garbage container areas and be accessible to the local franchised collection firm's equipment.

c. Recycling receptacles or shelters located outside a structure shall have lids and be covered by a roof constructed of water and insect-resistive material. The maintenance of enclosures, receptacles and shelters is the responsibility of the property owner.

d. The location of the recycling area and method of storage shall be approved by the local fire marshal.

e. Recycling and solid waste service areas shall be at ground level and/or otherwise accessible to the franchised solid waste and recycling collection firm.

f. Recycling and solid waste service areas shall be used only for purposes of storing solid waste and recyclable materials and shall not be a general storage area to store personal belongings of tenants, lessees, property management or owners of the development or premises.

g. Recyclable material service areas shall be maintained in a clean and safe condition.

Special wastes or recyclable materials.

a. Environmentally hazardous wastes defined in ORS 466.005 shall be located, prepared, stored, maintained, collected, transported, and disposed in a manner acceptable to the Oregon Department of Environmental Quality.

b. Containers used to store cooking oils, grease or animal renderings for recycling or disposal shall not be located in the principal recyclable materials or solid waste storage areas. These materials shall be stored in a separate storage area designed for such purpose.

Screening and buffering.

a. Enclosures shall include a curbed landscape area at least three feet in width on the sides and rear. Landscaping shall include, at a minimum, a continuous hedge maintained at a height of 36 inches.

b. Placement of enclosures adjacent to residentially zoned property and along street frontages is strongly discouraged. They shall be located so as to conceal them from public view to the maximum extent possible.

c. All dumpsters and other trash containers shall be completely screened on all four sides with an enclosure that is comprised of a durable material such as masonry with a finish that is architecturally compatible with the project. Chain link fencing, with or without slats, will not be allowed.

Litter receptacles.

a. Location. Litter receptacles may not encroach upon the minimum required walkway widths.

b. Litter receptacles may not be located within public rights-of-way except as permitted through an agreement with the City in a manner acceptable to the City Attorney or their designee.

c. Number. The number and location of proposed litter receptacles shall be based on the type and size of the proposed uses. However, at a minimum, for non-residential uses, at least one external litter receptacle shall be provided for every 25 parking spaces for first 100 spaces, plus one receptacle for every additional 100 spaces.

**Applicant's Response:**

**Applicant understands the requirements of this section as related to this project. Shown on sheet A1.01 there is space designated for up to (3) 40-yard containers for solid waste and/or recycling on a flat, drained, level asphalt pad.**

55.110 Site Analysis

The site analysis shall include:

A. A vicinity map showing the location of the property in relation to adjacent properties, roads, pedestrian and bike ways, transit stops and utility access.

B. A site analysis on a drawing at a suitable scale (in order of preference, one inch equals 10 feet to one inch equals 30 feet) which shows:

1. The property boundaries, dimensions, and gross area.

2. Contour lines at the following minimum intervals:

    a. Two-foot intervals for slopes from zero to 25 percent; and

    b. Five- or 10-foot intervals for slopes in excess of 25 percent.

3. Tables and maps identifying acreage, location and type of development constraints due to site characteristics such as slope, drainage and geologic hazards, including a slope analysis which identifies portions of the site according to the land types (I, II, III and IV) defined in Chapter 02 CDC.

4. The location and width of adjoining streets.

5. The drainage patterns and drainage courses on the site and on adjacent lands.

6. Potential natural hazard areas including:

    a. Floodplain areas pursuant to the site's applicable FEMA Flood Map panel;

    b. Water resource areas as defined by Chapter 32 CDC;

    c. Landslide areas designated by the Natural Hazard Mitigation Plan, Map 16; and

    d. Landslide vulnerable analysis areas, designated by the Natural Hazard Mitigation Plan, Map 17.

7. Resource areas including:

    a. Wetlands;

    b. Riparian corridors;

    c. Streams, including intermittent and ephemeral streams;

    d. Habitat conservation areas; and

    e. Large rock outcroppings.

8. Potential historic landmarks and registered archaeological sites. The existence of such sites on the property shall be verified from records maintained by the Community Development Department and other recognized sources.

9. Identification information including the name and address of the owner, developer, project designer, lineal scale and north arrow.

10. Identify Type I and II lands in map form. Provide a table which identifies square footage of Type I and II lands also as percentage of total site square footage.

**Applicant's Response:**

**Vicinity map is shown on civil sheet 0.0 and Site Analysis is shown on civil sheet C1.0.**

55.120 Site Plan

The site plan shall be at the same scale as the site analysis (CDC 55.110) and shall show:

A. The applicant's entire property and the surrounding property to a distance sufficient to determine the relationship between the applicant's property and proposed development and adjacent property and development.

B. Boundary lines and dimensions for the perimeter of the property and the dimensions for all proposed lot or parcel lines.

C. Streams and stream corridors.

D. Identification information, including the name and address of the owner, developer, project designer, lineal scale and north arrow.

E. The location, dimensions, and names of all existing and proposed streets, public pathways, easements on adjacent properties and on the site, and all associated rights-of-way.

F. The location, dimensions and setback distances of all:

1. Existing and proposed structures, improvements, and utility facilities on site; and

2. Existing structures and driveways on adjoining properties.

G. The location and dimensions of:

1. The entrances and exits to the site;

2. The parking and circulation areas;

3. Areas for waste disposal, recycling, loading, and delivery;

4. Pedestrian and bicycle routes, including designated routes, through parking lots and to adjacent rights-of-way;

5. On-site outdoor recreation spaces and common areas;

6. All utilities, including stormwater detention and treatment; and

7. Sign locations.

H. The location of areas to be landscaped.

**Applicant's Response:**

**All Site Plan elements are shown on A1.01 and C1.0.**

55.125 Transportation Analysis

Certain development proposals require that a traffic impact analysis (TIA) be provided which may result in modifications to the site plan or conditions of approval to address or minimize any adverse impacts created by the proposal. The purpose, applicability and standards of this analysis are found in CDC 85.170(B)(2).

**Applicant's Response:**

**Applicant understands the requirements of this section as related to this project.**

55.140 Architectural Drawings

Architectural drawings shall be submitted showing:

A. Building elevations and sections tied to curb elevation;

B. Building materials: color and type; and

C. The name of the architect or designer.

**Applicant's Response:**

**Applicant has included the full set of above-referenced elevations, sections, building materials, and name of architect.**

55.150 Landscape Plan

A. The landscape plan shall be prepared and shall show the following:

1. Preliminary underground irrigation system, if proposed;
2. The location and height of fences and other buffering of screening materials, if proposed;
3. The location of terraces, decks, patios, shelters, and play areas, if proposed;
4. The location, size, and species of the existing and proposed plant materials, if proposed; and
5. Building and pavement outlines.

B. The landscape plan shall be accompanied by:

1. The erosion controls that will be used, if necessary;
2. Planting list; and
3. Supplemental information as required by the Planning Director or City Arborist.

**Applicant's Response:**

**Applicant has included the full set of above-referenced drawings—see L2.0 for landscape items.**

Chapter 60: Conditional Uses

60.030 Administration and Approval Process

A. Conditional use applications shall be decided by the Planning Commission in the manner set forth in CDC 99.060(B). A petition for review by the Council may be filed as provided by CDC 99.240(B).

B. All approved conditional use applications in new buildings, or buildings with a major modification, shall be subject to design review under the provisions of Chapter 55 CDC, and in the manner set forth in CDC 99.060(B).

1. Except where stated otherwise in the base zone requirements of other applicable development standards.

C. All approved conditional use applications within existing buildings shall not be subject to design review.

**Applicant's Response:**

**Applicant understands the requirements of this section as related to this project.**

60.070 Approval Standards and Conditions

A. The Planning Commission shall approve, approve with conditions, or deny an application for a conditional use, except for a manufactured home subdivision in which case the approval standards and conditions shall be those specified in CDC 36.030, or to enlarge or alter a conditional use based on findings of fact with respect to each of the following criteria:

1. The site size and dimensions provide:

   a. Adequate area for the needs of the proposed use; and

   b. Adequate area for aesthetic design treatment to mitigate any possible adverse effect from the use on surrounding properties and uses.

2. The characteristics of the site are suitable for the proposed use considering size, shape, location, topography, and natural features.

3. The granting of the proposal will produce a facility that provides an overall benefit to the City.

4. Adequate public facilities will be available to provide service to the property at the time of occupancy. In situations where the level-of-service or volume-to-capacity performance standard for an affected City or State roadway is currently failing or projected to fail to meet the standard at a date determined within a traffic impact analysis, and an improvement project is not programmed, the development shall avoid further degradation of the affected transportation facility. Mitigation must be provided to bring the facility performance standard to existing conditions at the time of occupancy.

5. The applicable requirements of the zone are met, except as modified by this chapter.

6. The supplementary requirements set forth in Chapters 52 to 55 CDC and CDC 92.010(E) are met, if applicable.

7. The use will comply with the applicable policies of the Comprehensive Plan.

B. An approved conditional use or enlargement or alteration of an existing conditional use shall be subject to the development review provisions set forth in Chapter 55 CDC.

**Applicant's Response:**

**Item (A): As shown in the site plan included with this application, there is ample site area to support the proposed use. The proposed buildings are significantly set back from the property lines on all sides and views into the property are mitigated by substantial, preexisting trees. The design itself is comprised of 3, appropriately-sized one and two-story buildings with materials such as mass timber and gray metal siding which blend well with the natural surroundings and residential quality of its context.**

**Given the scale of the site (33.02 acres) and shape, there is ample space to allow for the necessary vehicle access, movements, and building configurations necessary to support an operations complex of this type. This is illustrated in the site plan included in this application.**

**The benefits of this facility to the City of West Linn are clear and substantial; a modern, fully functional facility supporting public works, fleet maintenance, parks and recreations, water and environmental services.**

**Adequate public facilities will be available to provide service to the property at the time of occupancy as confirmed at applicant's pre-application conference with City Engineer on 4/3/25.**

**The applicable requirements of the zone are met as a conditional use per section 11.020 part C.**

**The supplementary requirements in chapters 52 to 55 and 92.010 (E) are met as shown in the responses to those sections itemized above.**

**The property is defined as low density residential under the Comprehensive Plan and the use will comply with those policies as defined elsewhere in these responses.**

**Item (B): Applicant understands that the development review provisions in Chapter 55 are applicable and has responded to those provisions above.**

60.080 Site Plan and Map

All site plans and maps shall include the name, address, and telephone number of the applicant, the scale of the site plan, north arrow, and a vicinity map.

The applicant shall submit a site plan drawn to an appropriate scale (in order of preference, one inch equals 10 feet to one inch equals 30 feet) which contains the following information:

The subdivision name, block, and lot number or the section, township, range, and tax lot number.

The lot or parcel boundaries, dimensions, and gross area.

The applicant's property and the surrounding property to a distance sufficient to determine the relationship between the applicant's property and proposed development to the adjacent property and development.

The location, dimensions, and names of all existing and platted streets and other public ways and easements on adjacent property and on the site.

The location, dimensions, and setback distances of all:

a. Existing structures, improvements, utilities, and drainage facilities on adjoining properties;

b. Existing structures, improvements, utilities, and drainage facilities to remain on the site; and

c. Proposed structures or changes to existing structures, improvements, utilities, and drainage facilities.

The existing and proposed dimensions of:

a. The entrances and exits to the site;

b. The parking and circulation areas;

c. Loading and service areas for waste disposal, loading and delivery;

d. Pedestrian and bicycle circulation area;

e. On-site outdoor recreation spaces and common areas; and

f. Above-ground utilities.

The location of areas to be landscaped and the proposed landscape plan.

The location of all trees having a six-inch caliper at a height of five feet.

The applicant shall submit the site plan on a map showing two-foot contours up to 20 percent grade and 10-foot contours on grades above 20 percent.

**Applicant's Response:**

**Applicant understands the requirements of this section as related to this project and is including a site plan (A1.01 and C1.0) which meets these requirements.**

Chapter 85.170 (B)(2)(c)(1)(C):

(C) The development shall cause one or more of the following effects, which can be determined by field counts, site observation, traffic impact analysis or study, field measurements, crash history, Institute of Transportation Engineers Trip Generation manual, and information and studies provided by the local reviewing jurisdiction and/or ODOT:

(1) An increase in site traffic volume generation by 250 average daily trips (ADT) or more (or as required by the City Engineer); or

(2) An increase in use of adjacent streets by vehicles exceeding the 20,000 pound gross vehicle weights by 10 vehicles or more per day; or

(3) The location of the access driveway does not meet minimum intersection sight distance requirements, or is located where vehicles entering or leaving the property are restricted, or such vehicles queue or hesitate on the State highway, creating a safety hazard; or

(4) The location of the access driveway does not meet the access spacing standard of the roadway on which the driveway is located; or

(5) A change in internal traffic patterns that may cause safety problems, such as backup onto the highway or traffic crashes in the approach area.

***Applicant's Response:***

***(1): Per the included letter from Kittelson & Associates, a transportation engineering firm, traffic counts were collected at the existing facility since the proposed project will replace the existing facility without expanding operational capacity, staffing or fleet size (please see letter for more detail.) Information was gathered over 3 days and total average daily trips was 256. Per the letter, a full TIA is not recommended since only one of the 3 days exceeded the 250 vehicle threshold and the average only exceeded the threshold by six trips.***

***(2): Per the included letter, the trip generation data did not distinguish between heavy and non-heavy vehicles but anecdotal evidence provided by the City indicates that the proposed facility will not generate 10 or more heavy vehicle trips (20,000 lb) per day.***

***(3): Clear vision area and queuing distance are shown and dimensioned on the civil sheet C1.0 within the property are shown in compliance with this section.***

***(4): Per the included letter, the new driveway will be located approximately 430 feet south of Barrington Drive and 190 feet north of Greene Street. Per table 15 of the City's transportation system plan, the minimum spacing requirements along minor arterials, such as Salamo Road is 150 feet between intersections and driveways.***

***(5): Since the development sight is new (and not a preexisting development) current traffic planning and civil engineering standards are being utilized for all roads, parking and fire access elements as shown on civil and architectural sheets included here.***

Chapter 96: Street Improvement Construction

96.010 Construction Required

A. Street improvements for residential construction are required when:

1. Construction of a new single-family attached or detached structure (replacement of an existing structure is exempt); or

2. Replacement of a single-family home increases the square feet by 50 percent or greater; or

3. Construction of a new multifamily structure; or

4. Increase in dwelling unit density on site (accessory dwelling units are exempt).

B. Street improvements for commercial construction are required when:

1. Construction of a new commercial structure; or

2. Remodel of an existing commercial structure with an increase in floor area; or

3. Construction that increases the dwelling unit density on site; or

4. Construction which requires a change in type, number, or location of accessways; or

5. Replacement of an existing structure with an increase in floor area.

**Applicant's Response:**

**Applicant does not intend to provide improvements to frontage. It is not feasible or desired to construct improvements due to existing steep slopes and environmental area buffers.**

96.020 Fee-In-Lieu

A. An applicant may apply for a waiver of street improvements and the option to pay a fee-in-lieu (in accordance with the City's adopted fee structure) of constructing street improvements if one of the following are met:

1. Located on a cul-de-sac with no existing curb and/or no existing sidewalk; or

2. Located on a street less than 1,320 linear feet in length and not planned as a through street; or

3. Located more than 1,320 linear feet from nearest street improvements on the same street or connecting street.

**Applicant's Response:**

**Applicant does not intend to provide improvements to frontage. It is not feasible or desired to construct improvements due to existing steep slopes and environmental area buffers.**

96.030 Standards

Street improvements shall be installed according to the City standards and shall be completed prior to the issuance of any occupancy permit for the new or remodeled structure or building. In unimproved areas of the City, the City Engineer may grant a time extension of the provisions of this section; provided the applicant submit sufficient security in an amount and quantity satisfactory to the City Attorney to assure payment of such improvement costs.

**Applicant's Response:**

**Applicant understands the requirements of this section as related to this project.**

Chapter 99: Procedures for Decision Making: Quasi-Judicial

99.030 Application Process

A. Who may apply.
   1. Applications for approval required under this chapter may be initiated by:
      a. The owner of the property that is the subject of the application or the owner's duly authorized representative;
      b. The purchaser of such property who submits a duly executed written contract or copy thereof, which has been recorded with the Clackamas Clerk;
      c. A lessee in possession of such property who submits written consent of the owner to make such application; or
      d. Motion by the Planning Commission or City Council.
   2. Any person authorized by this chapter to submit an application for approval may be represented by an agent who is authorized in writing by such a person to make the application.

B. Pre-application conferences.
   1. Subject to subsection (B)(4) of this section, a pre-application conference is required for, but not limited to, each of the following applications:
      a. Boundary changes, per Chapter 81 CDC;
      b. Amendments to the Comprehensive Plan;
      c. Amendments to the Zoning Map;
      d. Conditional uses;
      e. Design review (Class I and Class II);
      f. Historic Design Review (Class II);
      g. Designation of a historic resource or removal of a historic resource designation;
      h. Demolition of a historic resource;
      i. Relocation of a historic resource;
      j. New construction or remodels in the Willamette Falls Drive Commercial Design District, except as provided for in subsection (B)(2)(h) of this section
      k. Minor partitions
      l. Land divisions;
      m. Enlargement of non-conforming uses or alteration of a structure containing a non-conforming use;
      n. Planned unit developments
      o. Class II variances;
      p. Development subject to Chapter 32 CDC, Water Resource Area Protection;
      q. Development subject to Chapter 27 CDC, Flood Management Areas
      r. Development subject to Chapter 28 CDC, Willamette and Tualatin River Protection;
      s. Right-of-way and easement vacations; and
      t. Extensions of approval with modifications to original approval.
   2. Subject to subsection (B)(3) of this section, the following applications are exempt from subsection (B)(1) of this section, Pre-Application Conference:
      a. Signs;
      b. Home occupations;
      c. Temporary use permits;
      d. Sidewalk uses;
      e. Final plats;
      f. Property line adjustments;
      g. Re-vegetation plans;
      h. Painting, signage, awnings, or architectural in-kind replacements in the Willamette Falls Drive Commercial Design District;
      i. Appeals of land use decisions;
      j. Extensions of approval with no modification to original approval; and
      k. Class I variances.

3. The Planning Director shall have the authority to require a preapplication conference prior to the submittal of any application that is not listed in subsection (B)(1) of this section if they determine that the potential development is of significant complexity or magnitude to merit a preapplication conference.
4. The Planning Director may waive the requirement for a pre-application conference for any application if they determine that such a conference is not warranted. Upon making such a determination, the Planning Director shall provide written notification (i.e., e-mail or letter) to the Planning Commission and applicable neighborhood association.
5. At such conference, the Planning Director or designee shall:
    a. Cite the Comprehensive Plan map designation;
    b. Cite the applicable substantive and procedural ordinance provisions;
    c. Provide technical data and assistance which will aid the applicant;
    d. Identify other policies and regulations that relate to the application;
    e. Identify other pertinent factors that relate to the application; and
    f. Provide the applicant with a written description of all rights for appeal and provide access to all administrative procedures.
6. The failure of the Director to provide any of the information required by this section shall not constitute a waiver of the standards, criteria, or requirements of the application.
7. At least 10 days prior to the scheduled date of the conference, the City shall make the pre-application conference schedule available to the public. Within 10 days following the conference, the City shall make staff-prepared written notes summarizing the contents of the meeting available to the public. Failure to comply with this section due to technical or administrative problems is not a procedural defect entitling any party to a delay in the hearing process.
8. The Planning Director shall prepare administrative procedures designed to allow citizens to attend and participate in pre-application conferences for applications. Lack of neighborhood association participation in a pre-application conference is not a procedural defect entitling any party to a delay in the hearing process.
9. If the applicant is not the owner of the subject property, the applicant shall provide written evidence that the owner has consented to the pre-application conference prior to it being scheduled.

C. The requirements for making an application.
    1. The application shall be made on forms provided by the Director as provided by CDC 99.040(A)(1);
    2. The application shall be complete and shall contain the information requested on the form, shall address the appropriate submittal requirements and approval criteria in sufficient detail for review and action, and shall be accompanied by the deposit or fee required by CDC 99.033. No application will be accepted if not accompanied by the required fee or deposit. In the event an additional deposit is required by CDC 99.033 and not provided within the time required, the application shall be rejected without further processing or deliberation and all application materials shall be returned to the applicant, notwithstanding any determination of completeness.

**Applicant's Response:**

**Pre-application meeting for this project has already taken place on 4/3/25 with subsequent neighborhood association meeting on 6/9/25. Applicant understands the requirements of this section as related to this project.**

99.038 Neighborhood Contact Required (Yes, CUP requires NA meeting)

No assigned NA, hold public meeting 99.038.C

Prior to submittal of an application for any subdivision, conditional use permit, multifamily project, planned unit development of four or more lots, non-residential buildings over 1,500 square feet, or a zone change that requires a Comprehensive Plan amendment, the applicant shall contact and discuss the proposed development with any affected neighborhood as provided in this section. Although not required for other or smaller projects, contact with neighbors is highly recommended. The Planning Director may require neighborhood contact pursuant to this section prior to the filing of an application for any other development permit if the Director deems neighborhood contact to be beneficial.

A. Purpose. The purpose of neighborhood contact is to identify potential issues or conflicts regarding a proposed application so that they may be addressed prior to filing. This contact is intended to result in a better application and to expedite and lessen the expense of the review process by avoiding needless delays, appeals, remands, or denials. The City expects an applicant to take the reasonable concerns and recommendations of the neighborhood into consideration when preparing an application. The City expects the neighborhood association to work with the applicant to provide such input.

B. The applicant shall contact by letter all recognized neighborhood associations whose boundaries contain all or part of the site of the proposed development and all property owners within 500 feet of the site.

C. The letter shall be sent to the president of the neighborhood association, and to one designee as submitted to the City by the neighborhood association, and shall be sent by regular mail to the other officers of the association and the property owners within 500 feet. If another neighborhood association boundary is located within the 500-foot notice radius, the letter shall be sent to that association's president, and to one designee as submitted to the City by the neighborhood association as well. The letter shall briefly describe the nature and location of the proposed development, and invite the association and interested persons to a meeting to discuss the proposal in more detail. The meeting shall be scheduled at the association's regularly scheduled monthly meeting, or at another time at the discretion of the association, and not less than 20 days from the date of mailing of the notice. If the meeting is scheduled as part of the association's regular monthly meeting, the letter shall explain that the proposal may not be the only topic of discussion on the meeting agenda. The letter shall encourage concerned citizens to contact their association president, or their association designee, with any questions that they may want to relay to the applicant.

Neighborhood contact shall be initiated by the applicant by mailing the association president, and to one designee as submitted to the City by the neighborhood association, a letter, return receipt requested, formally requesting, within 60 days, a date and location to have their required neighborhood meeting. The 60 days shall be calculated from the date that the applicant mails this letter to the association. If the neighborhood association does not want to meet within the 60-day timeframe, or if there is no neighborhood association, the applicant shall hold a public meeting during the evening after 6:00 p.m., or on the weekend no less than 20 days from the date of mailing of the notice. All meetings shall be held at a location open to the public within the boundaries of the association or at a public facility within the City of West Linn. If the meeting is held at a business, it shall be posted at the time of the meeting as the meeting place and shall note that the meeting is open to the public and all interested persons may attend.

D. On the same date the letters described in subsections A through C of this section are mailed, the applicant shall provide and post notice on the property subject to the proposed application. The notice shall be posted at a location visible from the public right-of-way. If the site is not located adjacent to a through street, then an additional sign shall be posted on the nearest through street. The sign notice shall be at least 11 inches by 17 inches in size on durable material and in clear, legible writing. The notice shall state that the site may be subject to a proposed development (e.g., subdivision, variance, conditional use) and shall set forth the name of the applicant and a telephone number where the applicant can be reached for additional information. The site shall remain posted until the conclusion of the meeting.

E. An application shall not be accepted as complete unless and until the applicant demonstrates compliance with this section by including with the application:

1. A copy of the certified letter to the neighborhood association with a copy of return receipt;

2. A copy of the letter to officers of the association and to property owners within 500 feet, including an affidavit of mailing and a copy of the mailing list containing the names and addresses of such owners and residents;

3. A copy of the required posted notice, along with an affidavit of posting;

4. A copy of the minutes of the meetings, produced by the neighborhood association, which shall include a record of any verbal comments received, and copies of any written comments from property owners, residents, and neighborhood association members. If there are no minutes, the applicant may provide a summary of the meeting comments. The applicant shall also send a copy of the summary to the chair of the neighborhood association. The chair shall be allowed to supplement the summary with any additional comments regarding the content of the meeting, as long as such comments are filed before the record is closed;

5. An audiotape of the meeting; and

6. In the event that it is discovered by staff that the aforementioned procedures of this section were not followed, or that a review of the audio tape and meeting minutes show the applicant has made a material misrepresentation of the project at the neighborhood meeting, the application shall be deemed incomplete until the applicant demonstrates compliance with this section.

**Applicant's Response:**

**Pre-application meeting for this project has already taken place on 4/3/25 with subsequent Neighborhood Association meeting on 6/9/25. All three referenced NAs were invited to this meeting held at City Hall. Applicant includes all required records as part of this application.**

99.060 Approval Authority (Planning Commission)

This section explains the authority of the Planning Director, Planning Commission, City Council, and Historic Review Board as it relates to quasi-judicial and legislative action.

A. Planning Director authority. The Planning Director, or designee, shall have the authority to:

1. Approve, deny, or approve with conditions the following applications:

a. A temporary use or structure application for a period no more than 120 days, including all extensions (Chapter 35 CDC), and not associated with another land use approval.

b. A home occupation application (Chapter 37 CDC).

c. Access restrictions (Chapter 48 CDC).

d. A minor partition (Chapter 85 CDC).

e. A final subdivision plat (Chapter 89 CDC).

f. A final partition plat (Chapter 89 CDC).

g. A lot line adjustment (Chapter 85 CDC).

h. Enlargement or alteration of a non-conforming single-family structure containing a conforming use (Chapter 66 CDC).

i. Decide applications for a determination of unlisted parking requirements (Chapter 46 CDC).

j. *Repealed by Ord. 1735.*

k. Parks Design Review, Class I (Chapter 56 CDC).

l. Design Review, Class I (Chapter 55 CDC).

m. A sign application (Chapter 52 CDC).

n. Sidewalk use permit (Chapter 53 CDC).

o. Flood management area permit (Chapter 27 CDC).

p. *Repealed by Ord. 1622.*

q. Tualatin River protection permit (Chapter 28 CDC).

r. Water resource area permit (Chapter 32 CDC).

s. Class I variance (Chapter 75 CDC).

t. Willamette River Greenway Permit (Chapter 28 CDC).

u. Extension of approval without modifications.

v. Extension of approval with proposed modifications when the Planning Director acted as the initial decision-making authority.

w. Class I Historic Design Review (Chapter 25 CDC).

x. A demolition permit for a non-contributing or not in period primary structure or an accessory structure (Chapter 25 CDC).

y. Expedited land division.

z. Middle housing land division.

2. Approve a use permitted under prescribed conditions provided all of the conditions are satisfied.

3. Make initial interpretations of the provisions of the code.

4. Make the initial determination regarding the status of the following:

a. Non-conforming structure (Chapter 66 CDC).

b. Non-conforming structure involving a non-conforming use (Chapter 65 CDC).

c. Non-conforming use of land (Chapter 67 CDC).

B. Planning Commission authority. The Planning Commission shall have the authority to:

1. Make a recommendation to approve, deny, or approve with conditions to the Council:

a. A quasi-judicial Comprehensive Plan Map amendment (Chapter 105 CDC).

b. A quasi-judicial zone change application pursuant to Chapter 105 CDC, excluding applications requesting the designation or removal of a designation for a historic resource.

2. Approve, deny, or approve with conditions the following applications:

a. A temporary use or structure application (Chapter 35 CDC) for a minimum of 121 days to no more than one year, or an application associated with another land use approval.

b. A conditional use (Chapter 60 CDC).

c. Enlargement of a non-conforming use or alteration for a structure containing a non-conforming use (Chapter 66 CDC).

d. Enlargement or alteration of a non-single-family residential non-conforming use (Chapter 66 CDC).

e. Class II variance or special waiver (Chapter 75 CDC).

f. Subdivision (Chapter 85 CDC).

g. Planned unit development (Chapter 24 CDC).

h. Design review, Class II (Chapter 55 CDC).

i. Parks design review, Class II (Chapter 56 CDC).

j. Any matter not specifically assigned to another approval authority.

k. Extension of approval with proposed modifications when the Planning Commission acted as the initial decision-making authority.

3. Revoke or modify an approval as provided by CDC 99.330 for any application approved by the Planning Commission or Planning Director.

4. Make an unlisted use determination.

5. An appeal of the Planning Director's interpretation of the code pursuant to CDC 01.060.

C. City Council authority. The Council shall have the authority to:

1. Approve, deny, or approve with conditions applications for the following development applications:

a. A quasi-judicial Comprehensive Plan Map amendment (Chapter 105 CDC).

b. A quasi-judicial zone change application pursuant to Chapter 105 CDC.

c. Boundary change proposals (Chapter 81 CDC).

2. Consider an appeal or review of a decision made by the Planning Director under the provisions of CDC 99.240(A) and 99.080(B).

3. Consider an appeal or review of a decision made by the Planning Commission or Historic Review Board, whether on the Council's own motion, or otherwise as provided by CDC 99.240.

4. Decide an appeal of the Director's interpretation of zoning boundaries as provided by CDC 05.040.

5. Revoke or modify an approval as provided by CDC 99.330 for any application approved by the City Council, including an application approved by the City Council on appeal from another City decision-making authority.

D. Historic Review Board authority. The Historic Review Board shall review an application for compliance with Chapters 25 and 58 CDC, as applicable. The Historic Review Board shall have the authority to:

1. Approve, deny, or approve with conditions an application regarding the following:

a. Class II Historic Design Review;

b. A demolition permit for a historic landmark or primary contributing structure within a historic district;

c. Relocation of a historic resource;

d. Revocation or modification of an approval as provided by CDC 99.330 for any application approved by the Historic Review Board; and

e. Extension of an approval with proposed modifications when the Historic Review Board acted as the initial decision-making authority.

2. Make recommendations to the approval authority specified in this section regarding the following:

a. Designation of a historic resource;

b. Removal of historic resource designation;

c. Class I or Class II design review on a property within the Willamette Falls Drive Commercial Design District that is not a historic landmark or within the Willamette Historic District;

d. New construction within the Willamette Falls Drive Commercial Design District that is not a historic landmark or within the Willamette Historic District;

e. A partition or subdivision of property containing a historic resource;

f. Conditional use of property containing a historic resource.

E. Referee.

1. Approve, deny, or approve with conditions the following applications:

a. Appeal of an expedited land division per ORS 197.375.

b. Appeal of a middle housing land division per ORS 197.375.

**Applicant's Response:**

**Applicant understands the requirements of this section and that this Class II Design Review is subject to Planning Commission approval.**

# APPENDIX: SUPPLEMENTAL DRAWINGS & REPORTS

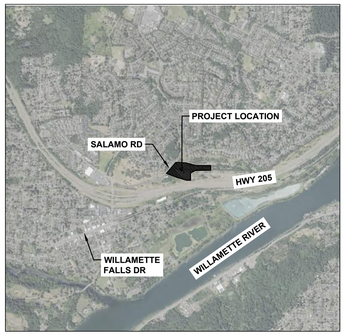
CIVIL & LANDSCAPE DRAWINGS

FILE PATH: C:\Revit_Local\23028_West Linn Public Works_jjorgensenZEPNR.rvt

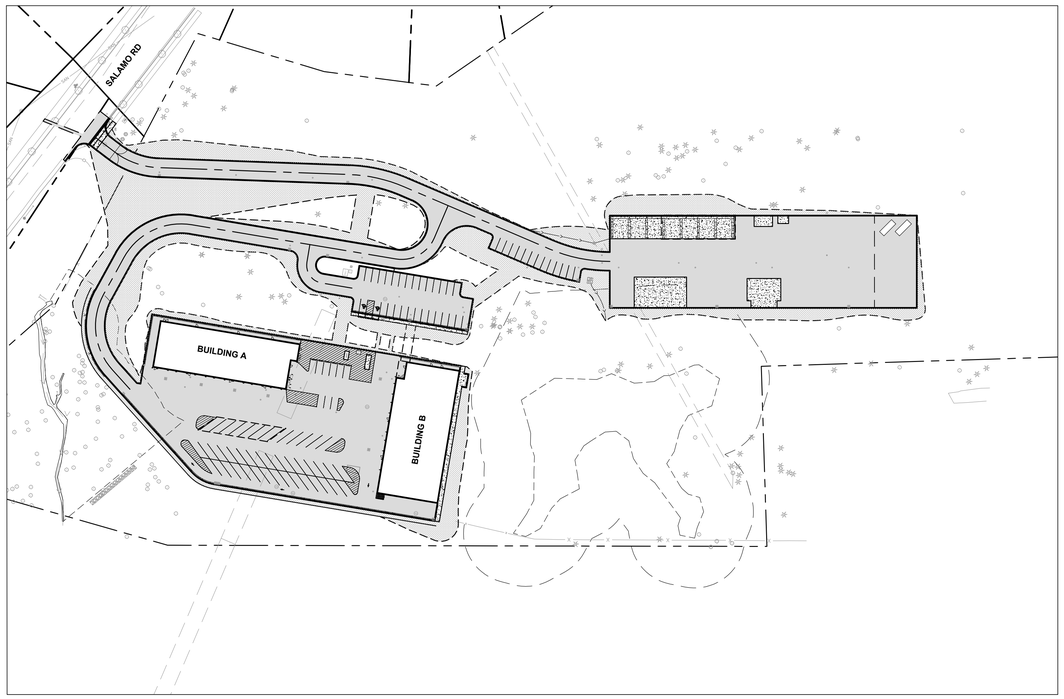
# WEST LINN PUBLIC WORKS

## WEST LINN, OREGON

NOVEMBER 2025




**VICINITY MAP**
NTS




**PLAN VIEW**
SCALE: 1" = 80'

0 40 80 160
SCALE: 1" = 80'

## SHEET INDEX


| | |
|---|---|
| C0.0 | COVER SHEET & GENERAL NOTES |
| C1.0 | SITE PAVING PLAN |
| C2.0 | STORMWATER AND GRADING PLAN |
| C3.0 | UTILITY PLAN |
| L1.0 | TREE PROTECTION AND REMOVAL PLAN |
| L2.0 | LANDSCAPE PLAN |
| L2.1 | LANDSCAPE PLAN |
| L3.0 | PRELIMINARY IRRIGATION PLAN |
| L3.1 | IRRIGATION DETAILS |


## LIST OF ABBREVIATIONS:

| | |
|---|---|
| EL | ELEVATION |
| LT | LEFT |
| RT | RIGHT |
| CB | CATCH BASIN |
| MH | MANHOLE |
| EP | EDGE OF PAVEMENT |
| R.O.W., R/W | RIGHT-OF-WAY |
| PL, P/L | PROPERTY LINE |
| ESMT | EASMENT |
| STD | STANDARD |
| AC | ASPHALT CONCRETE |
| DI | DUCTILE IRON |
| PVC | POLYVINYL CHLORIDE |
| STM | STORM |
| SAN | SANITARY |
| WTR | WATER |
| STA | ALIGNMENT STATION |
| CR | CURB RETURN |
| FFE | FINISHED FLOOR ELEVATION |
| TC | TOP OF CURB |
| BC | BOTTOM OF CURB (FINISHED GRADE) |
| FG | FINISHED GRADE |
| EX | EXISTING |
| PROP | PROPOSED |

## PROJECT TEAM


### OWNER/DEVELOPER
WEST LINN PUBLIC WORKS
22500 SALAMO ROAD
WEST LINN, OREGON 97068
PHONE: (503) 722-3434
CONTACT: ERIC LAIS, PE
PUBLIC WORKS DIRECTION/CITY ENGINEER
EMAIL: ELAIS@WESTLINNOREGON.GOV

### ARCHITECT
SCOTT EDWARDS ARCHITECTURE, LLP
2525 E BURNSIDE STREET
PORTLAND, OREGON 97214
PHONE: (503) 226-3617
CONTACT: BRANDON DOLE
EMAIL: BDOLE@SEALLP.COM

### STRUCTURAL ENGINEER
WDY
6443 SW BEAVERTON-HILLSDALE HWY, SUITE 210
PORTLAND, OREGON 97221
PHONE: (503) 203-8111
CONTACT: DALE DILORETO
EMAIL: DALE@WDYI.COM

### MECHANICAL/ELECTRICAL/PLUMBING/ TECHNOLOGY ENGINEER
INTERFACE ENGINEERING, INC.
100 SW MAIN STREET, SUITE 1600
PORTLAND, OREGON 97204
PHONE: (503) 382-2266
CONTACT: MARK O'LEARY
EMAIL: MARKO@INTERFACE.COM

### CIVIL ENGINEER
HARPER HOUF PETERSON RIGHELLIS INC.
205 SE SPOKANE STREET, SUITE 200
PORTLAND, OREGON 97202
PHONE: (503) 221-1131
CONTACT: ALEX SIMPSON, PE
EMAIL: ALEXS@HHPR.COM

### LANDSCAPE ARCHITECT
HARPER HOUF PETERSON RIGHELLIS INC.
205 SE SPOKANE STREET, SUITE 200
PORTLAND, OREGON 97202
PHONE: (503) 221-1131
CONTACT: DANIEL CHIN, RLA
EMAIL: DANCHIN@HHPR.COM


## SITE INFORMATION

XXXXX SALAMO RD, WEST LINN, OR 97068
PARCEL ID: XXXXXXXXXXX (X.XX AC)
TOPOGRAPHIC SURVEY COMPLETED BY HHPR, APRIL 16, 2025

### BENCHMARK:

VERTICAL DATUM: NAVD 88, BASED ON NETWORK GPS OBSERVATIONS
HORIZONTAL COORDINATES ARE BASED ON OREGON STATE PLAN (NORTH ZONE) - REFERENCE FRAME: NAD 83 (CORS96)(EPOCH: 2010.0000), US SURVEY FEET. ALL DISTANCES ARE GROUND, SO STATE PLANE COORDINATES ARE APPROXIMATE.

## GENERAL NOTES:

1. ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE CITY OF WEST LINN AND THE PROJECT SPECIFICATIONS.
2. FIELD VERIFY LOCATION OF EXISTING UTILITIES PRIOR TO CONSTRUCTION. CALL 811.
3. CONTRACTOR TO PROTECT ALL EXISTING UTILITIES TO REMAIN. CONTRACTOR SHALL ADJUST ALL EXISTING RIM ELEVATIONS TO FINISHED GRADE OF NEW CONSTRUCTION.
4. ALL ON-SITE WORK SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT EDITION OF THE CITY OF WEST LINN DESIGN AND CONSTRUCTION STANDARDS (EFFECTIVE AUGUST 1, 2019), CITY OF WEST LINN PUBLIC WORKS DESIGN STANDARDS - STORM DRAINS 2025, AND THE INTERNATIONAL FIRE CODE. WORK SHALL ALSO CONFORM TO THE STANDARDS OF THE JURISDICTION AND TO THE PROJECT SPECIFICATIONS.
5. THE LOCATION AND DESCRIPTION OF EXISTING UTILITIES ARE COMPILED FROM AVAILABLE RECORDS AND/OR FIELD SURVEYS AND ARE APPROXIMATE. UTILITIES MAY EXIST THAT ARE NOT SHOWN ON THESE PLANS. THE CONTRACTOR SHALL VERIFY AND CONFIRM EXISTING CONDITIONS PRIOR TO CONSTRUCTION. NOTIFY ENGINEER OF VARIATIONS IN CONDITIONS SHOWN ON THE PLANS. POINTS OF CONNECTION TO EXISTING UTILITIES AND LOCATIONS WHERE NEW UTILITIES WILL CROSS EXISTING UTILITIES SHALL BE VERIFIED BY POTHOLING PRIOR TO CONSTRUCTION OR ORDERING MATERIALS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO SCHEDULE POTHOLING SUCH THAT IF CONFLICTS ARE ENCOUNTERED, SUFFICIENT TIME EXISTS TO PREPARE MODIFIED DESIGNS AND HAVE THE MODIFICATIONS APPROVED BY THE JURISDICTION WITHOUT IMPACTING THE PROJECT SCHEDULE.
6. PROVISIONS SHALL BE MADE BY THE CONTRACTOR TO KEEP ALL EXISTING UTILITIES IN SERVICE AND PROTECT THEM DURING CONSTRUCTION.
7. ALL TRADE LICENSES AND PERMITS NECESSARY FOR THE PROCUREMENT AND COMPLETION OF THE WORK SHALL BE SECURED BY THE CONTRACTOR PRIOR TO COMMENCING DEMOLITION.
8. THE CONTRACTOR SHALL PRESERVE AND PROTECT FROM DAMAGE ALL EXISTING RIGHT-OF-WAY SURVEY MONUMENTATION DURING DEMOLITION. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING AND PAYING FOR THE REPLACEMENT BY A LICENSED SURVEYOR OF ANY DAMAGED OR REMOVED MONUMENTS.
9. PROTECT ALL ITEMS ON ADJACENT PROPERTIES AND IN THE RIGHT-OF-WAY INCLUDING BUT NOT LIMITED TO SIGNAL EQUIPMENT, PARKING METERS, SIDEWALKS, STREET TREES, STREET LIGHTS, CURBS, PAVEMENT AND SIGNS. CONTRACTOR SHALL BE RESPONSIBLE FOR RESTORING ANY DAMAGED ITEMS TO ORIGINAL CONDITION.
10. PROTECT STRUCTURES, UTILITIES, SIDEWALKS, AND OTHER FACILITIES IMMEDIATELY ADJACENT TO EXCAVATIONS FROM DAMAGES CAUSED BY SETTLEMENT, LATERAL MOVEMENT, UNDERMINING, WASHOUT AND OTHER HAZARDS.
11. EXTENTS OF SAWCUT REMOVAL SHOWN ON PLANS IS APPROXIMATE. CONTRACTOR IS TO ADJUST EXTENTS AS NECESSARY WITHIN PROJECT SCOPE AND REQUIREMENTS. CONTRACTOR IS TO SAWCUT AT STRAIGHT LINE AT THE NEAREST JOINT.
12. CONTRACTOR IS RESPONSIBLE TO CONTROL DUST AND MUD DURING THE DEMOLITION PERIOD, AND DURING TRANSPORTATION OF DEMOLITION DEBRIS. ALL STREET SURFACES OUTSIDE THE CONSTRUCTION ZONE MUST BE KEPT CLEAN.
13. PROTECT ALL EXISTING UTILITY STRUCTURES AND UNDERGROUND MAINS NOT PROPOSED FOR DEMOLITION.
14. PROTECT ALL EXISTING VEGETATION TO REMAIN WITHIN AND OUTSIDE OF PROJECT LIMITS.
15. CONTRACTOR TO VERIFY BUILDING SLAB SECTION REQUIREMENTS WITHIN ALL DOCUMENTS, INCLUDING BUT NOT LIMITED TO ARCHITECTURAL AND STRUCTURAL DRAWINGS WITH REFERENCED GEOTECHNICAL DATA, PRIOR TO EXCAVATION TO PAD ELEVATION.

## TRAFFIC CONTROL:

1. TRAFFIC CONTROL TO BE PERFORMED IN ACCORDANCE WITH THE MANUAL FOR UNIFORM TRAFFIC CONTROL DEVICES AND CALIFORNIA AMENDMENTS AS APPLICABLE. THE CITY OR COUNTY CAN REQUIRE ADDITIONAL TRAFFIC CONTROL MEASURES AS NEEDED TO PROVIDE FOR PUBLIC SAFETY.
2. A TRAFFIC CONTROL PLAN SHALL BE PREPARED AND SUBMITTED FOR REVIEW BY CITY, FOR BOTH WORK-DAY HOURS, CONSTRUCTION OPERATIONS, AND AFTER-HOUR DISRUPTIONS.
3. ALL TRAFFIC CONTROL MEASURES NEED TO BE SUBMITTED TO THE CITY FOR REVIEW AND APPROVAL.

## PRIVATE UTILITY NOTES:

### STORM DRAINAGE

1. PRIVATE STORM DRAINAGE CONSTRUCTION SHALL BE IN ACCORDANCE WITH CITY OF WEST LINN PUBLIC WORKS DESIGN STANDARDS - STORM DRAINS 2025, CITY OF WEST LINN DESIGN STANDARDS (EFFECTIVE AUGUST 1, 2019), AND THE 2023 OREGON SPECIALTY PLUMBING CODE.
2. PRIVATE STORM DRAINAGE PIPE MATERIAL TO BE AS NOTED ON THE PLANS OR ENGINEER APPROVED EQUAL.
3. THE CONTRACTOR SHALL TEST ALL PVC AND HDPE STORM PIPE FOR DEFLECTION AS PER CITY OF EUREKA CONSTRUCTION STANDARDS. A COPY OF THE TEST RESULTS SHALL BE SUBMITTED FOR REVIEW AND APPROVAL.
4. THE CONTRACTOR SHALL FLUSH THE ENTIRE STORM SYSTEM AND VIDEO INSPECT ALL STORM SEWER CONVEYANCE PIPES. A COPY OF THE REPORT AND VIDEO TAPE SHALL BE SUBMITTED FOR REVIEW AND APPROVAL.
5. CATCH BASINS SHALL BE INSTALLED TO FINISH GRADE OR AS NOTED ON PLANS.
6. ADJUST MANHOLES, CLEAN OUT AND AREA DRAIN RIMS TO FINISH GRADE.
7. HORIZONTAL LINES CONNECTING WITH OTHER HORIZONTAL LINES SHALL ENTER THROUGH 45 DEGREE WYE BRANCH. TEE BRANCH IS NOT ALLOWED.
8. ALL RAIN DRAIN PIPING INSTALLED WITHIN 5.0 FEET OF A BUILDING TO BE SCHEDULE 40 PVC-D.W.V. PIPING OR APPROVED EQUAL. COORDINATE LOCATION OF RAIN DRAINS WITH PLUMBING PLANS.
9. FOUNDATION DRAIN PIPE AND WALL DRAINAGE PIPING SHALL BE COORDINATED WITH STRUCTURAL AND ARCHITECTURAL PLANS AND DETAILS. AT FOUNDATION DRAIN CONNECTION INSTALL CLEANOUT AND ACCESSIBLE FLAPPER TYPE BACKWATER VALVE. SET RIM TO FINISH GRADE. COORDINATE FOUNDATION DRAIN CONNECTION POINTS WITH ARCHITECTURAL AND STRUCTURAL PLANS.
10. TRACER WIRE - 12-GAUGE STRANDED OR SOLID COPPER INSULATED HIGH MOLECULAR WEIGHT POLYETHYLENE (HMW-PE) TRACER WIRE. THE HMW-PE INSULATED COVER SHALL BE GREEN AND A MINIMUM 45 MIL THICK. THE WIRE SHALL BE RATED FOR 140 DEGREES FAHRENHEIT. INSTALL TRACER WIRE IN ALL TRENCHES FOR STORM SEWERS. PLACE THE TRACER WIRE DIRECTLY OVER THE PIPE CENTERLINE AND ON TOP OF THE PIPE ZONE MATERIAL, PARALLEL TO, AND ALONG THE ENTIRE LENGTH OF ALL NONMETALLIC PIPE.

### SANITARY SEWER

1. ALL SANITARY SEWER CONSTRUCTION TO WITHIN THREE (3) FEET OF THE BUILDING SHALL BE PVC ASTM D3034 SDR 35 AND IN ACCORDANCE WITH CITY OF WEST LINN, THE INTERNATIONAL BUILDING CODE (IBC), AND THE 2023 OREGON SPECIALTY PLUMBING CODE .
2. PRIVATE SANITARY SEWER PIPE WITHIN THREE (3) FEET OF THE BUILDING SHALL BE DRAIN WASTE VENT (DWV), IN ACCORDANCE WITH INTERNATIONAL BUILDING CODE (IBC) AND THE 2023 OREGON SPECIALTY PLUMBING CODE.
3. PRIVATE SANITARY DRAINAGE PIPE MATERIAL TO BE ADS SANITITE HP (SMOOTH INTERIOR), PVC 3034-D OR ENGINEER APPROVED EQUAL.
4. HORIZONTAL LINES CONNECTING WITH OTHER HORIZONTAL LINES SHALL ENTER THROUGH 45 DEGREE WYE BRANCH. TEE BRANCH IS NOT ALLOWED.
5. WHERE SANITARY LINES CROSS WATER LINES, THE SYSTEMS NEED TO BE CONSTRUCTED SUCH THAT THE CROSSING WILL OCCUR AT THE CENTER OF A PIPE SEGMENT FOR BOTH LINES.
6. PRIOR TO TESTING AND INSPECTION OF THE SANITARY PIPELINE, ALL PARTS OF THE SYSTEM SHALL BE CLEANED OF ALL DEBRIS.
7. TESTING OF PRIVATE SANITARY PIPELINE SHALL BE IN ACCORDANCE WITH INTERNATIONAL BUILDING CODE AND THE 2023 OREGON SPECIALTY PLUMBING CODE.
8. ALL SANITARY PIPELINE SHALL PASS THE REQUIRED AIR TEST, MANDREL TEST, AND COMPACTION TEST. ALL SANITARY PIPELINE SHALL BE VIDEO INSPECTED, AND BE FREE OF VISIBLE LEAKS. SANITARY MANHOLES SHALL BE TESTED USING THE HYDROSTATIC TEST OR THE VACUUM TEST.
9. TRACER WIRE - 12-GAUGE STRANDED OR SOLID COPPER INSULATED HIGH MOLECULAR WEIGHT POLYETHYLENE (HMW-PE) TRACER WIRE. THE HMW-PE INSULATED COVER SHALL BE GREEN AND A MINIMUM 45 MIL THICK. THE WIRE SHALL BE RATED FOR 140 DEGREES FAHRENHEIT. INSTALL TRACER WIRE IN ALL TRENCHES FOR SANITARY SEWERS. PLACE THE TRACER WIRE DIRECTLY OVER THE PIPE CENTERLINE AND ON TOP OF THE PIPE ZONE MATERIAL, PARALLEL TO, AND ALONG THE ENTIRE LENGTH OF ALL NONMETALLIC PIPE.

### PRIVATE WATER SERVICE

1. ALL PIPE SHALL HAVE A MINIMUM OF 36" OF COVER MEASURED FROM FINISH GRADE.
2. PRIVATE WATER PIPE MATERIAL SHALL BE AS NOTED ON THE PLANS OR ENGINEER APPROVED EQUAL.
3. FIRE SERVICE PIPE MATERIAL SHALL BE AS NOTED ON THE PLANS OR ENGINEER APPROVED EQUAL.
4. THE CONTRACTOR SHALL CALL FOR ALL INSPECTIONS AND PERFORM THE NECESSARY TESTING REQUIRED BY THE SPECIFICATIONS AND THE PRIVATE UTILITIES PERMIT. UPON COMPLETION OF THE INSTALLATION OF THE WATER SYSTEM ALL LINES SHALL BE FLUSHED AND DISINFECTED IN CONFORMANCE WITH HEALTH DIVISION GUIDELINES.
5. ALL WATERLINES, JOINTS, TEES, BENDS (HORIZ. & VERT.), REDUCERS AND VALVES SHALL BE MECHANICALLY RESTRAINED.
6. ALL WATER PIPE SHALL COMPLY WITH AWWA STANDARDS AND UL APPROVED.
7. TRACER WIRE - 12-GAUGE STRANDED OR SOLID COPPER INSULATED HIGH MOLECULAR WEIGHT POLYETHYLENE (HMW-PE) TRACER WIRE. THE HMW-PE INSULATED COVER SHALL BE GREEN AND A MINIMUM 45 MIL THICK. THE WIRE SHALL BE RATED FOR 140 DEGREES FAHRENHEIT. INSTALL TRACER WIRE IN ALL TRENCHES FOR WATER LINE. PLACE THE TRACER WIRE DIRECTLY OVER THE PIPE CENTERLINE AND ON TOP OF THE PIPE ZONE MATERIAL, PARALLEL TO, AND ALONG THE ENTIRE LENGTH OF ALL NONMETALLIC PIPE.


THESE DRAWINGS ARE THE ORIGINAL UNPUBLISHED WORK OF THE ARCHITECT AND MAY NOT BE DUPLICATED OR USED WITHOUT THE WRITTEN CONSENT OF THE ARCHITECT.



Scott Edwards Architecture
2525 E Burnside St. 503.226.3617
Portland, OR 97214 seallp.com


REGISTERED PROFESSIONAL ENGINEER
OREGON
JULY 15, 2014
ALEXANDER J. SIMPSON
EXPIRES: 06/30/2024

**WEST LINN PUBLIC WORKS FACILITY**

**Job Number:** 23028

**WEST LINN, OR**


HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171


| ISSUE | DATE |
|---|---|
| 100% DESIGN DEVELOPMENT SET | 11/17/2025 |

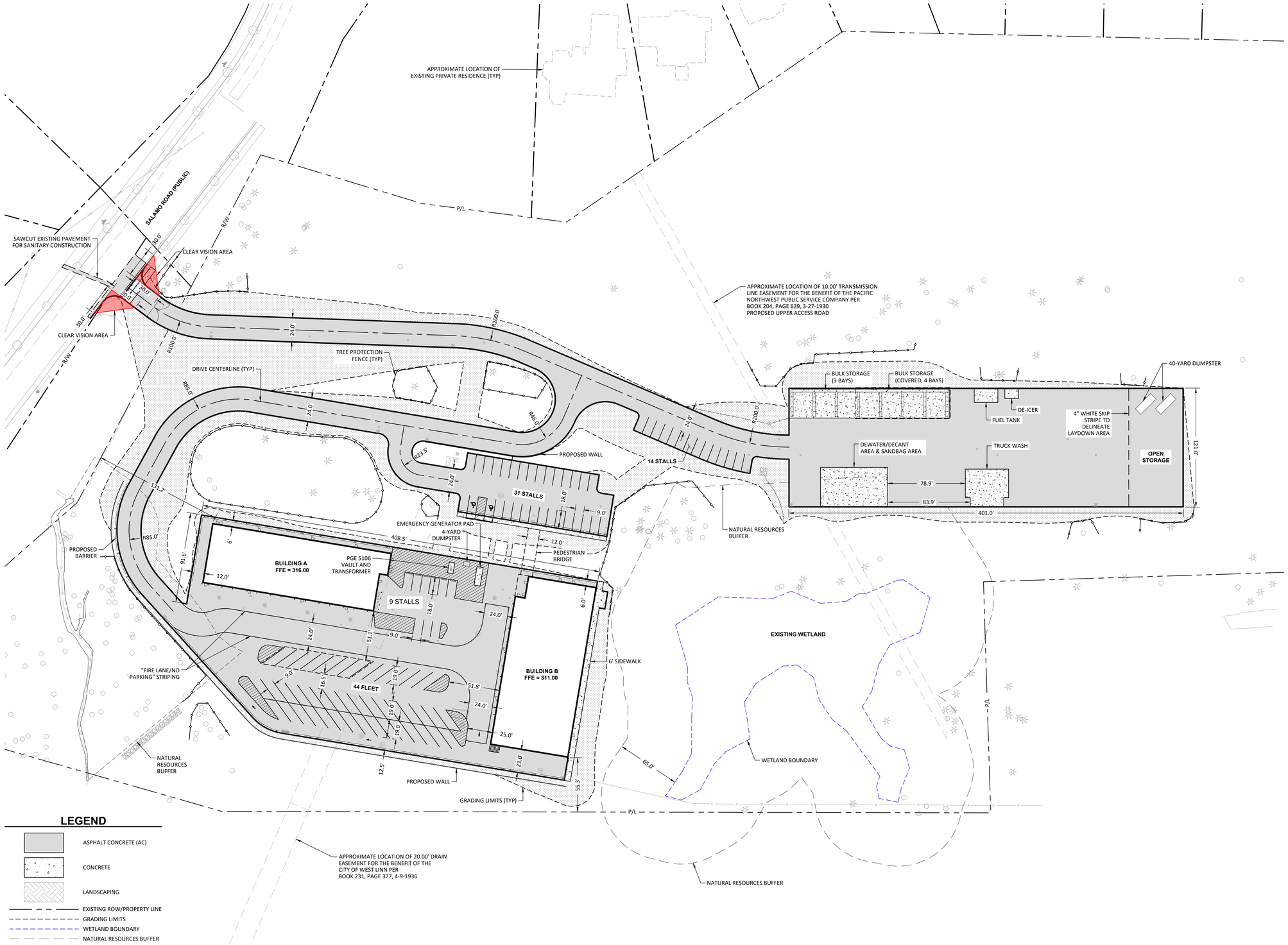
**Drawing:**

**COVER SHEET**

**Sheet No:**

**0.0**

FILE PATH: C:\Revit_Local\23028_West Linn Public Works_tjorgensenZEPNR.rvt




## LEGEND

- ASPHALT CONCRETE (AC)
- CONCRETE
- LANDSCAPING
- EXISTING ROW/PROPERTY LINE
- GRADING LIMITS
- WETLAND BOUNDARY
- NATURAL RESOURCES BUFFER

**PLAN VIEW**
SCALE: 1" = 40'

0 20 40 80
SCALE: 1" = 40'

THESE DRAWINGS ARE THE ORIGINAL UNPUBLISHED WORK OF THE ARCHITECT AND MAY NOT BE DUPLICATED OR USED WITHOUT THE WRITTEN CONSENT OF THE ARCHITECT.

Scott Edwards Architecture
2525 E Burnside St. Portland, OR 97214
503.226.3617 seallp.com

REGISTERED PROFESSIONAL ENGINEER
OREGON
JULY 13, 2018
ALEXANDER J. SIMPSON
EXPIRES: 06/30/2024

NOT FOR CONSTRUCTION

# WEST LINN PUBLIC WORKS FACILITY

**Job Number:** 23028

**WEST LINN, OR**

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

| ISSUE | DATE |
|---|---|
| 100% DESIGN DEVELOPMENT SET | 11/17/2025 |

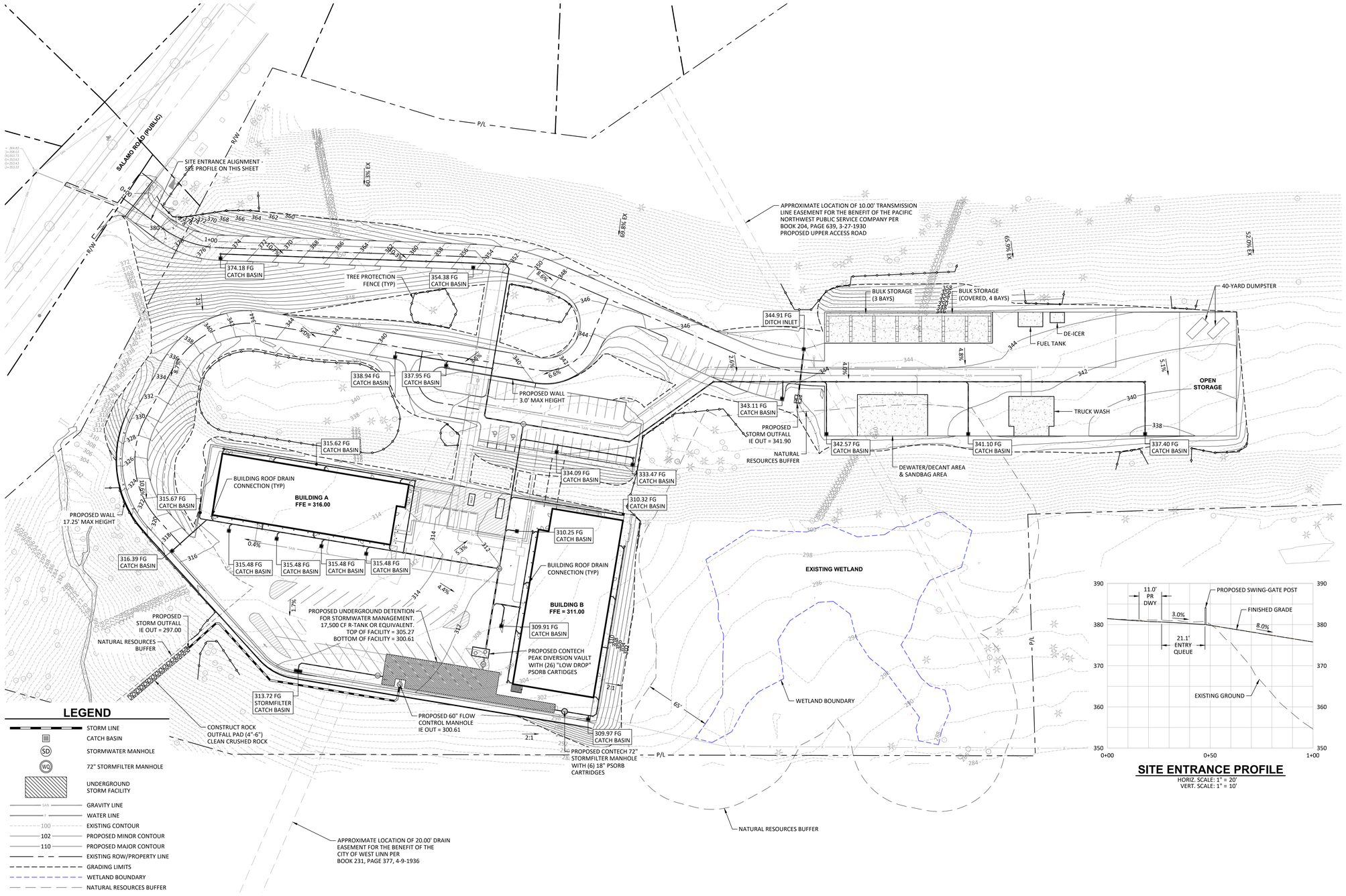
**Drawing:**

**SITE PAVING PLAN**

**Sheet No:**

**C1.0**

FILE PATH: C:\Revit_Local\23028_West Linn Public Works_tjorgensenZEPNR.rvt




## LEGEND

- STORM LINE
- CATCH BASIN
- STORMWATER MANHOLE
- 72" STORMFILTER MANHOLE
- UNDERGROUND STORM FACILITY
- GRAVITY LINE
- WATER LINE
- EXISTING CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- EXISTING ROW/PROPERTY LINE
- GRADING LIMITS
- WETLAND BOUNDARY
- NATURAL RESOURCES BUFFER

## PLAN VIEW

SCALE: 1" = 40'




## SITE ENTRANCE PROFILE

HORIZ. SCALE: 1" = 20'
VERT. SCALE: 1" = 10'

0 20 40 80

SCALE: 1" = 40'

THESE DRAWINGS ARE THE ORIGINAL UNPUBLISHED WORK OF THE ARCHITECT AND MAY NOT BE DUPLICATED OR USED WITHOUT THE WRITTEN CONSENT OF THE ARCHITECT.

Scott Edwards Architecture
2525 E Burnside St. Portland, OR 97214
503.226.3617 seallp.com

REGISTERED PROFESSIONAL ENGINEER
OREGON
JULY 13, 2018
ALEXANDER J. SIMPSON
EXPIRES: 06/30/2024

NOT FOR CONSTRUCTION

# WEST LINN PUBLIC WORKS FACILITY

**Job Number:** 23028

**WEST LINN, OR**

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

**100% DESIGN DEVELOPMENT SET** 11/17/2025
**ISSUE** **DATE**

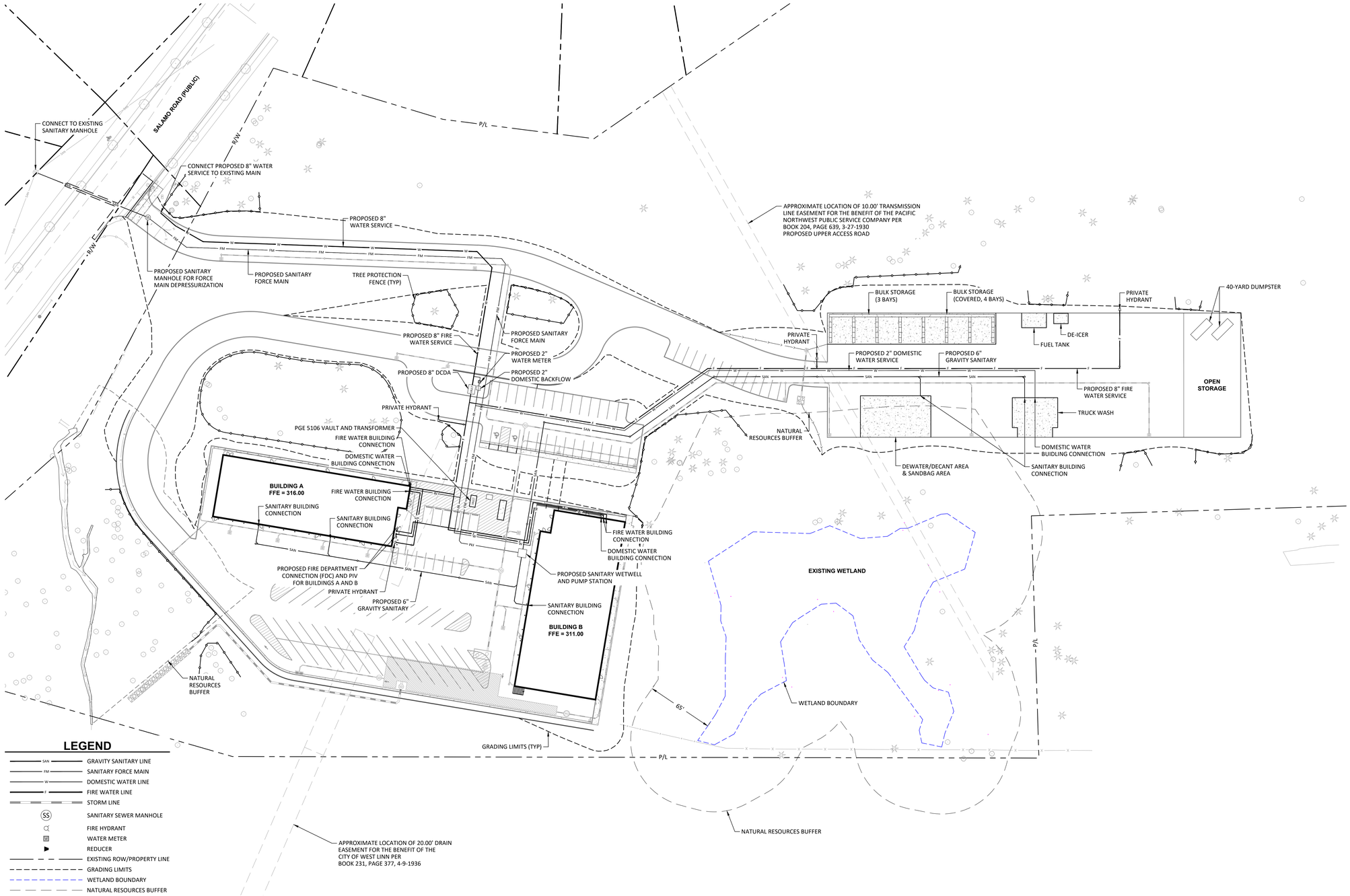
**Drawing:**

## STORMWATER & GRADING PLAN

**Sheet No:**

# C2.0

FILE PATH: C:\Revit_Local\23028_West Linn Public Works_tjorgensenZEPNR.rvt




## LEGEND

- SAN — GRAVITY SANITARY LINE
- FM — SANITARY FORCE MAIN
- W — DOMESTIC WATER LINE
- F — FIRE WATER LINE
- STORM LINE
- SS — SANITARY SEWER MANHOLE
- FIRE HYDRANT
- WATER METER
- REDUCER
- EXISTING ROW/PROPERTY LINE
- GRADING LIMITS
- WETLAND BOUNDARY
- NATURAL RESOURCES BUFFER

**PLAN VIEW**
SCALE: 1" = 40'

0 20 40 80
SCALE: 1" = 40'

THESE DRAWINGS ARE THE ORIGINAL UNPUBLISHED WORK OF THE ARCHITECT AND MAY NOT BE DUPLICATED OR USED WITHOUT THE WRITTEN CONSENT OF THE ARCHITECT.

Scott Edwards Architecture
2525 E Burnside St. 503.226.3617
Portland, OR 97214 seallp.com

REGISTERED PROFESSIONAL ENGINEER
OREGON
JULY 13, 2018
ALEXANDER J. SIMPSON
EXPIRES: 06/30/2024
NOT FOR CONSTRUCTION

# WEST LINN PUBLIC WORKS FACILITY

**Job Number:** 23028

**WEST LINN, OR**

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

| ISSUE | DATE |
|---|---|
| 100% DESIGN DEVELOPMENT SET | 11/17/2025 |

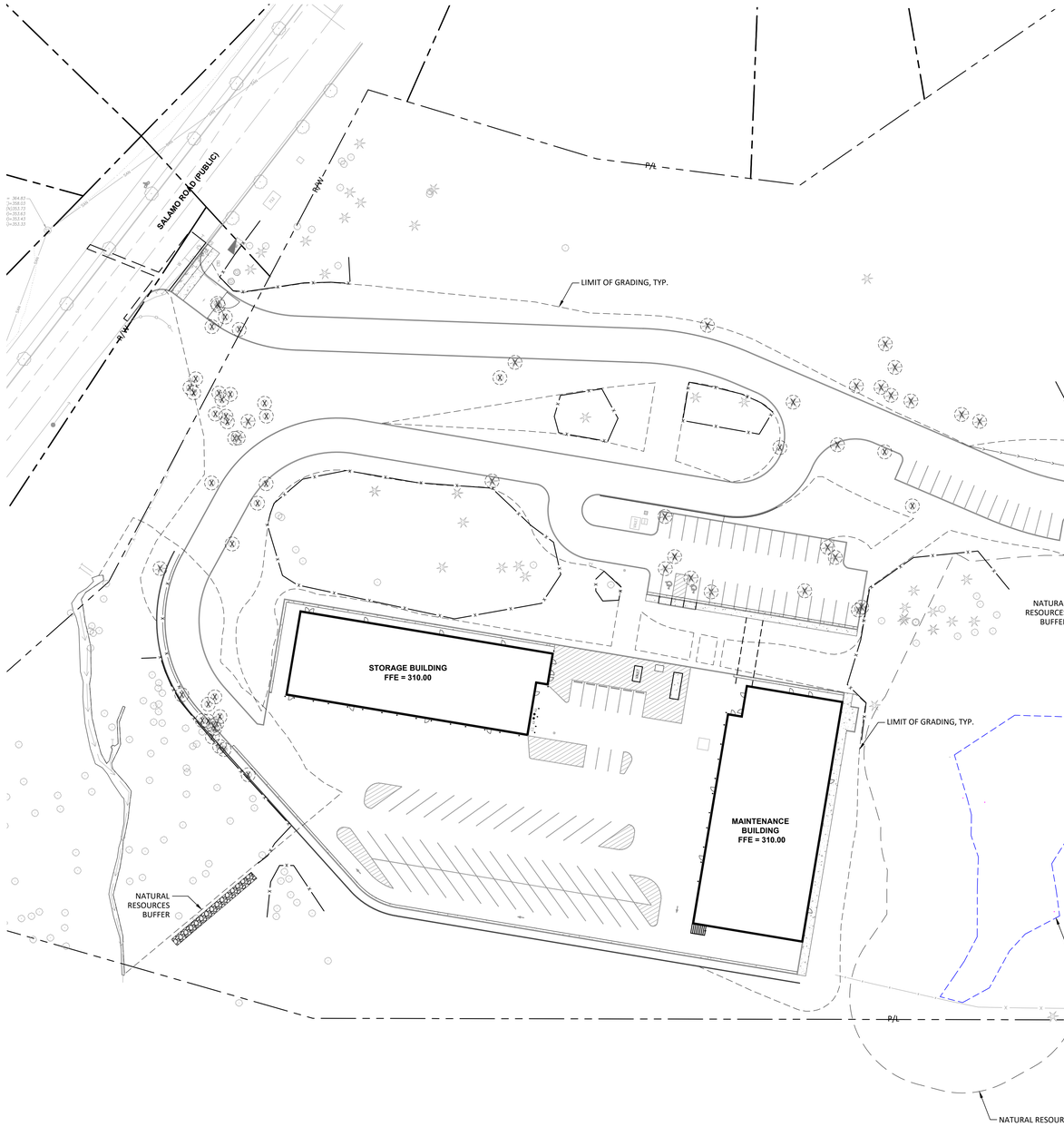
**Drawing:**

## UTILITY PLAN

**Sheet No:**

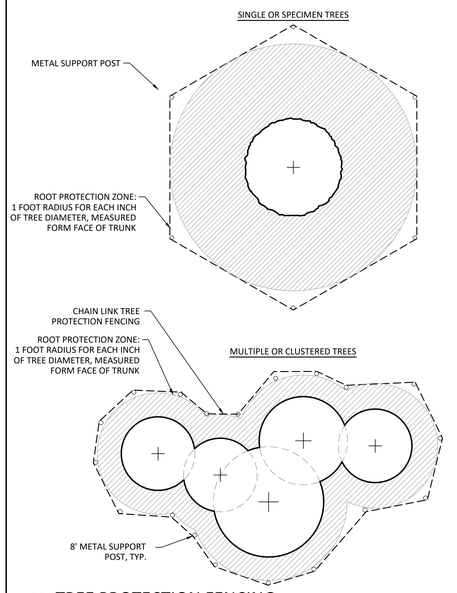
# C3.0

FILE PATH: C:\Revit_Local\23028_West Linn Public Works_jjorgensenZEPNR.rvt

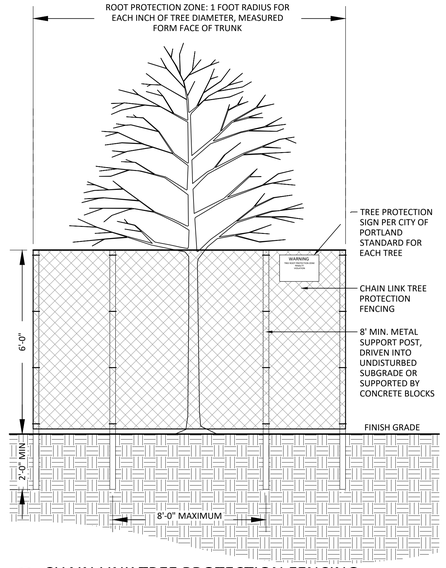



NOTES:

1. TREE PROTECTION SHALL BE A MINIMUM OF 6'-0" GALVANIZED CHAIN LINK AND BE SECURED TO THE GROUND WITH 8'-0" METAL POSTS AND SUPPORTED BY CONCRETE BLOCKS.
2. TREE PROTECTION FENCING SHALL BE ERECTED OUTSIDE OF THE ROOT PROTECTION ZONE PRIOR TO ANY CLEARING, GRADING OR OTHER CONSTRUCTION ACTIVITY. CONTRACTOR TO MAINTAIN TREE PROTECTION FENCING IN PLACE DURING CONSTRUCTION.
3. THE FOLLOWING IS PROHIBITED WITHIN THE ROOT PROTECTION ZONE OF EACH TREE OR OUTSIDE THE LIMITS OF THE DEVELOPMENT IMPACT AREA: GROUND DISTURBANCE OR CONSTRUCTION ACTIVITY INCLUDING VEHICLE OR EQUIPMENT ACCESS (BUT EXCLUDING ACCESS ON EXISTING STREETS OR DRIVEWAYS), STORAGE OF EQUIPMENT OR MATERIALS INCLUDING SOIL, TEMPORARY OR PERMANENT STOCKPILING, PROPOSED BUILDINGS, IMPERVIOUS SURFACES, UNDERGROUND UTILITIES, EXCAVATION OR FILL, TRENCHING OR OTHER WORK ACTIVITIES.




1 TREE PROTECTION FENCING
Plan
NOT TO SCALE




2 CHAIN LINK TREE PROTECTION FENCING
Section
NOT TO SCALE

## LEGEND

- TREES TO REMAIN
- TREES TO REMOVE
- LIMIT OF GRADING
- TREE PROTECTION FENCE

## TREE DATA:

PROPOSED TO BE REMOVED: 108

PROPOSED TO BE PROTECTED (WITHIN LIMIT OF WORK): 17

PROTECTION FENCE: 2,031 LF

0 20 40 80
SCALE: 1" = 40'

Scott Edwards Architecture
2525 E Burnside St. 503.226.3617
Portland, OR 97214 seallp.com

REGISTERED LANDSCAPE ARCHITECT
PRELIMINARY
NOT FOR CONSTRUCTION
JEFFREY A. SCHEEL
OREGON
2007/3111
EXPIRES: 05/31/26

# WEST LINN PUBLIC WORKS FACILITY

**Job Number:** 23028

**WEST LINN, OR**

Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

| | |
|---|---|
| 100% DESIGN DEVELOPMENT SET ISSUE | 11/17/2025 DATE |

**Drawing:**

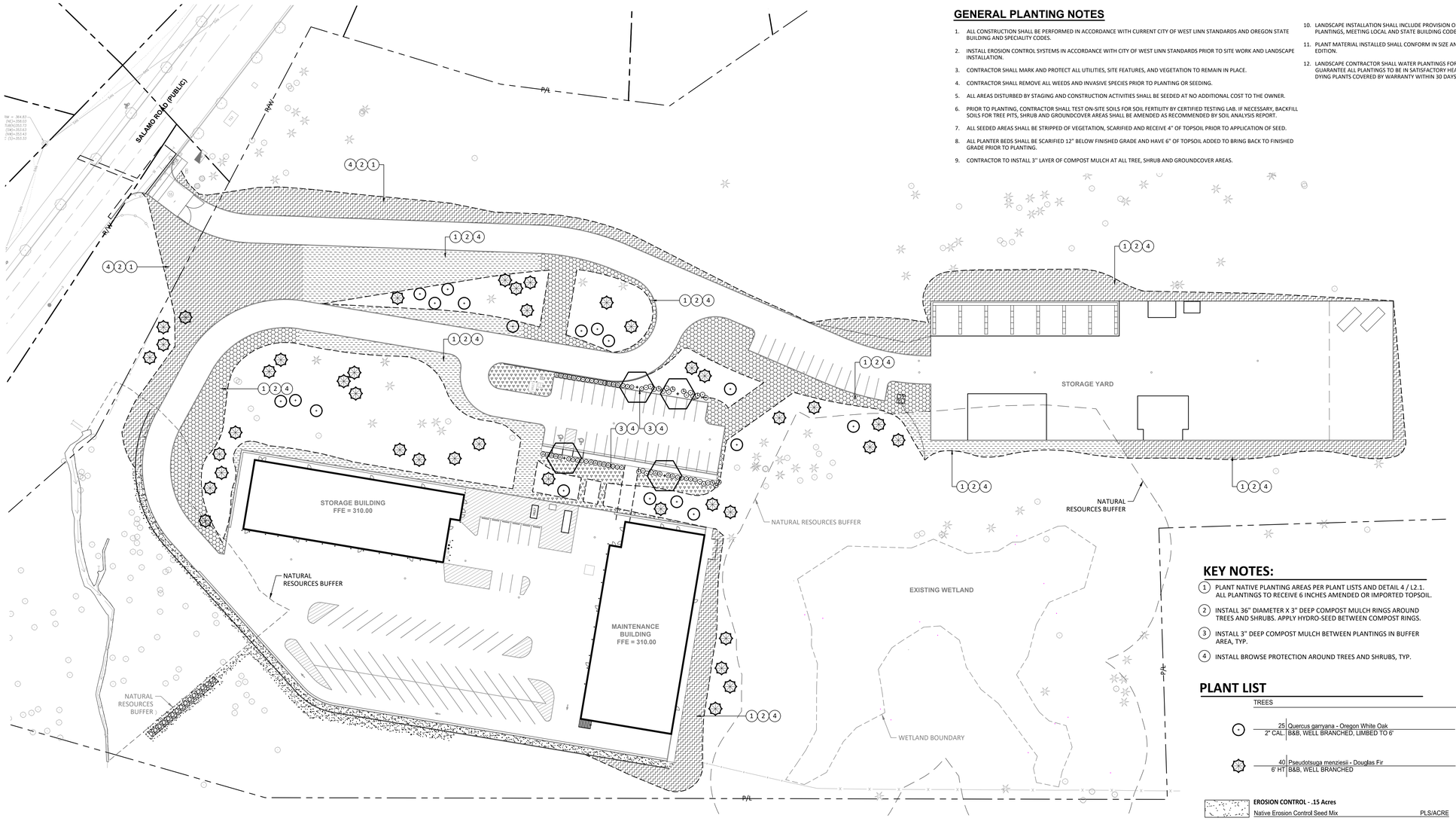
**TREE PROTECTION AND REMOVAL PLAN**

**Sheet No:**

**L1.0**

THESE DRAWINGS ARE THE ORIGINAL UNPUBLISHED WORK OF THE ARCHITECT AND MAY NOT BE DUPLICATED OR USED WITHOUT THE WRITTEN CONSENT OF THE ARCHITECT.

FILE PATH: C:\Revit_Local\23028_West Linn Public Works_tjorgensenZEPNR.rvt




## GENERAL PLANTING NOTES

1. ALL CONSTRUCTION SHALL BE PERFORMED IN ACCORDANCE WITH CURRENT CITY OF WEST LINN STANDARDS AND OREGON STATE BUILDING AND SPECIALITY CODES.
2. INSTALL EROSION CONTROL SYSTEMS IN ACCORDANCE WITH CITY OF WEST LINN STANDARDS PRIOR TO SITE WORK AND LANDSCAPE INSTALLATION.
3. CONTRACTOR SHALL MARK AND PROTECT ALL UTILITIES, SITE FEATURES, AND VEGETATION TO REMAIN IN PLACE.
4. CONTRACTOR SHALL REMOVE ALL WEEDS AND INVASIVE SPECIES PRIOR TO PLANTING OR SEEDING.
5. ALL AREAS DISTURBED BY STAGING AND CONSTRUCTION ACTIVITIES SHALL BE SEEDED AT NO ADDITIONAL COST TO THE OWNER.
6. PRIOR TO PLANTING, CONTRACTOR SHALL TEST ON-SITE SOILS FOR SOIL FERTILITY BY CERTIFIED TESTING LAB. IF NECESSARY, BACKFILL SOILS FOR TREE PITS, SHRUB AND GROUNDCOVER AREAS SHALL BE AMENDED AS RECOMMENDED BY SOIL ANALYSIS REPORT.
7. ALL SEEDED AREAS SHALL BE STRIPPED OF VEGETATION, SCARIFIED AND RECEIVE 4" OF TOPSOIL PRIOR TO APPLICATION OF SEED.
8. ALL PLANTER BEDS SHALL BE SCARIFIED 12" BELOW FINISHED GRADE AND HAVE 6" OF TOPSOIL ADDED TO BRING BACK TO FINISHED GRADE PRIOR TO PLANTING.
9. CONTRACTOR TO INSTALL 3" LAYER OF COMPOST MULCH AT ALL TREE, SHRUB AND GROUNDCOVER AREAS.
10. LANDSCAPE INSTALLATION SHALL INCLUDE PROVISION OF A TEMPORARY AUTOMATIC IRRIGATION SYSTEM TO SUSTAIN LANDSCAPE PLANTINGS, MEETING LOCAL AND STATE BUILDING CODES.
11. PLANT MATERIAL INSTALLED SHALL CONFORM IN SIZE AND GRADE TO THE "AMERICAN STANDARD FOR NURSERY STOCK" CURRENT EDITION.
12. LANDSCAPE CONTRACTOR SHALL WATER PLANTINGS FOR DURATION OF 1-YEAR WARRANTY PERIOD AFTER INSTALLATION AND GUARANTEE ALL PLANTINGS TO BE IN SATISFACTORY HEALTH. LANDSCAPE CONTRACTOR SHALL REPLACE ALL DAMAGED, DEAD, OR DYING PLANTS COVERED BY WARRANTY WITHIN 30 DAYS OF INITIAL IDENTIFICATION OF CONDITION.

## KEY NOTES:

1. PLANT NATIVE PLANTING AREAS PER PLANT LISTS AND DETAIL 4 / L2.1. ALL PLANTINGS TO RECEIVE 6 INCHES AMENDED OR IMPORTED TOPSOIL.
2. INSTALL 36" DIAMETER X 3" DEEP COMPOST MULCH RINGS AROUND TREES AND SHRUBS. APPLY HYDRO-SEED BETWEEN COMPOST RINGS.
3. INSTALL 3" DEEP COMPOST MULCH BETWEEN PLANTINGS IN BUFFER AREA, TYP.
4. INSTALL BROWSE PROTECTION AROUND TREES AND SHRUBS, TYP.

## PLANT LIST

TREES

| | | | |
|---|---|---|---|
| ⊙ | 25 | Quercus garryana - Oregon White Oak | 2" CAL. \| B&B, WELL BRANCHED, LIMBED TO 6' |
| ✿ | 40 | Pseudotsuga menziesii - Douglas Fir | 6' HT \| B&B, WELL BRANCHED |

**EROSION CONTROL - .15 Acres**

| Native Erosion Control Seed Mix | PLS/ACRE |
|---|---|
| Hordeum brachyantherum - Meadow Barley | 17.45 |
| Bromus carinatus - California Brome | 15.27 |
| Festuca rubra rubra - Native Red Fescue | 8.73 |
| Deschampsia cespitosa - Tufted Hairgrass | 1.31 |
| Agrostis exerata - Spike Bentgrass | .87 |
| | 43.63 |

**BUFFER PLANTING** - 5,092 SF

| | BOTANICAL NAME | COMMON NAME | HABIT | FORM | MIN. SIZE | MIN. SPACING | QUANTITY |
|---|---|---|---|---|---|---|---|
| | TREES | | | | | | |
| + | Rhamnus purshiana | Cascara | Tree | 1.5" Caliper | na | as shown | 14 |
| | Cornus kousa | Pacific Dogwood | Tree | 15 gallon | na | 10' o.c. | 10 |
| | Arbutus menziesii | Pacific Madrone | Tree | 5 gallon | 24" | 10' o.c. | 10 |
| | | | | | | Total | 34 |
| | SHRUBS | | | | | | |
| ⊙ | Ceanothus thyrsiflorus | Blue Blossom | Large shrub | 1 Gallon | 18" | 3' o.c. | 70 |
| △ | Vaccinium ovatum | Evergreen Huckleberry | Large shrub | 1 gallon | 18" | 3' o.c. | 70 |
| ⊹ | Mahonia aquifolium | Oregon Grape | Large shrub | 1 gallon | 18" | 3' o.c. | 70 |
| L | Ribes sanguineum | Red Flowering Currant | Large shrub | 1 gallon | 4" | 2' o.c. | 45 |
| | | | | | | Total | 255 |
| | GROUNDCOVER | | | | | | |
| | Arctostaphylos uva-ursi | Kinnikinnik | Groundcover | 4" pots | na | 3' o.c. | 200 |
| | Deschampsia cespitosa | Tufted Hairgrass | Grass | 10 Ci. plug | na | 2' o.c. | 200 |
| | Epilobium canum | California Fuchsia | Herb | 4" pots | na | 2' o.c. | 200 |
| | | | | | | | 600 |

## PLANT LIST

Oak Woodland/Savanna - 14,514 SF

| BOTANICAL NAME | COMMON NAME | HABIT | FORM | MIN. SIZE | MIN. SPACING | QUANTITY |
|---|---|---|---|---|---|---|
| TREES | | | | | | |
| Quercus garryana | Oregon White Oak | Tree | 1 gallon | 24" | 10' o.c. | 80 |
| Pinus ponderosa | Ponderosa pine | Tree | 1 gallon | 24" | 10' o.c. | 30 |
| Arbutus menziesii | Pacific Madrone | Tree | 1 gallon | 12" | 10' o.c. | 35 |
| | | | | | Total | 145 |
| SHRUBS | | | | | | |
| Amelanchier alnifolia | Pacific Serviceberry | Shrub | Bare root | 18" | 4' o.c. | 100 |
| Mahonia aquifolium | Oregon Grape | Shrub | Bare root | 18" | 4' o.c. | 100 |
| Holodiscus discolor | Oceanspray | Shrub | Bare root | 18" | 4' o.c. | 100 |
| Philadelphus Lewisii | Mock Orange | Shrub | Bare root | 18" | 2' o.c. | 200 |
| | | | | | Total | 1500 |

| NATIVE SEED MIX NO. 1 ( .33 ACRES) | | | | % PLS | LBS/ACRE | |
|---|---|---|---|---|---|---|
| Bromus carinatus | California Brome | Grass | Seed | 15 | 16.26 | |
| Lupinus albaculus | Sicklekeel Lupine | Legume | Seed | 5 | 16.26 | |
| Elymus elymodies | Squirreltail | Herb | Seed | 15 | 12.36 | |
| Gaillardia aristata | Blanketflower | Herb | Seed | 10 | 7.80 | |
| Lotus purshianus | Spanish Clover | Herb | Seed | 10 | 5.20 | |
| Festuca occidentalis | Western Fescue | Grass | Seed | 10 | 2.60 | |
| Eschscholzia californica | California Poppy | Herb | Seed | 4 | 2.60 | |
| Koeleria macrantha | Prairie Junegrass | Grass | Seed | 15 | 0.98 | |
| Clarkia unguiculata | Elegant Clarkia | Herb | Seed | 8 | 0.65 | |
| Achillea millefolium | Common Yarrow | Herb | Seed | 8 | 0.33 | |
| | | | | | 65.04 | |

**EARLY SUCCESSIONAL HABITAT** - 16,188 SF

| BOTANICAL NAME | COMMON NAME | HABIT | FORM | MIN. SIZE | MIN. SPACING | QUANTITY |
|---|---|---|---|---|---|---|
| TREES | | | | | | |
| Quercus garryana | Oregon White Oak | Tree | 1 gallon | 24" | 10' o.c. | 32 |
| Acer macrophyllum | Big Leaf Maple | Tree | 1 gallon | 24" | 10' o.c. | 100 |
| Arbutus menziesii | Pacific Madrone | Tree | 1 gallon | 12" | 10' o.c. | 30 |
| | | | | | Total | 162 |
| SHRUBS | | | | | | |
| Amelanchier alnifolia | Pacific Serviceberry | Large shrub | Bare root | 24" | 4' o.c. | 135 |
| Holodiscus discolor | Oceanspray | Large shrub | Bare root | 18" | 4' o.c. | 135 |
| Rosa nutkana | Nootka Rose | Large shrub | Bare root | 18" | 4' o.c. | 135 |
| Cornus sericea | Redtwig Dogwood | Large shrub | Bare root | 24" | 4' o.c. | 135 |
| Symphoricarpos albus | Common Snowberry | Shrub | Bare root | 18" | 3' o.c. | 135 |
| Mahonia repens | Creeping Mahonia | Shrub | Plugs | 12" | 3' o.c. | 135 |
| | | | | | Total | 810 |

| SEEDING MIX NO. 2 ( .37 ACRES) | | | | % PLS | LBS/ACRE | |
|---|---|---|---|---|---|---|
| Hordeum brachyantherum | Meadow Barley | Grass | Seed | 10 | 17.45 | |
| Bromus carinatus | California Brome | Grass | Seed | 10 | 15.27 | |
| Festuca rubra rubra | Red Fescue | Grass | Seed | 30 | 8.73 | |
| Deschampsia cespitosa | Tufted Hairgrass | Grass | Seed | 25 | 1.31 | |
| Agrostis exerata | Spike Bentgrass | Grass | Seed | 25 | 0.87 | |
| | | | | | 43.56 | |

**PIONEER FOREST** - 34,024 SF

| BOTANICAL NAME | COMMON NAME | HABIT | FORM | MIN. SIZE | MIN. SPACING | QUANTITY |
|---|---|---|---|---|---|---|
| TREES | | | | | | |
| Psuedotsuga menziesii | Douglas Fir | Tree | 1 gallon | 36" | 10' o.c. | 200 |
| Abies grandis | Grand Fir | Tree | 1 gallon | 24" | 10' o.c. | 100 |
| Acer macrophyllum | Big Leaf Maple | Tree | 1 gallon | 24" | 10' o.c. | 40 |
| | | | | | Total | 340 |
| SHRUBS | | | | | | |
| Mahonia nervosa | Cascade Oregon Grape | Large shrub | Bare root | 18" | 4' o.c. | 100 |
| Oemleris cerasiformis | Indian Plum | Large shrub | Bare root | 18" | 2' o.c. | 100 |
| Sambucus racemosa | Red Elderberry | Large shrub | Bare root | 18" | 4' o.c. | 100 |
| Holodiscus discolor | Oceanspray | Large shrub | Bare root | 18" | 4' o.c. | 100 |
| Gaultheria Shalon | Salal | Shrub | Plugs | 4" | 3' o.c. | 550 |
| | | | | | Total | 1700 |

| WETLAND SEEDING MIX NO. 1 ( .47 ACRES) | | | | % PLS | LBS/ACRE | |
|---|---|---|---|---|---|---|
| Hordeum brachyantherum | Meadow Barley | Grass | Seed | 10 | 17.45 | |
| Bromus carinatus | California Brome | Grass | Seed | 10 | 15.27 | |
| Festuca rubra rubra | Red Fescue | Grass | Seed | 30 | 8.73 | |
| Deschampsia cespitosa | Tufted Hairgrass | Grass | Seed | 25 | 1.31 | |
| Agrostis exerata | Spike Bentgrass | Grass | Seed | 25 | 0.87 | |
| | | | | | 43.56 | |

THESE DRAWINGS ARE THE ORIGINAL UNPUBLISHED WORK OF THE ARCHITECT AND MAY NOT BE DUPLICATED OR USED WITHOUT THE WRITTEN CONSENT OF THE ARCHITECT.

Scott Edwards Architecture
2525 E Burnside St. 503.226.3617
Portland, OR 97214 seallp.com

REGISTERED LANDSCAPE ARCHITECT
PRELIMINARY
NOT FOR CONSTRUCTION
JEFFREY A. STREET
OREGON
2007/311
EXPIRES: 05/31/26

# WEST LINN PUBLIC WORKS FACILITY

**Job Number:** 23028

**WEST LINN, OR**

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

**100% DESIGN DEVELOPMENT SET ISSUE** 11/17/2025 **DATE**

**Drawing:**

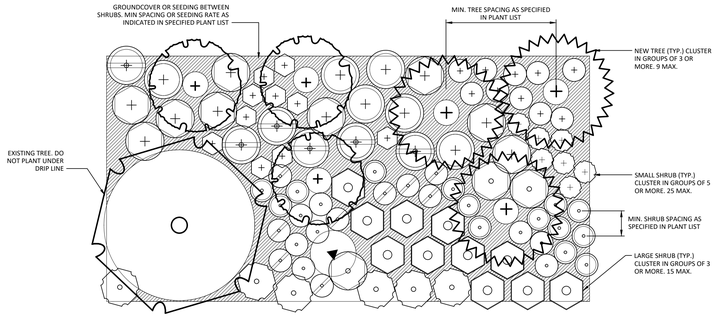
**LANDSCAPE PLAN**

0 20 40 80
SCALE: 1" = 40'

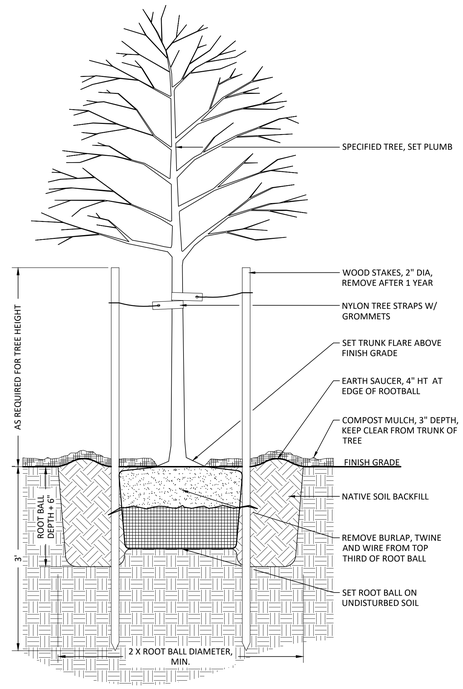
**Sheet No:**

**L2.0**

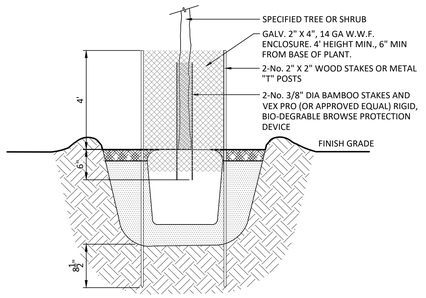
FILE PATH: C:\Revit_Local\23028_West Linn Public Works_tjorgensenZEPNR.rvt



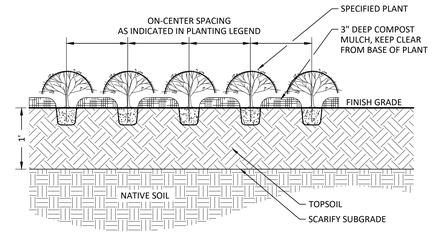

3 SAMPLE PLANTING TEMPLATE
Section
Scale: 1"-8'-0"



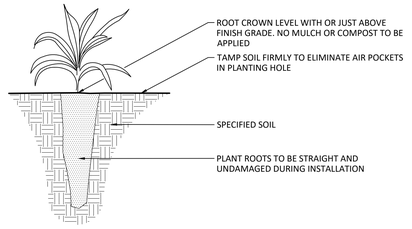

1 TREE PLANTING - DECIDUOUS
Section
NOT TO SCALE




6 BROWSE PROTECTION
Section
NOT TO SCALE

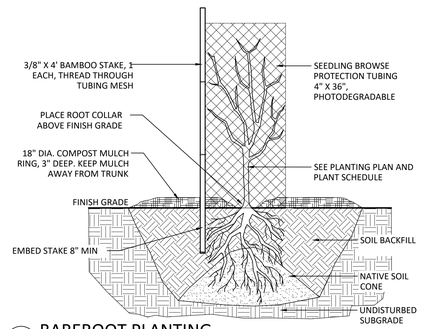



4 GROUNDCOVER PLANTING
Section
NOT TO SCALE

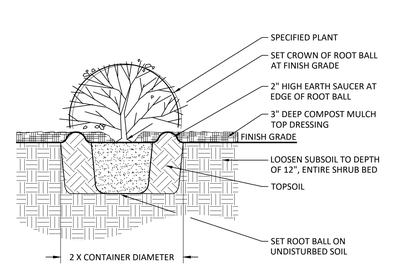



NOTE:
CREATE PLANTING HOLE BY DRIVING A STEEL SPIKE OR DIBBLE INTO THE GROUND AND WORKING BACK AND FORTH

7 PLUG PLANTING
Section
NOT TO SCALE




5 BAREROOT PLANTING
Section
NOT TO SCALE




2 SHRUB PLANTING
Section
NOT TO SCALE

THESE DRAWINGS ARE THE ORIGINAL UNPUBLISHED WORK OF THE ARCHITECT AND MAY NOT BE DUPLICATED OR USED WITHOUT THE WRITTEN CONSENT OF THE ARCHITECT.

Scott Edwards Architecture
2525 E Burnside St. 503.226.3617
Portland, OR 97214 seallp.com

REGISTERED LANDSCAPE ARCHITECT
OREGON
JULY 31, 2011
KEITH D. STREEL
PRELIMINARY NOT FOR CONSTRUCTION
EXPIRES: 05/31/26

**WEST LINN PUBLIC WORKS FACILITY**

**Job Number:** 23028

**WEST LINN, OR**

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

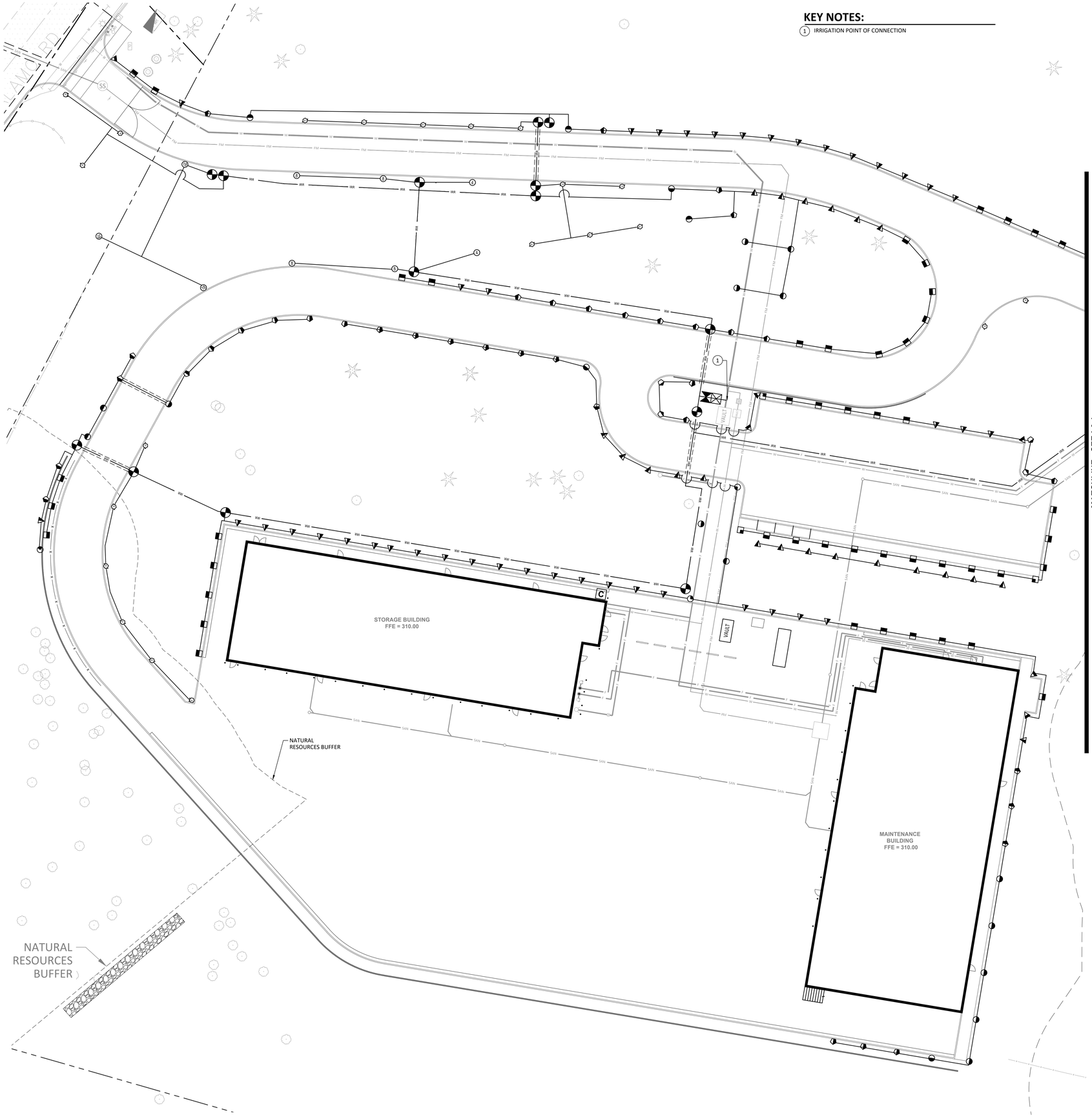
| ISSUE | DATE |
|---|---|
| 100% DESIGN DEVELOPMENT SET | 11/17/2025 |

**Drawing:**

**LANDSCAPE PLAN**

**Sheet No:**

**L2.1**




## KEY NOTES:

1. IRRIGATION POINT OF CONNECTION

## IRRIGATION LEGEND

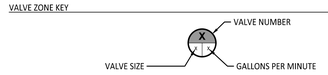
EQUIPMENT

| SYMBOL | DESCRIPTION |
|---|---|
| | BACKFLOW PREVENTOR - FEBCO MODEL 850, 2" OR APPROVED EQ. |
| | BALL VALVE - NIBCO T-560 OR APPROVED EQUAL. |
| | REMOTE CONTROL VALVE - RAINBIRD PEB, SIZE AS SHOWN REMOTE CONTROL VALVE |
| | QUICK COUPLER - RAINBIRD RC |
| | MANUAL DRAIN VALVE - |
| C | CONTROLLER - RAINBIRD ESP-LXME OR EQUAL |

PIPE

- MAINLINE - 2" SCH. 80 PVC
- SLEEVING - 4" SLEEVE FOR PIPES < 2"
- LATERAL LINE - .75", CLASS 200 PVC
- LATERAL LINE - 1.0", 1.25" & 1.5" CLASS 200 PVC
- LATERAL LINE - SIZE AS INDICATED, CLASS 200 PVC
- DRIP IRRIGATION - RAINBIRD SUB-SURFACE DRIPLINE XFS-00-00-100

VALVE ZONE KEY




HEAD SCHEDULE

| SYMBOL | DESCRIPTION | PSI | RADIUS | GPM |
|---|---|---|---|---|
| | RAINBIRD 1800-PRS HEADS W/ MPR NOZZLES | | | |
| | 1800-PRS-5 (F, H & Q) | 30 | 5' | .41, .20, .10 |
| | 1800-PRS-8 (F, H & Q) | 30 | 8' | 1.05, .52, .26 |
| | 1800-PRS-10 (F, H & Q) | 30 | 10' | 1.58, .79, .39 |
| | 1800-PRS-12 (F, H & Q) | 30 | 12' | 2.60, 1.30, .65 |
| | 1800-PRS-15 (F, H & Q) | 30 | 15' | 3.70, 1.85, .92 |
| | 1800-PRS-15 (SST & EST) | 30 | 4'X30', 4'X15' | 1.21, .61 |
| | RAINBIRD ROOT WATERING SYSTEM RWS-B-1401 | 40 | NA | .25 |
| | RAINBIRD VAN ROTATORY NOZZLES | | | |
| | R VAN-LCS, R-VAN-SST | 40 | 5X30', 5'X15' | .48, .24 |
| | R-VAN14 (360, 180, 90) | 40 | 8'-14' | 1.27, .63, .32 |
| | R VAN18 (360, 180, 90) | 40 | 13'-18' | 1.85, 1.01, .50 |
| | R VAN24 (360, 180, 90) | 40 | 17'-24' | 3.48, 1.68, .84 |
| | RAINBIRD 5000 PLUS MPR | | | |
| | 5000-MPR-25(F, H, & Q) | *45* | *25'* | *3.82, 1.98, 1.00* |
| | 5000-MPR-30(F, H, & Q) | *45* | *30'* | *5.78, 2.96, 1.40* |
| | 5000-MPR-35(F, H, & Q) | *45* | *35'* | *7.58, 3.81, 1.92* |
| | RAINBIRD FALCON 6500 | | | |
| P | 6500-PC | *40* | *41'-59'* | *3.3 - 13.7* |

0 10' 20' 40'
SCALE: 1" = 20'

Scott Edwards Architecture
2525 E Burnside St. 503.226.3617
Portland, OR 97214 seallp.com

REGISTERED LANDSCAPE ARCHITECT
PRELIMINARY
NOT FOR CONSTRUCTION
JEFFREY A. STREET
OREGON
2007/311
EXPIRES: 05/31/26

# WEST LINN PUBLIC WORKS FACILITY

**Job Number:** 23028

**WEST LINN, OR**

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

**100% DESIGN DEVELOPMENT SET ISSUE** **11/17/2025 DATE**

**Drawing:**

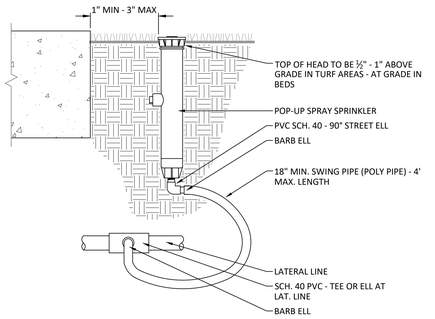
## PRELIMINARY IRRIGATION PLAN

**Sheet No:**

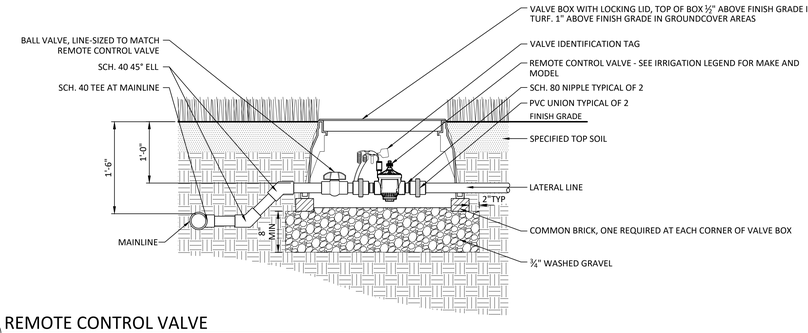
# L3.0

FILE PATH: C:\Revit_Local\23028_West Linn Public Works_Jorgensen2EPNR.rvt

THESE DRAWINGS ARE THE ORIGINAL UNPUBLISHED WORK OF THE ARCHITECT AND MAY NOT BE DUPLICATED OR USED WITHOUT THE WRITTEN CONSENT OF THE ARCHITECT.

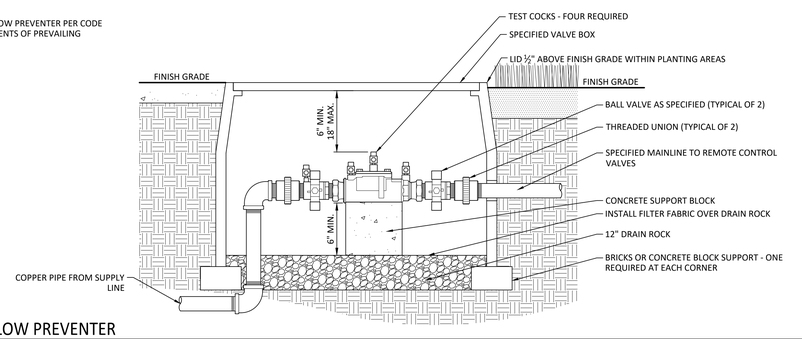



3 12" POP-UP SPRAY SPRINKLER
Section NTS



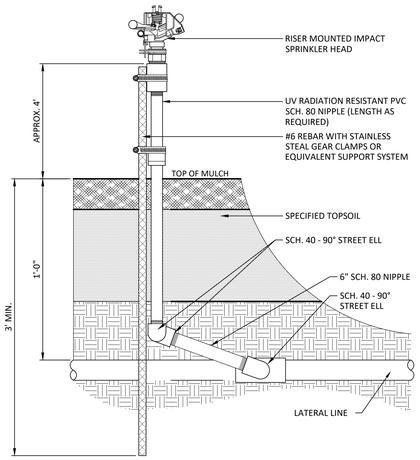

2 REMOTE CONTROL VALVE
Section NTS

NOTE:
1. INSTALL BACKFLOW PREVENTER PER CODE AND REQUIREMENTS OF PREVAILING JURISDICTION



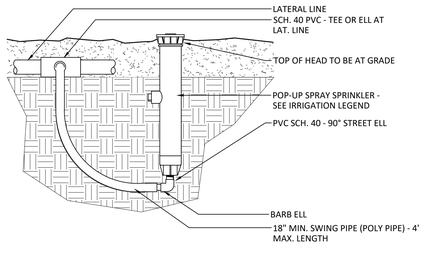

1 BACKFLOW PREVENTER
Section NTS

*SCALE: NTS*

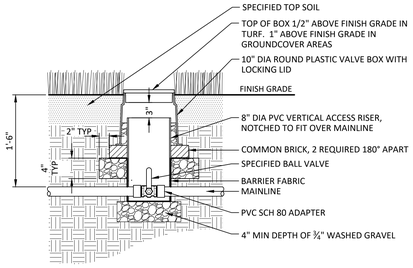



NOTE:
1. RISER MOUNTED IMPACTED HEADS TO ONLY BE INSTALLED IN TEMPOARY IRRIGAITON AREAS ONLY.

7 RISER MOUNTED IMPACT HEAD
Section NTS

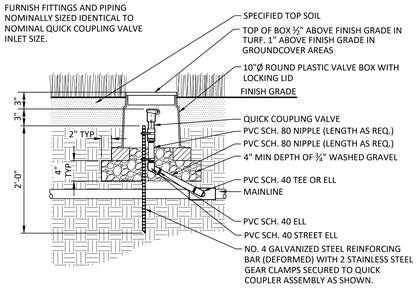



8 TEMPORARY POP-UP HEAD
Section NTS

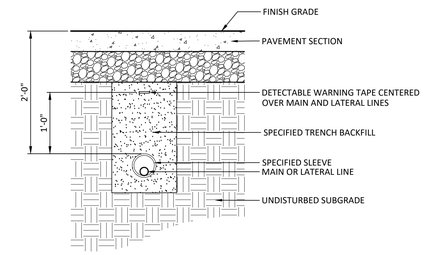



6 ISOLATION VALVE
Section NTS

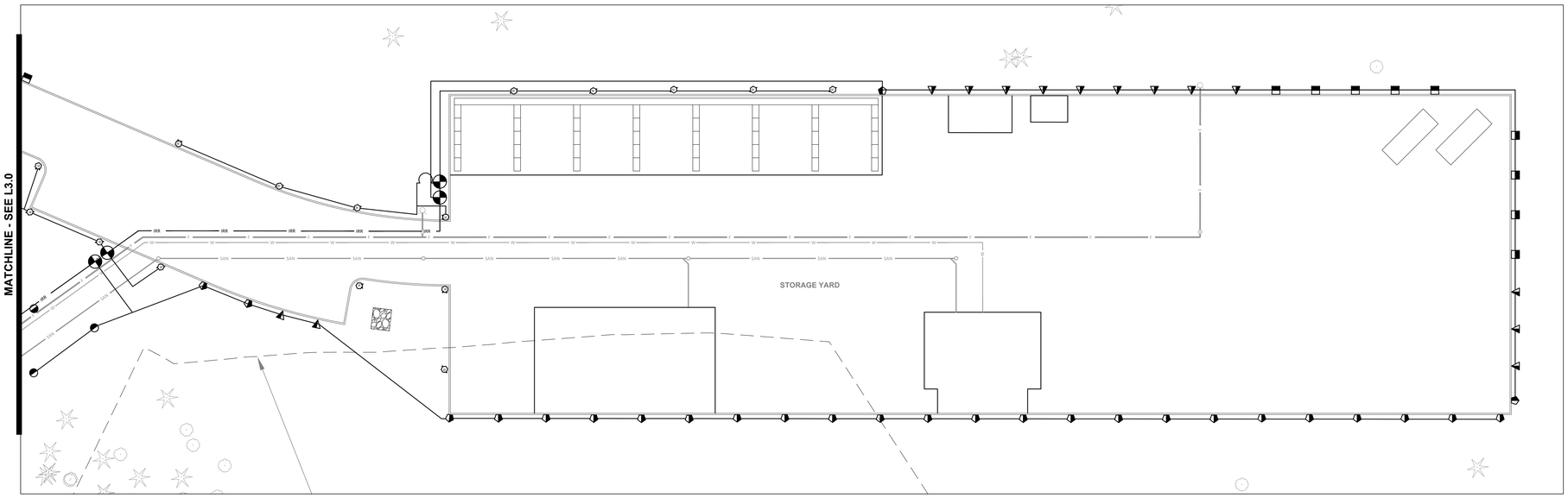
NOTE:
1. FURNISH FITTINGS AND PIPING NOMINALLY SIZED IDENTICAL TO NOMINAL QUICK COUPLING VALVE INLET SIZE.




5 QUICK COUPLER
Section NTS




4 SLEEVING
Section NTS




**IRRIGATION PLAN**
SCALE: 1" = 20'

THESE DRAWINGS ARE THE ORIGINAL UNPUBLISHED WORK OF THE ARCHITECT AND MAY NOT BE DUPLICATED OR USED WITHOUT THE WRITTEN CONSENT OF THE ARCHITECT.

FILE PATH: C:\Revit_Local\23028_West Linn Public Works_tjorgensenZEPNR.rvt

Scott Edwards Architecture
2525 E Burnside St. 503.226.3617
Portland, OR 97214 seallp.com

REGISTERED PROFESSIONAL LANDSCAPE ARCHITECT
PRELIMINARY
NOT FOR CONSTRUCTION
JEFFREY C. STREEL
OREGON
2007/3/11
EXPIRES: 05/31/26

# WEST LINN PUBLIC WORKS FACILITY

**Job Number:** 23028

**WEST LINN, OR**

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

**100% DESIGN DEVELOPMENT SET ISSUE** **11/17/2025 DATE**

**Drawing:**

## IRRIGATION DETAILS

**Sheet No:**

# L3.1

ARBORIST & STORMWATER MANAGEMENT REPORTS

Todd Prager & Associates LLC

# Arborist Report and Tree Preservation Plan

For West Linn Public Works Facility at
Salamo Road in West Linn, Oregon

**Prepared by:**
**Liliana Morgan, ISA Certified Arborist ® PN-9492A,**
**Todd Prager & Associates, LLC**

**12/09/2025**

# Table of Contents

Purpose ..... 3
Scope of Work and Limitations ..... 3
General Description ..... 3
Tree Inventory ..... 4
Tree Preservation Plan ..... 4
Tree Protection Standards ..... 6
Conclusion ..... 9
Attachment 1 – Tree Inventory ..... 10
Attachment 2 – Tree Removal and Protection Exhibit ..... 15
Attachment 3 – Example Tree Protection Signage ..... 16
Attachment 4 – Assumptions and Limiting Conditions ..... 17

# City of West Linn Public Works Facility – West Linn, Oregon Arborist Report and Tree Preservation Plan December 9, 2025

## Purpose

This Arborist Report and Tree Preservation Plan is for the City of West Linn Public Works Facility Development. This report describes the existing trees located on the project site, as well as recommendations for tree removal, retention and protection. This report is based on observations made by ISA Certified Arborist (PN-9492A) and Qualified Tree Risk Assessor Liliana Morgan during site visits conducted between June 2nd and 6th, 2025 and site plan coordination with the City of West Linn and their consultants.

## Scope of Work and Limitations

Todd Prager & Associates, LLC was contracted by the City of West Linn to collect tree inventory data for individual trees measuring six inches and larger in diameter within and near the work limits at the site, and to develop a tree preservation plan for the project. The site is planned for public infrastructure development including maintenance, storage and administrative buildings, with parking and associated access, utility, and grading improvements. Site plans were provided by Harper Houf Peterson Righellis Inc. (HHPR) illustrating the location of existing trees and potential construction impacts. Combined survey data from past survey work was the basis for tree data collection in the field. Tree removals that occurred since survey data was collected were recorded in the inventory in Attachment 1 and noted on the tree removal and protection exhibit in Attachment 2.

A visual tree assessment was performed on individual trees located within a defined tree assessment limit covering the area of the site to be impacted by construction activities. The enclosed tree inventory data sheet in Attachment 1 includes data for trees located within the tree assessment limit, with the addition of several trees outside said limit which were determined during field inspection as potentially subject to construction impacts. Trees were evaluated in terms of general condition and potential construction impacts. Following the inventory fieldwork, we coordinated with HHPR to discuss tree protection and removal recommendations.

The client may choose to accept or disregard the recommendations contained herein, or seek additional advice. Neither this author nor Todd Prager & Associates, LLC have assumed any responsibility for liability associated with the trees on or adjacent to this site.

## General Description

The West Linn Public Works Facility Development site is located adjacent to 23900 Salamo Road in West Linn, Oregon. The site is comprised of three tax lots (21E35D 05400, 21E36 02300, and 21E35D 05200), totaling approximately 33.5 acres. The latter tax lot, which contains a City reservoir at 23900 Salamo Road, did not fall

within the assessment limits. Trees within the assessment limits consist primarily of native tree groves, concentrated along the steep slopes on the north and west edges of the site, and dispersed along the northern plateau.

The groves of native trees are a mix of ages with most of the trees in fair to good health and structural condition. The trees are undergoing natural stand dynamics, whereby trees are competing with one another. Over time, some trees become dominant or codominant, while others are suppressed beneath the dominant overstory. Stands along the eastern slopes represent continuous, dense canopy comprised of primarily bigleaf maple (*Acer macrophyllum*) with high, competing crowns. Douglas-fir (*Pseudotsuga menziesii*) are scattered throughout the site. Numerous swaths of removals evidently took place since the survey data was collected, and areas of the northwestern slope and adjacent plateau were cleared for the installation of a winding gravel access road. Some downed wood remains on site.

The exhibit in Attachment 2 by HHPR includes the locations of existing trees in relation to proposed construction impacts such as grading, driveways, parking, utilities, and buildings. The tree numbers in Attachment 2 correspond to the tree numbers in the inventory in Attachment 1. The trees were also tagged with their corresponding numbers in the field.

## Tree Inventory

During site visits conducted on June 2nd, 4th, and 6th 2025, I and an associate assessed all existing trees over 6-inches in trunk diameter (DBH) inside the delineated assessment area of the West Linn Public Works Facility project site. A spreadsheet of the inventoried trees is provided in Attachment 1. The inventory lists the tree number, species (common and scientific names), DBH, crown radius, health condition, structural condition, whether the tree is significant as defined in the City of West Linn Community Development Code, significant tree protected area (i.e. dripline plus 10 feet), treatment (remove/retain), and pertinent comments.

The tree numbers in the inventory in Attachment 1 correspond to the tree numbers in the tree exhibit in Attachment 2. Trees are further denoted as significant or non-significant in the exhibit in Attachment 2.

## Tree Preservation Plan

Trees suitable for preservation and tree removals were evaluated based on the initial site plan provided by Scott Edwards Architecture and the City of West Linn. Table 1 provides a summary of the number of inventoried non-significant and significant trees by treatment recommendation. Note that none of the trees in the 0.56-acre City reservoir lot, nor significant swaths of trees within the primary development lots, are included in the calculations in Table 1. Only trees within the assessment limit are addressed in the below calculations.

**Table 1. Number of Inventoried Trees by Treatment and Significance.**

| Treatment | Remove | Retain | Total |
|---|---|---|---|
| Non-Significant Trees | 31 | 30 (49%) | **61** |
| Significant Trees | 84 | 67 (44%) | **151** |
| **Total** | 115 | 97 (46%) | **212** |

**Tree Retention and Removal**

Of the 212 inventoried trees at the site, 97 trees are planned for retention, and 115 trees are planned for removal to accommodate the proposed development. Note that all of the non-inventoried trees in the areas outside of the assessment limit are also planned for retention. The following is a discussion of the proposed significant and non-significant tree retention and removal.

*Significant Tree Retention*

The 97 trees planned for retention include 67 significant trees. Note that 63 of the 67 significant trees are native to the West Linn area and are comprised of Douglas-fir, bigleaf maple, and black cottonwood (*Populus trichocarpa*) species.

During the tree inventory fieldwork, we evaluated the trees in terms of potential impacts from adjacent tree removal. Trees located along the southwest slope of the site are part of a cohesive grove and will therefore have an elevated risk of failure following site clearing and development due to changes in wind dynamics. Generally, trees located within the interior of a forested stand are adapted to the shelter provided by edge-grown trees and are at increased risk of failure when edge trees are removed. Trees selected for preservation ideally should be the more dominant species with higher live crown ratios[1] and lower height to diameter ratios[2] which indicate they are more structurally stable.

While most of the trees selected for preservation are anticipated to be viable for the foreseeable future, it is important to note that the removal of edge trees from a grove inherently increases the risk of adjacent tree failure. Therefore, I recommend re-assessing the trees at the time of site clearing and periodically during construction to verify that they are suitable for preservation and do not present unacceptable risks to people or property. For trees identified to be at an increased risk, coordination with the City of West Linn will be required to appropriately mitigate the risk in accordance with code requirements.

*Non-Significant Tree Retention*

The other 31 trees planned for retention are not significant. These trees are not significant because they are less than 12-inch DBH. They are being retained because they do not conflict with proposed site improvements.

[1] Live crown ratio is the ratio of the height of the live crown of a tree to the total height of the tree. Generally, the higher the live crown ratio, the better the structural stability of a tree.
[2] Height to diameter ratio is the ratio of the height of a tree to the diameter of the trunk. Generally, the lower the height to diameter ratio, the better the structural stability of a tree.

*Tree Removal (Significant and Non-Significant)*
The 114 trees planned for removal include 84 significant trees and 30 non-significant trees. The reasons for the proposed removals are for mass grading of the site, construction of numerous facility buildings, road/access construction, and construction of utilities to serve the buildings.

## Tree Protection Standards

This section of the report includes tree protection recommendations in accordance with the City of West Linn Code and Tree Technical Manual.

**Site Specific Tree Protection Recommendations**
The following site-specific tree protection standards apply to this project:

- **Tree Protection Fencing**: The trees to be retained should be protected with tree protection fencing as shown in Attachment 2.
- **Adjust Grading**: Many of the trees to be preserved that are interior to the site have proposed grading within their tree protection zones. This grading will need to be adjusted so it is outside the protection zones. If grading is not possible to adjust, additional trees may need to be removed.
- **Adjust Riprap**: Trees 37505, 37506, and 37529 are outside the tree assessment limits but may be impacted by proposed riprap shown in Attachment 2. This riprap should be adjusted to outside a radius of one foot per inch of DBH for the trees. If the riprap cannot be adjusted, these trees may need to be removed.
- **Directional Felling**: Fell the trees to be removed away from the trees to be retained so they do not contact or otherwise damage the trunks or branches of the trees to be retained. No vehicles or heavy equipment should be permitted within the tree protection zones during tree removal operations. Trees to be removed from within the tree protection zones shall be removed under the direction of the project arborist.
- **Stump Removal**: Stumps of trees removed within the tree protection zones shall be retained in place, carefully stump ground, or have their structural roots cut before pulling with a machine under the direction of project arborist to protect the root systems of the trees to be retained.
- **Sediment Fence**: Ensure sediment fence is placed outside the tree protection zones to protect the root systems of the trees to be retained.
- **Periodic Risk Assessments**: The trees to be retained that were part of a larger grove will be at increased risk of failure after adjacent tree removal. These trees should be monitored periodically and after storm events by the project arborist following site clearing to determine if any pose intolerable risks. For trees identified to be at increased risk, coordination with the City of West Linn will be required to appropriately address the risks in accordance with code requirements.
- **Tree Protection Zone Encroachments**: In some cases, the proposed development will encroach within tree protection zones. In these cases, alternative tree protection measures will be needed. Tree protection fencing initially installed in the locations shown in Attachment 2 should only be adjusted based on coordination with the project arborist. Exploratory

excavation is recommended during the grading and site improvement phase of construction in order to locate roots of protected trees and assess potential impacts to critical roots. The contractor should coordinate with the project arborist to adjust tree protection fencing, monitor exploratory excavation, and evaluate potential root impacts. The arborist should then prepare a supplemental memorandum containing recommendations to minimize root impacts for specific trees. If critical roots are encountered, alternative construction techniques may be needed to avoid critical root impacts.

- **Pruning**: Some of the trees to be retained will need to be pruned for construction or future vehicle clearance. Pruning should be directed by the project arborist and completed by a qualified tree service with an ISA Certified Arborist on site. All pruning shall be completed in a manner that is consistent with ANSI A300 pruning standards and corresponding ISA Best Management Practices.

**General Tree Protection Standards**
The following general tree protection standards are consistent with the City of West Linn Code and Tree Technical Manual.

***Before Construction***

1. **Tree Protection Zone.** The project arborist shall designate the Tree Protection Zone (TPZ) for each tree to be protected. Where feasible, the size of the TPZ shall be established at the dripline of the tree plus 10-feet for significant trees. Alternatively, the TPZ shall be established at a minimum radius from the trunks of 0.5 feet per inch of DBH. Where improvements (driveways, buildings, and utilities) must be installed closer to the tree(s), the TPZ may be established within the standard setbacks if the project arborist, in coordination with the City Arborist, determines that the tree(s) will not be unduly damaged. The location of TPZs shall be shown on construction drawings.
2. **Protection Fencing.** Protection fencing shall serve as the tree protection zone and shall be erected before demolition, grubbing, grading, or construction begins. All trees to be retained shall be protected by six-foot-high chain link fences installed at the edge of the TPZ. Protection fencing shall be secured to two-inch diameter galvanized iron posts, driven to a depth of a least two feet, placed no further than 10-feet apart. If fencing is located on pavement, posts may be supported by an appropriate grade level concrete base. Protection fencing shall remain in place until final inspection of the project permit, or in consultation with the project arborist.
3. **Signage.** An 8.5x11 –inch sign stating, “WARNING: Tree Protection Zone,” shall be displayed on each protection fence at all times. See Attachment 3 for an example.
4. **Designation of Cut Trees.** Trees to be removed shall be clearly marked with construction flagging, tree-marking paint, or other methods approved in advance by the project arborist. Trees shall be carefully removed so as to avoid either above or below ground damage to those trees to be preserved.
5. **Preconstruction Conference.** The project arborist shall be on site to discuss methods of tree removal and tree protection prior to any construction.

6. **Verification of Tree Protection Measures.** Prior to commencement of construction, the project arborist shall verify in writing to the City Arborist that tree protection fencing has been satisfactorily installed.

***During Construction***

7. **Tree Protection Zone Maintenance.** The protection fencing shall not be moved, removed, or entered by equipment except under direction of the project arborist, in coordination with the City Arborist.
8. **Storage of Material or Equipment.** The contractor shall not store materials or equipment within the TPZ.
9. **Excavation within the TPZ.** Excavation with the TPZ shall be avoided if alternatives are available. If excavation within the TPZ is unavoidable, the project arborist shall evaluate the proposed excavation to determine methods to minimize impacts to trees. This can include tunneling, hand digging or other approaches. All construction within the TPZ shall be under the on-site technical supervision of the project arborist, in coordination with the City Arborist.
10. **Tree Protection Zone.** The project arborist shall monitor construction activities and progress and provide written reports to the City at regular intervals. Tree protection inspections shall occur monthly or more frequently if needed.
11. **Quality Assurance.** The project arborist shall supervise proper execution of this plan during construction activities that could encroach on retained trees. Tree protection site inspection monitoring reports shall be provided to the City on a regular basis throughout construction.

***Post Construction***

12. **Final Report.** After the project has been completed, the project arborist shall provide a final report to the City. The final report shall include concerns about any trees negatively impacted during construction, and describe the measures needed to maintain and protect the remaining trees for a minimum of two years after project completion.

## Conclusion

The recommendations in this report address the applicable requirements in the City of West Linn Code and Tree Technical Manual for the West Linn Public Works Facility project.

Please contact me if you have questions, concerns, or need any additional information.

Sincerely,

Liliana Morgan
*ISA Certified Arborist ®, PN-9492A*
*ISA Tree Risk Assessment Qualified*
*ASCA Tree and Plant Appraisal Qualified*

Enclosures: Attachment 1 – Tree Inventory
Attachment 2 – Tree Removal and Protection Exhibit
Attachment 3 – Example Tree Protection Signage
Attachment 4 – Assumptions and Limiting Conditions

**Attachment 1 – Tree Inventory**
**Attachment 2 – Tree Removal and Protection Exhibit**
**Attachment 3 – Example Tree Protection Signage**
**Attachment 4 – Assumptions and Limiting Conditions**

Todd Prager & Associates LLC

**Attachment 1**
**Tree Inventory**
**West Linn Public Works Facility at Salamo Road**
June 6th, 2025

| Survey Number | Common Name | Scientific Name | DBH[1] (in) | Crown radius[2] (ft) | Health condition[3] | Structural condition[3] | Significant Tree[4] | Significant Tree crown radius + 10' | Significant Tree Area[5] | Treatment | Site notes/ Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 34015 | bigleaf maple | *Acer macrophyllum* | 13 | 7 | fair | fair | X | 17 | 908 | retain | multi-stem, asymmetrical crown |
| 34016 | Douglas-fir | *Pseudotsuga menziesii* | 38 | 10 | fair | fair | X | 20 | 1257 | retain | multi-stem, codominant leaders with inclusion, asymmetrical crown, dead branches 0 to 2" diameter |
| 34017 | Douglas-fir | *Pseudotsuga menziesii* | 23 | 15 | fair | fair | X | 25 | 1963 | retain | thin foliage/crown, high crown, dead branches 0 to 2" diameter |
| 34017.01 | bigleaf maple | *Acer macrophyllum* | 6 | 5 | poor | poor | | n/a | n/a | retain | narrow crown, high crown, thin foliage/crown |
| 34017.02 | bigleaf maple | *Acer macrophyllum* | 7 | 3 | poor | very poor | | n/a | n/a | remove | thin foliage/crown, high crown, narrow crown, trunk wound |
| 34017.03 | bigleaf maple | *Acer macrophyllum* | 13 | 5 | poor | poor | X | 15 | 707 | retain | multi-stem, narrow crown, high crown, thin foliage/crown, trunk wound |
| 34017.04 | bigleaf maple | *Acer macrophyllum* | 6 | 3 | very poor | very poor | | n/a | n/a | retain | self-corrected phototropic lean, high crown, narrow crown, choked by ivy |
| 34019 | bigleaf maple | *Acer macrophyllum* | 44 | 20 | fair | fair | X | 30 | 2827 | remove | multi-stem, choked by ivy, dead branches 0 to 2" diameter, narrow crown, high crown |
| 34019.01 | bigleaf maple | *Acer macrophyllum* | 10 | 8 | poor | poor | | n/a | n/a | remove | asymmetrical crown, self-corrected phototropic lean, choked by ivy, trunk wound |
| 34019.02 | bigleaf maple | *Acer macrophyllum* | 12 | 12 | fair | poor | X | 22 | 1520 | remove | asymmetrical crown, suppressed, choked by ivy |
| 34028 | bigleaf maple | *Acer macrophyllum* | 13 | 7 | fair | poor | X | 17 | 908 | remove | choked by ivy, narrow crown, high crown, thin foliage/crown |
| 34029 | bigleaf maple | *Acer macrophyllum* | 10 | 6 | poor | very poor | | n/a | n/a | remove | self-corrected phototropic lean, crooked trunk, trunk cavities |
| 34030 | bigleaf maple | *Acer macrophyllum* | 11 | 0 | dead | dead | n/a | n/a | n/a | n/a | removed for gravel roadway |
| 34031 | bigleaf maple | *Acer macrophyllum* | 12 | 0 | dead | dead | n/a | n/a | n/a | n/a | removed for gravel roadway |
| 34033 | bigleaf maple | *Acer macrophyllum* | 12 | 0 | dead | dead | n/a | n/a | n/a | n/a | removed for gravel roadway |
| 34034 | bigleaf maple | *Acer macrophyllum* | 10 | 0 | dead | dead | n/a | n/a | n/a | n/a | removed for gravel roadway |
| 34035 | bigleaf maple | *Acer macrophyllum* | 18 | 0 | dead | dead | n/a | n/a | n/a | n/a | removed for gravel roadway |
| 34036 | bigleaf maple | *Acer macrophyllum* | 6 | 0 | dead | dead | n/a | n/a | n/a | n/a | removed for gravel roadway |
| 34037 | bigleaf maple | *Acer macrophyllum* | 6 | 0 | dead | dead | n/a | n/a | n/a | n/a | removed for gravel roadway |
| 34038 | bigleaf maple | *Acer macrophyllum* | 23 | 15 | fair | fair | X | 25 | 1963 | remove | multi-stem, dead branches 0 to 2" diameter, asymmetrical crown, high crown |
| 34041 | bigleaf maple | *Acer macrophyllum* | 6 | 0 | dead | dead | n/a | n/a | n/a | n/a | removed for gravel roadway |
| 34042 | bigleaf maple | *Acer macrophyllum* | 17 | 14 | fair | poor | X | 24 | 1810 | remove | multi-stem, trunk wound, high crown, asymmetrical crown, bowed trunk |
| 34043 | bigleaf maple | *Acer macrophyllum* | 34 | 18 | fair | fair | X | 28 | 2463 | remove | multi-stem, diameter measured at 4', dead branches 2 to 4" diameter, high crown |
| 34044 | bigleaf maple | *Acer macrophyllum* | 20 | 18 | fair | fair | X | 28 | 2463 | remove | self-corrected phototropic lean, dead branches 0 to 2" diameter, codominant leaders |
| 34049 | bigleaf maple | *Acer macrophyllum* | 13 | 0 | dead | dead | n/a | n/a | n/a | n/a | removed for gravel roadway |
| 34049.01 | bigleaf maple | *Acer macrophyllum* | 17 | 12 | fair | fair | X | 22 | 1520 | retain | asymmetrical crown,high crown,dead branches 2 to 4" diameter |
| 34049.02 | bigleaf maple | *Acer macrophyllum* | 9 | 5 | fair | poor | | n/a | n/a | retain | dead branches 2 to 4" diameter,suppressed,epicormic branches,high crown |
| 34049.03 | Douglas-fir | *Pseudotsuga menziesii* | 51 | 18 | poor | poor | X | 28 | 2463 | retain | multi-stem, thin foliage/crown, narrow crown, high crown, dead branches 0 to 2" diameter, other, asymmetrical crown, ivy covering one stem |
| 34080 | bigleaf maple | *Acer macrophyllum* | 23 | 12 | good | fair | X | 22 | 1520 | retain | asymmetrical crown, dead branches 0 to 2" diameter |
| 34083 | Douglas-fir | *Pseudotsuga menziesii* | 23 | 14 | good | good | X | 24 | 1810 | retain | asymmetrical crown |
| 34084 | bigleaf maple | *Acer macrophyllum* | 17 | 18 | good | fair | X | 28 | 2463 | retain | multi-stem, other, invasive ground cover, untagged |
| 34095 | bigleaf maple | *Acer macrophyllum* | 8 | 0 | dead | dead | n/a | n/a | n/a | n/a | stump, resprouting from base |
| 34105 | Douglas-fir | *Pseudotsuga menziesii* | 7 | 0 | dead | dead | n/a | n/a | n/a | n/a | removed for gravel roadway |
| 34106 | Douglas-fir | *Pseudotsuga menziesii* | 21 | 0 | dead | dead | n/a | n/a | n/a | n/a | removed for gravel roadway |
| 34107 | Douglas-fir | *Pseudotsuga menziesii* | 9 | 0 | dead | dead | n/a | n/a | n/a | n/a | removed for gravel roadway |
| 34109 | bigleaf maple | *Acer macrophyllum* | 5 | 0 | dead | dead | n/a | n/a | n/a | n/a | removed for gravel roadway |
| 34111 | bigleaf maple | *Acer macrophyllum* | 9 | 5 | fair | poor | | n/a | n/a | remove | dead branches 2 to 4" diameter, thin foliage/crown, high crown, narrow crown |
| 34112 | bigleaf maple | *Acer macrophyllum* | 8 | 4 | fair | poor | | n/a | n/a | remove | thin foliage/crown, narrow crown, high crown, asymmetrical crown |
| 34113 | bigleaf maple | *Acer macrophyllum* | 7 | 4 | fair | poor | | n/a | n/a | remove | thin foliage/crown, asymmetrical crown, high crown, narrow crown |
| 34127 | Douglas-fir | *Pseudotsuga menziesii* | 24 | 23 | good | fair | X | 33 | 3421 | retain | dead branches greater than 4", mechanical damage to lower limbs |
| 34127.01 | Douglas-fir | *Pseudotsuga menziesii* | 16 | 8 | fair | fair | X | 18 | 1018 | retain | thin foliage/crown, asymmetrical crown, suppressed |
| 34127.02 | Douglas-fir | *Pseudotsuga menziesii* | 16 | 10 | good | fair | X | 20 | 1257 | retain | asymmetrical crown, narrow crown |
| 34127.03 | Douglas-fir | *Pseudotsuga menziesii* | 18 | 8 | fair | fair | X | 18 | 1018 | retain | thin foliage/crown, narrow crown, high crown, dead branches 0 to 2" diameter |
| 34130 | Douglas-fir | *Pseudotsuga menziesii* | 22 | 18 | fair | fair | X | 28 | 2463 | remove | thin foliage/crown,dead branches 0 to 2" diameter |
| 34131 | Douglas-fir | *Pseudotsuga menziesii* | 21 | 18 | good | good | X | 28 | 2463 | remove | |
| 34141 | Douglas-fir | Douglas-fir | 22 | 25 | good | good | X | 35 | 3848 | retain | |
| 34142 | Douglas-fir | Douglas-fir | 12 | 0 | dead | dead | n/a | n/a | n/a | n/a | STUMP |
| 34143 | Douglas-fir | Douglas-fir | 13 | 0 | dead | dead | n/a | n/a | n/a | n/a | STUMP |
| 34144 | Douglas-fir | Douglas-fir | 15 | 0 | dead | dead | n/a | n/a | n/a | n/a | STUMP |
| 34145 | Douglas-fir | Douglas-fir | 14 | 0 | dead | dead | n/a | n/a | n/a | n/a | STUMP |
| 34182 | bigleaf maple | *Acer macrophyllum* | 36 | 15 | fair | fair | X | 25 | 1963 | remove | multi-stem, narrow crown, epicormic branches, dead branches 2 to 4" diameter |
| 34183 | bigleaf maple | *Acer macrophyllum* | 19 | 10 | fair | fair | X | 20 | 1257 | remove | multi-stem, suppressed, asymmetrical crown |
| 34184 | Douglas-fir | *Pseudotsuga menziesii* | 22 | 12 | good | fair | X | 22 | 1520 | remove | dead branches 0 to 2" diameter, high crown |
| 34185 | Douglas-fir | *Pseudotsuga menziesii* | 10 | 5 | fair | fair | | n/a | n/a | remove | asymmetrical crown, suppressed |
| 34186 | bigleaf maple | *Acer macrophyllum* | 24 | 10 | fair | fair | X | 20 | 1257 | remove | multi-stem, suppressed, asymmetrical crown |
| 34187 | bigleaf maple | *Acer macrophyllum* | 9 | 6 | fair | fair | | n/a | n/a | remove | self-corrected phototropic lean, narrow crown, high crown |
| 34187.01 | Douglas-fir | *Pseudotsuga menziesii* | 7 | 4 | fair | poor | | n/a | n/a | remove | asymmetrical crown, thin foliage/crown, lost and regrew top |

Todd Prager & Associates LLC

**Attachment 1**
**Tree Inventory**
**West Linn Public Works Facility at Salamo Road**
June 6th, 2025

| Survey Number | Common Name | Scientific Name | DBH[1] (in) | Crown radius[2] (ft) | Health condition[3] | Structural condition[3] | Significant Tree[4] | Significant Tree crown radius + 10' | Significant Tree Area[5] | Treatment | Site notes/ Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 34187.02 | Douglas-fir | *Pseudotsuga menziesii* | 24 | 12 | fair | fair | X | 22 | 1520 | remove | dead branches 0 to 2" diameter,asymmetrical crown,high crown |
| 34187.03 | bigleaf maple | *Acer macrophyllum* | 10 | 10 | fair | fair | | n/a | n/a | remove | asymmetrical crown, high crown |
| 34187.04 | bigleaf maple | *Acer macrophyllum* | 10 | 10 | fair | fair | | n/a | n/a | remove | asymmetrical crown, bowed trunk, high crown |
| 34188 | bigleaf maple | *Acer macrophyllum* | 7 | 5 | fair | fair | | n/a | n/a | remove | narrow crown, high crown, suppressed |
| 34189 | bigleaf maple | *Acer macrophyllum* | 9 | 8 | fair | fair | | n/a | n/a | remove | suppressed, high crown, narrow crown, epicormic branches |
| 34264 | Douglas-fir | *Pseudotsuga menziesii* | 13 | 0 | dead | dead | n/a | n/a | n/a | n/a | STUMP |
| 34265 | Douglas-fir | *Pseudotsuga menziesii* | 15 | 0 | dead | dead | n/a | n/a | n/a | n/a | STUMP |
| 34266 | Douglas-fir | *Pseudotsuga menziesii* | 9 | 0 | dead | dead | n/a | n/a | n/a | n/a | STUMP |
| 34267 | Douglas-fir | *Pseudotsuga menziesii* | 17 | 0 | dead | dead | n/a | n/a | n/a | n/a | STUMP |
| 34269 | Douglas-fir | *Pseudotsuga menziesii* | 17 | 0 | dead | dead | n/a | n/a | n/a | n/a | STUMP |
| 34270 | Douglas-fir | *Pseudotsuga menziesii* | 14 | 0 | dead | dead | n/a | n/a | n/a | n/a | STUMP |
| 34271 | Douglas-fir | *Pseudotsuga menziesii* | 18 | 0 | dead | dead | n/a | n/a | n/a | n/a | STUMP |
| 34272 | Douglas-fir | *Pseudotsuga menziesii* | 20 | 0 | dead | dead | n/a | n/a | n/a | n/a | STUMP |
| 34273 | Douglas-fir | *Pseudotsuga menziesii* | 12 | 0 | dead | dead | n/a | n/a | n/a | n/a | STUMP |
| 34274 | Douglas-fir | *Pseudotsuga menziesii* | 11 | 0 | dead | dead | n/a | n/a | n/a | n/a | STUMP |
| 34275 | Douglas-fir | *Pseudotsuga menziesii* | 20 | 0 | dead | dead | n/a | n/a | n/a | n/a | STUMP |
| 34276 | Douglas-fir | *Pseudotsuga menziesii* | 14 | 0 | dead | dead | n/a | n/a | n/a | n/a | STUMP |
| 34277 | Douglas-fir | *Pseudotsuga menziesii* | 13 | 0 | dead | dead | n/a | n/a | n/a | n/a | STUMP |
| 34278 | Douglas-fir | *Pseudotsuga menziesii* | 22 | 0 | dead | dead | n/a | n/a | n/a | n/a | STUMP |
| 34279 | Douglas-fir | *Pseudotsuga menziesii* | 26 | 0 | dead | dead | n/a | n/a | n/a | n/a | STUMP |
| 34302 | Douglas-fir | *Pseudotsuga menziesii* | 23 | 15 | good | fair | X | 25 | 1963 | remove | dead branches 0 to 2" diameter, asymmetrical crown, trunk wound |
| 34303 | bigleaf maple | *Acer macrophyllum* | 19 | 12 | good | good | X | 22 | 1520 | remove | multi-stem, asymmetrical crown |
| 34329 | bigleaf maple | *Acer macrophyllum* | 34 | 20 | good | good | X | 30 | 2827 | remove | multi-stem |
| 34343 | black cottonwood | *Populus trichocarpa* | 21 | 18 | good | fair | X | 28 | 2463 | retain | dead branches 2 to 4" diameter, asymmetrical crown |
| 34343.01 | Douglas-fir | *Pseudotsuga menziesii* | 20 | 15 | good | fair | X | 25 | 1963 | retain | dead branches 0 to 2" diameter, suppressed |
| 34344 | Douglas-fir | *Pseudotsuga menziesii* | 24 | 18 | good | good | X | 28 | 2463 | retain | asymmetrical crown |
| 34345 | bigleaf maple | *Acer macrophyllum* | 8 | 12 | fair | fair | | n/a | n/a | retain | asymmetrical crown, thin foliage/crown, suppressed |
| 34346 | cherry | *Prunus spp.* | 16 | 8 | fair | fair | X | 18 | 1018 | retain | thin foliage/crown, dead branches 0 to 2" diameter, narrow crown, high crown |
| 34346.01 | bigleaf maple | *Acer macrophyllum* | 23 | 16 | good | fair | X | 26 | 2124 | retain | multi-stem, dead branches 0 to 2" diameter, asymmetrical crown |
| 34346.02 | bigleaf maple | *Acer macrophyllum* | 24 | 20 | good | good | X | 30 | 2827 | retain | multi-stem, asymmetrical crown |
| 34346.03 | Douglas-fir | *Pseudotsuga menziesii* | 11 | 10 | good | fair | | n/a | n/a | retain | self-corrected phototropic lean, asymmetrical crown |
| 34346.04 | bigleaf maple | *Acer macrophyllum* | 13 | 13 | good | good | X | 23 | 1662 | retain | asymmetrical crown |
| 34346.05 | bigleaf maple | *Acer macrophyllum* | 12 | 18 | good | good | X | 28 | 2463 | retain | asymmetrical crown |
| 34347 | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | tree does not exist |
| 34348 | Douglas-fir | *Pseudotsuga menziesii* | 7 | 4 | fair | fair | | n/a | n/a | retain | thin foliage/crown, suppressed |
| 34349 | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | tree does not exist |
| 34350 | black cottonwood | *Populus trichocarpa* | 24 | 20 | good | good | X | 30 | 2827 | retain | dead branches 0 to 2" diameter |
| 34351 | Douglas-fir | *Pseudotsuga menziesii* | 11 | 4 | poor | poor | | n/a | n/a | retain | thin foliage/crown, asymmetrical crown, suppressed, high crown, narrow crown |
| 34352 | Douglas-fir | *Pseudotsuga menziesii* | 18 | 10 | fair | fair | X | 20 | 1257 | retain | narrow crown, high crown, asymmetrical crown |
| 34353 | Douglas-fir | *Pseudotsuga menziesii* | 25 | 10 | good | fair | X | 20 | 1257 | retain | asymmetrical crown, codominant leaders |
| 34354 | Douglas-fir | *Pseudotsuga menziesii* | 13 | 10 | good | fair | X | 20 | 1257 | remove | asymmetrical crown, high crown, narrow crown |
| 34361 | Douglas-fir | *Pseudotsuga menziesii* | 15 | 0 | dead | dead | n/a | n/a | n/a | n/a | STUMP |
| 34363 | Douglas-fir | *Pseudotsuga menziesii* | 14 | 0 | dead | dead | n/a | n/a | n/a | n/a | STUMP |
| 34364 | Douglas-fir | *Pseudotsuga menziesii* | 18 | 0 | dead | dead | n/a | n/a | n/a | n/a | STUMP |
| 34367 | Douglas-fir | *Pseudotsuga menziesii* | 27 | 30 | good | good | X | 40 | 5026 | remove | |
| 34379 | Douglas-fir | *Pseudotsuga menziesii* | 25 | 25 | good | good | X | 35 | 3848 | retain | DBH approximated by arborist |
| 34380 | Douglas-fir | *Pseudotsuga menziesii* | 20 | 15 | good | good | X | 25 | 1963 | retain | |
| 34381 | Douglas-fir | *Pseudotsuga menziesii* | 22 | 20 | good | good | X | 30 | 2827 | remove | |
| 34382 | Douglas-fir | *Pseudotsuga menziesii* | 18 | 15 | good | good | X | 25 | 1963 | retain | |
| 34383 | Douglas-fir | *Pseudotsuga menziesii* | 20 | 18 | good | poor | X | 28 | 2463 | retain | codominant leaders with inclusion |
| 34384 | Douglas-fir | *Pseudotsuga menziesii* | 22 | 18 | good | poor | X | 28 | 2463 | retain | codominant leaders with inclusion |
| 34386 | bigleaf maple | *Acer macrophyllum* | 12 | 18 | good | good | X | 28 | 2463 | remove | |
| 34387 | Douglas-fir | *Pseudotsuga menziesii* | 22 | 28 | good | good | X | 38 | 4536 | remove | DBH approximated by arborist |
| 34389 | Douglas-fir | *Pseudotsuga menziesii* | 29 | 25 | good | good | X | 35 | 3848 | remove | DBH approximated by arborist |
| 34392 | Douglas-fir | *Pseudotsuga menziesii* | 34 | 28 | good | fair | X | 38 | 4536 | remove | multi-stem, codominant leaders with inclusion |
| 34394 | Douglas-fir | *Pseudotsuga menziesii* | 23 | 22 | good | good | X | 32 | 3217 | remove | DBH approximated by arborist |
| 34437 | Douglas-fir | *Pseudotsuga menziesii* | 25 | 25 | good | good | X | 35 | 3848 | retain | |
| 34438 | Douglas-fir | *Pseudotsuga menziesii* | 25 | 30 | good | good | X | 40 | 5026 | retain | DBH approximated by arborist |
| 34442 | Douglas-fir | *Pseudotsuga menziesii* | 24 | 18 | good | good | X | 28 | 2463 | remove | asymmetrical crown |

Todd Prager & Associates LLC

**Attachment 1**
**Tree Inventory**
**West Linn Public Works Facility at Salamo Road**
June 6th, 2025

| Survey Number | Common Name | Scientific Name | DBH[1] (in) | Crown radius[2] (ft) | Health condition[3] | Structural condition[3] | Significant Tree[4] | Significant Tree crown radius + 10' | Significant Tree Area[5] | Treatment | Site notes/ Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 34445 | Douglas-fir | *Pseudotsuga menziesii* | 15 | 15 | good | good | X | 25 | 1963 | remove | asymmetrical crown |
| 34449 | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | tree does not exist |
| 34466 | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | tree does not exist |
| 34469 | bigleaf maple | *Acer macrophyllum* | 9 | 10 | poor | poor | | n/a | n/a | remove | multi-stem, dying from the top down |
| 36022 | Douglas-fir | *Pseudotsuga menziesii* | 34 | 20 | good | good | X | 30 | 2827 | retain | |
| 36028 | Douglas-fir | *Pseudotsuga menziesii* | 46 | 18 | good | good | X | 28 | 2463 | retain | multi-stem |
| 36029 | Douglas-fir | *Pseudotsuga menziesii* | 30 | 20 | good | good | X | 30 | 2827 | retain | dead branches 0 to 2" diameter |
| 36030 | Douglas-fir | *Pseudotsuga menziesii* | 18 | 25 | good | good | X | 35 | 3848 | retain | DBH approximated by arborist |
| 36031 | Douglas-fir | *Pseudotsuga menziesii* | 18 | 18 | good | good | X | 28 | 2463 | retain | asymmetrical crown |
| 36032 | Douglas-fir | *Pseudotsuga menziesii* | 18 | 22 | good | good | X | 32 | 3217 | retain | DBH approximated by arborist |
| 36033 | Douglas-fir | *Pseudotsuga menziesii* | 11 | 22 | good | good | | n/a | n/a | retain | |
| 36035 | Douglas-fir | *Pseudotsuga menziesii* | 21 | 25 | good | good | X | 35 | 3848 | retain | DBH approximated by arborist |
| 36044 | Douglas-fir | *Pseudotsuga menziesii* | 23 | 16 | good | good | X | 26 | 2124 | remove | |
| 36049 | Douglas-fir | *Pseudotsuga menziesii* | 34 | 20 | good | good | X | 30 | 2827 | remove | |
| 36056 | Douglas-fir | *Pseudotsuga menziesii* | 33 | 20 | good | good | X | 30 | 2827 | remove | |
| 36062 | Douglas-fir | *Pseudotsuga menziesii* | 19 | 28 | good | good | X | 38 | 4536 | remove | |
| 36066 | bigleaf maple | *Acer macrophyllum* | 26 | 22 | good | poor | X | 32 | 3217 | retain | multi-stem, trunk wound |
| 36073 | bigleaf maple | *Acer macrophyllum* | 9 | 18 | good | fair | | n/a | n/a | remove | multi-stem |
| 36074 | Douglas-fir | *Pseudotsuga menziesii* | 14 | 20 | good | good | X | 30 | 2827 | remove | |
| 36077 | Douglas-fir | *Pseudotsuga menziesii* | 19 | 20 | good | good | X | 30 | 2827 | remove | DBH approximated by arborist |
| 36092 | Douglas-fir | *Pseudotsuga menziesii* | 34 | 22 | good | good | X | 32 | 3217 | remove | |
| 36094 | bigleaf maple | *Acer macrophyllum* | 42 | 22 | good | good | X | 32 | 3217 | retain | multi-stem |
| 36100 | Douglas-fir | *Pseudotsuga menziesii* | 21 | 22 | good | good | X | 32 | 3217 | remove | |
| 36103 | Douglas-fir | *Pseudotsuga menziesii* | 16 | 0 | dead | dead | n/a | n/a | n/a | n/a | STUMP |
| 36104 | Pacific madrone | *Arbutus menziesii* | 13 | 8 | fair | poor | X | 18 | 1018 | remove | multi-stem, DBH approximated by arborist, invasive ground cover |
| 36110 | Douglas-fir | *Pseudotsuga menziesii* | 20 | 12 | good | fair | X | 22 | 1520 | remove | asymmetrical crown, high crown, narrow crown |
| 36111 | Douglas-fir | *Pseudotsuga menziesii* | 18 | 14 | good | good | X | 24 | 1810 | remove | |
| 36113 | Douglas-fir | *Pseudotsuga menziesii* | 25 | 15 | good | good | X | 25 | 1963 | remove | |
| 36114 | Douglas-fir | *Pseudotsuga menziesii* | 19 | 15 | good | fair | X | 25 | 1963 | remove | asymmetrical crown, narrow crown, high crown |
| 36115 | Douglas-fir | *Pseudotsuga menziesii* | 22 | 14 | good | fair | X | 24 | 1810 | remove | asymmetrical crown, high crown, narrow crown |
| 36117 | Douglas-fir | *Pseudotsuga menziesii* | 20 | 16 | good | good | X | 26 | 2124 | remove | asymmetrical crown |
| 36126 | Douglas-fir | *Pseudotsuga menziesii* | 30 | 25 | good | good | X | 35 | 3848 | remove | |
| 36157 | bigleaf maple | *Acer macrophyllum* | 5 | 0 | dead | dead | n/a | n/a | n/a | n/a | |
| 36157 | Douglas-fir | *Pseudotsuga menziesii* | 5 | 4 | good | good | | n/a | n/a | remove | |
| 36158 | Douglas-fir | *Pseudotsuga menziesii* | 21 | 15 | good | good | X | 25 | 1963 | remove | asymmetrical crown |
| 36159 | Douglas-fir | *Pseudotsuga menziesii* | 16 | 8 | good | fair | X | 18 | 1018 | remove | asymmetrical crown, high crown, narrow crown |
| 36160 | Douglas-fir | *Pseudotsuga menziesii* | 26 | 15 | good | good | X | 25 | 1963 | remove | asymmetrical crown |
| 36161 | Douglas-fir | *Pseudotsuga menziesii* | 20 | 18 | good | good | X | 28 | 2463 | remove | |
| 36162 | Douglas-fir | *Pseudotsuga menziesii* | 27 | 16 | good | good | X | 26 | 2124 | remove | asymmetrical crown |
| 36165 | Pacific madrone | *Arbutus menziesii* | 11 | 6 | fair | fair | X | 16 | 804 | remove | multi-stem, dead branches 0 to 2" diameter, multi-stem |
| 36181 | Douglas-fir | *Pseudotsuga menziesii* | 14 | 15 | good | good | X | 25 | 1963 | remove | DBH approximated by arborist |
| 36182 | Douglas-fir | *Pseudotsuga menziesii* | 19 | 18 | good | good | X | 28 | 2463 | remove | |
| 36183 | Douglas-fir | *Pseudotsuga menziesii* | 12 | 15 | good | good | X | 25 | 1963 | remove | |
| 36184 | Douglas-fir | *Pseudotsuga menziesii* | 19 | 15 | good | good | X | 25 | 1963 | retain | DBH approximated by arborist |
| 36185 | Douglas-fir | *Pseudotsuga menziesii* | 28 | 18 | good | good | X | 28 | 2463 | remove | |
| 36187 | Douglas-fir | *Pseudotsuga menziesii* | 17 | 20 | good | good | X | 30 | 2827 | remove | |
| 36188 | Douglas-fir | *Pseudotsuga menziesii* | 17 | 20 | good | poor | X | 30 | 2827 | remove | DBH approximated by arborist, codominant leaders with inclusion |
| 36189 | Douglas-fir | *Pseudotsuga menziesii* | 15 | 15 | good | good | X | 25 | 1963 | retain | DBH approximated by arborist |
| 36190 | Douglas-fir | *Pseudotsuga menziesii* | 14 | 20 | good | good | X | 30 | 2827 | retain | |
| 36191 | Douglas-fir | *Pseudotsuga menziesii* | 37 | 18 | good | fair | X | 28 | 2463 | remove | multi-stem, asymmetrical crown, recent machinery/ mechanical damage to lower branches |
| 36192 | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | same as tree 36191 |
| 36196 | Douglas-fir | *Pseudotsuga menziesii* | 32 | 20 | good | good | X | 30 | 2827 | remove | |
| 36197 | Douglas-fir | *Pseudotsuga menziesii* | 19 | 12 | good | fair | X | 22 | 1520 | remove | asymmetrical crown, narrow crown |
| 36198 | Douglas-fir | *Pseudotsuga menziesii* | 16 | 12 | good | good | X | 22 | 1520 | remove | asymmetrical crown |
| 36199 | Douglas-fir | *Pseudotsuga menziesii* | 26 | 22 | good | good | X | 32 | 3217 | remove | |
| 36506 | bigleaf maple | *Acer macrophyllum* | 24 | 17 | good | good | X | 27 | 2290 | remove | multi-stem, asymmetrical crown |
| 36506.01 | bigleaf maple | *Acer macrophyllum* | 15 | 12 | fair | fair | X | 22 | 1520 | remove | multi-stem, thin foliage/crown, asymmetrical crown |
| 36510 | Douglas-fir | *Pseudotsuga menziesii* | 25 | 12 | fair | fair | X | 22 | 1520 | remove | asymmetrical crown, suppressed, narrow crown |
| 36510.01 | black cottonwood | *Populus trichocarpa* | 20 | 18 | good | good | X | 28 | 2463 | remove | |

Todd Prager & Associates LLC

**Attachment 1**
**Tree Inventory**
**West Linn Public Works Facility at Salamo Road**
June 6th, 2025

| Survey Number | Common Name | Scientific Name | DBH[1] (in) | Crown radius[2] (ft) | Health condition[3] | Structural condition[3] | Significant Tree[4] | Significant Tree crown radius + 10' | Significant Tree Area[5] | Treatment | Site notes/ Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 36510.02 | black cottonwood | *Populus trichocarpa* | 18 | 12 | good | good | X | 22 | 1520 | remove | narrow crown |
| 36560 | Douglas-fir | *Pseudotsuga menziesii* | 21 | 18 | good | good | X | 28 | 2463 | retain | |
| 36563 | Douglas-fir | *Pseudotsuga menziesii* | 18 | 15 | good | good | X | 25 | 1963 | remove | asymmetrical crown |
| 36563.01 | bigleaf maple | *Acer macrophyllum* | 8 | 8 | fair | fair | | n/a | n/a | remove | suppressed, asymmetrical crown, narrow crown, high crown |
| 36565 | Douglas-fir | *Pseudotsuga menziesii* | 18 | 38 | good | good | X | 48 | 7238 | remove | dead branches 0 to 2" diameter |
| 36567 | Douglas-fir | *Pseudotsuga menziesii* | 24 | 20 | good | good | X | 30 | 2827 | remove | dead branches 0 to 2" diameter |
| 36569 | Douglas-fir | *Pseudotsuga menziesii* | 21 | 18 | good | fair | X | 28 | 2463 | remove | asymmetrical crown, dead branches 0 to 2" diameter |
| 36570 | Douglas-fir | *Pseudotsuga menziesii* | 24 | 22 | good | good | X | 32 | 3217 | remove | asymmetrical crown |
| 36571 | Douglas-fir | *Pseudotsuga menziesii* | 23 | 22 | good | good | X | 32 | 3217 | remove | |
| 36576 | bigleaf maple | *Acer macrophyllum* | 6 | 5 | good | good | | n/a | n/a | retain | asymmetrical crown |
| 36577 | Douglas-fir | *Pseudotsuga menziesii* | 20 | 10 | good | good | X | 20 | 1257 | retain | asymmetrical crown |
| 36578 | Douglas-fir | *Pseudotsuga menziesii* | 19 | 10 | good | fair | X | 20 | 1257 | retain | asymmetrical crown, codominant leaders with inclusion |
| 36579 | Douglas-fir | *Pseudotsuga menziesii* | 22 | 12 | good | good | X | 22 | 1520 | retain | asymmetrical crown |
| 36580 | Douglas-fir | *Pseudotsuga menziesii* | 25 | 20 | good | good | X | 30 | 2827 | retain | |
| 36583 | bigleaf maple | *Acer macrophyllum* | 30 | 20 | good | good | X | 30 | 2827 | retain | multi-stem |
| 36584 | bigleaf maple | *Acer macrophyllum* | 16 | 22 | good | good | X | 32 | 3217 | retain | dead branches 0 to 2" diameter |
| 36585 | bigleaf maple | *Acer macrophyllum* | 6 | 6 | good | fair | | n/a | n/a | retain | narrow crown |
| 36586 | bigleaf maple | *Acer macrophyllum* | 11 | 14 | good | fair | | n/a | n/a | remove | codominant leaders, asymmetrical crown |
| 36587 | bigleaf maple | *Acer macrophyllum* | 5 | 2 | very poor | very poor | | n/a | n/a | remove | suppressed, crooked trunk, narrow crown, high crown, epicormic branches |
| 36597 | bigleaf maple | *Acer macrophyllum* | 18 | 14 | good | good | X | 24 | 1810 | remove | multi-stem |
| 36606 | Douglas-fir | *Pseudotsuga menziesii* | 18 | 12 | good | fair | X | 22 | 1520 | retain | asymmetrical crown, thin foliage/crown |
| 36607 | bigleaf maple | *Acer macrophyllum* | 12 | 14 | good | good | X | 24 | 1810 | retain | asymmetrical crown |
| 36609 | bigleaf maple | *Acer macrophyllum* | 18 | 12 | good | fair | X | 22 | 1520 | retain | multi-stem, asymmetrical crown |
| 36902 | bigleaf maple | *Acer macrophyllum* | 7 | 4 | poor | poor | | n/a | n/a | remove | thin foliage/crown, asymmetrical crown, narrow crown, high crown |
| 36903 | bigleaf maple | *Acer macrophyllum* | 6 | 4 | fair | poor | | n/a | n/a | remove | dead branches 0 to 2" diameter,asymmetrical crown,narrow crown,high crown |
| 36904 | bigleaf maple | *Acer macrophyllum* | 11 | 20 | good | fair | | n/a | n/a | remove | asymmetrical crown,dead branches 0 to 2" diameter |
| 36905 | bigleaf maple | *Acer macrophyllum* | 6 | 6 | poor | poor | | n/a | n/a | remove | asymmetrical crown, trunk wound, suppressed, thin foliage/crown |
| 36906 | bigleaf maple | *Acer macrophyllum* | 9 | 5 | fair | poor | | n/a | n/a | remove | asymmetrical crown, trunk wound |
| 36907 | bigleaf maple | *Acer macrophyllum* | 23 | 20 | good | fair | X | 30 | 2827 | remove | multi-stem, asymmetrical crown,dead branches 0 to 2" diameter |
| 36908 | bigleaf maple | *Acer macrophyllum* | 8 | 8 | fair | fair | | n/a | n/a | remove | asymmetrical crown, suppressed |
| 36909 | bigleaf maple | *Acer macrophyllum* | 10 | 14 | fair | poor | | n/a | n/a | remove | storm damage, thin foliage/crown |
| 36910 | bigleaf maple | *Acer macrophyllum* | 10 | 7 | very poor | very poor | | n/a | n/a | remove | choked by ivy, thin foliage/crown,dead branches 0 to 2" diameter |
| 36911 | bigleaf maple | *Acer macrophyllum* | 5 | 3 | poor | poor | | n/a | n/a | remove | suppressed, thin foliage/crown, narrow crown, high crown |
| 36912 | bigleaf maple | *Acer macrophyllum* | 7 | 8 | fair | fair | | n/a | n/a | remove | asymmetrical crown,dead branches 0 to 2" diameter,suppressed |
| 36913 | bigleaf maple | *Acer macrophyllum* | 6 | 5 | fair | fair | | n/a | n/a | remove | asymmetrical crown, thin foliage/crown |
| 36915 | bigleaf maple | *Acer macrophyllum* | 13 | 20 | fair | fair | X | 30 | 2827 | remove | dead branches 0 to 2" diameter,codominant leaders,thin foliage/crown |
| 36916 | bigleaf maple | *Acer macrophyllum* | 11 | 7 | poor | poor | | n/a | n/a | retain | asymmetrical crown, thin foliage/crown, high crown, trunk wound |
| 36919 | Pacific madrone | *Arbutus menziesii* | 38 | 15 | fair | fair | X | 25 | 1963 | remove | multi-stem, choked by ivy, history of main stem failure |
| 36921 | American plum | *Prunus americana* | 5 | 5 | fair | fair | | n/a | n/a | remove | dead branches 0 to 2" diameter,asymmetrical crown,epicormic branches |
| 36922 | bigleaf maple | *Acer macrophyllum* | 36 | 10 | very poor | very poor | X | 20 | 1257 | remove | multi-stem, main stem failure, evidence of fire, large trunk cavities |
| 36951 | bigleaf maple | *Acer macrophyllum* | 13 | 8 | good | fair | X | 18 | 1018 | retain | multi-stem, asymmetrical crown,dead branches 0 to 2" diameter |
| 36951.01 | bigleaf maple | *Acer macrophyllum* | 24 | 12 | good | fair | X | 22 | 1520 | retain | multi-stem, dead branches 0 to 2" diameter |
| 36952 | bigleaf maple | *Acer macrophyllum* | 19 | 12 | fair | fair | X | 22 | 1520 | retain | multi-stem, dead branches 0 to 2" diameter,asymmetrical crown |
| 36953 | bigleaf maple | *Acer macrophyllum* | 18 | 7 | fair | fair | X | 17 | 908 | retain | multi-stem, asymmetrical crown |
| 36954 | bigleaf maple | *Acer macrophyllum* | 11 | 6 | fair | fair | | n/a | n/a | retain | multi-stem, asymmetrical crown |
| 36955 | bigleaf maple | *Acer macrophyllum* | 12 | 8 | fair | fair | X | 18 | 1018 | retain | multi-stem, asymmetrical crown |
| 36956 | bigleaf maple | *Acer macrophyllum* | 8 | 4 | fair | poor | | n/a | n/a | retain | multi-stem, dead branches 2 to 4" diameter, suppressed, asymmetrical crown |
| 36959 | bigleaf maple | *Acer macrophyllum* | 9 | 8 | fair | fair | | n/a | n/a | retain | multi-stem, asymmetrical crown, thin foliage/crown |
| 36963 | bigleaf maple | *Acer macrophyllum* | 15 | 10 | fair | fair | X | 20 | 1257 | retain | multi-stem, asymmetrical crown, dead branches 0 to 2" diameter |
| 36964 | bigleaf maple | *Acer macrophyllum* | 23 | 10 | good | fair | X | 20 | 1257 | retain | multi-stem, asymmetrical crown |
| 37537 | Douglas-fir | *Pseudotsuga menziesii* | 22 | 16 | good | fair | X | 26 | 2124 | retain | asymmetrical crown,dead branches 2 to 4" diameter, mechanical damage to lower branches |
| 37537.01 | Douglas-fir | *Pseudotsuga menziesii* | 18 | 12 | good | good | X | 22 | 1520 | retain | tree added by arborist |
| 37542 | bigleaf maple | *Acer macrophyllum* | 29 | 28 | good | good | X | 38 | 4536 | remove | multi-stem, dead branches 0 to 2" diameter |
| 37544 | bigleaf maple | *Acer macrophyllum* | 16 | 15 | fair | poor | X | 25 | 1963 | remove | multi-stem, trunk seam, trunk cavities |
| 37544.01 | Douglas-fir | *Pseudotsuga menziesii* | 21 | 12 | good | good | X | 22 | 1520 | remove | asymmetrical crown |
| 37547 | bigleaf maple | *Acer macrophyllum* | 22 | 15 | good | good | X | 25 | 1963 | remove | multi-stem, asymmetrical crown |
| 46249 | bigleaf maple | *Acer macrophyllum* | 11 | 10 | poor | poor | | n/a | n/a | retain | multi-stem, dead branches 2 to 4" diameter, failed primary stem, epicormic growth |
| 46252 | bigleaf maple | *Acer macrophyllum* | 10 | 7 | fair | fair | | n/a | n/a | retain | thin foliage/crown, epicormic branches |
| 46253 | bigleaf maple | *Acer macrophyllum* | 10 | 6 | fair | poor | | n/a | n/a | retain | thin foliage/crown, asymmetrical crown, narrow crown |

Todd Prager & Associates LLC

**Attachment 1**
**Tree Inventory**
**West Linn Public Works Facility at Salamo Road**
June 6th, 2025

| Survey Number | Common Name | Scientific Name | DBH[1] (in) | Crown radius[2] (ft) | Health condition[3] | Structural condition[3] | Significant Tree[4] | Significant Tree crown radius + 10' | Significant Tree Area[5] | Treatment | Site notes/ Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 46254 | bigleaf maple | *Acer macrophyllum* | 11 | 9 | fair | fair | | n/a | n/a | retain | thin foliage/crown,asymmetrical crown,dead branches 0 to 2" diameter |
| 46255 | bigleaf maple | *Acer macrophyllum* | 5 | 3 | poor | poor | | n/a | n/a | retain | thin foliage/crown, leaning trunk, trunk seam |
| 46256 | bigleaf maple | *Acer macrophyllum* | 12 | 12 | fair | fair | X | 22 | 1520 | retain | asymmetrical crown, crooked trunk |
| 46257 | bigleaf maple | *Acer macrophyllum* | 11 | 11 | fair | fair | | n/a | n/a | retain | asymmetrical crown, high crown |
| 46261 | bigleaf maple | *Acer macrophyllum* | 9 | 7 | fair | poor | | n/a | n/a | retain | asymmetrical crown, thin foliage/crown, high crown, narrow crown |
| 46262 | bigleaf maple | *Acer macrophyllum* | 9 | 8 | fair | fair | | n/a | n/a | retain | dead branches 0 to 2" diameter,asymmetrical crown,thin foliage/crown |
| 46263 | bigleaf maple | *Acer macrophyllum* | 7 | 3 | poor | poor | | n/a | n/a | retain | thin foliage/crown,suppressed,narrow crown,high crown,trunk cavities,leaning trunk |
| 46264 | bigleaf maple | *Acer macrophyllum* | 6 | 2 | poor | very poor | | n/a | n/a | retain | asymmetrical crown, epicormic branches, dying from the top down |
| 46266 | bigleaf maple | *Acer macrophyllum* | 7 | 8 | fair | fair | | n/a | n/a | retain | asymmetrical crown,narrow crown,high crown,self-corrected phototropic lean |
| 46267 | bigleaf maple | *Acer macrophyllum* | 6 | 6 | fair | fair | | n/a | n/a | retain | narrow crown, high crown |
| 46273 | sweet cherry | *Prunus avium* | 5 | 4 | fair | poor | | n/a | n/a | retain | thin foliage/crown,asymmetrical crown,suppressed,dead branches 0 to 2" diameter |
| 46274 | sweet cherry | *Prunus avium* | 13 | 15 | poor | very poor | X | 25 | 1963 | retain | dead branches 0 to 2" diameter,thin foliage/crown, trunk cavities, high crown |
| 46275 | sweet cherry | *Prunus avium* | 12 | 5 | very poor | very poor | X | 15 | 707 | retain | thin foliage/crown, asymmetrical crown, leaning trunk, trunk cavities |
| 46292 | oneseed hawthorn | *Crataegus monogyna* | 14 | 7 | poor | poor | X | 17 | 908 | retain | multi-stem, dead branches 2 to 4" diameter, suppressed, trunk wound, history of branch/leader failure |
| 50039 | bigleaf maple | *Acer macrophyllum* | 5 | 2 | very poor | very poor | | n/a | n/a | retain | self-corrected phototropic lean, high crown, narrow crown, crooked trunk, suppressed, very little live foliage |
| 50123 | Douglas-fir | *Pseudotsuga menziesii* | 3 | 6 | good | good | | n/a | n/a | retain | |
| 50125 | Douglas-fir | *Pseudotsuga menziesii* | 3 | 8 | good | good | | n/a | n/a | retain | |
| 50136 | Douglas-fir | *Pseudotsuga menziesii* | 31 | 28 | good | good | X | 38 | 4536 | remove | DBH approximated by arborist |
| 50184 | Douglas-fir | *Pseudotsuga menziesii* | 20 | 20 | good | good | X | 30 | 2827 | remove | DBH approximated by arborist |
| 50201 | bigleaf maple | *Acer macrophyllum* | 20 | 25 | good | fair | X | 35 | 3848 | remove | multi-stem, DBH approximated by arborist |
| 50262 | Douglas-fir | *Pseudotsuga menziesii* | 22 | 28 | good | good | X | 38 | 4536 | remove | DBH approximated by arborist |

[1]**DBH** is the trunk diameter in inches at 4.5 feet above ground level, per International Society of Arboriculture (ISA) standards. The trunk diameter of a multi-stem tree converted to a single number according to the following formula: square root of the sum of the squared diameter of each trunk at 4.5

[2]**C-Rad** is the approximate crown radius in feet.

[3]**Condition and Structure** ratings range from dead, very poor, poor, fair, to good.

[4]**Significant Tree** is defined in the City of West Linn Code as, "a tree with a minimum of six-inch DBH for Oregon white oak, Pacific madrone, and Pacific dogwood, and 12-inch DBH for all other tree species. If the tree splits into multiple trunks above grade but below breast height, the diameter shall be determined by adding the total diameter of all trunks two inches or greater DBH."

[5]**Significant Tree Area** is defined in the City of West Linn Code as, "...the area within the dripline of the tree(s), plus an additional 10-foot measurement beyond the dripline" in square feet.

# Attachment 2

## Tree Legend

-Trees proposed for removal

-Trees removed prior to tree inventory

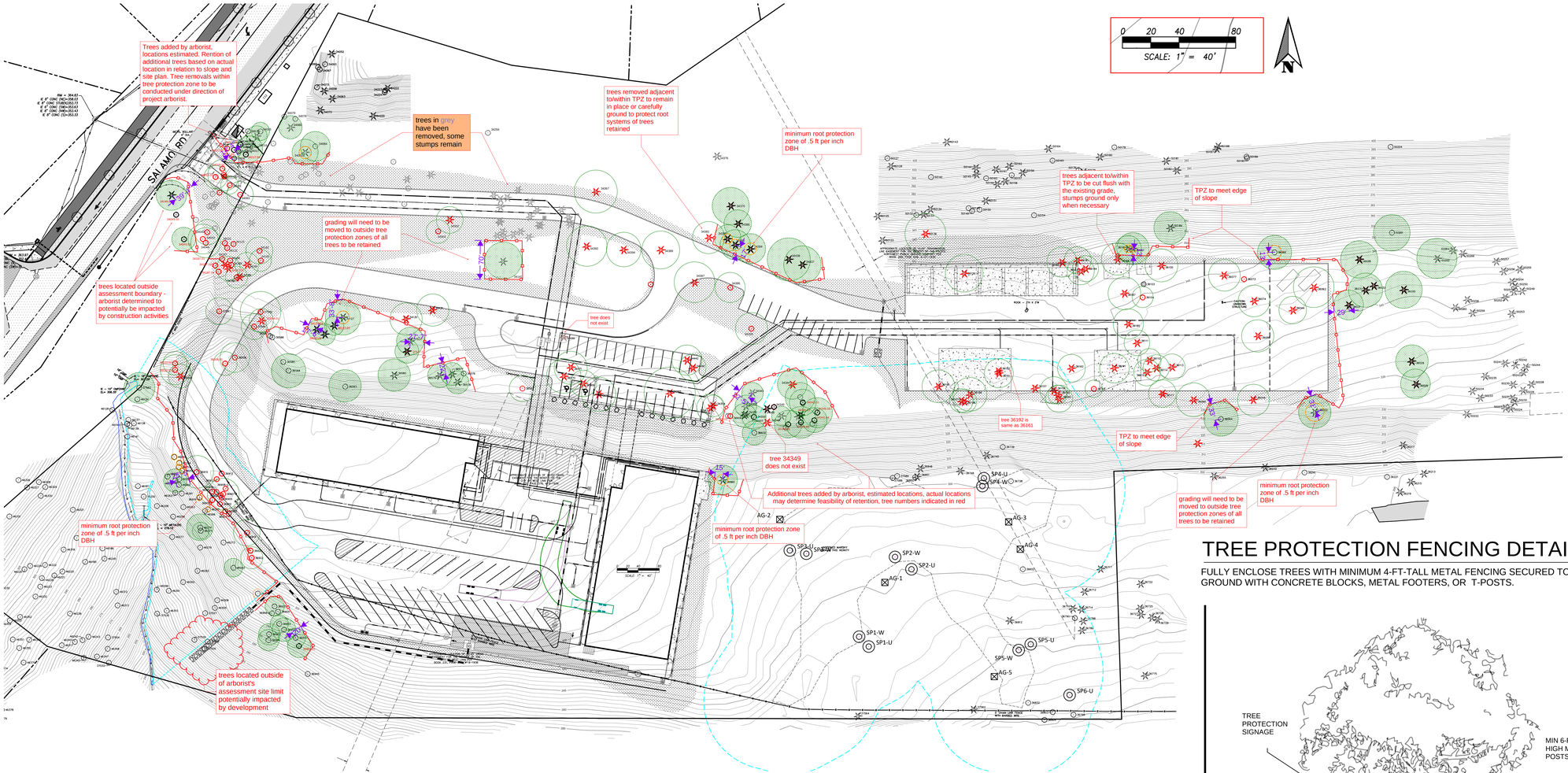
-Significant tree protected area to be removed

-Significant tree protected area to be preserved

-Tree protection fence

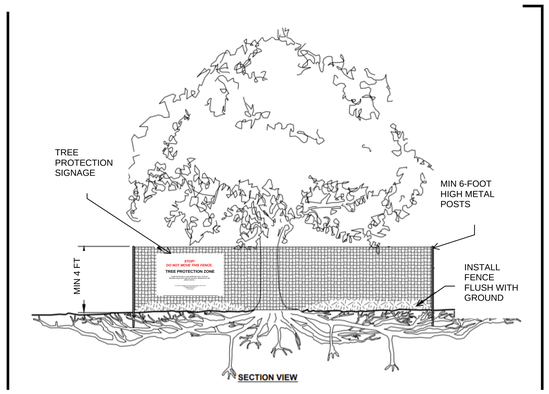
0 20 40 80
SCALE: 1" = 40'

N




## TREE PROTECTION FENCING DETAIL

FULLY ENCLOSE TREES WITH MINIMUM 4-FT-TALL METAL FENCING SECURED TO THE GROUND WITH CONCRETE BLOCKS, METAL FOOTERS, OR T-POSTS.




***NOTES:***

1. THE FENCE SHALL BE INSTALLED BEFORE ANY GROUND DISTURBING ACTIVITIES INCLUDING CLEARING AND GRADING, OR CONSTRUCTION STARTS; AND SHALL REMAIN IN PLACE UNTIL FINAL INSPECTION.
2. FENCING SHALL BE A MINIMUM 4 FT TALL METAL FENCING. FENCING SHALL BE SECURED WITH METAL POSTS SHALL BE ESTABLISHED AT THE EDGE OF THE ROOT PROTECTION ZONE AND PERMISSIBLE ENCROACHMENT AREA ON THE DEVELOPMENT SITE AS INDICATED ON THE TREE PROTECTION PLAN.
3. SIGNAGE DESIGNATING THE PROTECTION ZONE AND PENALTIES FOR VIOLATIONS SHALL BE SECURED IN A PROMINENT LOCATION ON EACH PROTECTION FENCE AT A MINIMUM OF EVERY 30 FT OR EVERY THIRD FENCE PANEL.
4. THE FOLLOWING IS PROHIBITED WITHIN THE ROOT PROTECTION ZONE OF EACH TREE OR OUTSIDE THE LIMITS OF THE DEVELOPMENT IMPACT AREA: GROUND DISTURBANCE OR CONSTRUCTION ACTIVITY INCLUDING VEHICLE OR EQUIPMENT ACCESS (BUT EXCLUDING ACCESS ON EXISTING STREETS OR DRIVEWAYS), STORAGE OF EQUIPMENT OR MATERIALS INCLUDING SOIL, TEMPORARY OR PERMANENT STOCKPILING, PROPOSED BUILDINGS, IMPERVIOUS SURFACES, UNDERGROUND UTILITIES, EXCAVATION OR FILL, TRENCHING OR OTHER WORK ACTIVITIES.

**Attachment 3**



# *STOP!*
# *DO NOT MOVE THIS FENCE.*

# TREE PROTECTION ZONE

Inside the fencing is a tree protection zone, not to be disturbed unless prior approval has been obtained from the project arborist.

For questions regarding tree protection please call the project arborist:
Todd Prager & Associates, LLC
todd@toddprager.com
971.295.4835

## Attachment 4
## Assumptions and Limiting Conditions

1. Any legal description provided to the consultant is assumed to be correct. The site plans and construction information provided by the City of West Linn, HHPR, and their affiliates was the basis of the information provided in this report.
2. It is assumed that this property is not in violation of any codes, statutes, ordinances, or other governmental regulations.
3. The client is advised to ensure compliance with applicable local, state, and federal laws and regulations that could relate to this project, i.e., Local and State Tree or Natural Resource Regulations, Local and State Development Regulations, Migratory Bird Treaty Act, Endangered Species Act, Clean Water Act, Americans with Disabilities Act, etc. The consultant may advise the client of issues regarding local, state, and federal laws that the consultant believes would be helpful to the client, but any such advice or comment is not a determination or interpretation of local, state, or federal law or regulation.
4. The consultant is not responsible for information gathered from others involved in various activities pertaining to this project. Care has been taken to obtain information from reliable sources.
5. Loss or alteration of any part of this delivered report invalidates the entire report.
6. Drawings and information contained in this report may not be to scale and are intended to be used as display points of reference only.
7. The consultant's role is only to make recommendations. Inaction on the part of those receiving the report is not the responsibility of the consultant.
8. The purpose of this report is to provide tree removal, preservation, and protection recommendations for the City of West Linn Public Works Facility Development.

# WEST LINN OPERATIONS COMPLEX
## WEST LINN, OREGON

# Draft Stormwater Management Report

NOVEMBER 2025


**PREPARED FOR:**
West Linn Public Works
22500 Salamo Road
West Linn, Oregon 97068
Eric Lais, PE
P: 503-722-3434
E: ELAIS@WESTLINNOREGON.GOV

**PREPARED BY:**
Harper Houf Peterson Righellis Inc.
205 SE Spokane Street, Suite 200
Portland, OR 97202
P: 503-221-1131
E: ALEXS@HHPR.COM

Lucas Melac, PE
Alex Simpson, PE

EXPIRES: 12/31/2026

Harper Houf Peterson Righellis Inc.
ENGINEERS◆PLANNERS
LANDSCAPE ARCHITECTS◆SURVEYORS

**PRELIMINARY**

# Table of Contents


- **Project Overview…… 1**
- **Basin Characteristics…… 1**
  - **Existing Conditions…… 1**
  - **Proposed Conditions…… 2**
- **Stormwater Management…… 2**
  - **Water Quality…… 2**
  - **Hydromodification Assessment & Detention…… 3**
  - **Conveyance…… 4**
  - **Downstream Analysis…… 4**
  - **Operations and Maintenance…… 4**
- **Conclusion…… 5**
- **Appendix A - Figures**
  - **Existing Basin Map**
  - **Water Quality Basin Map**
  - **Detention Basin Map**
- **Appendix B – Geotechnical Data**
  - **USGS Soil Survey**
  - **Executive Summary of Geotechnical Report**
- **Appendix C – Plan Sheets**
- **Appendix D – Hydrographs**

## PROJECT OVERVIEW

The West Linn Public Works Department proposes to construct a new public works operations complex at 22500 Salamo Road in West Linn, Oregon. The proposed development includes a multi-story 28,200 square foot office and warehouse building, an 11,000 square foot warehouse and shop building, truck wash and decant buildings, fueling station, covered and open bulk storage areas, asphalt roadways for site access and parking, concrete hardscape and sidewalks, and landscaping. The total project footprint is approximately 5.7 acres. The project is situated on a vacant lot east of Salamo Road, north of Highway 205, west of an existing public works material laydown area, and south of existing private residences off of Barrington Drive. Stormwater BMPs (best management practices) outlined in this report will comply with the City of West Linn Stormwater Management Manual dated May 2025. See Table 1 below for design requirements per the City of West Linn.

**Table 1. West Linn Stormwater Management Criteria**

| Design Requirement | West Linn Criteria |
|---|---|
| **Project Classification** | Centralized Subdivision and Large Development (Creates or replaces 10,000 SF or more of impervious surface area)<br>• Use a downstream, centralized stormwater management facility to meet the infiltration, water quality, and flow control performance standard for all impervious surfaces on site. |
| **Flow Control Performance** | Match pre-developed discharge rates for the 2-year, 10-year and 25-year, 24-hour storm events using the 'Engineered Method' – Santa Barbara Urban Hydrograph (SBUH) Method using the Soil Conservation Service Type 1-A, 24-hour rainfall distribution. |
| **Water Quality** | Stormwater management facilities must treat 80% of the average annual runoff (1 inch per 24 hour period). |
| **Conveyance** | Storm pipes shall be sized using the 25-year, 24-hour storm event. Pipes shall have a minimum velocity of 2 feet per second when flowing full using a Manning's coefficient of no less than 0.013 and slope of no less than 0.55%. |
| **Downstream Analysis** | Review and physically inspect either 1,500 feet downstream of the proposed outlet or to the distance which the project contributes less than 15% of the total upstream basin area. Confirm nothing downstream of the end point will be adversely affected by the project's runoff. |

## BASIN CHARACTERISTICS

### Existing Conditions

The existing conditions within the project footprint consist of a stabilized hill with a mix of trees and vegetated ground cover, as well as a large gravel pad. Slopes within the vegetated areas of the site vary beyond 33% while the gravel area is generally flat. Existing drainage flows north to south towards a natural ravine southwest of the site, ultimately flowing to the east along the toe of the fill slope of Highway 205.

The following technical criteria were determined for the existing site:

- **Hydrologic Soil Group D (Per USGS WebSoil Survey)**
  - **64D – Kinton Silt Loam: 13.5% of Site Area, Soil Group C**
  - **34C – Nekia Silty Clay Loam: 7.2% of Site Area, Soil Group C**
  - **89D – Witzel Very Stony Silt Loam: 79.2% of Site Area. Soil Gound D**
- **Basin 1 Time of Concentration: 15.3 minutes**
- **Basin 2 Time of Concentration: 16.5 minutes**
- **Curve Number:**
  - **70 (Existing ground per West Linn Stormwater Management Manual 2.3.2.1)**

The existing basin map is available in appendix A. Additional soil data is available in appendix B.

Infiltration as a method of stormwater management was not recommended by the geotechnical engineer (Columbia West) in the draft geotechnical report dated April 3, 2025 “due to the presence of steep slopes at the site and subsurface conditions”. Refer to appendix B for the Executive Summary of the geotechnical report.

### Proposed Conditions

The proposed operations complex will include two new buildings, covered truck wash and decant structures, covered and open bulk storage areas, asphalt pavement for site access, parking, and material lay-down, concrete hardscape, and landscaping. The proposed site generally maintains the flow characteristics of the existing site, utilizing a network of underground storm pipes to convey stormwater north to south. At the south end of the site, a proprietary underground chamber system (R-Tank) is proposed for detention of runoff with a proprietary mechanical system (Contech StormFilter vault, manhole, and catch basin) providing pretreatment. The release rate of the stormwater within the R-Tank will be regulated by a flow control manhole to match the existing 2, 10, and 25-year, 24-hour storm events, meeting the City of West Linn criteria for large developments. Stormwater will outfall downslope at the south end of the site towards the existing natural ravine. The following technical criteria were determined for the proposed site:

- **Time of Concentration (all basins): 5 minutes**
- **Curve Number:**
  - **98 (Proposed Impervious Area)**
  - **80 (Proposed Landscaping)**

The proposed basin map is available in appendix A and storm plan sheets are available in appendix C.

## STORMWATER MANAGEMENT

### Water Quality

The City of West Linn water quality requirements will be met by treating runoff using a proprietary treatment vault, manhole, and catch basin (Contech StormFilter). According the City of West Linn Stormwater Management Manual, “manufactured stormwater treatment technology” is ranked third in the hierarchy of stormwater management facilities used to manage the water quality design storm,

behind full or partial infiltration, and vegetated filtration or other green infrastructure. Per the geotechnical report (see appendix B), infiltration is not recommended due to the site's steep slopes and subsurface conditions. Vegetated filtration is not feasible due the site's topography. The proposed development utilizes the flat areas of the existing site for its buildings and hardscape, leaving only very steep terrain as options for placing a vegetated swale or pond. Placing a pond or swale in the steep slopes of the site would not provide adequate residence time for stormwater treatment and would require very large walls to accommodate the cut section of a pond. Therefore, underground detention is proposed beneath the asphalt of the south parking lot with upstream treatment provided by a Contech StormFilter vault, manhole, and catch basin.

The following City of West Linn Water Quality Design Storm was used for water quality calculations:

- **1 inch per 24-hour period**

Table 2 below provides a summary of the water quality calculations.

**Table 2. Water Quality Calculation Summary**

| Basin | Water Quality Flow (cfs) | Proposed Treatment Facility | Number of Cartridges* |
|---|---|---|---|
| WQ 1 | 0.247 | Contech StormFilter 6' x 12' Peak Diversion Vault | 9 |
| WQ 2 | 0.053 | Contech StormFilter 48" Water Quality Manhole | 2 |
| WQ 3 | 0.078 | Contech StormFilter Steel 3 - Cartridge Catch Basin | 3 |

*Calculations assume 18" PSROB cartridges with peak flow capacity of 0.028 cfs (12.53 gpm)

Refer to appendix A for water quality basin map. Refer to appendix D for hydrographs.

## Hydromodification and Detention

The project proposes to add 4.12 acres (179,309 SF) of impervious area to the site; therefore, it is classified as a 'large development' by the City of West Linn Stormwater Management Manual. Peak-flow matching is required for the pre-developed 2, 10, and 25-year, 24-hour storm events. The site layout lends itself to a 'centralized' approach with all stormwater on site being piped to a single centralized underground detention facility. The Santa Barbara Urban Hydrograph (SBUH) was chosen to demonstrate the detention facility is adequately sized for flow control using the following parameters:

- **2-Year: 2.5 inches/hour**
- **5-Year: 3.1 inches/hour**
- **10-Year: 3.45 inches/hour**
- **25-Year: 4.9 inches/hour**
- **Type 1A Rainfall Distribution**

Site stormwater will be routed to a 17,475 CF R-Tank set at elevation 300.86 beneath the site's south parking lot. Flow out of the R-Tank is regulated by a flow control manhole with a single 4.1" diameter

orifice set at elevation 300.86. A 12" overflow is provided at elevation 304.46 which helps to convey the 10, 25, and 100 year storm events.

The proposed R-Tank is designed to capture and detain runoff from Basin 1 only. Basin 2 will shed stormwater offsite as topographical constraints do not allow for stormwater to be captured and routed back to the facility. Basin 2 includes just 1,232 SF of new impervious area with the rest of the basin being made up of pervious fill slope (0.49 Acres) to catch the existing grade downslope of the project. Basin 3 will be routed around the project site, bypassing the development. Refer to the Conveyance section of this report for more information on Basin 3 and refer to appendix A for the proposed basin map.

Table 3 below provides a summary of the flow control data for this project.

**Table 3. Flow Control Data**

| Storm Event | Pre-Developed Flow (cfs) | Post-Developed Flow (cfs) | Detained Release Rate (cfs) |
|---|---|---|---|
| 2-Year | 0.630 | 2.512 | 0.624 |
| 10-Year | 1.610 | 3.758 | 1.228 |
| 25-Year | 2.139 | 4.347 | 2.127 |
| 100-Year* | 3.155 | 5.387 | 3.485 |

*100 year storm event not required for peak flow matching. Shown for conveyance through the R-Tank system only.

Refer to appendix D for hydrographs.

## Conveyance

The project site sits at the bottom of an existing 2:1 slope which will shed water toward the proposed development. The upper access road will require fill to construct, creating a low point north of road. Stormwater will drain to the toe of this fill slope and be conveyed to a proposed ditch inlet just west of the eastern asphalt yard and discharged through a 12" culvert to the existing wetland to the south, bypassing the project site. See 'basin 3' in the proposed basin map exhibit in appendix A for basin location.

The stormwater conveyance system will be sized using the Santa Barabara Urban Hydrograph Method (SBUH) to convey the 25-year storm event. Conveyance calculations will be provided with the final report.

## Downstream Analysis

A downstream analysis will be provided in the final report.

## Operations and Maintenance

An operations and maintenance plan will be provided for the R-Tank and Contech StormFilter structures in the final report.

## CONCLUSION

The proposed stormwater management plan will achieve stormwater quality and flow control to the standards of the City of West Linn Stormwater Management Manual dated May 2025.

# Appendix A – Figures

P:\01-Portland\SEA (Scott Edwards Architecture)\SEA-158 (West Linn Public Works)\SEA158-DOCS\Reports\Stormwater\Exhibits\ SEA158-Existing Basin Map.dwg

SALAMO RD

WETLAND BOUNDARY

EX RAVINE

VEGETATED CORRIDOR

## LEGEND

- BASIN 1
  PERVIOUS: 85,620 SF (1.97)
- BASIN 1 - OFFSITE
  PERVIOUS: 21,159 SF (0.49 AC)
- BASIN 2
  PERVIOUS: 221,441 SF (5.08 AC)
- BASIN 2 - OFFSITE
  PERVIOUS: 256,078 SF (5.88 AC)

0 50 100 200

SCALE: 1" = 100'

N

| DATE | NO. | DESCRIPTION |
|---|---|---|
| | | |

REVISIONS

DESIGNED: ---
DRAWN: ---
CHECKED: ---
DATE: -----

Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

EXISTING BASIN MAP

# WEST LINN OPERATIONS COMPLEX

WEST LINN, OREGON

SHEET NO.
**EX**

JOB NO.
SEA-158

P:\01-Portland\SEA (Scott Edwards Architecture)\SEA-158 (West Linn Public Works)\SEA158-DOCS\Reports\Stormwater\Exhibits\ SEA158-Proposed Basin Map.dwg

SALAMO RD

BASIN 3 BYPASS
INLET AND CULVERT

FFE = 316.00

FFE = 311.00

EX RAVINE

PROPOSED R-TANK

IE OUT = 297.00

WETLAND
BOUNDARY

VEGETATED CORRIDOR

## LEGEND

BASIN 1
IMPERVIOUS: 178,077 SF (4.09 AC)
PERVIOUS: 48,722 SF (1.12 AC)

BASIN 2
IMPERVIOUS: 1,232 SF (0.03 AC)
PERVIOUS: 21,560 SF (0.49 AC)

BASIN 3 - BYPASSED
IMPERVIOUS: 0 SF (0.00 AC)
PERVIOUS: 239,195 SF (5.50 AC)

0 25 50 100
SCALE: 1" = 100'

N

| DATE | NO. | DESCRIPTION |
|---|---|---|
| | | |

REVISIONS

DESIGNED: LEM
DRAWN: LEM
CHECKED: AJS
DATE: NOVEMBER 2025

Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

PROPOSED BASIN MAP - DETENTION

# WEST LINN OPERATIONS COMPLEX

WEST LINN, OREGON

SHEET NO.
**DET**

JOB NO.
SEA-158

P:\01-Portland\SEA (Scott Edwards Architecture)\SEA-158 (West Linn Public Works)\SEA158-DOCS\Reports\Stormwater\Exhibits\ SEA158-Water Quality Basin Map.dwg

SALAMO RD

FFE = 316.00

FFE = 311.00

EX RAVINE

IE OUT = 297.00

CONTECH STORMFILTER CATCH BASIN

PROPOSED R-TANK

VEGETATED CORRIDOR

WETLAND BOUNDARY

CONTECH STORMFILTER VAULT

72" CONTECH STORMFILTER MANHOLE

## LEGEND

WQ BASIN 1
IMPERVIOUS: 149,601 SF (3.43 AC)

WQ BASIN 2
IMPERVIOUS: 11,288 SF (0.26 AC)

WQ BASIN 3
IMPERVIOUS: 18,421 SF (0.42 AC)

0 25 50 100
SCALE: 1" = 100'

N

| DATE | NO. | DESCRIPTION |
|---|---|---|
| | | |

R E V I S I O N S

DESIGNED: LEM
DRAWN: LEM
CHECKED: AJS
DATE: NOVEMBER 2025

Harper Houf Peterson Righellis Inc.
ENGINEERS ✦ PLANNERS
LANDSCAPE ARCHITECTS ✦ SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

PROPOSED BASIN MAP - WATER QUALITY

# WEST LINN OPERATIONS COMPLEX

WEST LINN, OREGON

SHEET NO. **WQ**

JOB NO. SEA-158

# Appendix B – Geotechnical Data

# Custom Soil Resource Report
## Soil Map

Map Scale: 1:1,320 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 15 30 60 90

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

# Map Unit Legend

| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
|---|---|---|---|
| 48D | Kinton silt loam, 15 to 30 percent slopes | 1.0 | 13.5% |
| 64C | Nekia silty clay loam, 8 to 15 percent slopes | 0.5 | 7.2% |
| 89D | Witzel very stony silt loam, 3 to 40 percent slopes | 5.7 | 79.2% |
| **Totals for Area of Interest** | | **7.2** | **100.0%** |

# Clackamas County Area, Oregon

## 48D—Kinton silt loam, 15 to 30 percent slopes

### Map Unit Setting

*National map unit symbol:* 2258
*Elevation:* 250 to 1,400 feet
*Mean annual precipitation:* 40 to 60 inches
*Mean annual air temperature:* 52 to 54 degrees F
*Frost-free period:* 165 to 210 days
*Farmland classification:* Farmland of statewide importance

### Map Unit Composition

*Kinton and similar soils:* 85 percent
*Minor components:* 2 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Kinton

#### Setting

*Landform:* Hillslopes
*Landform position (two-dimensional):* Summit, footslope
*Landform position (three-dimensional):* Interfluve, base slope
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Stratified glaciolacustrine deposits

#### Typical profile

*H1 - 0 to 15 inches:* silt loam
*H2 - 15 to 35 inches:* silt loam
*H3 - 35 to 60 inches:* silt loam

#### Properties and qualities

*Slope:* 15 to 30 percent
*Depth to restrictive feature:* 30 to 40 inches to fragipan
*Drainage class:* Moderately well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)
*Depth to water table:* About 27 to 37 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water supply, 0 to 60 inches:* Moderate (about 7.7 inches)

#### Interpretive groups

*Land capability classification (irrigated):* 4e
*Land capability classification (nonirrigated):* 4e
*Hydrologic Soil Group:* C
*Ecological site:* F002XB005OR - Loess Hill Group
*Forage suitability group:* Moderately Well Drained >15% Slopes (G002XY003OR)
*Other vegetative classification:* Moderately Well Drained >15% Slopes (G002XY003OR)
*Hydric soil rating:* No

**Minor Components**

**Delena**

*Percent of map unit:* 2 percent
*Landform:* Hillslopes, terraces
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Interfluve, riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Other vegetative classification:* Poorly Drained (G002XY006OR)
*Hydric soil rating:* Yes

## 64C—Nekia silty clay loam, 8 to 15 percent slopes

**Map Unit Setting**

*National map unit symbol:* 2269
*Elevation:* 250 to 1,200 feet
*Mean annual precipitation:* 40 to 60 inches
*Mean annual air temperature:* 52 to 54 degrees F
*Frost-free period:* 165 to 210 days
*Farmland classification:* Farmland of statewide importance

**Map Unit Composition**

*Nekia and similar soils:* 80 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Nekia**

**Setting**

*Landform:* Hillslopes
*Landform position (two-dimensional):* Summit, shoulder
*Landform position (three-dimensional):* Interfluve, nose slope, crest
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Colluvium derived from basalt

**Typical profile**

*H1 - 0 to 19 inches:* silty clay loam
*H2 - 19 to 39 inches:* clay
*H3 - 39 to 43 inches:* unweathered bedrock

**Properties and qualities**

*Slope:* 8 to 15 percent
*Depth to restrictive feature:* 20 to 40 inches to lithic bedrock
*Drainage class:* Well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.57 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None

*Available water supply, 0 to 60 inches:* Moderate (about 6.2 inches)

**Interpretive groups**

*Land capability classification (irrigated):* 3e
*Land capability classification (nonirrigated):* 3e
*Hydrologic Soil Group:* C
*Ecological site:* R002XC012OR - Red Hill Group
*Forage suitability group:* Well drained < 15% Slopes (G002XY002OR)
*Other vegetative classification:* Well drained < 15% Slopes (G002XY002OR)
*Hydric soil rating:* No

## 89D—Witzel very stony silt loam, 3 to 40 percent slopes

**Map Unit Setting**

*National map unit symbol:* 227s
*Elevation:* 300 to 1,000 feet
*Mean annual precipitation:* 40 to 60 inches
*Mean annual air temperature:* 52 to 54 degrees F
*Frost-free period:* 165 to 210 days
*Farmland classification:* Not prime farmland

**Map Unit Composition**

*Witzel and similar soils:* 80 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Witzel**

**Setting**

*Landform:* Hillslopes
*Landform position (two-dimensional):* Summit, shoulder
*Landform position (three-dimensional):* Interfluve, nose slope, crest
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Colluvium derived from basalt

**Typical profile**

*H1 - 0 to 4 inches:* very stony silt loam
*H2 - 4 to 16 inches:* very stony silty clay loam
*H3 - 16 to 20 inches:* unweathered bedrock

**Properties and qualities**

*Slope:* 3 to 40 percent
*Depth to restrictive feature:* 12 to 20 inches to lithic bedrock
*Drainage class:* Well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.57 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water supply, 0 to 60 inches:* Very low (about 1.1 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 6s
*Hydrologic Soil Group:* D
*Ecological site:* R002XC009OR - Bald Group
*Forage suitability group:* Well Drained > 15% Slopes (G002XY001OR)
*Other vegetative classification:* Well Drained > 15% Slopes (G002XY001OR)
*Hydric soil rating:* No

## EXECUTIVE SUMMARY

This executive summary presents the primary geotechnical considerations associated with the proposed City of West Linn's Operations Center located in West Linn, Oregon. Our conclusions and recommendations are based on the subsurface information presented in the report and proposed development information provided by the design team. Detailed discussion of the geotechnical considerations summarized here is presented in respective sections of the report.

- Based on our understanding of the proposed development and the results of our explorations and engineering analyses, it is our opinion that the proposed development can be constructed at the site.

- Undocumented fill was encountered to depths between 1 foot and 31 feet BGS in 15 of our 18 explorations and to depths between 10.5 and 49.5 feet BGS in prior explorations by others. The composition and consistency of the fill are highly variable and generally include medium stiff to hard clay with varying proportions of sand and gravel or very loose to very dense gravel and sand with varying proportions of clay and silt. The fill also includes cobbles and boulders. Bark chip fill was encountered in seven of our explorations to depths between 6 and 24 inches. To prevent excessive differential settlement, foundations and floor slabs should not bear on the undocumented fill, unless it has been improved. This material should be evaluated during construction and removed from foundation and floor slab subgrade.

- Based on the assumed foundation loads, buildings in areas not underlain by undocumented fill or underlain by less than a few feet of undocumented fill can be supported on conventional spread footings, provided the undocumented fill is removed and replaced with structural fill and the buildings can safely withstand the predicted static foundation settlement.

- In lieu of removal of undocumented fill where the fill is more than a few feet thick, the buildings can be supported on deep foundation or ground improvement. Ground improvement is typically more economical than deep foundations. Therefore, this report focuses on ground improvement. If requested, our office can provide additional recommendations for deep foundations.

- The native, dense gravel, cobbles, and boulders encountered at shallow depths will result in difficult excavation with conventional equipment in both fill and decomposed/weathered basalt as well as the underlying intact basalt. In addition, because of the presence of cobbles and boulders in the near-surface fill and decomposed/weathered basalt, we expect difficult excavation at shallow depths. Utility trenches may result in slowed excavation and larger backfill volumes due to the presence of cobbles, boulders, and related caving.

- The project budget should include a contingency for removal of boulders.

- Static groundwater was measured at depths as shallow as 79.3 feet BGS in the VWPs installed at the site. Based on planned development grades, static groundwater is not a design consideration. Perched groundwater could be encountered at shallow depths following periods of heavy or prolonged rainfall.

- Based on soil and groundwater conditions at the site, liquefaction and lateral spreading are not design considerations at the site.

- Eleven of our 18 explorations encountered topsoil in the upper 6 to 12 inches, which includes an approximately 4- to 6-inch-thick root zone. In general, the topsoil is soft and contains organic material. This material exhibits low or highly variable strength and generally does not provide consistent subgrade support for foundations, floor slabs, or pavement. We recommend that the topsoil be removed, stabilized, or scarified and compacted as recommended for structural fill where it is present.

- Minor to severe caving was observed in 6 of our 13 test pits, starting at depths between 0 feet and 1 foot BGS. Caving was observed to occur within the fill.

- The on-site soil is suitable for use as structural fill, provided it is properly moisture conditioned and free of oversized materials. Moisture conditioning (drying) of the soil will likely be required depending on location and depth. It will be impossible to dry the soil during periods of extended wet weather.

- As an alternative to the use of thickened granular sections to support construction traffic, cement amendment can be used to obtain suitable support properties. However, depending on the grade and location, cobbles and boulders could be present in the subgrade. These oversized materials can damage cement tilling equipment when encountered and may require removal before cement amendment.

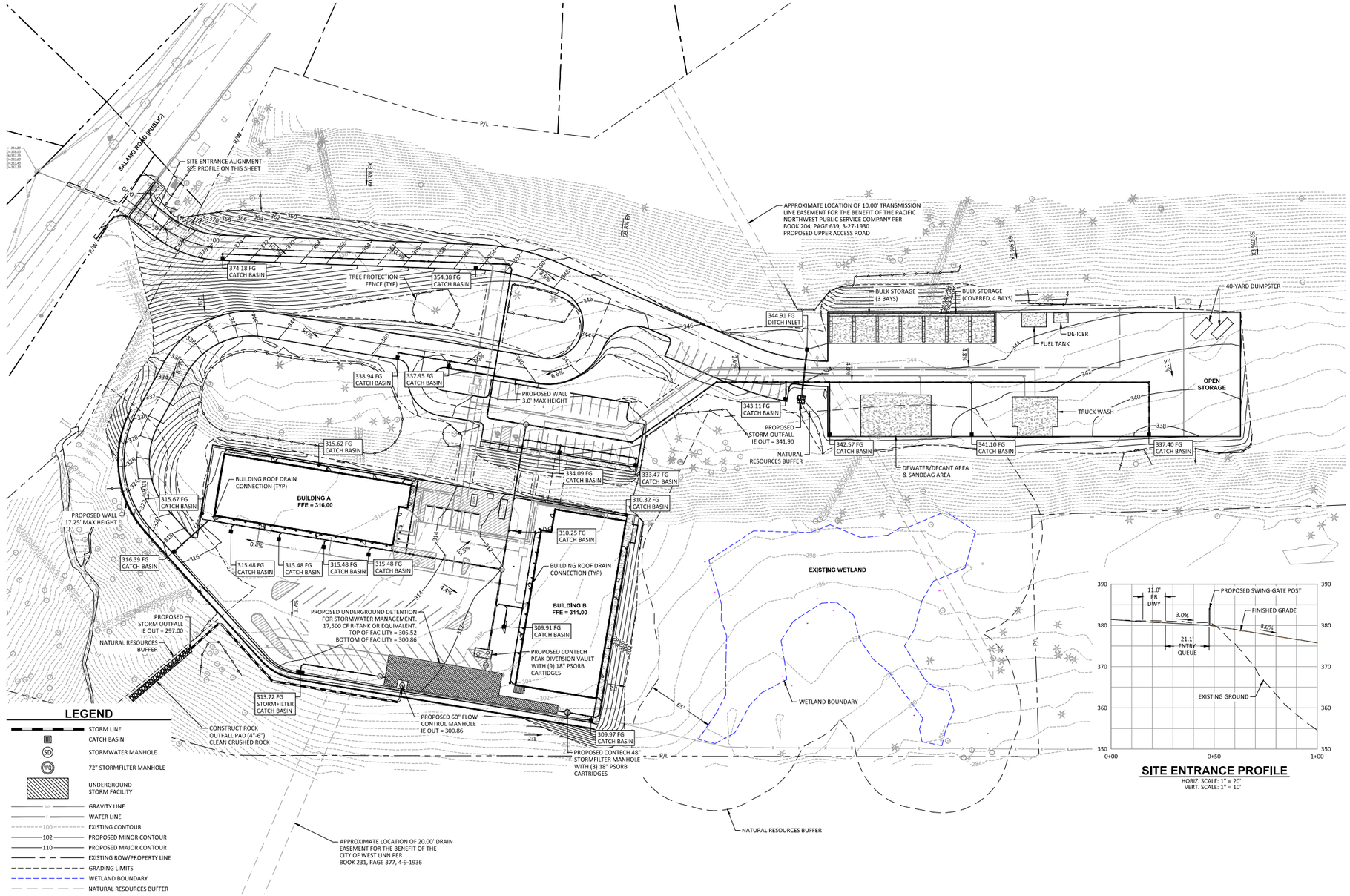
- Perimeter building foundation drains are recommended based on the preliminary grading plan and site surface and subsurface conditions. Columbia West should be contacted to review the final grading plans to verify our recommendations.

- The site is classified as Site Class C according to the 2022 SOSSC and ASCE 7-16 based on site-specific shear wave velocity measurements. Buildings founded directly on basalt can be designed using Site Class B.

- Due to the presence of steep slopes at the site and subsurface conditions, we do not recommend that stormwater drainage be infiltrated on the site. Stormwater should be routed to an appropriate stormwater system.

# Appendix C – Plan Sheets

FILE PATH: C:\Revit_Local\23028_West Linn Public Works_tjorgensenZEPNR.rvt




**PLAN VIEW**
SCALE: 1" = 40'




**SITE ENTRANCE PROFILE**
HORIZ. SCALE: 1" = 20'
VERT. SCALE: 1" = 10'

SCALE: 1" = 40'

THESE DRAWINGS ARE THE ORIGINAL UNPUBLISHED WORK OF THE ARCHITECT AND MAY NOT BE DUPLICATED OR USED WITHOUT THE WRITTEN CONSENT OF THE ARCHITECT.

Scott Edwards Architecture
2525 E Burnside St. Portland, OR 97214
503.226.3617 sealp.com

REGISTERED PROFESSIONAL ENGINEER
OREGON
JULY 15, 2015
ALEXANDER J. SIMPSON
EXPIRES: 06/30/2024

**WEST LINN PUBLIC WORKS FACILITY**

Job Number: 23028

WEST LINN, OR

Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

| ISSUE | DATE |
|---|---|
| 100% DESIGN DEVELOPMENT SET | 11/17/2025 |

Drawing:

**STORMWATER & GRADING PLAN**

Sheet No:

**C2.0**

# Appendix D – Hydrographs

# TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

## Hyd. No. 1

Basin 1 - Existing

| Description | A | | B | | C | | Totals |
|---|---|---|---|---|---|---|---|
| **Sheet Flow** | | | | | | | |
| Manning's n-value | = 0.240 | | 0.011 | | 0.011 | | |
| Flow length (ft) | = 240.0 | | 0.0 | | 0.0 | | |
| Two-year 24-hr precip. (in) | = 2.40 | | 0.00 | | 0.00 | | |
| Land slope (%) | = 15.50 | | 0.00 | | 0.00 | | |
| **Travel Time (min)** | **= 14.63** | **+** | **0.00** | **+** | **0.00** | **=** | **14.63** |
| **Shallow Concentrated Flow** | | | | | | | |
| Flow length (ft) | = 318.00 | | 0.00 | | 0.00 | | |
| Watercourse slope (%) | = 15.10 | | 0.00 | | 0.00 | | |
| Surface description | = Paved | | Paved | | Paved | | |
| Average velocity (ft/s) | =7.90 | | 0.00 | | 0.00 | | |
| **Travel Time (min)** | **= 0.67** | **+** | **0.00** | **+** | **0.00** | **=** | **0.67** |
| **Channel Flow** | | | | | | | |
| X sectional flow area (sqft) | = 0.00 | | 0.00 | | 0.00 | | |
| Wetted perimeter (ft) | = 0.00 | | 0.00 | | 0.00 | | |
| Channel slope (%) | = 0.00 | | 0.00 | | 0.00 | | |
| Manning's n-value | = 0.015 | | 0.015 | | 0.015 | | |
| Velocity (ft/s) | =0.00 | | | | | | |
| | | | 0.00 | | | | |
| | | | | | 0.00 | | |
| Flow length (ft) | ({0})0.0 | | 0.0 | | 0.0 | | |
| **Travel Time (min)** | **= 0.00** | **+** | **0.00** | **+** | **0.00** | **=** | **0.00** |

**Total Travel Time, Tc ..... 15.30 min**

# TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

## Hyd. No. 3

Basin 2 - Existing

| Description | A | | B | | C | | Totals |
|---|---|---|---|---|---|---|---|
| **Sheet Flow** | | | | | | | |
| Manning's n-value | = 0.240 | | 0.011 | | 0.011 | | |
| Flow length (ft) | = 273.0 | | 0.0 | | 0.0 | | |
| Two-year 24-hr precip. (in) | = 2.40 | | 0.00 | | 0.00 | | |
| Land slope (%) | = 16.60 | | 0.00 | | 0.00 | | |
| **Travel Time (min)** | **= 15.78** | **+** | **0.00** | **+** | **0.00** | **=** | **15.78** |
| **Shallow Concentrated Flow** | | | | | | | |
| Flow length (ft) | = 179.00 | | 0.00 | | 0.00 | | |
| Watercourse slope (%) | = 4.50 | | 0.00 | | 0.00 | | |
| Surface description | = Paved | | Paved | | Paved | | |
| Average velocity (ft/s) | =4.31 | | 0.00 | | 0.00 | | |
| **Travel Time (min)** | **= 0.69** | **+** | **0.00** | **+** | **0.00** | **=** | **0.69** |
| **Channel Flow** | | | | | | | |
| X sectional flow area (sqft) | = 0.00 | | 0.00 | | 0.00 | | |
| Wetted perimeter (ft) | = 0.00 | | 0.00 | | 0.00 | | |
| Channel slope (%) | = 0.00 | | 0.00 | | 0.00 | | |
| Manning's n-value | = 0.015 | | 0.015 | | 0.015 | | |
| Velocity (ft/s) | =0.00 | | | | | | |
| | | | 0.00 | | | | |
| | | | | | 0.00 | | |
| Flow length (ft) | ({0})0.0 | | 0.0 | | 0.0 | | |
| **Travel Time (min)** | **= 0.00** | **+** | **0.00** | **+** | **0.00** | **=** | **0.00** |

**Total Travel Time, Tc ..... 16.50 min**

# Hydrograph Report - WATER QAULITY



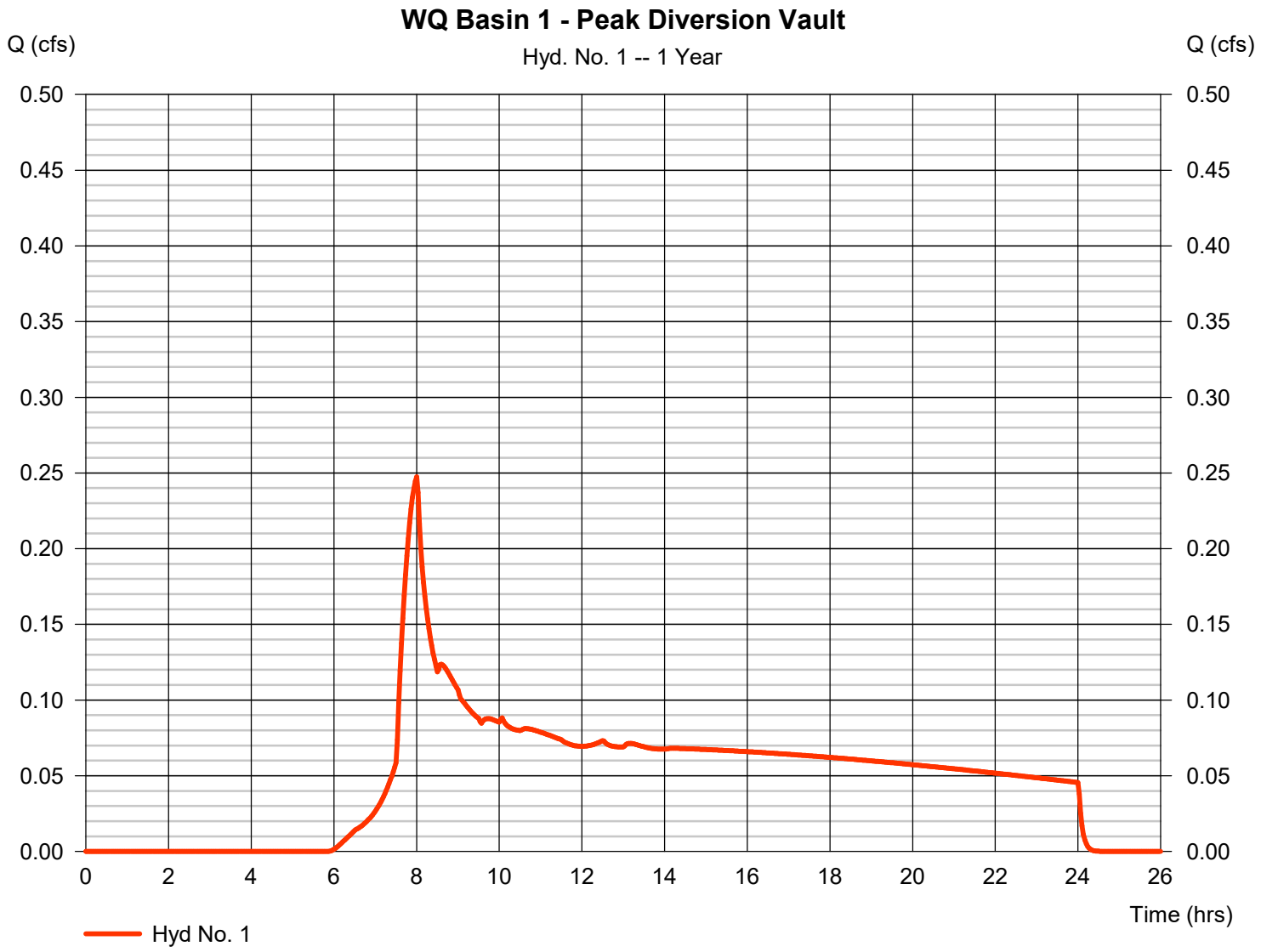
## Hyd. No. 1

WQ Basin 1 - Peak Diversion Vault

1 in/hr

| | | | |
|---|---|---|---|
| Hydrograph type | = SBUH Runoff | Peak discharge | = 0.247 cfs |
| Storm frequency | = 1 yrs | Time to peak | = 8.00 hrs |
| Time interval | = 2 min | Hyd. volume | = 4,473 cuft |
| Drainage area | = 3.430 ac | Curve number | = 91* |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = User | Time of conc. (Tc) | = 5.00 min |
| Total precip. | = 1.00 in | Distribution | = Type IA |
| Storm duration | = 24 hrs | Shape factor | = n/a |

* Composite (Area/CN) = [(2.300 x 80) + (3.960 x 98)] / 3.430



# Hydrograph Report - WATER QAULITY

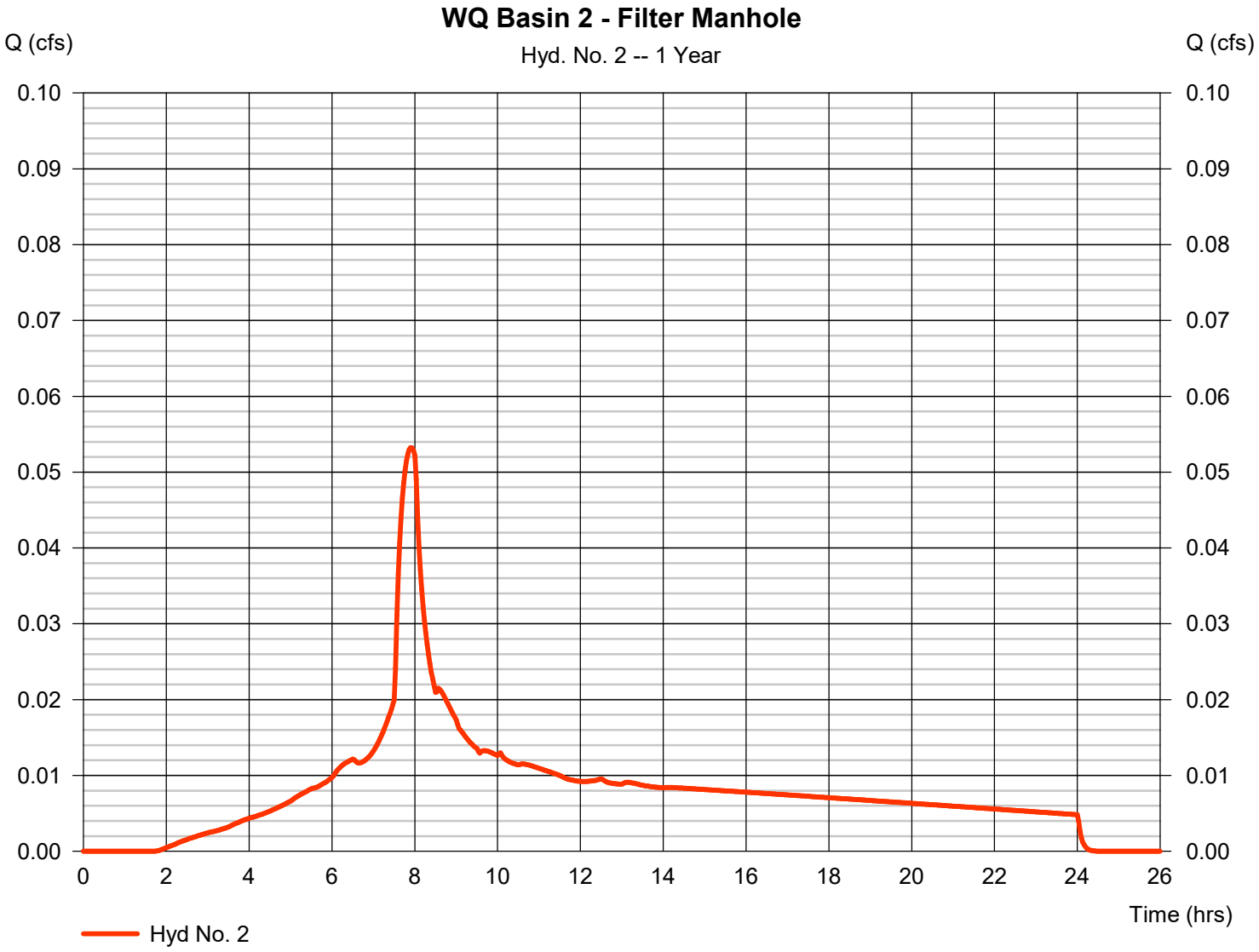


## Hyd. No. 2

1 in/hr

WQ Basin 2 - Filter Manhole

| | | | |
|---|---|---|---|
| Hydrograph type | = SBUH Runoff | Peak discharge | = 0.053 cfs |
| Storm frequency | = 1 yrs | Time to peak | = 7.90 hrs |
| Time interval | = 2 min | Hyd. volume | = 746 cuft |
| Drainage area | = 0.260 ac | Curve number | = 98 |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = User | Time of conc. (Tc) | = 5.00 min |
| Total precip. | = 1.00 in | Distribution | = Type IA |
| Storm duration | = 24 hrs | Shape factor | = n/a |



# Hydrograph Report - WATER QAULITY

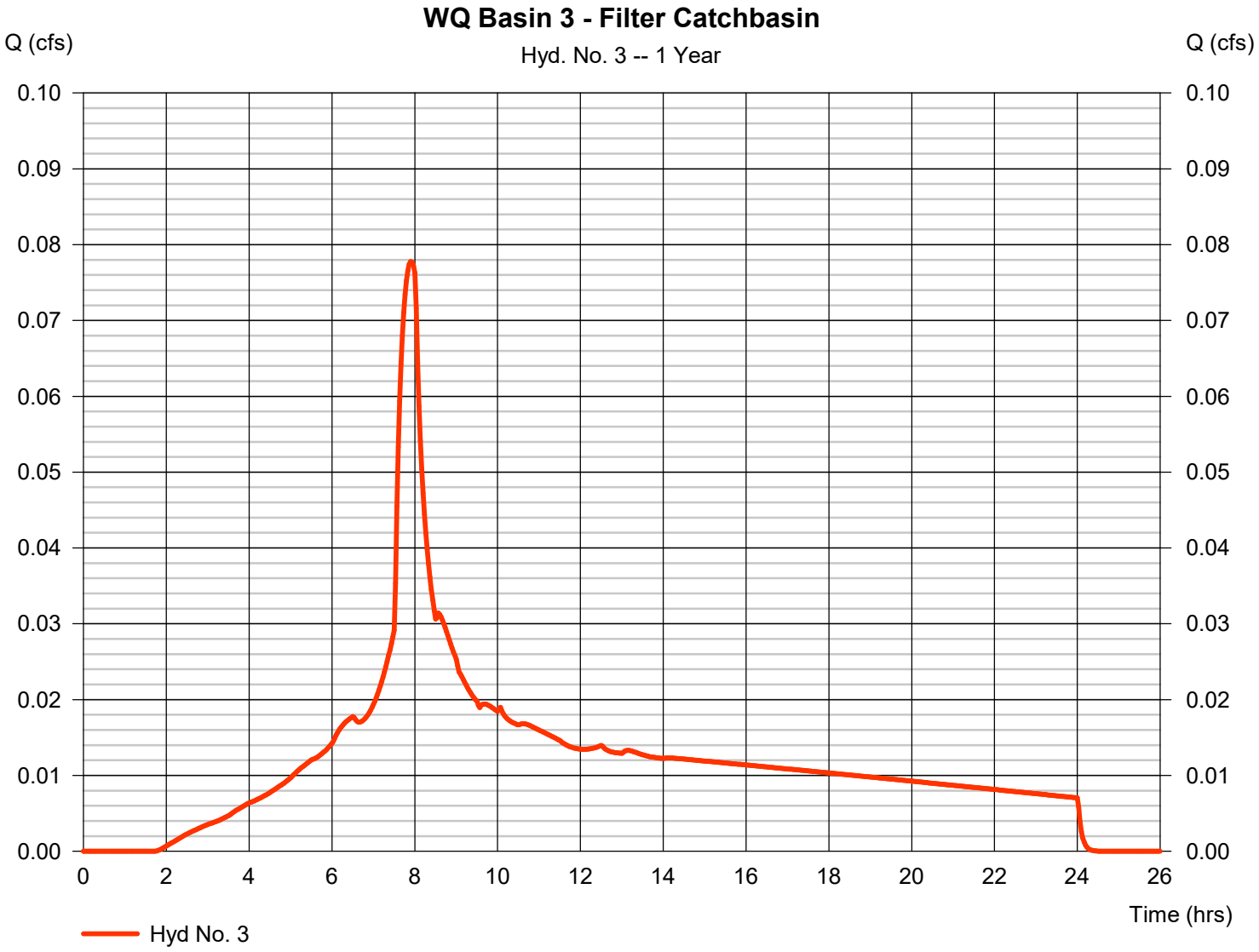


## Hyd. No. 3

1 in/hr

WQ Basin 3 - Filter Catchbasin

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SBUH Runoff | Peak discharge | = | 0.078 cfs |
| Storm frequency | = | 1 yrs | Time to peak | = | 7.90 hrs |
| Time interval | = | 2 min | Hyd. volume | = | 1,091 cuft |
| Drainage area | = | 0.380 ac | Curve number | = | 98 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 1.00 in | Distribution | = | Type IA |
| Storm duration | = | 24 hrs | Shape factor | = | n/a |



# Hydrograph Report

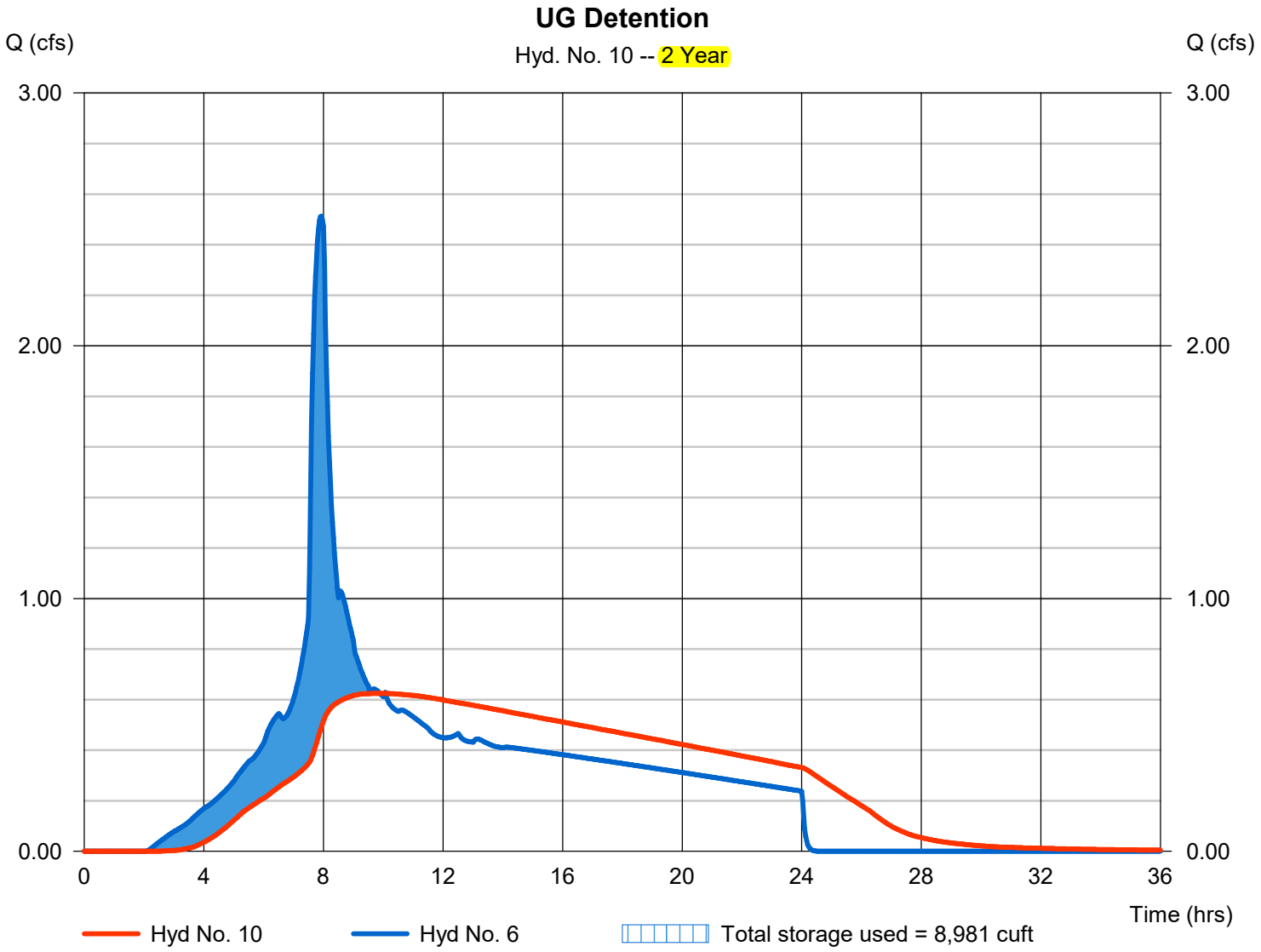
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 11 / 19 / 2025

## Hyd. No. 10

UG Detention

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Reservoir | Peak discharge | = | 0.624 cfs |
| Storm frequency | = | 2 yrs | Time to peak | = | 9.90 hrs |
| Time interval | = | 2 min | Hyd. volume | = | 35,316 cuft |
| Inflow hyd. No. | = | 6 - Basin 1 - Proposed | Max. Elevation | = | 102.39 ft |
| Reservoir name | = | UG Detention | Max. Storage | = | 8,981 cuft |

Storage Indication method used.



# Hydrograph Report

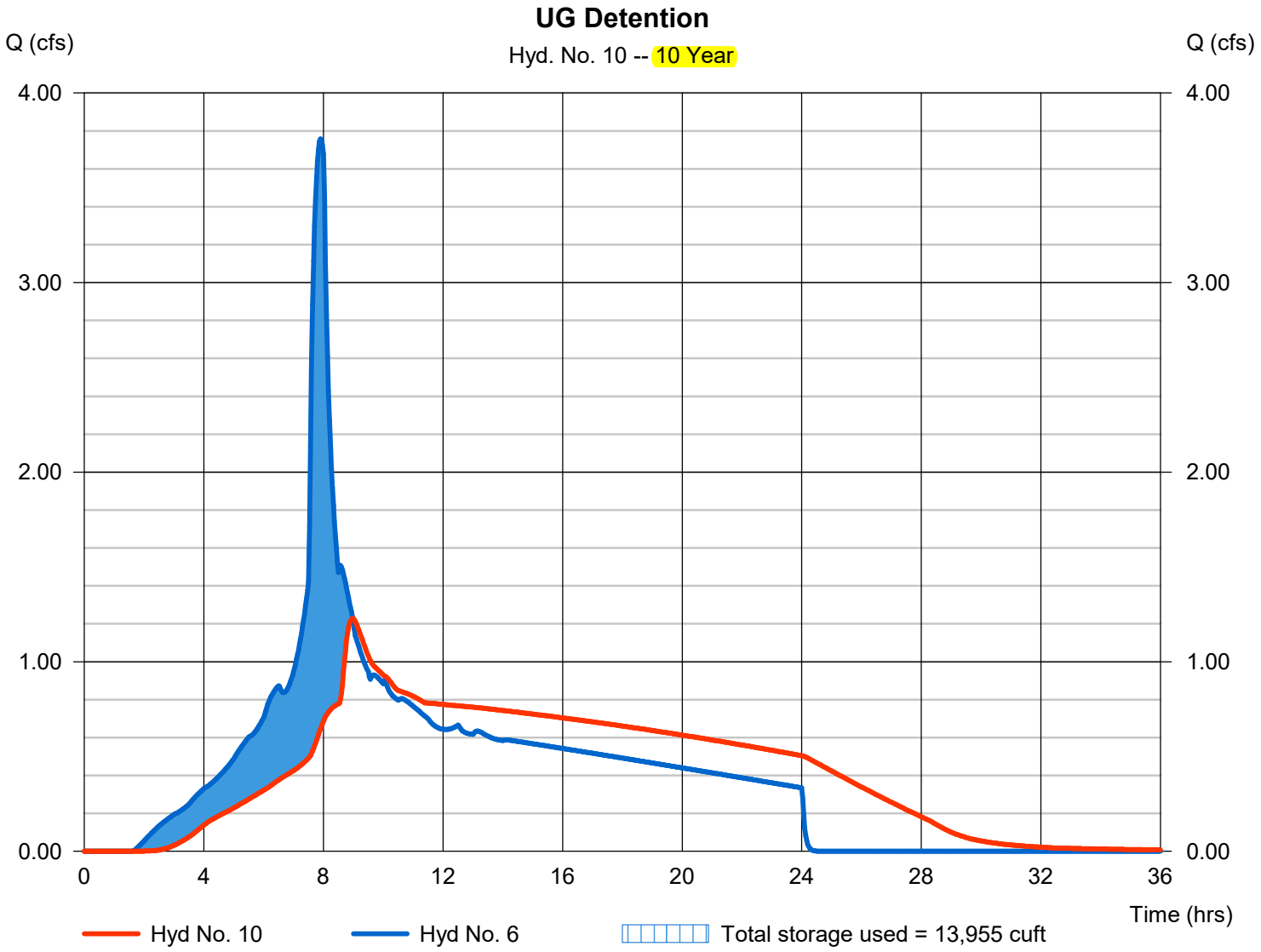
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 11 / 19 / 2025

## Hyd. No. 10

UG Detention

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Reservoir | Peak discharge | = | 1.228 cfs |
| Storm frequency | = | 10 yrs | Time to peak | = | 8.97 hrs |
| Time interval | = | 2 min | Hyd. volume | = | 52,669 cuft |
| Inflow hyd. No. | = | 6 - Basin 1 - Proposed | Max. Elevation | = | 103.72 ft |
| Reservoir name | = | UG Detention | Max. Storage | = | 13,955 cuft |

Storage Indication method used.



# Hydrograph Report

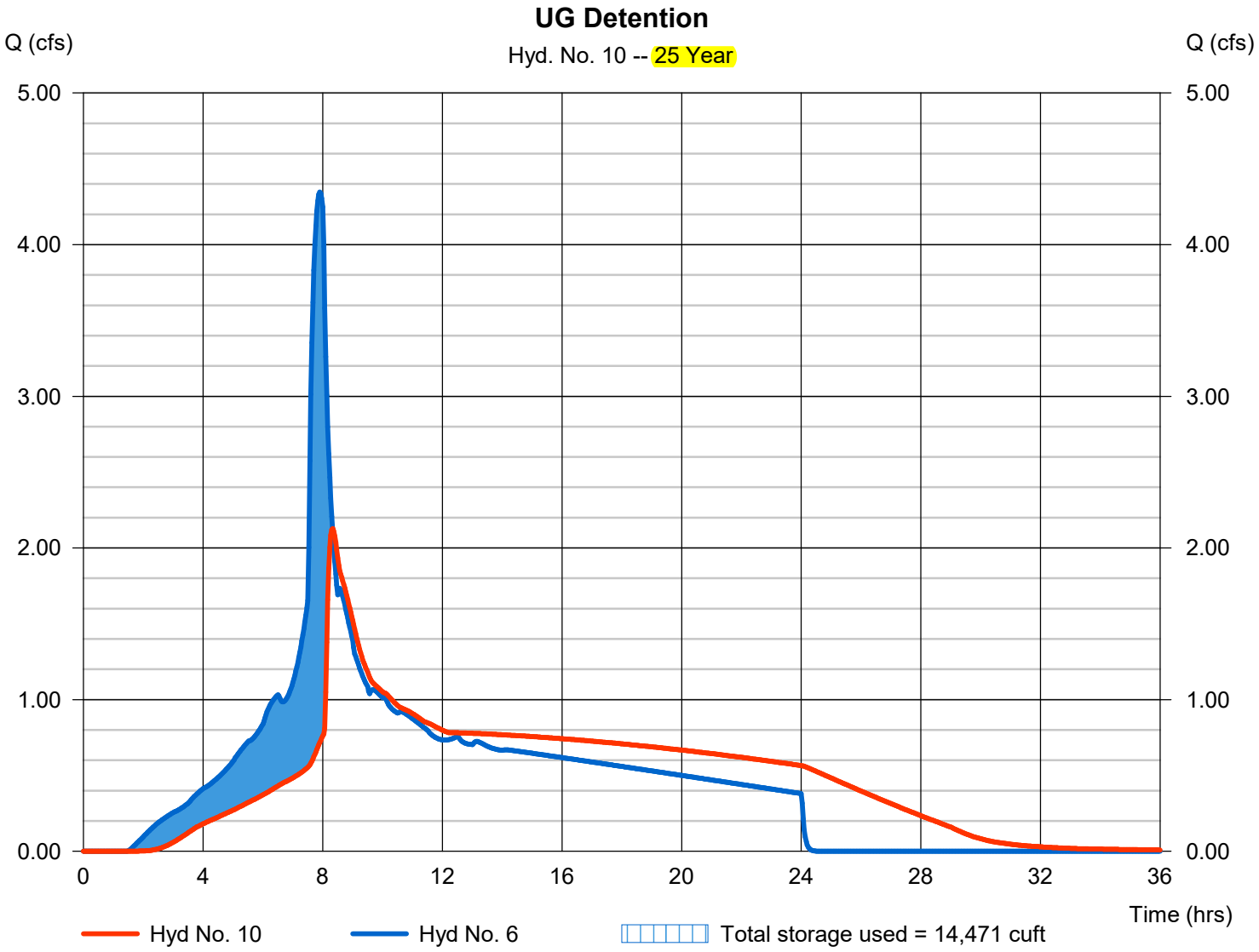


## Hyd. No. 10

UG Detention

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Reservoir | Peak discharge | = | 2.127 cfs |
| Storm frequency | = | 25 yrs | Time to peak | = | 8.33 hrs |
| Time interval | = | 2 min | Hyd. volume | = | 60,981 cuft |
| Inflow hyd. No. | = | 6 - Basin 1 - Proposed | Max. Elevation | = | 103.86 ft |
| Reservoir name | = | UG Detention | Max. Storage | = | 14,471 cuft |

Storage Indication method used.



# Hydrograph Report



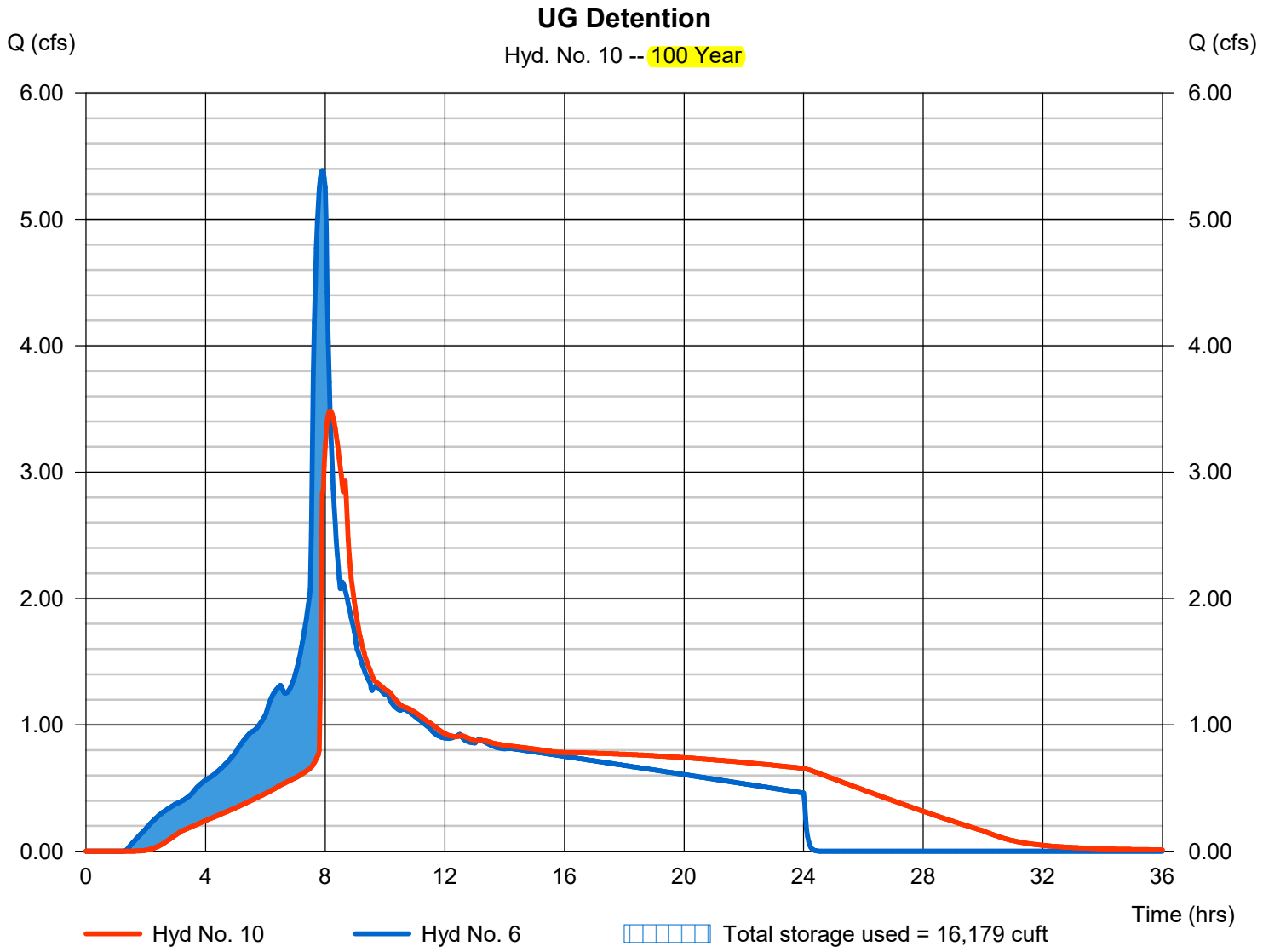
## Hyd. No. 10

UG Detention

Shown for conveyance through underground detention only. Peak Flow Matching not required.

| | | | |
|---|---|---|---|
| Hydrograph type | = Reservoir | Peak discharge | = 3.485 cfs |
| Storm frequency | = 100 yrs | Time to peak | = 8.17 hrs |
| Time interval | = 2 min | Hyd. volume | = 75,843 cuft |
| Inflow hyd. No. | = 6 - Basin 1 - Proposed | Max. Elevation | = 104.31 ft |
| Reservoir name | = UG Detention | Max. Storage | = 16,179 cuft |

Storage Indication method used.



# Pond Report





## Pond No. 1 - UG Detention

### Pond Data

**Trapezoid** -Bottom L x W = 150.0 x 25.0 ft, Side slope = 0.00:1, Bottom elev. = 100.00 ft, Depth = 4.66 ft

### Stage / Storage Table

| Stage (ft) | Elevation (ft) | Contour area (sqft) | Incr. Storage (cuft) | Total storage (cuft) |
|---|---|---|---|---|
| 0.00 | 100.00 | 3,750 | 0 | 0 |
| 0.47 | 100.47 | 3,750 | 1,748 | 1,748 |
| 0.93 | 100.93 | 3,750 | 1,748 | 3,495 |
| 1.40 | 101.40 | 3,750 | 1,748 | 5,243 |
| 1.86 | 101.86 | 3,750 | 1,748 | 6,990 |
| 2.33 | 102.33 | 3,750 | 1,748 | 8,738 |
| 2.80 | 102.80 | 3,750 | 1,748 | 10,485 |
| 3.26 | 103.26 | 3,750 | 1,748 | 12,233 |
| 3.73 | 103.73 | 3,750 | 1,748 | 13,980 |
| 4.19 | 104.19 | 3,750 | 1,748 | 15,728 |
| 4.66 | 104.66 | 3,750 | 1,748 | 17,475 |

### Culvert / Orifice Structures

| | [A] | [B] | [C] | [PrfRsr] |
|---|---|---|---|---|
| **Rise (in)** | = 12.00 | 4.10 | 0.00 | 0.00 |
| **Span (in)** | = 12.00 | 4.10 | 0.00 | 0.00 |
| **No. Barrels** | = 1 | 1 | 0 | 0 |
| **Invert El. (ft)** | = 100.00 | 100.00 | 0.00 | 0.00 |
| **Length (ft)** | = 100.00 | 0.00 | 0.00 | 0.00 |
| **Slope (%)** | = 0.50 | 0.00 | 0.00 | n/a |
| **N-Value** | = .013 | .013 | .013 | n/a |
| **Orifice Coeff.** | = 0.60 | 0.60 | 0.60 | 0.60 |
| **Multi-Stage** | = n/a | Yes | No | No |

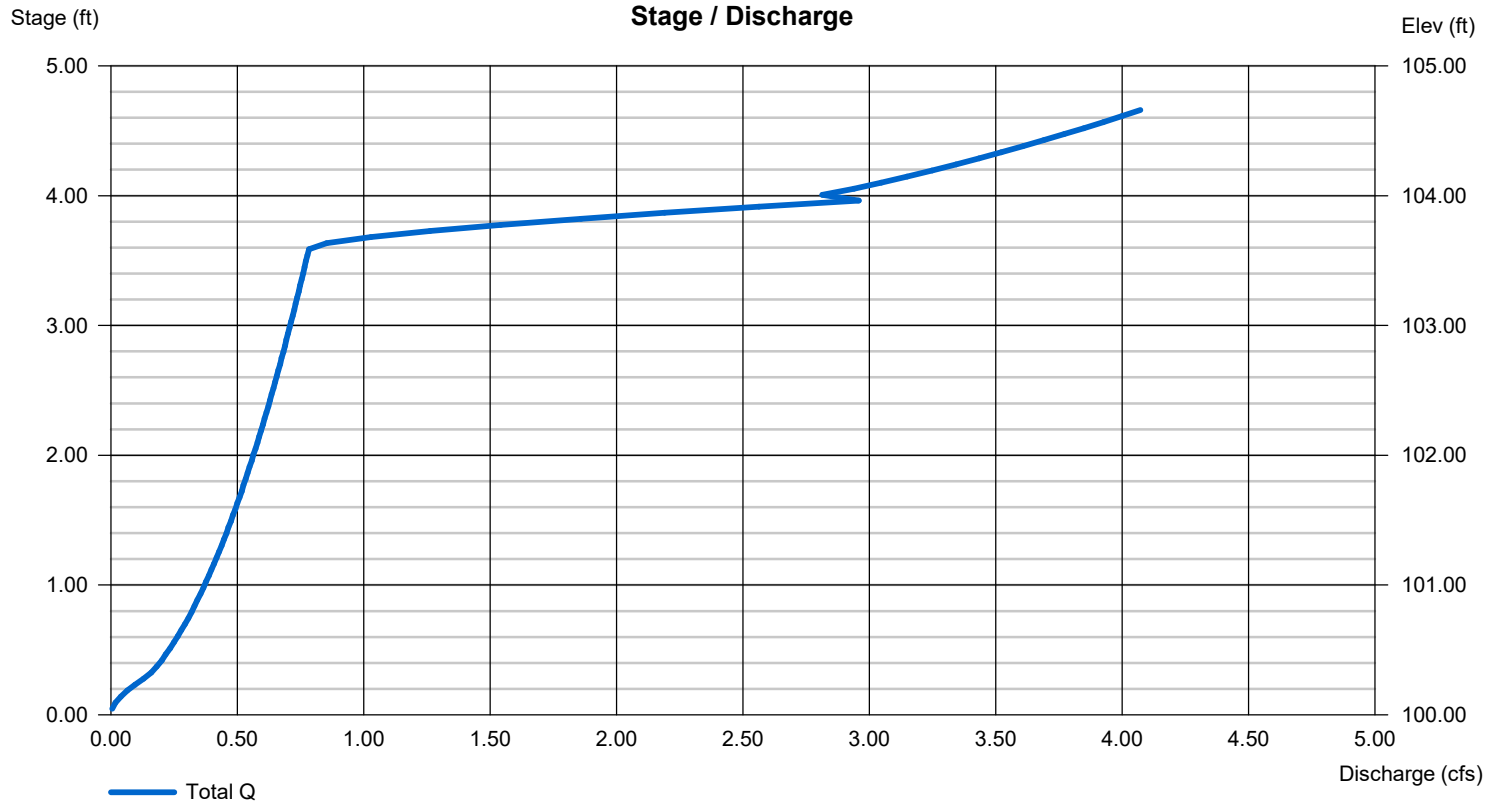
### Weir Structures

| | [A] | [B] | [C] | [D] |
|---|---|---|---|---|
| **Crest Len (ft)** | = 3.14 | 0.00 | 0.00 | 0.00 |
| **Crest El. (ft)** | = 103.60 | 0.00 | 0.00 | 0.00 |
| **Weir Coeff.** | = 3.33 | 3.33 | 3.33 | 3.33 |
| **Weir Type** | = 1 | --- | --- | --- |
| **Multi-Stage** | = Yes | No | No | No |

**Exfil.(in/hr)** = 0.000 (by Contour)

**TW Elev. (ft)** = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



# Transportation Assessment

KITTELSON & ASSOCIATES
851 SW 6th Avenue, Suite 600
Portland, OR 97204
P 503.228.5230

October 15, 2025 Project #32260.001

Erich Lais
City of West Linn
22500 Salamo Road
West Linn, OR 97068

**RE: Proposed New West Linn Public Works Operations Facility – Transportation Assessment**

Dear Erich:

This letter summarizes the trip generation characteristics of the proposed Public Works Operations Facility located along Salamo Road. As documented herein, the proposed facility is expected to exceed the City's trip generation threshold for requiring a formal traffic impact analysis (TIA). However, given that it exceeds the threshold by only a few vehicles and that the additional weekday PM peak hour trips are expected to have a negligible impact on traffic operations along Salamo Road, a formal TIA is not recommended. Additional information on the findings and recommendations is provided herein.

# Proposed Development

The City of West Linn is proposing to relocate its existing Public Works Operations Facility from Norfolk Street to a new location on Salamo Road. The existing facility will be closed, and all public works and parks maintenance staff, along with associated fleet vehicles, will be relocated to the new site. The new facility is not expected to increase staffing, vehicle fleet size, or overall operational capacity. Access to the new facility will be provided by a new driveway on the east side of Salamo Road. The driveway will be gated; however, the gate will remain open during business hours. Attachment A contains the conceptual site plan. Construction of the new facility is planned for 2026, with full build-out and occupancy in 2027.

Chapter 85.170(B)(2) of the West Linn Community Development Code establishes the standards for when a Traffic Impact Analysis (TIA) may be required. Per the Code, a TIA may be required for development applications that involve zoning or plan amendments, are identified by ODOT as having potential operational or safety concerns, generate 250 or more average daily trips, increase the use of heavy vehicles (20,000 pounds) by 10 or more per day, or create access, circulation, or sight distance deficiencies that could impact the transportation system. The remainder of this letter documents how the proposed development responds to each standard and demonstrates that a formal TIA is not recommended.

# Proposed Development Site

As indicated above, the proposed development site is located along the east side of Salamo Road. The site is located within the West Linn city limits, it is vacant, and it is zoned Single-Family Residential Detached (R10), which permits public support facilities as a conditional use. Accordingly, the proposed development is consistent with the existing zoning designation but will require conditional use approval through the City's land use review process.

Also indicated above, site access will be provided by a new driveway located on the east side of Salamo Road, which is a City-owned and operated facility. No direct access to, or impacts on, ODOT facilities are anticipated, and ODOT review of the development application is not expected to be required.

# Trip Generation

Given that (1) the proposed Public Works Operations Facility will replace the existing facility without expanding operational capacity, staffing, or fleet size, and (2) the *Trip Generation Manual* does not include a land use category that reflects the unique characteristics of the City's Public Works operations, trip generation for the proposed facility was estimated based on observed activity at the existing site rather than on a standard land use rate. Accordingly, a trip generation study was conducted at the existing facility to establish representative trip rates for application to the proposed site.

Traffic counts were collected at the existing facility over three consecutive days in September 2025 (Tuesday through Thursday) to capture the total number of vehicles entering and exiting the site. The data indicates that the existing facility generates an average of 256 daily trips, including 31 trips (8 inbound, 23 outbound) during the morning peak hour and 8 trips (1 inbound, 7 outbound) during the evening peak hour. Table 1 summarizes the trip generation data collected during the study period. *Attachment A contains the raw traffic count data.*

**Table 1. Existing Facility Trip Generation Rates**

| Day | Daily Trips | Weekday AM Peak Hour | | | Weekday PM Peak Hour | | |
|---|---|---|---|---|---|---|---|
| | | Total | In | Out | Total | In | Out |
| Tuesday (9/23/2025) | 246 | 39 | 11 | 28 | 10 | 3 | 7 |
| Wednesday (9/24/2025 | 247 | 30 | 8 | 22 | 8 | 1 | 7 |
| Thursday (9/25/2025) | 276 | 24 | 5 | 19 | 3 | 2 | 1 |
| **Average** | **256** | **31** | **8** | **23** | **8** | **1** | **7** |

Per Chapter 85.170(B)(2) of the West Linn Community Development Code, a TIA is required for development that generates 250 or more daily trips. While the observed trip generation rates at the existing facility indicate that the proposed facility could exceed the City's threshold for requiring a TIA, a formal TIA is not recommended to support the development application given that (1) the trips associated with the existing facility did not meet the City's threshold on two of the three count days, (2) the three-day average was only six trips above the threshold, and (3) the weekday PM peak hour trips would have a negligible impact on traffic operations along Salamo Road.

In addition, the proposed facility will replace the existing facility and is expected to generate similar daily, weekday AM, and weekday PM peak hour trips. The existing site will likely return to single-family residential use consistent with surrounding properties. Because single-family homes are substantially lower trip generators than the existing public works facility, the proposed relocation is not expected to result in a significant increase in trips onto the broader transportation system. As such, a formal TIA would not provide additional value or change the conclusions regarding transportation impacts.

It should be noted that while the trip generation data does not distinguish between heavy and non-heavy vehicles, anecdotal information provided by the City indicates that the proposed facility will not generate 10 or more heavy vehicles (20,000 pounds) per day based on existing operations. This, too, is below the thresholds established in Chapter 85.170(B)(2) of the West Linn Community Development Code for requiring a TIA.

## Sight Distance

The site frontage has undergone some regrading and tree removal associated with some recent road work on Salamo in preparation for construction of the proposed facility. The expected access control devices, site distance, and vision clearance associated with the proposed access will be illustrated on site civil plans.

## Access Spacing

As indicated above, access to the operations facility will be provided by a new driveway on the east side of Salamo Road. The driveway will be located approximately 430 feet south of Barrington Drive and 190 feet north of Greene Street. Per Table 15 of the City's Transportation System Plan, the minimum access spacing requirements along minor arterials, such as Salamo Road, is 150 feet between intersections and driveways. Accordingly, the proposed access meets the City's access spacing requirements.

We trust that this letter provides sufficient information about the proposed West Linn Public Works Operations Facility. Please contact us with any questions or comments.

Sincerely,
**KITTELSON & ASSOCIATES, INC.**

Matt Bell
Associate Planner
503.535.7435
mbell@kittelson.com

# Appendix A Conceptual Site Plan

FILE PATH: Autodesk Docs://23028_West Linn Public Works/23028_West Linn Public Works_24.rvt

Scott Edwards Architecture
2525 E Burnside St. Portland, OR 97214
503.226.3617 seallp.com

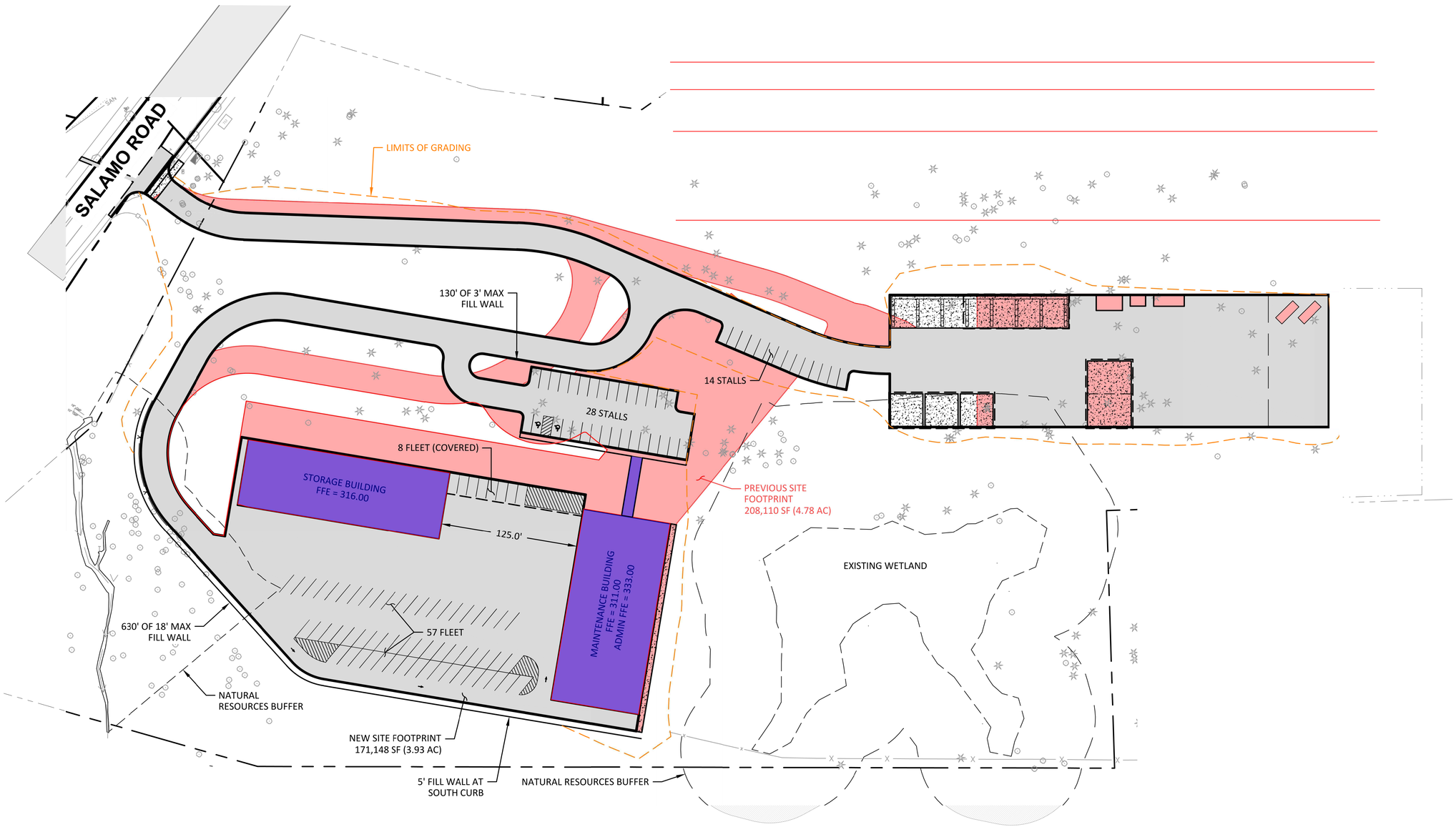
NOT FOR CONSTRUCTION

# WEST LINN OPERATIONS COMPLEX

**Job Number:** 23028

**WEST LINN, OR**

City of West Linn




1 **SITE PLAN**
1" = 40'-0"

NORTH

| | |
|---|---|
| 100% DESIGN DEVELOPMENT SET ISSUE | 05.23.2025 DATE |

**Drawing:**

**SITE PLAN**

**Sheet No:**

**A1.01**

THESE DRAWINGS ARE THE ORIGINAL UNPUBLISHED WORK OF THE ARCHITECT AND MAY NOT BE DUPLICATED OR USED WITHOUT THE WRITTEN CONSENT OF THE ARCHITECT.

SITE LIGHTING PLAN

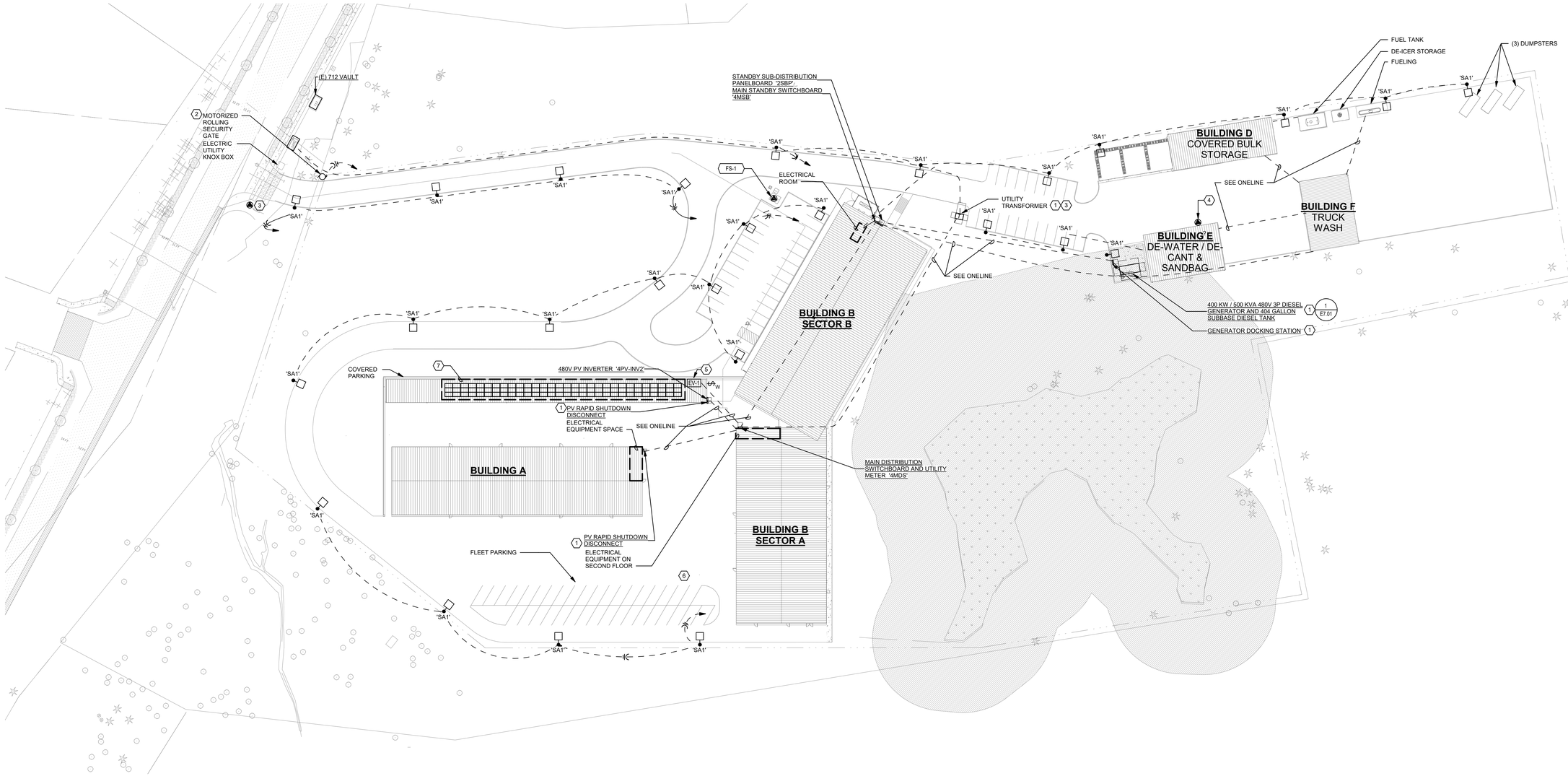
FILE PATH: Autodesk Docs://23028_West Linn Public Works/23028_West Linn Public Works_MEP_R24.rvt

## GENERAL SHEET NOTES

A. SEAL ALL CONDUIT PENETRATIONS TO PREVENT WATER INTRUSION.

## SHEET KEYNOTES

1. PROVIDE HEAVY DUTY BOLLARDS TO PROTECT EQUIPMENT FROM VEHICULAR TRAFFIC.
2. PROVIDE AND INSTALL UNDERGROUND MOTORIZED GATE VEHICLE EXIT AND SAFETY LOOP DETECTOR CABLES PER MANUFACTURER REQUIREMENTS.
3. COORDINATE LOCATION OF MONUMENT SIGN WITH OWNER AND ARCHITECT.
4. PROVIDE 1" CONDUIT AND 120 VOLT 20 AMP TO EYEWASH OVERFLOW ALARM. COORDINATE LOCATION WITH ARCHITECT.
5. PROVIDE DUAL PORT FLEET OWNER-BILLED ELECTRICAL VEHICLE CHARGER WITH TWO 60 AMP NON-GFCI CIRCUITS FOR (2) PARKING SPACES IN COVERED PARKING . CHARGEPOINT CP6000 POWER SELECT 48A OR APPROVED. COORDINATE EXACT LOCATION WITH OWNER PRIOR TO ROUGH-IN.
6. PROVIDE CONDUIT AND CIRCUIT FOR SITE SANITARY LIFT STATION. COORDINATE LOCATION WITH CIVIL AND ARCHITECTURAL DRAWINGS.
7. PROVIDE (90) 500W PHOTOVOLTAIC MODULES ON ROOF. PHOTOVOLTAIC INVERTER AS SHOWN ON SHEET E2.12, CIRCUIT, AND STRUCTURE WORK ASSOCIATED WITH PHOTOVOLTAIC SYSTEM. PROVIDE RACKING SYSTEM STRUCTURAL SUPPORT TIED TO STRUCTURE FOR PHOTOVOLTAIC PANELS TO LAY PARALLEL TO ROOF PITCH. PROVIDE STRUCTURAL CALCULATIONS PER PERMIT REQUIREMENTS. REFER TO STRUCTURAL DRAWINGS. SEE E5.01 AND SPECIFICATIONS 26 3100. MOUNT A MINIMUM OF 4 FEET FROM THE ROOF EDGE.




## 1 FIRST FLOOR ELECTRICAL SITE PLAN - SITE

0' 40' 80'
1" = 40'-0"

THESE DRAWINGS ARE THE ORIGINAL UNPUBLISHED WORK OF THE ARCHITECT AND MAY NOT BE DUPLICATED OR USED WITHOUT THE WRITTEN CONSENT OF THE ARCHITECT.

Scott Edwards Architecture
2525 E Burnside St. 503.226.3617
Portland, OR 97214 seallp.com

REGISTERED PROFESSIONAL ENGINEER OREGON JANUARY 13, 2015 PATRICK O'LEARY EXPIRES: 12/31/26

NOT FOR CONSTRUCTION

# WEST LINN PUBLIC WORKS FACILITY

**Job Number:** 23028

**WEST LINN, OR**

City of West Linn

INTERFACE ENGINEERING
PROJECT 2022-1449
CONTACT TESS ELLSWORTH
100 SW Main Street, Suite 1600
Portland, OR 97204
TEL 503.382.2266
www.interfaceengineering.com

| | |
|---|---|
| 100% DESIGN DEVELOPMENT SET ISSUE | 05/23/2025 DATE |

**Drawing:**

SITE LIGHTING PLAN

**ELECTRICAL**

**Sheet No:**

**E1.01**

TVF&R PERMIT & FIRE SERVICE PLAN

# FIRE CODE / LAND USE / BUILDING REVIEW APPLICATION

Tualatin Valley Fire & Rescue
REV 6-30-20

**North Operating Center**
11945 SW 70th Avenue
Tigard, OR 97223
Phone: 503-649-8577

**South Operating Center**
8445 SW Elligsen Rd
Wilsonville, OR 97070
Phone: 503-649-8577

## Project Information

Applicant Name: Jeff Dunn (Architect)
Address: 2525 E Burnside Rd, Portland, OR 97214
Phone: 503-226-3617
Email:jdunn@seallp.com
Site Address: Salamo Rd and Greene Street (east of Salamo)
City: West Linn, OR
Map & Tax Lot #: 21E35D 05400
Business Name: City of West Linn Operations
Land Use/Building Jurisdiction: R-10
Land Use/ Building Permit # in process

Choose from: Beaverton, Tigard, Newberg, Tualatin, North Plains, West Linn, Wilsonville, Sherwood, Rivergrove, Durham, King City, Washington County, Clackamas County, Multnomah County, Yamhill County

### Project Description

**This project is 2 new buildings (warehouse, fleet maintenance, and administrative office) supporting West Linn's operations functions (Public Works, Parks and Rec, Water, Environmental) with associated new grading and roads to connect all programs and truck movements. Both new buildings are fully sprinklered.**

## Permit/Review Type (check one):

X Land Use / Building Review - Service Provider Permit
☐ Emergency Radio Responder Coverage Install/Test
☐ LPG Tank (Greater than 2,000 gallons)
☐ Flammable or Combustible Liquid Tank Installation (Greater than 1,000 gallons)
  * Exception: Underground Storage Tanks (UST) are deferred to DEQ for regulation.
☐ Explosives Blasting (Blasting plan is required)
☐ Exterior Toxic, Pyrophoric or Corrosive Gas Installation (in excess of 810 cu.ft.)
☐ Tents or Temporary Membrane Structures (in excess of 10,000 square feet)
☐ Temporary Haunted House or similar
☐ OLCC Cannabis Extraction License Review
☐ Ceremonial Fire or Bonfire (For gathering, ceremony or other assembly)

### For Fire Marshal's Office Use Only

TVFR Permit # 2025-0099
Permit Type: SPP-West Linn
Submittal Date: 11/25/2025
Assigned To: DFM Arn
Due Date: NA
Fees Due: $0.
Fees Paid: $0.

Je

## Approval/Inspection Conditions
(For Fire Marshal's Office Use Only)

**This section is for application approval only**

0430 12/01/2025
Fire Marshal or Designee Date

Conditions: See approved fire service plans.

**See Attached Conditions:** ☐ Yes ☒ No

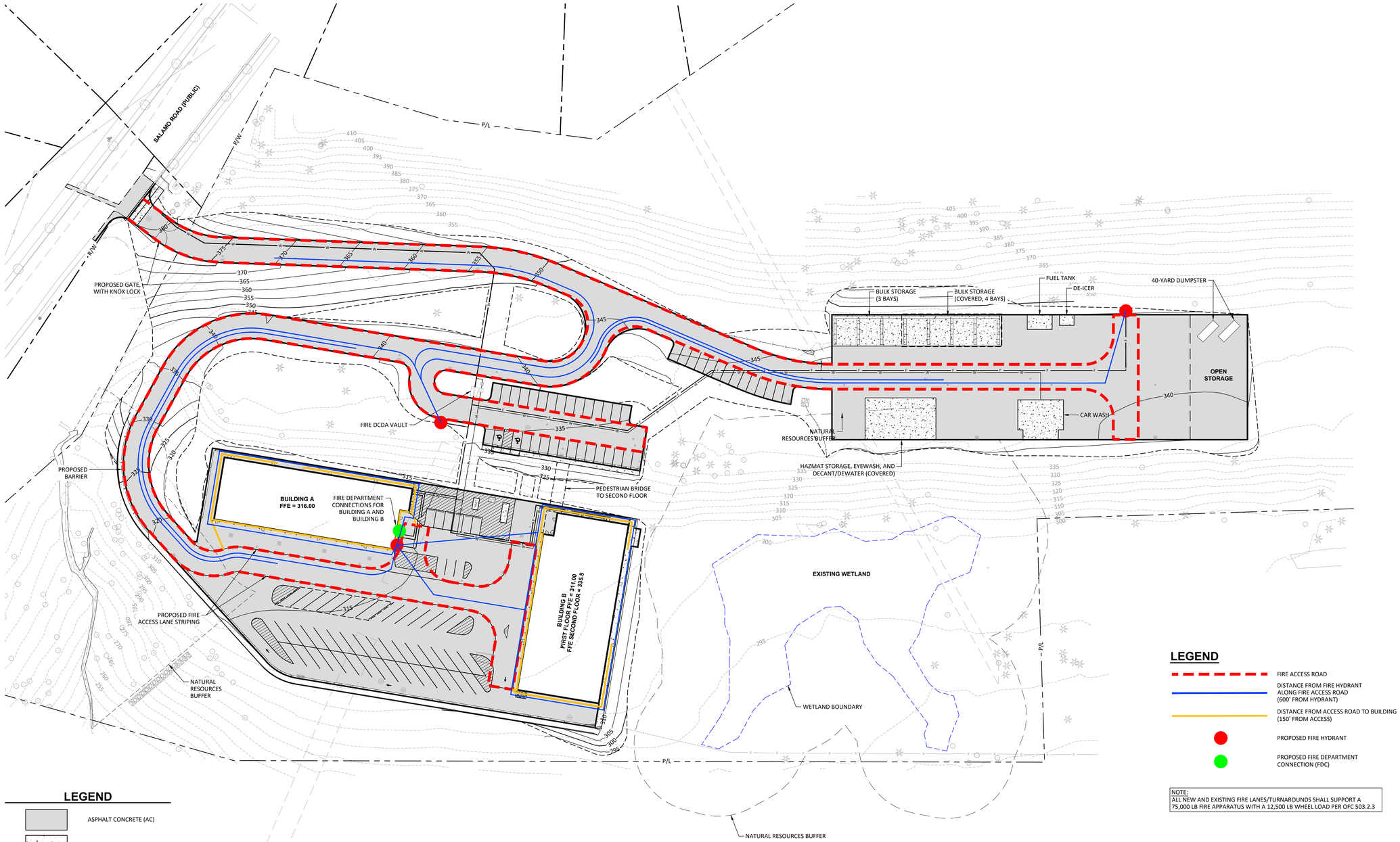
**Site Inspection Required:** ☒ Yes ☐ No

**This section used when site inspection is required**

Inspection Comments:

Final TVFR Approval Signature & Emp ID Date

FILE PATH: C:\Revit_Local\23028_West Linn Public Works_tjorgensenZEPNR.rvt




## LEGEND

- ASPHALT CONCRETE (AC)
- CONCRETE
- EXISTING ROW/PROPERTY LINE
- GRADING LIMITS
- WETLAND BOUNDARY
- NATURAL RESOURCES BUFFER

## LEGEND

- FIRE ACCESS ROAD
- DISTANCE FROM FIRE HYDRANT ALONG FIRE ACCESS ROAD (600' FROM HYDRANT)
- DISTANCE FROM ACCESS ROAD TO BUILDING (150' FROM ACCESS)
- PROPOSED FIRE HYDRANT
- PROPOSED FIRE DEPARTMENT CONNECTION (FDC)

NOTE:
ALL NEW AND EXISTING FIRE LANES/TURNAROUNDS SHALL SUPPORT A 75,000 LB FIRE APPARATUS WITH A 12,500 LB WHEEL LOAD PER OFC 503.2.3

## PLAN VIEW

SCALE: 1" = 40'

| BUILDING | AREA (SF) | TYPE OF CONSTRUCTION | OFC B105.1(2) FIRE FLOW (GPM) | NFPA 13 SPRINKLER PROTECTED | TABLE B105.2 25% OF VALUE IN B105.1(2) (GPM) | MIN. REQ'D FIRE FLOW @ 20 PSI (GPM) |
|---|---|---|---|---|---|---|
| BUILDING A: WAREHOUSE | 11,012 SF | II-B | 2,250 | YES | 625 | 1,500 |
| BUILDING B: (FIRST FLOOR) FLEET MAINTENANCE | 14,106 SF | V-B | 3,250 | YES | 938 | 1,500 |
| BUILDING B: (SECOND FLOOR) OFFICE ADMIN | 14,409 SF | V-B | 3,250 | YES | 813 | 1,500 |

NOTE:
1. REFER TO ATTACHED FIRE FLOW TESTING DATA.
2. AS THE REQUIRED FIRE FLOW IS 1,500 GPM FOR EACH BUILDING, THE BUILDINGS ARE TO BE SERVED BY A MINIMUM OF 1 HYDRANT IN ACCORDANCE WITH OFC TABLE C102.1.

0 20 40 80
SCALE: 1" = 40'

THESE DRAWINGS ARE THE ORIGINAL UNPUBLISHED WORK OF THE ARCHITECT AND MAY NOT BE DUPLICATED OR USED WITHOUT THE WRITTEN CONSENT OF THE ARCHITECT.

Scott Edwards Architecture
2525 E Burnside St. Portland, OR 97214
503.226.3617 seallp.com

REGISTERED PROFESSIONAL ENGINEER
OREGON
JULY 13, 2018
ALEXANDER J. SIMPSON
EXPIRES: 06/30/2024

NOT FOR CONSTRUCTION

# WEST LINN PUBLIC WORKS FACILITY

**Job Number:** 23028

**WEST LINN, OR**

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

TVF&R Tualatin Valley Fire & Rescue
APPROVED PLANS
APPROVAL OF PLANS IS NOT AN APPROVAL OF OMISSIONS OR OVERSIGHTS
Deputy Fire Marshal II
TVF&R Permit# 2025-0099

FD Notes: Fire department final inspection required (OFC 105.1).

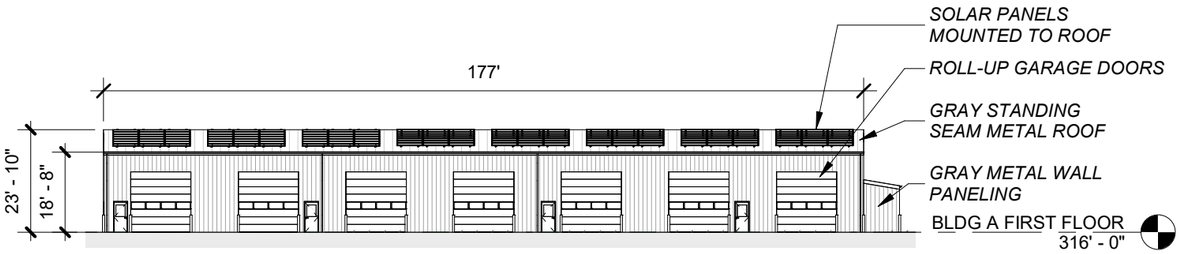
| ISSUE | DATE |
|---|---|
| 100% DESIGN DEVELOPMENT SET | 11/17/2025 |

**Drawing:**

**FIRE ACCESS SITE PLAN**

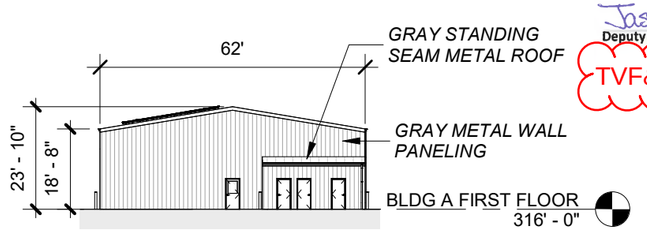
**Sheet No:**

**FS-1**



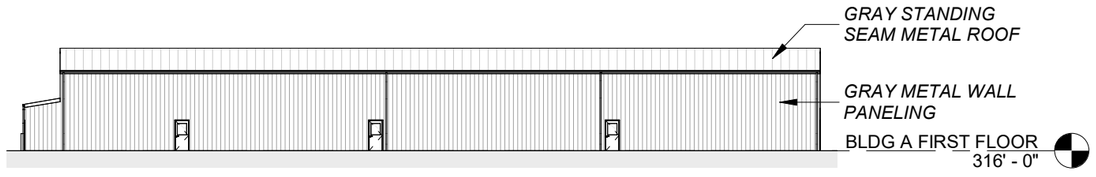

*facade area = 3,392 s.f.*
*transparency = 194 s.f. = .6%*

## BUILDING A - SOUTH ELEVATION
1/32" = 1'-0"



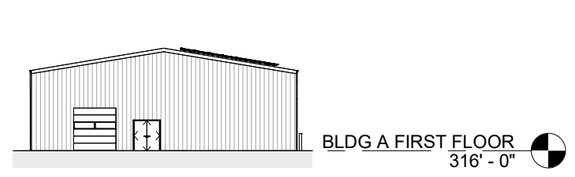

*facade area = 1,308 s.f.*
*transparency = 6 s.f. = .5%*

## BUILDING A - EAST ELEVATION
1/32" = 1'-0"




*facade area = 3,392 s.f.*
*transparency = 17 s.f. = .05%*

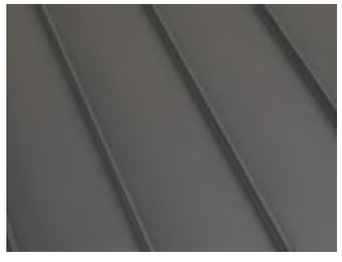
## BUILDING A - NORTH ELEVATION
1/32" = 1'-0"




*facade area = 1,308 s.f.*
*transparency = 16 s.f. = .1%*

## BUILDING A - WEST ELEVATION
1/32" = 1'-0"

ROLL-UP GARAGE DOORS - GRAY



STANDING SEAM METAL ROOF - GRAY

METAL WALL PANELING - GRAY

TVF&R
Tualatin Valley Fire & Rescue
APPROVED PLANS
APPROVAL OF PLANS IS NOT AN APPROVAL OF OMISSIONS OR OVERSIGHTS
Jason Arn Jamler
Deputy Fire Marshal II
TVF&R Permit# 2025-0099

**ELEVATIONS - BUILDING A**

SHEET No:
A3.1

0' 50' 100' 200'

**WEST LINN OPERATIONS COMPLEX**
**23028 11/24/25**

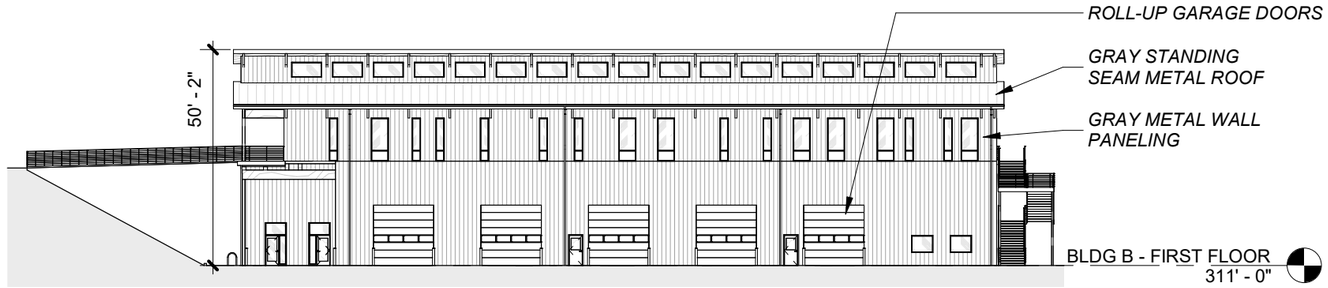
Scott Edwards Architecture

APPROVED PLANS

APPROVAL OF PLANS IS NOT AN APPROVAL OF OMISSIONS OR OVERSIGHTS.

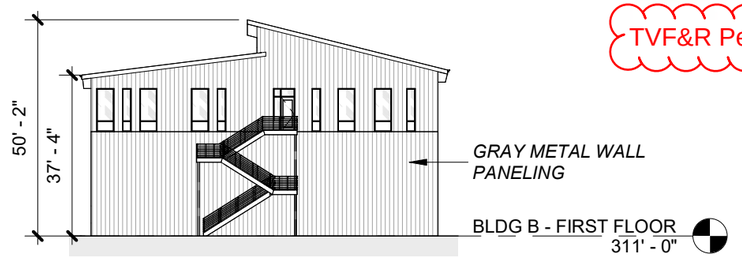
Deputy Fire Marshal II

TVF&R Permit# 2025-0099



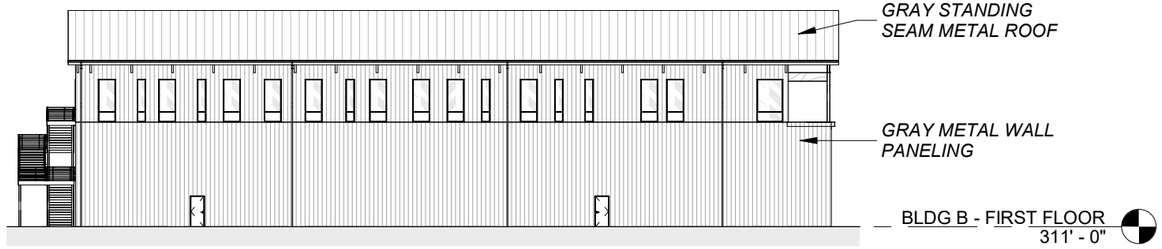

facade area = 8,813 s.f.
transparency = 1,595 s.f. = 18%

## BUILDING B - WEST ELEVATION
1/32" = 1'-0"



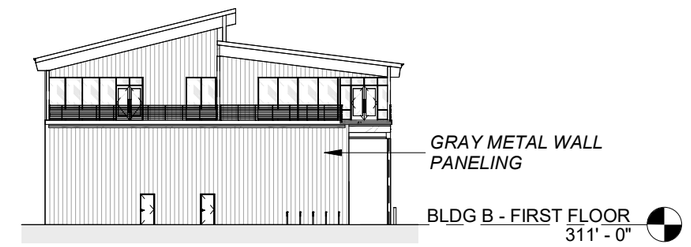

facade area = 3,430 s.f.
transparency = 330 s.f. = 9%

## BUILDING B - SOUTH ELEVATION
1/32" = 1'-0"




facade area = 8,813 s.f.
transparency = 724 s.f. = 8%

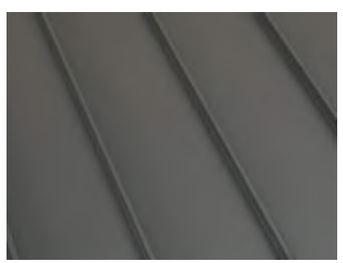
## BUILDING B - EAST ELEVATION
1/32" = 1'-0"



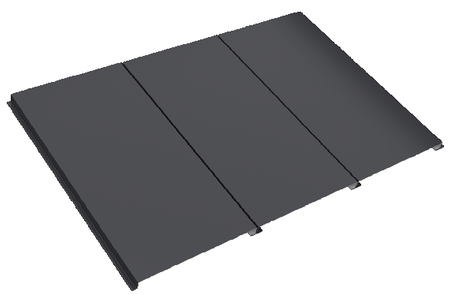

facade area = 3,423 s.f.
transparency = 770 s.f. = 22%

## BUILDING B - NORTH ELEVATION
1/32" = 1'-0"

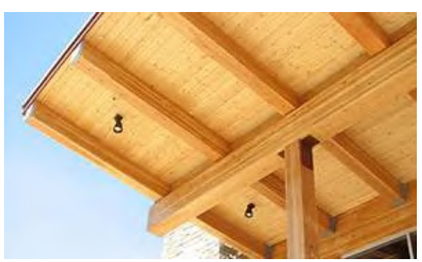
ROLL-UP GARAGE DOORS - GRAY



STANDING SEAM METAL ROOF - GRAY



METAL WALL PANELING - GRAY



GLUE-LAMINATED WOOD BEAMS

**ELEVATIONS - BUILDING B**

SHEET No:
A3.2

0' 50' 100' 200'

**WEST LINN OPERATIONS COMPLEX**
**23028 11/24/25**

Scott Edwards Architecture

# NEIGHBORHOOD ASSOCIATION OUTREACH DOCUMENTATION

Scott Edwards Architecture

# Meeting Notes

**Job:** West Linn Operations Complex (WLOC) Job #23028

**Date:** 06/09/2025 West Linn Public Mtg w. Neighborhood Association Groups

**Time:** 6:00PM

**Attendees:** Erich Lais, Public Works Director/City Engineer, City of West Linn
Morgan Lovel, Support Services Supervisor, Management Analyst, City of West Linn
Luke Borland, Public Works Coordinator, City of West Linn
Brandon Dole, Scott Edwards Architecture
Jeff Dunn, Scott Edwards Architecture
Neighborhood Associations: Barrington Heights, Willamette & Savannah Oaks

**Location:** West Linn City Hall

## 01 Public Meeting Notes

**A** Introduction of the West Linn Operations Complex with Erich Lais, Luke Borland, Brandon Dole and Jeff Dunn, showing site plan, floor plans, elevations and renderings of the project and what the developmnet will look like when completed. The project will be the new home for Public Works, Fleet Maintenance, Water, Environmental and Parks & Recreation staff and operations. The Scott Edwards team also gave a brief description of the design ambitions for the project including landscape/site design of the steep grade of the site, celebration of the wetlands, mass plywood structural system, and preservation of existing trees on site. A high-level schedule update was also shared.

**B** Question-and-Answer Session with Neighbors.

1. Question about exterior materials of the 3 buildings
    i. Answer from Design/City team: exterior cladding and roofing will be painted metal panels. The roofing, specifically, will be standing seam metal. All will be the same dark gray color with some visible mass timber structural elements. The material and formal qualities of the building also relate contextually to the residential buildings in the vicinity.
2. Question about seismic risk on site
    i. Answer from Design/City team: the design team will adhere to all geotechnical and structural requirements. Civil engineer and geotechnical team are engaged and providing guidance to the design team in terms of grading, structures and soil capacities.
3. Question about Grand Ronde tribes
    i. Answer from Design/City team: this will be handled during land use process. If the site is an area of significant resource then we will need to coordinate with SHPO and tribal communities as required.
4. Question about having any water treatment facilities on site
    i. No water treatment as part of the project, but there is a SCADA system (office space) as part of the project which helps control/maintain water treatment facilities.

5. Question about the grading/soils makeup of the site and if there are any risks to surrounding communities during or after construction
    i. Answer from Design/City team: there has been a thorough geotechnical study performed of the project site by a licensed geotechnical engineering firm which defines the requirements of site and foundation design within established limits of safety. The design and structural/civil engineering teams will adhere to all requirements defined by the geotechnical engineering team. The general contractor will take various precautions on site during construction to monitor any vibration during construction.
6. Question about noise pollution during construction and after
    i. Answer from Design/City team: It is assumed that because of the steep slopes of the site that sound will mostly be directed south toward 205 because of the natural features of the site, but project will also follow all regulations related to construction hours.
    ii. Once complete, most Operations work actually happens off site and out in the City itself, so for the most part there shouldn't be a lot of noise generation from the Operations Complex.
7. Question about traffic and potential for back-ups and/or flagging on Salamo Rd and concerns about parking in nearby neighborhood streets
    i. Answer from Design/City team: Once the entry road is built for the site, most construction vehicles and equipment should be able to be staged on the site itself, and there shouldn't be a need for it to be parked on the road or elsewhere in public areas. There may need to be flagging as certain equipment is brought in but this should be minimal and all safety/traffic regulations will be followed. Right-time delivery will also be used to coordinate deliveries to avoid any congestion.
8. Question about information flow and how to be sure community will receive answers to questions/concerns during construction phase
    i. Answer from Design/City team: Luke Borland (West Linn Communications) will field all questions from community and work with general contractor, architect and City staff to get answers and share those with community. City is working on the platform for this system currently.

CITY HALL 22500 Salamo Rd, West Linn, OR 97068 Telephone: (503) 657-0331 Fax: (503) 650-9041

City of West Linn

5/19/2025

R.E.: Meeting regarding the new City of West Linn Operations Building along Salamo Road

Dear Resident,

The City of West Linn has been in the process of designing a Public Works and Parks Operations Building along Salamo Road across from Greene Street (located on attached map). The new facility will be better equipped to meet the City's maintenance needs with ample and modern workshops, material and equipment storage, office space, and fleet maintenance areas.

We would like to invite you to a meeting in City Council Chambers on **June 9th** at 6pm to discuss the proposed project and answer any questions they may have. The meeting will also be streamed virtually with the virtual link found on the **www.westlinnoregon.gov/meetings**

Project Goals:

- Build a modern, sustainable, and appropriately sized operations facility
- Provide climate-controlled work and storage spaces for vital equipment
- Increase bulk material storage areas for added redundancy and more economical purchasing
- Provide a resilient structure for natural disaster response
- Consolidate operations and storage from various satellite locations

We look forward to discussing this project with you!

Applicant: City of West Linn Public Works Department
Project Manager: Morgan Lovell
503-722-3432
mlovell@westlinnoregon.gov

CITY HALL 22500 Salamo Rd, West Linn, OR 97068 Telephone: (503) 657-0331 Fax: (503) 650-9041

City of
# West Linn

TES
VICE.

01:57 PM

Price

$0.73

$4.85

$5.58

$0.73

$4.85

$5.58

$0.73

$4.85

$5.58

$0.73

$4.85

$5.58

$0.73

$4.85

$5.58

33.48

## U.S. Postal Service™ CERTIFIED MAIL® RECEIPT

*Domestic Mail Only*

For delivery information, visit our website at *www.usps.com®*.

West Linn, OR 97068

OFFICIAL USE

| | |
|---|---|
| Certified Mail Fee | $4.85 |
| Extra Services & Fees (check box, add fee as appropriate) | |
| ☐ Return Receipt (hardcopy) | $0.00 |
| ☐ Return Receipt (electronic) | $0.00 |
| ☐ Certified Mail Restricted Delivery | $0.00 |
| ☐ Adult Signature Required | $0.00 |
| ☐ Adult Signature Restricted Delivery | $ |
| Postage | $0.73 |
| Total Postage and Fees | $5.58 |

0155 10

Postmark Here

MAY 19 2025

05/19/2025

7022 2410 0001 4130 3990

Sent To: Robert Jester

Street and Apt. No., or PO Box No.: 3475 Riverhall Way

City, State, ZIP+4®: West Linn, OR 97068

PS Form 3800, April 2015 PSN 7530-02-000-9047 — See Reverse for Instructions

## U.S. Postal Service™ CERTIFIED MAIL® RECEIPT

*Domestic Mail Only*

For delivery information, visit our website at *www.usps.com®*.

West Linn, OR 97068

OFFICIAL USE

| | |
|---|---|
| Certified Mail Fee | $4.85 |
| Extra Services & Fees (check box, add fee as appropriate) | |
| ☐ Return Receipt (hardcopy) | $0.00 |
| ☐ Return Receipt (electronic) | $0.00 |
| ☐ Certified Mail Restricted Delivery | $0.00 |
| ☐ Adult Signature Required | $0.00 |
| ☐ Adult Signature Restricted Delivery | $ |
| Postage | $0.73 |
| Total Postage and Fees | $5.58 |

0155 10

Postmark Here

MAY 19 2025

05/19/2025

7022 2410 0001 4130 3983

Sent To: Grace Cargni

Street and Apt. No., or PO Box No.: 3565 Riverhall Way

City, State, ZIP+4®: West Linn, OR 97068

PS Form 3800, April 2015 PSN 7530-02-000-9047 — See Reverse for Instructions

## U.S. Postal Service™ CERTIFIED MAIL® RECEIPT

*Domestic Mail Only*

For delivery information, visit our website at *www.usps.com®*.

West Linn, OR 97068

OFFICIAL USE

| | |
|---|---|
| Certified Mail Fee | $4.85 |
| Extra Services & Fees (check box, add fee as appropriate) | |
| ☐ Return Receipt (hardcopy) | $0.00 |
| ☐ Return Receipt (electronic) | $0.00 |
| ☐ Certified Mail Restricted Delivery | $0.00 |
| ☐ Adult Signature Required | $0.00 |
| ☐ Adult Signature Restricted Delivery | $ |
| Postage | $0.73 |
| Total Postage and Fees | $5.58 |

0155 10

Postmark Here

MAY 19 2025

05/19/2025

7022 2410 0001 4130 3976

Sent To: Elizabeth Rocchia

Street and Apt. No., or PO Box No.: 957 Willamette Falls Dr

City, State, ZIP+4®: West Linn, OR 97068

PS Form 3800, April 2015 PSN 7530-02-000-9047 — See Reverse for Instructions

## U.S. Postal Service™ CERTIFIED MAIL® RECEIPT

*Domestic Mail Only*

For delivery information, visit our website at *www.usps.com®*.

West Linn, OR 97068

OFFICIAL USE

| | |
|---|---|
| Postage | $4.85 |
| Certified Fee | $0.00 |
| Return Receipt Fee (Endorsement Required) | $0.00 |
| Restricted Delivery Fee (Endorsement Required) | $0.00 |
| Total Postage & Fees | $0.73 |
| | $5.58 |

0155 10

Postmark Here

MAY 19 2025

05/19/2025

7014 2120 0000 7905 1582

Sent To: Roberta Schwarz

Street & Apt. No., or PO Box No.: 2206 Tanner Dr.

City, State, ZIP+4: West Linn, OR 97068

PS Form 3800, July 2014 — See Reverse for Instructions

## U.S. Postal Service™ CERTIFIED MAIL® RECEIPT

*Domestic Mail Only*

For delivery information, visit our website at *www.usps.com®*.

West Linn, OR 97068

OFFICIAL USE

| | |
|---|---|
| Postage | $4.85 |
| Certified Fee | $0.00 |
| Return Receipt Fee (Endorsement Required) | $0.00 |
| Restricted Delivery Fee (Endorsement Required) | $0.00 |
| Total Postage & Fees | $0.73 |
| | $5.58 |

0155 10

Postmark Here

MAY 19 2025

05/19/2025

7014 2120 0000 7905 1568

Sent To: Kathie Halicki

Street & Apt. No., or PO Box No.: 2307 Falcon Dr

City, State, ZIP+4: West Linn, OR 97068

PS Form 3800, July 2014 — See Reverse for Instructions

## U.S. Postal Service™ CERTIFIED MAIL® RECEIPT

*Domestic Mail Only*

For delivery information, visit our website at *www.usps.com®*.

West Linn, OR 97068

OFFICIAL USE

| | |
|---|---|
| Postage | $4.85 |
| Certified Fee | $0.00 |
| Return Receipt Fee (Endorsement Required) | $0.00 |
| Restricted Delivery Fee (Endorsement Required) | $0.00 |
| Total Postage & Fees | $0.73 |
| | $5.58 |

0155 10

Postmark Here

MAY 19 2025

05/19/2025

7014 2120 0000 7905 1575

Sent To: Amarillys Zurschmit

Street & Apt. No., or PO Box No.: 2550 Kensington Ct.

City, State, ZIP+4: West Linn, OR 97068

PS Form 3800, July 2014 — See Reverse for Instructions

# WATER RESOURCES AREA REPORT

# Water Resource Area Review

## West Linn Public Works Facility

West Linn, Oregon

*November 2025*


Prepared by:

Harper Houf Peterson Righellis Inc.

ENGINEERS • PLANNERS • LANDSCAPE ARCHITECTS • SURVEYORS • SCIENTISTS

205 SE Spokane Street, Suite 200, Portland, OR 97202

Ph: 503.221.1131 • HHPR.com • Fax: 503.221.1171


Prepared for:

**City of West Linn Public Works Department**
4100 Norfolk Street
West Linn, Oregon 97068

# Table of Contents


A. Introduction ..... 2

B. Applicant Information ..... 2

B.1 Applicant ..... 2

B.2 Applicant's Agent ..... 2

B.3 Site Location ..... 2

B.4 Legal Description ..... 3

B.5 Site Description ..... 3

C. Project Description ..... 4

D. Water Resource Protection Area ..... 4

D.1 Application Submittal Requirements ..... 5

**Appendix A** **Figures**

**Appendix B** **Previous Wetland Delineation**

**Appendix C** **Department of State Lands (DSL) Wetland Concurrence**

## A. Introduction

Harper Houf Peterson Righellis Inc. (HHPR) has prepared this Water Resource Area (WRA) Plan for the construction of the West Linn Public Works Facility.

The West Linn Public Works Facility project is proposed on an undeveloped hillside north of Interstate 205 (I-205), south of the Barrington Heights residential neighborhood, east of Salamo Road, and west of an existing Oregon Department of Transportation (ODOT) storage yard (Figure 1). The proposed development includes a public works facility, parking lot, and proposed access road connecting the facility to Salamo Road. A previous wetland delineation (WD2009-0342) identified one wetland within the currently proposed development and one stream located in a ravine west of the proposed development within the Study Area (SA). HHPR's qualified biologists prepared a wetland delineation report to document current conditions onsite (WD2025-0055; Appendix B) and identified one stream (Stream 1) and one wetland (Wetland A), which are consistent with features identified by Vigil-Agrimis.

Water Resource Areas are within the project area boundary (Figure 1). Impacts to the Water Resource Areas are proposed, and therefore a Water Resource Protection Area Impact Report is required. The format follows the pertinent sections of the City of West Linn Planning and Community Development Code (WLCDC Chapter 32). For ease of review by the City, key portions of the ordinance language are included, followed by specific responses to the requirements (bolded).

## B. Applicant Information

### B.1 Applicant

City of West Linn
Engineering Department
22500 Salamo Road
West Linn, OR 97068

### B.2 Applicant's Agent

Harper Houf Peterson Righellis Inc. (HHPR)
Attn: Dan Thew
205 SE Spokane Street, STE 200
Portland, OR 97202
Phone: (503) 221-1131
Email: dant@hhpr.com
Site Information

### B.3 Site Location

City of West Linn Public Works Facility
East of Salamo Rd & Greene St Intersection
West Linn, OR 97068

## B.4 Legal Description

Township 2 South, Range 1 East, Section 35, tax lots 5200 and 5400, ROW

Township 2 South, Range 1 East, Section 36, ROW

## B.5 Site Description

The SA is 14.3 acres and extends from Salamo Road right-of-way (ROW) at the western boundary across an upper and lower terrace to the eastern edge of the City-owned parcel (21E35D005400), tax lot 21E35D005200, and a portion of ODOT owned parcel (21E36 ROW).

A series of terraces were excavated during the construction of I-205 in 1969 in order to improve slope stability (WD2009-0342) and have remained undeveloped. The SA includes part of two of these terraces. The lower terrace is between an existing ODOT storage yard to the east and a steep ravine with an unnamed stream at the bottom to the west. The SA extends to the southern boundary of the City-owned parcel that occurs on or near the edge of the lower terrace. South of the SA is a steep cliff that descends to I-205 below.

In the vicinity of the SA there are dense residential neighborhoods upslope to the north and west. Downslope of the SA is I-205, and across that lies a low terrace with wetlands and a water treatment plant along the banks of the Willamette River (Figure 1). The SA is in the Tanner Creek-Willamette River (170900070405) 12 Digit Hydrologic Unit Code (HUC).

Vegetation within the SA is dominated by upland trees, shrubs, grasses, and forbs. Trees and shrubs are scattered throughout the SA, allowing for an open grass/scotch broom (*Cytisus scoparius*) plant community to be dominant throughout most of the SA. The ravine in the western portion of the SA has a full canopy. Vegetation communities are generally made up of the following groups:

- Upland areas with scattered Douglas fir (*Pseudotsuga menziesii*), bigleaf maple (*Acer macrophyllum*), and black cottonwood (*Populus trichocarpa*) trees, with a shrub layer of Oregon white oak (*Quercus garryana*) saplings, scotch broom (*Cytisus scoparius*), and lesser amounts of Himalayan blackberry (*Rubus armeniacus*), serviceberry (*Amelanchier alnifolia*), beaked hazelnut (*Corylus cornuta*), cascara (*Rhamnus purshiana*), common snowberry (*Symphoricarpos albus*), and Pacific madrone (*Arbutus menziesii*). Grasses including false oat grass (*Arrhenatherum elatius*), velvet grass (*Holcus lanatus*), common bentgrass (*Agrostis capillaris*), and tall fescue (*Schedonorus arundinaceus*), with upland forbs such as Queen Anne's lace (*Daucus carota*), St. John's wort (*Hypericum perforatum*), hairy cat's ear (*Hypochaeris radicata*), bracken fern (*Pteridium aquilinum*), and common teasel (*Dipsacus fullonum*).
- A steep ravine with a canopy of bigleaf maple, cottonwood, and Douglas fir with an understory of dense Himalayan blackberry and some western swordfern (*Polystichum munitum*) and English ivy (*Hedera helix*).

There is an area dominated by wood chips that is almost completely lacking vegetation with only a few Douglas fir and Oregon white oak saplings present.

On November 8, November 18, November 20, and December 4, 2024, HHPR identified and delineated the ordinary high-water mark (OHWM) of one stream (Stream 1) and one wetland. A wetland delineation report (WD2025-0055) was submitted to Oregon Department of State Lands (DSL) for concurrence on January 31, 2025 and concurrence was received on July 2, 2025 (Appendix C). A summary of the resources identified in the delineation is proved in Table 1 below. Existing conditions within the project area are shown in the figures in Appendix B.

***Table 1. Water Resources Within the Project Area***

| Name | Type | Extent in SA | HGM |
|---|---|---|---|
| Wetland A | PEM Wetland | 0.66 acres | Slope |
| Stream 1 | Intermittent Stream | 225 linear feet | Non-wetland water |

## C. Project Description

The proposed development includes a public works facility, operations and storage yard, parking lot, and proposed access connecting the facility to Salamo Road.

## D. Water Resource Protection Area

West Linn Development Code Chapter 32 establishes protections for water resource areas in order to comply with Title 3, and Title 13 Requirements.

HHPR delineated one wetland (Wetland A) and one watercourse (Stream 1) within the SA (Appendix A, WD2025-0055).

Wetland A is a slope class, palustrine emergent (PEM) wetland located in the eastern portion of the SA on the lower terrace. Wetland A is approximately 28,555 square feet (SF) (0.66 acres).

Stream 1, totaling approximately 225 linear feet (LF) within the SA, is an unnamed intermittent stream. Stream 1 flows from north to south through the SA. Stream 1 daylights out of two corrugated metal culverts downslope of Salamo Road, flows south through a ravine in the western portion of the SA and continues south out of the SA before draining under I-205, and ultimately to the Willamette River via Bernert Creek.

Characteristics of these features are summarized below in Table 2.

***Table 2: Water Resource Area Summary***

| Name | Type | Extent in SA | DSL Jurisdiction | USACE Jurisdiction |
|---|---|---|---|---|
| Wetland A | PEM Wetland | 0.66 acres | Yes | Assumed Yes |
| Stream 1 | Intermittent Stream | 225 linear feet | Yes | Yes |

## Habitat Conservation Areas

City of West Linn does not map any Habitat Conservation Areas (HCA) within the project area. During a preliminary meeting with City of West Linn Planning Department, dated December 20, 2024, the City Planner confirmed that HCA boundaries are present only where mapped and that they do not occur within the project area.

## Water Resource Areas

In accordance with CDC 32.060 Table 32-2 the width of the Water Resource Area (WRA) associated with Wetland A is 65 feet from the upland edge of the wetland. Additionally, for the water resource (Stream 1) within a ravine with slopes over 25% to a distinct top of slope require a WRA that extends from the water resource edge to the top of slope, plus an additional 50-feet. These buffer lengths were applied to the north side of Wetland A as there is a steep slope near wetland edge and along the ravine above Stream 1 within the project area. A total of 15,120 SF of permanent impacts will occur within the WRAs. In addition, 1,285 SF of temporary will occur within the WRAs. These areas will be revegetated in accordance with West Linn Development Code.

### D.1 Application Submittal Requirements

#### 28.90 SUBMITTAL REQUIREMENTS: APPLICATION

A. An application for a protection area permit shall be initiated by the property owner or the owner's authorized agent. Evidence shall be provided to demonstrate that the applicant has the legal right to use the land above the OLW. The property owner's signature is required on the application form.

B. A prerequisite to the filing of an application is a pre-application conference at which time the Planning Director shall explain the provisions of this chapter and provide appropriate forms as set forth in CDC 99.030(B).

C. An application for a protection area permit shall include the completed application and:

1. Narrative which addresses the approval criteria of CDC 28.110.
2. A site plan, with HCA boundaries shown and by low, moderate, high type shown (CDC 28.120).
3. A grading plan if applicable (CDC 28.130).
4. Architectural drawings if applicable (CDC 28.140).
5. A landscape plan if applicable (CDC 28.150).
6. A mitigation plan if applicable (CDC 28.160).
7. A storm detention and treatment plan and narrative statement pursuant to CDC 92.010(E)

**Response: This submittal constitutes the narrative requirement listed above.**

**32.050 Application**

A. An application requesting approval for a use or activity regulated by this chapter shall be initiated by the property owner, or the owner's authorized agent, and shall include an application form and the appropriate deposit or fee as indicated on the master fee schedule.

B. A pre-application conference shall be a prerequisite to the filing of the application.

**Response: A pre-application conference was held on March 6, 2025.**

C. The applicant shall submit maps and diagrams at 11 by 17 inches and a written narrative addressing the approval criteria and requirements of this chapter, and any additional copies required by the Planning Director.

**Response: A site plan is included as part of this submittal.**

D. Where review of soil maps, Department of Geology and Mineral Industries (DOGAMI) maps, or on-site inspection by the City Engineer reveals evidence of slope failures or that WRA slopes are potentially unstable or prone to failure, geotechnical studies may be required to demonstrate that the proposed development will not cause, or contribute to, slope failure or increased erosion or sedimentation in the WRA or adversely impact surface or modify groundwater flow or hydrologic conditions. These geotechnical studies shall include all necessary measures to avoid or correct the potential hazard.

**Response: A geotechnical report has been prepared for this project addressing slope stability for the proposed development. Refer to the included geotechnical report for further detail.**

E. Applications proposing that streets or utilities cross water resources, or any other development that modifies the water resource, shall present evidence in the form of adopted utility master plans or transportation master plans, or findings from a registered Oregon civil engineer, certified engineering geologist or similarly qualified professional to demonstrate that the development or improvements are consistent with accepted engineering practices.

**Response: The application does not propose any streets or utilities that cross water resources.**

F. Site plan. The applicant shall submit a site plan which contains the following information, as applicable:

1. The name, address, and telephone number of the applicant, the scale (lineal) of the plan, and a north arrow.
2. Property lines, rights-of-way, easements, etc.

3. A storm detention and treatment plan and narrative statement pursuant to CDC 92.010(E).
4. Tables and maps identifying acreage, location and type of development constraints due to site characteristics such as slope, drainage and geologic hazards. For Type I, II, and III lands (refer to definitions in Chapter 02 CDC), the applicant must provide a geologic report, with text, figures and attachments as needed to meet the industry standard of practice, prepared by a certified engineering geologist and/or a geotechnical professional engineer, that includes:
    a. Site characteristics, geologic descriptions and a summary of the site investigation conducted;
    b. Assessment of engineering geological conditions and factors;
    c. Review of the City of West Linn's Natural Hazard Mitigation Plan and applicability to the site; and
    d. Conclusions and recommendations focused on geologic constraints for the proposed land use or development activity, limitations and potential risks of development, recommendations for mitigation approaches and additional work needed at future development stages including further testing and monitoring.

**Response: The application includes a site plan, stormwater detention design, preliminary stormwater report with calculations, and geotechnical engineering report that include including the required information**.

Boundaries of the WRA, specifically delineating the water resource, and any riparian corridor boundary. If the proposal includes development of a wetland, a wetlands delineation prepared by a professional wetland specialist will be required. The wetland delineation may be required to be accepted or waived through the Department of State Lands (DSL) delineation review process.

**Response: HHPR prepared a wetland delineation report (WD2025-0055;Appendix B) that was submitted to DSL for concurrence on January 31, 2025 and concurrence was received on July 2, 2025 (Appendix C). See WD2025-0055 for further details.**

5. Location of existing and proposed development, including all existing and proposed structures, accessory structures, any areas of fill or excavation, water resource crossings, alterations to vegetation, or other alterations to the site's natural state.

**Response: Figure 1 in Appendix A shows proposed development, grading, alterations to vegetation or other alterations to the site's natural state.**

6. Identify the location and square footage of previously disturbed areas, areas that are to be temporarily disturbed, and area to be permanently disturbed or developed.

**Response: Figure 1 in Appendix A shows areas of permanent and temporary disturbance as well as proposed buildings and final contours.**

7. When an application proposes development within the WRA, an inventory of vegetation within the WRA, sufficient to categorize the existing condition of the WRA, including:
    a. The type and general quality of ground cover, including the identification of dominant species and any occurrence of non-native, invasive species;

**Response: During field reconnaissance on November 8, November 18, November 20, and December 4, 2024, HHPR staff documented the condition of WRA area onsite. There are two separate WRA, one associated with Stream 1 and one associated with Wetland A. Within these two WRAs, there are two unique WRA conditions that are described below.**

**Stream 1: The WRA around Stream 1 is mostly forested with a canopy of black cottonwood and lesser amounts of bigleaf maple and Douglas fir. The understory is dominated by Himalayan blackberry with lesser amounts of English ivy and western swordfern. The forested area extends from OHW and continues above the top of the slope towards the proposed project. The canopy does not extend beyond the top of slope, although the blackberry thickets extend beyond the break in slope and partially onto the terrace. The terrace above the ravine near the edge of the WRA is unvegetated and consists of several inches of woodchips spread over soils. The unvegetated areas do not act as quality habitat due to a lack of food and refuge areas. The unvegetated areas do not provide water quality benefits to the stream because they do not provide shade, erosion control, or water treatment. There are no plant stems to reduce velocity of flowing water, no leaves or branches to reduce velocity of falling rain, and the open areas do not provide ecological niches or refugia.**

**The dense Himalayan blackberry offers some habitat for foraging wildlife and refugia in the dense thickets, but has minimal structural variability or low ground cover. The dense Himalayan blackberry provide some water quality benefits to the stream in the form of interception of precipitation and stormwater in addition to erosion and sediment control but these functions are limited due in part to the lack of ground cover and minimal structural diversity. The forested area provides potential habitat and water quality benefits, primarily shade for the stream. The understory in this area is dense blackberry thickets which reduce the general condition of the buffer above the stream due to the presence of invasive species and a lack of native species.**

**Wetland A: The WRA around Wetland A is mostly grass field with scattered trees and shrubs. The portion of the WRA immediately to the west of Wetland A includes a shallow slope dominated by grasses, scotch broom, and Himalayan blackberry.**

**At the top of the shallow slope to the west, the WRA is unvegetated and several inches of decomposing woodchips have been spread on top of the shallow soils present. North of the wetland, a nearly vertical slope with grasses and scattered trees and shrubs occurs. The WRA extends 50 feet from the top of the steep slope and is dominated by grasses, Queen Anne's lace, and scotch broom with scattered Douglas fir. Few bigleaf maple and Pacific madrone shrubs are present with scattered Himalayan blackberry throughout. The WRA to the north provides moderate habitat and water quality benefits. The trees might provide some shade, but are generally too far away from wetland to provide significant shading. The presence of native trees and shrubs provides some habitat functions in the form of diverse ecological niches and refugia, but the understory is invasive species. The WRA to the north is mostly open, with grassy areas with invasive species dominating. The open spaces are not very diverse and offer limited water quality functions as grasses stabilize the ground during rain events, but retain little water and provide very limited velocity reduction for rain and surface flows. The majority of the WRA impacts will occur in this area north of Wetland A.**

**Vegetation within the remaining portions of the WRA includes scattered Douglas fir, bigleaf maple, and black cottonwood with lesser amounts of Pacific madrone and Oregon ash. There are areas where dense Himalayan blackberry thickets and scotch broom dominate the WRA with scattered saplings of Oregon white oak, Oregon ash, black cottonwood, and Pacific madrone. The herbaceous layer is dominated by common teasel and non-native pasture grasses including velvet grass, colonial bentgrass, red fescue (*Festuca rubra*), and meadow foxtail (*Alopecurus pratensis*). The buffer is significantly degraded around Wetland A as it is dominated by invasive species, lacks contiguous tree and shrub cover, and consists of primarily weedy species and low grasses. The unvegetated woodchip area does not provide habitat or water quality benefit to Wetland A.**

8. Locations of all significant trees as defined by the City Arborist.

**Response: Trees are present within the WRA of both Wetland A and Stream 1. Trees occur along the sides of the ravine and to a lesser extent, on terrace above Wetland A. Significant trees are shown in the Tree Protection and Removal Plan.**

9. Identify adopted transportation, utility and other plan documents applicable to this proposal.

**Response: The City of West Linn Transportation System Plan (TSP) and Utility Plans do not include any proposed public transportation or utility projects through the proposed development.**

### 32.060 APPROVAL CRITERIA (STANDARD PROCESS)

No application for development on property containing a WRA shall be approved unless the approval authority finds that the proposed development is consistent with the following approval criteria, or can satisfy the criteria by conditions of approval:

A. WRA protection/minimizing impacts.

1. Development shall be conducted in a manner that will avoid or, if avoidance is not possible, minimize adverse impact on WRAs.
2. Mitigation and re-vegetation of disturbed WRAs shall be completed per CDC 32.090 and 32.100, respectively.

**Response: The proposed project has minimized impacts to WRAs to the extent practicable while maintaining a feasible project. Minimization measures include minimizing areas of vegetation disturbance outside of the WRAs to the greatest extent practicable, utilizing areas of previous disturbance to the maximum extent, and minimizing grading of the steep slopes above Stream 1.**

**All temporarily disturbed WRAs will be permanently revegetated before completion of the project. The project proposes a total of 15,120 SF of permanent WRA impacts. A total of 7,560 SF of mitigation is proposed to offset the 15,120 SF of cumulative impacts to the various resource areas affected by the project. Responses to standards found in CDC 32.090 and 32.100 are provided below.**

B. Storm water and storm water facilities.

1. Proposed developments shall be designed to maintain the existing WRAs and utilize them as the primary method of storm water conveyance through the project site unless:
   a. The surface water management plan calls for alternate configurations (culverts, piping, etc.); or
   b. Under CDC 32.070, the applicant demonstrates that the relocation of the water resource will not adversely impact the function of the WRA including, but not limited to, circumstances where the WRA is poorly defined or not clearly channelized.

      Re-vegetation, enhancement and/or mitigation of the re-aligned water resource shall be required as applicable.
2. Public and private storm water detention, storm water treatment facilities and storm water outfall or energy dissipaters (e.g., rip rap) may encroach into the WRA if:
   a. Accepted engineering practice requires it;
   b. Encroachment on significant trees shall be avoided when possible, and any tree loss shall be consistent with the City's Tree Technical Manual and mitigated per CDC 32.090;
   c. There shall be no direct outfall into the water resource, and any resulting outfall shall not have an erosive effect on the WRA or diminish the stability of slopes; and
   d. There are no reasonable alternatives available.

A geotechnical report may be required to make the determination regarding slope stability.

**Response: The proposed development includes a stormwater design that manages stormwater on-site through filtration and detention. The disposal point for the development is near the southwest corner of the site and discharges into the existing ravine WRA. The proposed outfall location is the only reasonable location that directs stormwater into the existing ravine drainageway. If the outfall location were moved outside the WRA, stormwater would be directed toward the Interstate I-205 freeway and cause additional erosion concerns. No stormwater facilities are proposed to be located within the WRA.**

3. Roadside storm water conveyance swales and ditches may be extended within rights-of-way located in a WRA. When possible, they shall be located along the side of the road furthest from the water resource. If the conveyance facility must be located along the side of the road closest to the water resource, it shall be located as close to the road/sidewalk as possible and include habitat friendly design features (treatment train, rain gardens, etc.).

**Response: The proposed development does not include any roadside stormwater conveyance swales or ditches.**

4. Storm water detention and/or treatment facilities in the WRA shall be designed without permanent perimeter fencing and shall be landscaped with native vegetation.

**Response: The proposed development does not include any stormwater detention or treatment facilities in the WRA.**

F. Roads, driveways and utilities.

1. New roads, driveways, or utilities shall avoid WRAs unless the applicant demonstrates that no other practical alternative exists. In that case, road design and construction techniques shall minimize impacts and disturbance to the WRA by the following methods:

   a. New roads and utilities crossing riparian habitat areas or streams shall be aligned as close to perpendicular to the channel as possible.

   b. Roads and driveways traversing WRAs shall be of the minimum width possible to comply with applicable road standards and protect public safety. The footprint of grading and site clearing to accommodate the road shall be minimized.

   c. Road and utility crossings shall avoid, where possible:

      1. Salmonid spawning or rearing areas;

      2. Stands of mature conifer trees in riparian areas;

3. Highly erodible soils;
4. Landslide prone areas;
5. Damage to, and fragmentation of, habitat; and
6. Wetlands identified on the WRA Map.

2. Crossing of fish bearing streams and riparian corridors shall use bridges or arch-bottomless culverts or the equivalent that provides comparable fish protection, to allow passage of wildlife and fish and to retain the natural stream bed.
3. New utilities spanning fish bearing stream sections, riparian corridors, and wetlands shall be located on existing roads/bridges, elevated walkways, conduit, or other existing structures or installed underground via tunneling or boring at a depth that avoids tree roots and does not alter the hydrology sustaining the water resource, unless the applicant demonstrates that it is not physically possible or it is cost prohibitive. Bore pits associated with the crossings shall be restored upon project completion. Dry, intermittent streams may be crossed with open cuts during a time period approved by the City and any agency with jurisdiction.
4. No fill or excavation is allowed within the ordinary high water mark of a water resource, unless all necessary permits are obtained from the City, U.S. Army Corps of Engineers and Oregon Department of State Lands (DSL).
5. Crossings of fish bearing streams shall be aligned, whenever possible, to serve multiple properties and be designed to accommodate conduit for utility lines. The applicant shall, to the extent legally permissible, work with the City to provide for a street layout and crossing location that will minimize the need for additional stream crossings in the future to serve surrounding properties.

**Response: The proposed development includes portions of vehicular access lanes for service and emergency vehicles that are within the WRA. Due to the site's steep topography constraints, these portions of the vehicular access lanes are unable to be relocated outside of the WRA. The vehicular access is of the minimum required width for emergency access. No impacts to fish bearing streams or below ordinary high-water mark are proposed. No new utilities are proposed within the impacts, except for the proposed stormwater outfall in the southwest portion of the site.**

G. Passive recreation. Low impact or passive outdoor recreation facilities for public use including, but not limited to, multi-use paths and trails, not exempted per CDC 32.040(B)(2), viewing platforms, historical or natural interpretive markers, and benches in the WRA, are subject to the following standards:

1. Trails shall be constructed using non-hazardous, water permeable materials with a maximum width of four feet or the recommended width under the applicable American Association of State Highway and Transportation

Officials (AASHTO) standards for the expected type and use, whichever is greater.

2. Paved trails are limited to the area within 20 feet of the outer boundary of the WRA, and such trails must comply with the storm water provisions of this chapter.
3. All trails in the WRA shall be set back from the water resource at least 30 feet except at stream crossing points or at points where the topography forces the trail closer to the water resource.
4. Trails shall be designed to minimize disturbance to existing vegetation, work with natural contours, avoid the fall line on slopes where possible, avoid areas with evidence of slope failure and ensure that trail runoff does not create channels in the WRA.
5. Foot bridge crossings shall be kept to a minimum. When the stream bank adjacent to the foot bridge is accessible (e.g., due to limited vegetation or topography), where possible, fences or railings shall be installed from the foot bridge and extend 15 feet beyond the terminus of the foot bridge to discourage trail users and pets from accessing the stream bank, disturbing wildlife and habitat areas, and causing vegetation loss, stream bank erosion and stream turbidity. Bridges shall not be made of continuous impervious materials or be treated with toxic substances that could leach into the WRA.
6. Interpretive facilities (including viewpoints) shall be at least 10 feet from the top of the water resource's bankfull flow/OHW or delineated wetland edge and constructed with a fence between users and the resource. Interpretive signs may be installed on footbridges.

**Response: The proposed development does not include any low impact or passive recreation facilities, trails, bridges, or facilities within the WRA.**

H. Daylighting Piped Streams.

1. As part of any application, covered or piped stream sections shown on the WRA Map are encouraged to be "daylighted" or opened. Once it is daylighted, the WRA will be limited to 15 feet on either side of the stream. Within that WRA, water quality measures are required which may include a storm water treatment system (e.g., vegetated bioswales), continuous vegetative ground cover (e.g., native grasses) at least 15 feet in width that provides year round efficacy, or a combination thereof.
2. The re-opened stream does not have to align with the original piped route but may take a different route on the subject property so long as it makes the appropriate upstream and downstream connections and meet the standards of subsections (H)(3) and (4) of this section.
3. A re-aligned stream must not create WRAs on adjacent properties not owned by the applicant unless the applicant provides a notarized letter signed by the

adjacent property owner(s) stating that the encroachment of the WRA is permitted.

4. The evaluation of proposed alignment and design of the reopened stream shall consider the following factors:
    a. The ability of the reopened stream to safely carry storm drainage through the area without causing significant erosion.
    b. Continuity with natural contours on adjacent properties, slope on site and drainage patterns.
    c. Continuity of adjacent vegetation and habitat values.
    d. The ability of the existing and proposed vegetation to filter sediment and pollutants and enhance water quality.
    e. Provision of water temperature conducive to fish habitat.
5. Any upstream or downstream WRAs or riparian corridors shall not apply to, or overlap, the daylighted stream channel.
6. When a stream is daylighted the applicant shall prepare and record a legal document describing the reduced WRA required by subsections (H)(1) and (5) of this section. The document will be signed by a representative of the City and recorded at the applicant's expense to better ensure long term recognition of the reduced WRA and reduced restrictions for the daylighted stream section.

**Response: Not applicable. The project does not involve any in water work, nor work within previously piped streams.**

I. The following habitat friendly development practices shall be incorporated into the design of any improvements or projects in the WRA to the degree possible:
    1. Restore disturbed soils to original or higher level of porosity to regain infiltration and storm water storage capacity.
    2. Apply a treatment train or series of storm water treatment measures to provide multiple opportunities for storm water treatment and reduce the possibility of system failure.
    3. Incorporate storm water management in road rights-of-way.
    4. Landscape with rain gardens to provide on-lot detention, filtering of rainwater, and groundwater recharge.
    5. Use multi-functional open drainage systems in lieu of conventional curb-and-gutter systems.
    6. Use green roofs for runoff reduction, energy savings, improved air quality, and enhanced aesthetics.
    7. Retain rooftop runoff in a rain barrel for later on-lot use in lawn and garden watering.

8. Disconnect downspouts from roofs and direct the flow to vegetated infiltration/filtration areas such as rain gardens.
9. Use pervious paving materials for driveways, parking lots, sidewalks, patios, and walkways.
10. Reduce sidewalk width to a minimum four feet. Grade the sidewalk so it drains to the front yard of a residential lot or retention area instead of towards the street.
11. Use shared driveways.
12. Reduce width of residential streets and driveways, especially at WRA crossings.
13. Reduce street length, primarily in residential areas, by encouraging clustering.
14. Reduce cul-de-sac radii and use pervious and/or vegetated islands in center to minimize impervious surfaces.
15. Use previously developed areas (PDAs) when given an option of developing PDA versus non-PDA land.
16. Minimize the building, hardscape and disturbance footprint.
17. Consider multi-story construction over a bigger footprint. (Ord. 1623 § 1, 2014; Ord. 1635 § 19, 2014; Ord. 1647 § 5, 2016; Ord. 1662 § 7, 2017)

**Response: The proposed impacts to the WRA are the minimum impacts required for site circulation of emergency vehicles and usage of the site. No habitat-friendly amenities are proposed within the WRA.**

**32.090 MITIGATION PLAN**

A. A mitigation plan shall only be required if development is proposed within a WRA (including development of a PDA). (Exempted activities of CDC 32.040 do not require mitigation unless specifically stated. Temporarily disturbed areas, including TDAs associated with exempted activities, do not require mitigation, just grade and soil restoration and re-vegetation.) The mitigation plan shall satisfy all applicable provisions of CDC 32.100, Re- Vegetation Plan Requirements.

**Response: Mitigation is required in accordance with CDC 28.160.**

B. Mitigation shall take place in the following locations, according to the following priorities (subsections (B)(1) through (4) of this section):
    1. On-site mitigation by restoring, creating or enhancing WRAs.
    2. Off-site mitigation in the same sub-watershed will be allowed, but only if the applicant has demonstrated that:
        a. It is not practicable to complete mitigation on-site, for example, there is not enough area on-site;

b. The mitigation will provide equal or superior ecological function and value.

3. Off-site mitigation outside the sub-watershed will be allowed, but only if the applicant has demonstrated that:

   a. It is not practicable to complete mitigation on-site, for example, there is not enough area on-site; and

   b. The mitigation will provide equal or superior ecological function and value.

4. Purchasing mitigation credits though DSL or other acceptable mitigation bank.

**Response: Mitigation will occur onsite as enhancement to existing WRAs adjacent Wetland A (Figure 1).**

C. Amount of mitigation.

1. The amount of mitigation shall be based on the square footage of the permanent disturbance area by the application. For every one square foot of non-PDA disturbed area, on-site mitigation shall require one square foot of WRA to be created, enhanced or restored.

2. For every one square foot of PDA that is disturbed, on-site mitigation shall require one half a square foot of WRA vegetation to be created, enhanced or restored.

**Response: Permanent impacts to WRAs will occur in the form of grading and construction of roadway, parking lot, storage area, and the main building. Permanent impacts will be located in Previously Disturbed Areas (PDA) as the entire project area was altered or modified before January 1, 2006. The entire hillside was cut into two benched terraces as part of the I-205 construction during the late 1960s and early 1970s (WD2009-0342). This alteration removed native soils which were replaced with fill material.**

**The area of total permanent impacts to WRAs is 15,120 SF. The proposed impacts will be within PDAs. Therefore, the required amount of mitigation is equal to:**

**0.5 x (15,120 SF) = 7,560 SF**

**The applicant has proposed a total of 7,560 SF of mitigation in the form of enhancing existing WRA; therefore, the standard is met.**

3. For any off-site mitigation, including the use of DSL mitigation credits, the requirement shall be for every one square foot of WRA that is disturbed, two square feet of WRA shall be created, enhanced or restored. The DSL mitigation credits program or mitigation bank shall require a legitimate bid on the cost of on-site mitigation multiplied by two to arrive at the appropriate dollar amount.

**Response: Not applicable. Mitigation will occur onsite. Mitigation credits will not be used to fulfill any portion of the required mitigation.**

E. A mitigation plan shall contain the following information:

1. A list of all responsible parties including, but not limited to, the owner, applicant, contractor, or other persons responsible for work on the development site.

**Response: The responsible parties are provided below. Mitigation plantings will be installed by contractors who have not been selected at this time.**

**Property Owner:** **City of West Linn – Engineering Department**
**22500 Salamo Rd,**
**West Linn, OR 97068**

**Planning Consultant: SEA**

**Natural Resources: Harper Houf Peterson Righellis Inc.**
**205 SE Spokane Street, Suite 200**
**Portland, Oregon 97202**
**Contact: Dan Thew**
**Phone: 503-221-1131**
**Email: dant@hhpr.com**

**Landscape Architect: Harper Houf Peterson Righellis Inc.**
**205 SE Spokane Street, Suite 200**
**Portland, Oregon 97202**
**Contact: Dan Chin**
**Phone: 503-221-1131**
**Email: danchin@hhpr.com**

2. A map showing where the specific adverse impacts will occur and where the mitigation activities will occur.

**Response: Figure 1 shows the impact areas and proposed mitigation areas.**

3. A re-vegetation plan for the area(s) to be mitigated that meets the standards of CDC 32.100.
4. An implementation schedule, including timeline for construction, mitigation, mitigation maintenance, monitoring, and reporting. All in-stream work in fish bearing streams shall be done in accordance with the Oregon Department of Fish and Wildlife.

**Response: The revegetation plan is shown in Figure 1 in Attachment A. Mitigation will be installed during or after construction and will be conducted as soon as practicable based on the construction schedule. Construction of the proposed project is anticipated to begin in 2025. Monitoring of the mitigation area will be performed in the first year after planting to document survival of plant species,**

**establish photo points, and vegetation assessment plots. Monitoring shall occur each year until the mitigation requirements are met.**

5. Assurances shall be established to rectify any mitigation actions that are not successful within the first three years. This may include bonding or other surety. (Ord. 1623 § 1, 2014)

**Response: An annual monitoring report documenting the survival of the mitigation plantings will be submitted to the City of West Linn by December 31 of each monitoring year. Plants that die shall be replaced in kind as needed to ensure the minimum 80% of the required quantity of 76 trees and 378 shrubs survive during the monitoring period. No in-stream work is proposed to occur as part of this project.**

**32.100 RE-VEGETATION PLAN REQUIREMENTS**

A. In order to achieve the goal of re-establishing forested canopy, native shrub and ground cover and to meet the mitigation requirements of CDC 32.090 and vegetative enhancement of CDC 32.080, tree and vegetation plantings are required according to the following standards:

1. All trees, shrubs and ground cover to be planted must be native plants selected from the Portland Plant List.

**Response: Only native species will be installed in the revegetation plantings. All species proposed for planting were selected from the Portland Plant List. A list of species to be planted is provided in Figure 2 in Appendix A.**

2. 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.

**Response: All trees will be a minimum one-half inch caliper, and all shrubs will be at least one-gallon container or equivalent ball and burlap and at least 12 inches in height.**

3. Plant coverage.

a. Native trees and shrubs are required to be planted at a rate of five trees and 25 shrubs per every 500 square feet of disturbance area (calculated by dividing the number of square feet of disturbance area by 500, and then multiplying that result times five trees and 25 shrubs, and rounding all fractions to the nearest whole number of trees and shrubs; for example, if there will be 330 square feet of disturbance area, then 330 divided by 500 equals 0.66, and 0.66 times five equals 3.3, so three trees must be planted, and 0.66 times 25 equals 16.5, so 17 shrubs must be

planted). Bare ground must be planted or seeded with native grasses or herbs. Non-native sterile wheat grass may also be planted or seeded, in equal or lesser proportion to the native grasses or herbs.

b. 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 10 feet on center. When planting near existing trees, the dripline of the existing tree shall be the starting point for plant spacing measurements.

4. Plant diversity. Shrubs must consist of at least two different species. If 10 trees or more are planted, then no more than 50 percent of the trees may be of the same genus.

**Response: Trees and shrubs will be planted in accordance with the density requirements above. A total of 7,560 SF of mitigation will be revegetated. The total quantity of shrubs required is equal to (7,560/500)*25= 378, and the total required number of trees is equal to (7,560/500)*5=75.6 The mitigation plan proposes to plant 76 trees and 378 shrubs. Planting Plan will include the following:**

***Table 3. Native Plants to be planted in Mitigation Area.***

| Species | Plant Form | Size Range | Minimum Spacing | Quantity |
|---|---|---|---|---|
| | | ***Trees*** | | |
| Big Leaf Maple (*Acer macrophyllum*) | Container / bare root | ½ caliper min | 8 to 12 ft o.c. | 25 |
| Oregon White Oak (*Quercus garryana*) | Container / bare root | ½ caliper min | 8 to 12 ft o.c. | 25 |
| Douglas Fir (*Pseudotsuga menziesii*) | Container / bare root | ½ caliper min | 8 to 12 ft o.c. | 26 |
| Total | | | | 76 |
| | | ***Shrubs*** | | |
| Red elderberry (*Sambucus racemosa*) | Container / bare root | ½ caliper min | 4 to 5 ft o.c. | 60 |
| Vine maple (*Acer circinatum*) | Container / bare root | ½ caliper min | 4 to 5 ft o.c. | 65 |
| Western flowering dogwood (*Cornus nuttallii*) | Container / bare root | ½ caliper min | 4 to 5 ft o.c. | 55 |
| Common snowberry (*Symphoricarpos albus*) | Container / bare root | ½ caliper min | 4 to 5 ft o.c. | 75 |
| Service berry (*Amelanchier alnifolia*) | Container / bare root | ½ caliper min | 4 to 5 ft o.c. | 60 |
| Osoberry (*Oemleria cerasiformis*) | Container / bare root | ½ caliper min | 4 to 5 ft o.c. | 63 |
| Total | | | | 378 |
| | | ***Herbs/Grasses*** | | |
| Seed mix* | Seed | 1 lb per 1,000 SF | | 7.5 lbs |
| * Seed mix to consist of one or more of the following species, depending on availability:<br>Native Red Fescue - *Festuca rubra var rubra*<br>California Brome - *Bromus carinatus*<br>Blue Wildrye - *Elymus glaucus*<br>Large Leaf Lupine - *Lupinus polyphyllus* | | | | |

5. Invasive vegetation. Invasive non-native or noxious vegetation must be removed within the mitigation area prior to planting.

**Response: All invasive non-native or noxious weeds within mitigation areas will be removed or treated prior to planting mitigation areas.**

6. Tree and shrub survival. A minimum survival rate of 80 percent of the trees and shrubs planted is expected by the third anniversary of the date that the mitigation planting is completed.

**Response: A minimum 80 percent survival of trees and shrubs planted will be achieved within three years of mitigation construction.**

7. Monitoring and reporting. Monitoring of the mitigation site is the ongoing responsibility of the property owner. Plants that die must be replaced in kind.

**Response: Plants will be replaced in kind up to the minimum needed in order to achieve 80 percent survival at the end of the monitoring period.**

8. To enhance survival of tree replacement and plantings, the following practices are required:

    a. Mulching. Mulch new plantings a minimum of three inches in depth and 18 inches in diameter to retain moisture and discourage weed growth.

**Response: Mulch will be applied to new plantings within the mitigation area at the time of installation.**

    b. Irrigation. Water new plantings one inch per week between June 15th to October 15th, for the three years following planting.

**Response: New plantings will be irrigated to ensure survival beyond the monitoring period.**

    c. Weed control. Remove, or control, non-native or noxious vegetation throughout maintenance period.

**Response: Weeds will be monitored and controlled as needed throughout the maintenance period.**

    d. Planting season. Plant bare root trees between December 1st and February 28th, and potted plants between October 15th and April 30th.

**Response: Trees and shrubs will be planted between October 15 and April 30.**

    e. Wildlife protection. Use plant sleeves or fencing to protect trees and shrubs against wildlife browsing and resulting damage to plants.

**Response: Plant sleeves will be utilized on trees and shrubs to minimize damage from wildlife browsing.**

B. When weather or other conditions prohibit planting according to schedule, the applicant shall ensure that disturbed areas are correctly protected with erosion control measures and shall provide the City with funds in the amount of 125 percent of a bid from a recognized landscaper or nursery which will cover the cost of the plant materials, installation and any follow up maintenance. Once the planting conditions are favorable the applicant shall proceed with the plantings and receive the funds back from the City upon completion, or the City will complete the plantings using those funds. (Ord. 1623 § 1, 2014).

**Response: The applicant is committed to conducting the required mitigation as soon as site conditions are conducive. In the unlikely event that mitigation areas cannot be installed on schedule, the applicant will provide the necessary revegetation funds described above.**

# Appendix A: Figures

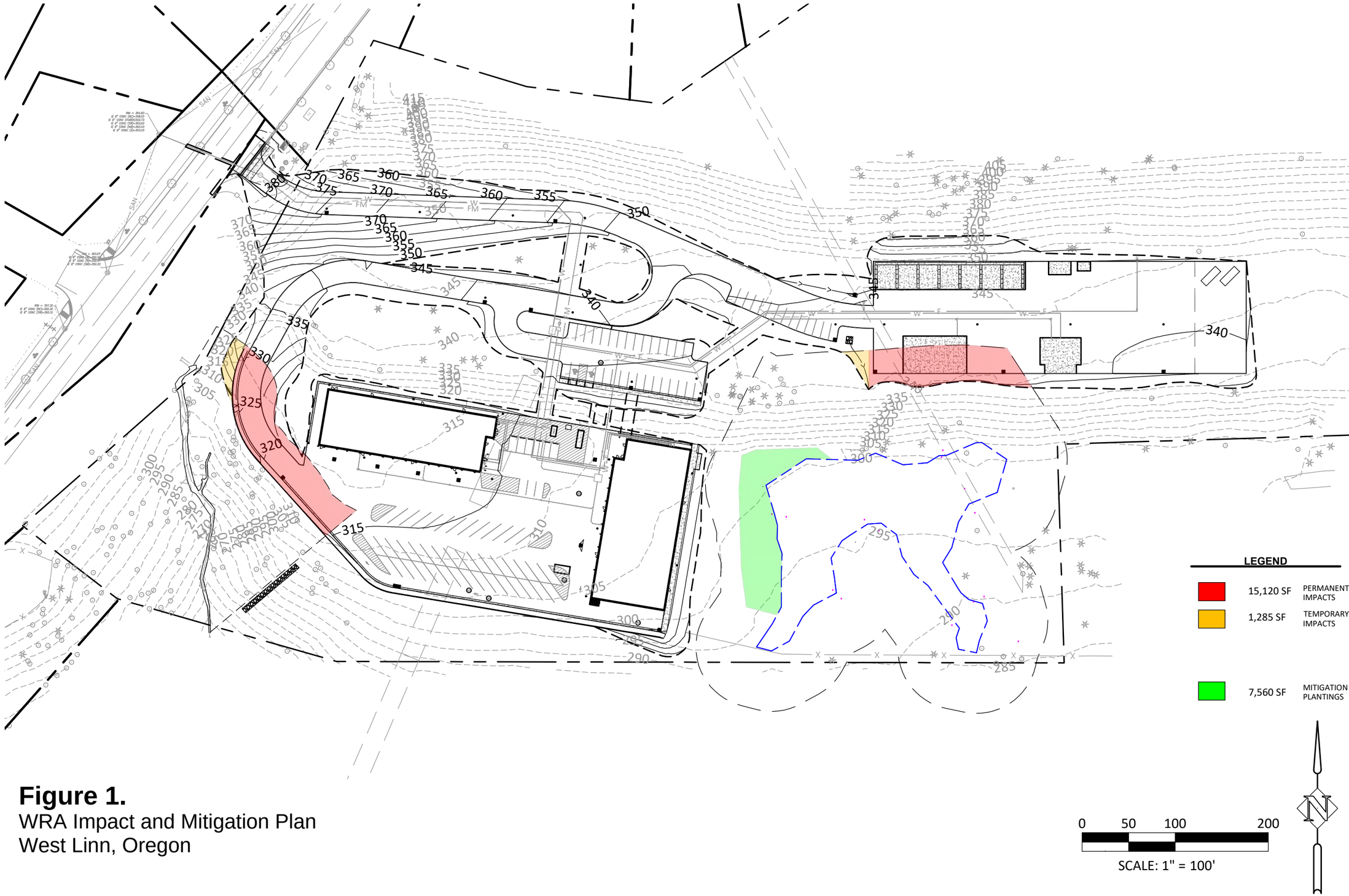



**Figure 1.**
WRA Impact and Mitigation Plan
West Linn, Oregon

| Species | Plant Form | Size Range | Minimum Spacing | Quantity |
|---|---|---|---|---|
| Trees | | | | |
| **Big Leaf Maple (**Acer macrophyllum**)** | **Container / bare root** | **½ caliper min** | **8 to 12 ft o.c.** | **25** |
| **Oregon White Oak (**Quercus garryana**)** | **Container / bare root** | **½ caliper min** | **8 to 12 ft o.c.** | **25** |
| **Douglas Fir (**Pseudotsuga menziesii**)** | **Container / bare root** | **½ caliper min** | **8 to 12 ft o.c.** | **26** |
| **Total** | | | | **76** |
| Shrubs | | | | |
| **Red elderberry (**Sambucus racemosa**)** | **Container / bare root** | **½ caliper min** | **4 to 5 ft o.c.** | **60** |
| **Vine maple (**Acer circinatum**)** | **Container / bare root** | **½ caliper min** | **4 to 5 ft o.c.** | **65** |
| **Western flowering dogwood (**Cornus ***nuttallii*****)** | **Container / bare root** | **½ caliper min** | **4 to 5 ft o.c.** | **55** |
| **Common snowberry (**Symphoricarpos albus**)** | **Container / bare root** | **½ caliper min** | **4 to 5 ft o.c.** | **75** |
| **Service berry (**Amelanchier alnifolia**)** | **Container / bare root** | **½ caliper min** | **4 to 5 ft o.c.** | **60** |
| **Osoberry (**Oemleria cerasiformis**)** | **Container / bare root** | **½ caliper min** | **4 to 5 ft o.c.** | **63** |
| **Total** | | | | **378** |
| Herbs/Grasses | | | | |
| **Seed mix*** | **Seed** | **1 lb per 1,000 SF** | | **7.5 lbs** |
| *** Seed mix to consist of one or more of the following species, depending on availability:**<br>**Native Red Fescue -** Festuca rubra var rubra<br>**California Brome -** Bromus carinatus<br>**Blue Wildrye -** Elymus glaucus<br>**Large Leaf Lupine -** Lupinus polyphyllus | | | | |

# Figure 2.

Planting Schedule
West Linn, Oregon

# Appendix B: Wetland Delineation Report

- **50MB or larger** - A single unlocked PDF can be uploaded to DSL's Box.com website. After upload notify DSL by email at: wetland.delineation@dsl.oregon.gov.
- OR a hard copy of the unbound report and signed cover form can be mailed to: Oregon Department of State Lands, 775 Summer Street NE, Suite 100, Salem, OR 97301-1279.
- By check payable to the Oregon Department of State Lands attached to the unbound mailed hardcopy OR attached to the complete signed cover form if report submitted electronically.

## Contact and Authorization Information

☒ Applicant ☐ Owner Name, Firm and Address:
Erich Lais
City of West Linn
22500 Salamo Road
West Linn, OR 97068

Business phone # (503) 722-3434
Mobile phone # (optional)
E-mail: elais@westlinnoregon.gov

☐ Authorized Legal Agent, Name and Address (if different):

Business phone #
Mobile phone # (optional)
E-mail:

I either own the property described below or I have legal authority to allow access to the property. I authorize the Department to access the property for the purpose of confirming the information in the report, after prior notification to the primary contact.

**Typed/Printed Name:** Erich Lais **Signature:** Erich Lais

Date: 1/31/25 Special instructions regarding site access: _____

## Project and Site Information

Project Name: City of West Linn Public Works Facility

Latitude: 45.349955 Longitude: -122.642363
**decimal degree** - centroid of site or start & end points of linear project

Proposed Use:
The proposed development includes a public works facility, parking lot, and proposed access road connecting the facility to Salamo Road.

Tax Map # 21E35D
Tax Lot(s) ROW, 005400, 005200

Tax Map # 21E36
Tax Lot(s) ROW

Project Street Address (or other descriptive location):
East of Salamo Road and Greene Street intersection

Township 02S Range 01E Section 35&36 QQ
Use separate sheet for additional tax and location information

City: West Linn County: Clackamas

Waterway: Stream 1 River Mile: n/a

## Wetland Delineation Information

Wetland Consultant Name, Firm and Address:
Dan Thew
HHPR
205 SE Spokane Street Suite 200
Portland, OR 97202

Phone # (503) 221-1131
Mobile phone # (if applicable)
E-mail: dant@hhpr.com

The information and conclusions on this form and in the attached report are true and correct to the best of my knowledge.

**Consultant Signature:** Dan Thew Digitally signed by Dan Thew DN: C=US, E=dant@hhpr.com, CN=Dan Thew Date: 2025.01.31 10:31:20-08'00' Date: 1/31/25

**Primary Contact** for report review and site access is ☒ Consultant ☐ Applicant/Owner ☐ Authorized Agent

Wetland/Waters Present? ☒ Yes ☐ No Study Area size: 14.3 acres Total Wetland Acreage: 0.6600

## Check Applicable Boxes Below

☐ R-F permit application submitted
☐ Fee payment submitted $ _____
☐ Mitigation bank site
☐ Resubmittal of rejected report ($100)
☐ EFSC/ODOE Proj. Mgr: _____
☐ Request for Reissuance. See eligibility criteria. (no fee)
DSL # _____ Expiration date _____
☐ Wetland restoration/enhancement project (not mitigation)
☒ Previous delineation/application on parcel
If known, previous DSL # WD2009-0342
☐ LWI shows wetlands or waters on parcel
Wetland ID code _____

## For Office Use Only

DSL Reviewer: TG Fee Paid Date: ____ / ____ / ____ DSL WD # 2025-0055

Date Delineation Received: 01 / 31 / 2025 DSL App.# _____

NOTICE: REPORTS ARE CONSIDERED DRAFT DOCUMENTS UNTIL REVIEW IS COMPLETED BY DSL. WETLAND MAPS MAY CHANGE AS A RESULT OF DSL REVIEW.

# Wetland and Waters of the U.S. and State Delineation Report

West Linn Public Works Facility

West Linn, Oregon

*January 2025*

Prepared by:

Harper Houf Peterson Righellis Inc.
ENGINEERS ◆ PLANNERS
LANDSCAPE ARCHITECTS ◆ SURVEYORS

Prepared for:

**City of West Linn Public Works Department**
4100 Norfolk Street
West Linn, Oregon 97068

# Table of Contents


A. Landscape Setting and Land Use ..... 2
B. Site Alterations ..... 3
C. Precipitation Data and Analysis ..... 3
D. Methods ..... 7
E. Description of All Wetlands and Non-Wetland Waters ..... 8
E.1 Wood Chip Area ..... 8
E.2 Wetland A ..... 9
E.3 Stream 1 ..... 9
F. Deviation From SWI ..... 10
G. Mapping Method ..... 10
H. Additional Information ..... 10
I. Results and Conclusions ..... 11
J. Required Disclaimer ..... 11
K. References ..... 12

**Appendix A** **Figures**

**Appendix B** **Photo Log**

**Appendix C** **Datasheets**

**Appendix D** **Previous Wetland Delineation**

## A. Landscape Setting and Land Use

The West Linn Public Works Facility project is proposed on an undeveloped hillside north of Interstate 205 (I-205), south of the Barrington Heights residential neighborhood, east of Salamo Road, and west of an existing Oregon Department of Transportation (ODOT) storage yard (Figures 1 and 5). The proposed development includes a public works facility, parking lot, and proposed access road connecting the facility to Salamo Road. A previous wetland delineation identified one wetland within the currently proposed development and one stream located in a ravine west of the proposed development within the Study Area (SA).

The SA is 14.3 acres and extends from Salamo Road right-of-way (ROW) in the west across an upper and lower terrace to the eastern edge of the City-owned parcel (21E35D 005400), tax lot 21E35D005200, and a portion of ODOT owned parcel (21E36 ROW). A series of terraces were excavated during the construction of I-205 in 1969 in order to improve slope stability (Vigil-Agrimis 2009; Appendix D) and have remained undeveloped. The SA includes part of two of these terraces. The lower terrace is between an existing ODOT storage yard to the east and a steep ravine with an unnamed stream at the bottom to the west. The SA extends to the southern boundary of the City-owned parcel that occurs on or near the edge of the lower terrace. South of the SA is a steep cliff that descends to I-205 below.

In the vicinity of the SA there are dense residential neighborhoods upslope to the north and west. Downslope of the SA is I-205, and across that lies a low terrace with wetlands and a water treatment plant along the banks of the Willamette River (Figure 1). The SA is in the Tanner Creek-Willamette River (170900070405) 12 Digit Hydrologic Unit Code (HUC).

The USDA Natural Resource Conservation Service (NRCS) Web Soil Survey (2024) identifies three soil map units within the SA (Appendix A, Figure 4):

- Kinton silt loam, 15 to 30 percent slopes (map unit symbol 48D) is moderately well drained, rated as non-hydric, and is mapped in the northeastern portion of the SA. This map unit contains one minor component that is rated as hydric: Delena; comprising 2 percent of the map unit.

- Nekia silty clay loam, 8 to 15 percent slopes (map unit symbol 64C) is well drained, rated as non-hydric, and is mapped in the northwestern portion of the SA.

- Witzel very stony silt loam, 3 to 40 percent slopes (map unit symbol 89D) is well drained, rated as non-hydric, and is mapped in the majority of the SA.

Vegetation within the SA is dominated by upland trees, shrubs, grasses, and forbs. Trees and shrubs are scattered throughout the SA, allowing for an open grass/scotch broom (*Cytisus scoparius*) plant community to be dominant throughout most of the SA. The ravine in the western portion of the SA has a full canopy. Vegetation communities are generally made up of the following groups:

- Upland areas with scattered Douglas fir (*Pseudotsuga menziesii*), bigleaf maple (*Acer macrophyllum*), and black cottonwood (*Populus trichocarpa*) trees, with a

shrub layer of Oregon white oak (*Quercus garryana*) saplings, scotch broom, and lesser amounts of Himalayan blackberry (*Rubus armeniacus*), serviceberry (*Amelanchier alnifolia*), beaked hazelnut (*Corylus cornuta*), cascara (*Rhamnus purshiana*), common snowberry (*Symphoricarpos albus*), and Pacific madrone (*Arbutus menziesii*). Grasses including false oat grass (*Arrhenatherum elatius*), velvet grass (*Holcus lanatus*), common bentgrass (*Agrostis capillaris*), and tall fescue (*Schedonorus arundinaceus*), with upland forbs such as Queen Anne's lace (*Daucus carota*), St. John's wort (*Hypericum perforatum*), hairy cat's ear (*Hypochaeris radicata*), bracken fern (*Pteridium aquilinum*), and common teasel (*Dipsacus fullonum*).

- A steep ravine with a canopy of bigleaf maple, cottonwood, and Douglas fir with an understory of dense Himalayan blackberry and some western swordfern (*Polystichum munitum*) and English ivy (*Hedera helix*).

There is an area dominated by wood chips that is almost completely lacking vegetation with only a few Douglas fir and Oregon white oak saplings observed within the entire area.

## B. Site Alterations

Per WD2009-0342 (Vigil-Agrimis 2009), the 1969 construction of I-205 is the most significant site alteration within or adjacent to the SA. The Canby 7.5-minute USGS Topographical Quad (1954) shows a steep, convex hill sloping down towards the Willamette River. As previously mentioned, this hillside was cut into two benched terraces as part of the I-205 construction during the late 1960s and early 1970s. This alteration removed native soils which were replaced with fill material. Soils are much shallower than the 20-40 inches depth mapped in the Clackamas County Soil Survey (1985).

Additionally, the low terrace west of mapped Wetland A was covered in several feet of woodchips after the December 2021 ice storm. Aerial imagery pre-2021 shows an open, grassy area with few shrubs. Tire tracks are visible in aerial imagery as far back as 2000, implying regular vehicle activity along the lower terrace. The area now covered in woodchips is devoid of vegetation except for a few Oregon white oak and Douglas fir saplings observed growing out of the woodchips. Comparison of historic aerial imagery shows that prior to being covered, the woodchipped area was vegetated with grasses and few shrubs similar to other upland areas onsite. Additionally, no inundation is visible in this area on historic aerials. In contrast, Wetland A has visible inundation in aerial photographs and the color of the wetland vegetation is distinctly different when compared to the surrounding upland areas.

## C. Precipitation Data and Analysis

The field investigation was conducted on November 8, November 18, November 20, and December 4, 2024, with a follow-up visit on January 22, 2025. The Oregon City, OR weather station recorded precipitation in the 14 days prior to the site visits is shown in Table 2 (AgACIS 2024).

The total precipitation for the water year-to-date (October 1-31, 2024) was 0.63 inches (0.08 inches above normal) (AgACIS 2024).

According to the WETS table, there is a 50% chance the growing season is 300 days long from February 10th to December 7th.

***Table 1: Precipitation recorded at the Oregon City, OR station prior to and during wetland delineation fieldwork on November 8, 18, 20, and December 04, 2024 (AgACIS 2024). Light gray shading indicates days of field visits.***

| Day | Recorded Precipitation (inches) | Plots Completed |
|---|---|---|
| 2024-10-25 | 0 | |
| 2024-10-26 | 0.2 | |
| 2024-10-27 | 1.4 | |
| 2024-10-28 | 0.1 | |
| 2024-10-29 | 0.02 | |
| 2024-10-30 | 0.36 | |
| 2024-10-31 | M | |
| 2024-11-01 | 1.1 | |
| 2024-11-02 | 0.33 | |
| 2024-11-03 | 0.1 | |
| 2024-11-04 | 0.4 | |
| 2024-11-05 | 0 | |
| 2024-11-06 | 0 | |
| 2024-11-07 | 0 | |
| **14 days prior to field visit = 4.01 inches** | | |
| **2024-11-08** | 0 | SP1-U, SP1-W, SP2-U, SP2-W, SP3-U, SP3-W, AG-1, AG-2 |
| 2024-11-09 | 0 | |
| 2024-11-10 | 0.06 | |
| 2024-11-11 | 0.44 | |
| 2024-11-12 | 0.2 | |
| 2024-11-13 | 0.92 | |
| 2024-11-14 | 0.4 | |
| 2024-11-15 | 0.05 | |
| 2024-11-16 | 0.07 | |
| 2024-11-17 | 0.72 | |
| **14 days prior to field visit = 3.26 inches** | | |
| **2024-11-18** | 0.90 | SP4-W, SP4-U, SP5-W, SP5-U, SP6-U |
| 2024-11-19 | 1.00 | |
| **14 days prior to field visit = 4.76 inches** | | |
| **2024-11-20** | 0.45 | AG-3, AG-4, AG-5 |

***Table 1 continued:*** *(Note – Line 2024-11-20 is repeated)*

| Day | Recorded Precipitation (inches) | Plots Completed |
|---|---|---|
| **2024-11-20** | 0.45 | AG-3, AG-4, AG-5 |
| 2024-11-21 | 0.02 | |
| 2024-11-22 | 0.74 | |
| 2024-11-23 | 0.15 | |
| 2024-11-24 | 0.12 | |
| 2024-11-25 | 0.35 | |
| 2024-11-26 | 0.01 | |
| 2024-11-27 | 0.02 | |
| 2024-11-28 | 0 | |
| 2024-11-29 | 0 | |
| 2024-11-30 | 0 | |
| 2024-12-01 | 0 | |
| 2024-12-02 | 0 | |
| 2024-12-03 | 0 | |
| **14 days prior to field visit = 1.86 inches** | | |
| **2024-12-04** | 0 | SP7-U and SP8-U |
| **Overall Total = 10.63 inches** | | |

(M) = Missing values

***Table 2: Summary of precipitation (inches) at the Oregon City, OR weather station for the three months prior to the November delineation, compared to normal ranges (AgACIS 2024).***

| | WETS DATA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **Month** | **30% Probability Less Than** | **Ave. Precip.** | **30% Probability More Than** | **Rec. Precip.** | **Weighing Factor** | **Weighted 30% Probability Less Than** | **Weighted 30% Probability More Than** | **Weighted Recorded Precip.** |
| **3rd Month Prior** | Aug 2024 | 0.13 | 0.55 | 0.53 | 0.63 | 1 | 0.13 | 0.53 | 0.63 |
| **2nd Month Prior** | Sept 2024 | 0.76 | 1.76 | 2.14 | 1.21 | 2 | 1.52 | 4.28 | 2.42 |
| **1st Month Prior** | Oct 2024 | 2.79 | 4.27 | 5.13 | 3.99 | 3 | 8.37 | 15.39 | 11.97 |
| | | | | | | | **10.02** | **20.2** | **15.02** |

***Table 3: Summary of precipitation (inches) at the Oregon City, OR weather station for the three months prior to the December delineation, compared to normal ranges (AgACIS 2024).***

| | WETS DATA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **Month** | **30% Probability Less Than** | **Ave. Precip.** | **30% Probability More Than** | **Rec. Precip.** | **Weighing Factor** | **Weighted 30% Probability Less Than** | **Weighted 30% Probability More Than** | **Weighted Recorded Precip.** |
| **3rd Month Prior** | Sept 2024 | 0.76 | 1.76 | 2.14 | 1.21 | 1 | 0.76 | 2.14 | 1.21 |
| **2nd Month Prior** | Oct 2024 | 2.79 | 4.27 | 5.13 | 3.99 | 2 | 5.58 | 10.26 | 7.98 |
| **1st Month Prior** | Nov 2024 | 4.63 | 6.49 | 7.68 | 8.55 | 3 | 13.89 | 23.04 | 25.65 |
| | | | | | | | **20.23** | **35.44** | **34.84** |

Weighted precipitation for the three months prior to the delineation site visits were within the normal range based on WETS data analyzed from 1994 through 2024 (AgACIS 2024), as shown in Table 2 and 3. A large rain event occurred the seven days prior to the first site visit (November 8) and during the second site visit (November 18). Direct observations of hydrology can be assumed to be accurate representations of wetland conditions.

## D. Methods

Potential wetlands and waters were identified prior to the site visit via a review of relevant materials, including Oregon Explorer (2024); US Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) (2024); State Wetland Inventory (SWI) (2024), USDA NRCS Web Soil Survey (2024); previous wetland delineations, historic topographic maps (USGS 1914-2024), and Google Earth aerial imagery (Google 2024).

HHPR natural resources scientists conducted a wetland and Ordinary High-Water Mark (OHWM) delineation within the SA on November 8, 18, 20, and December 4, 2024, with a follow-up visit on January 22, 2025. HHPR performed a pedestrian review of the entire site. Five sample plot pairs, three upland plots, and one auger hole (AG-3) were established to review and document areas where hydrology, vegetation, or other indicators suggested wetland presence. In addition, four auger holes (AG-1, AG-2, AG-4, and AG-5) were established along the wetland edge to confirm the absence of wetland hydrology and were checked several times for wetland hydrology. Soil color was recorded for each auger hole.

After each auger hole was dug, the groundwater table was allowed to equilibrate for at least 60 minutes before measurements of water table depth were taken. Several auger holes were left open for 12 days and no water table was observed during site visits. Water table depths were not recorded on November 18, as there was a large precipitation event during the morning of the field visit.

Sample plots SP7-U and SP8-U were recorded to document an atypical situation where vegetation had been removed and woodchips had been spread over a portion of the lower terrace. Sample plot and auger hole locations are shown on Figure 6. Soil pits on site generally met refusal at depths of between 6 and 10 inches. Large, compacted rocks (>9 inches in diameter) were observed at these depths and HHPR staff were not able to excavate around the large rocks.

HHPR followed the three-parameter wetland delineation method described in the Corps of Engineers Wetland Delineation Manual (1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys and Coast Region (2010). Vegetation, soil, and hydrologic data for sample plots was recorded on US Army Corps of Engineers (USACE) Western Mountains, Valleys, and Coast data forms version 2.0 (USACE 2010). Plant names and wetland indicator status on the data forms follow the 2022 National Wetland Plant List (USACE 2022).

The OHWM delineation was based on physical characteristics observed during the site visit, as described in USACE Regulatory Guidance Letter No. 05-05 (dated December 7, 2005) and Oregon Removal-Fill Rules (Oregon Administrative Rules [OAR] 141-085-0515(3)). Due to safety issues with accessing the onsite portion of Stream 1, physical characteristics observed at spot check locations were used as a basis for drawing OHWM along topography. OHWM indicators observed during the field investigation include destruction of terrestrial vegetation, clear line on the bank, change in sediment texture, and erosion.

Ground level color photographs are presented in Appendix B and Wetland Datasheets are presented in Appendix C.

## E. Description of All Wetlands and Non-Wetland Waters

HHPR delineated one wetland (Wetland A) and one watercourse (Stream 1) within the SA (Figure 6 and 6.1). The location, characteristics, extent, and anticipated jurisdictional determinations for each feature are described in the following sections.

### E.1 Wood Chip Area

As mentioned above, a large portion of the lower terrace was covered in more than 12 inches of woodchips. The work occurred before the City acquired the property from ODOT, after the 2021 ice storm.

Investigation of this atypical area began at the toe of the slope between the upper terrace and lower terrace, where hydrology was most likely to be present (SP7-U). Jumbled matrix colors consistent with what is often observed in fill were identified within the soil pit that was excavated until refusal due to very large rock. The fill, and large rock observed in soil pits, are likely associated with work done in the 1960s to protect I-205 from landslides. No water was observed along the base of the slope adjacent to wood chip area. Additionally, all vegetation within the sample plot area was dominated by Facultative Upland (FACU) and Upland (UPL) species rooted on the hillside above the plot. It is likely that, based on the upland plants in the adjacent upland areas of similar topography, the wood chip area was dominated by an upland plant community, including scotch broom and false oat grass prior to the woodchips being spread on the low terrace.

SP8-U, located near the center of the wood chip area, contained shallow surface water. This pit also showed signs of disturbed soils (mixed colors from fill), but also contained formed-in-place redoximorphic concentrations. During the November 20 field visit, steam was observed rising out of the wet woodchips in this area and there was a strong mushroom smell with clumps of mycelium in the subsurface. During both the November 20 and December 4 site visits, groundwater and soils were warm to the touch, implying decomposition of the woodchips is creating heat that is raising the temperature in the soils and groundwater as a result of increased metabolic function in the near surface. These conditions appear to be accelerating the formation of redox features. Additionally, the woodchips sitting above the soil were saturated on November 20 and damp/moist on December 4. The woodchips appear to be holding moisture in place for longer than the soils would hold water without the woodchips, influencing hydrology. The decomposing organic material will likely form a dense A-horizon over time as the wood material breaks down and is incorporated into the soil profile. The wood chip area has shallow soil and is gently sloped without depressions, so it was likely well-drained before the wood chips were added and started holding water.

The previous delineation (WD2009-0342), completed in 2009 when the area was still vegetated, identified the area with woodchips as upland. No major alteration has occurred onsite since the 2009 delineation, except for the addition of the woodchips. The area is less than 5 percent vegetated and dominated by facultative-upland species, and therefore would not meet wetland vegetation criteria. Surrounding areas are vegetated with upland species with no identified seeps or inundation visible on historic aerials.

The area around SP8-U was not identified as wetland based on the lack of vegetation. In addition, review of the previous wetland delineation concurrence and site history indicates that the human-placed woodchips are altering hydrology and metabolic processes in the soils, resulting in high water table and redox formation. If no further disturbance occurs (such as more woodchips being deposited), soil and hydrology will eventually return to its previous state as the woodchips decompose and the organic matter is dissipated. It is uncertain how long this process would take.

## E.2 Wetland A

Wetland A is a slope class, palustrine emergent (PEM) wetland located in the eastern portion of the SA on the lower terrace. Wetland A is approximately 28,555 square feet (SF) (0.66 acres).

Groundwater discharge at the toe of a cut-slope provides hydrology for Wetland A. A seep was observed in the northeast corner of the wetland and groundwater appears to come to the surface throughout the remaining portions of the wetland. The northern portion of the wetland is a broad, shallow depression, narrowing to two swales that flow to the south on either side of an upland area. Flowing surface water was observed in the narrow swale potions of the wetland. Water from the west swale of Wetland A drains down the hillside toward I-205, where it is captured in a ditch and is directed to Stream 1, eventually draining to the Willamette River via Bernert Creek. This connection to Stream 1 is likely intermittent based on water flow conditions observed in Wetland A during the site visits.

With the exception of the eastern boundary, there was a clear vegetative shift from hydrophytic vegetation to upland vegetation along the wetland boundary. The boundary was further confirmed with several paired plots and auger holes that were allowed to remain open for at least 60 minutes to determine if wetland hydrology was present.

Vegetation in Wetland A is dominated by broadleaf cattail (*Typha latifolia*), red fescue (*Festuca rubra*), meadow foxtail (*Alopecurus pratensis*), and rice cut grass (*Leersia oryzoides*), with areas of dense Himalayan blackberry throughout with lesser amounts of teasel, tansy ragwort (*Jacobaea vulgaris*), duckweed (*Lemna minor*), a few scattered Oregon ash saplings and an unidentified willowherb (*Epilobium sp*.).

The Oregon Department of State Lands (DSL) is likely to assert jurisdiction over Wetland A, per OAR 141-085-0515(4).

USACE is likely to assert jurisdiction over Wetland A per the definition contained in 33 CFR 328.3 (a)(4), as revised and amended in 2023, because it is a wetland connected to a relatively perennial tributary to the Willamette River (via Bernert Creek).

## E.3 Stream 1

Stream 1, totaling approximately 225 linear feet (LF) within the SA, is an unnamed intermittent stream. Stream 1 flows from north to south through the SA. Stream 1 daylights out of two corrugated metal culverts downslope of Salamo Road, flows south through a ravine in the western portion of the SA and continues south out of the SA before draining under I-205, and ultimately to the Willamette River via Bernert Creek.

The V-shaped channel width ranges from 6 to 8 feet at OHWM and the bed substrate consists of a rock bottom (gravels and pebbles) with some silty material. The creek flows through the bottom of a steep ravine, and is confined on both sides by steep slopes densely vegetated with Himalayan blackberry.

During the site review, flowing water was observed in the stream channel, between 2 and 4 inches deep, on November 20, down to less than 1 inch of flowing water on December 4, with approximately 18 to 24 inches of water in the scour pool. Stream 1 likely flows intermittently and is primarily fed by stormwater based on observations in the field and the stream flow characteristics described in the WD2009-0342 (Vigil-Agrimis 2009).

Vegetation along Stream 1 includes a canopy of bigleaf maple, Douglas fir, and black cottonwoods with an understory dominated by Himalayan blackberry with lesser amounts of English ivy and western swordfern.

No state listed salmonid species of fish are mapped within Stream 1 according to StreamNet Mapper (2024). Stream 1 is not mapped as Essential Salmonid Habitat (ESH) by the DSL ESH mapper (2024).

HHPR delineated the OHWM of Stream 1 based on a combination of topographic breaks, destruction of terrestrial vegetation, and erosion/scour.

DSL is likely to assert jurisdiction over Stream 1 per OAR 141-085-0515(3).

USACE is likely to assert jurisdiction over Stream 1 per the definition contained in 33 CFR 328.3 (a)(3), as revised and amended in 2023 because it is a relatively permanent flowing tributary to the Willamette River (via Bernert Creek).

## F. Deviation From SWI

DSL's SWI mapper does not identify any wetlands or non-wetland waters within the SA.

Previous delineation WD2009-0342 (Vigil-Agrimis 2009) maps a stream and wetland consistent with the delineated boundaries of Wetland A and Stream 1. The southern boundary between the two narrow swales of Wetland A appears to have expanded to the south. Additionally, Vigil-Agrimis had mapped what appeared to be a log scar as part of the wetland. An auger hole was dug in this area, and soils were determined to be upland and no water table was present during any of the site visits.

## G. Mapping Method

HHPR natural resources staff flagged features in the field. Each flag was GNSS located using an EOS Arrow 100 GNSS receiver with sub-meter accuracy.

## H. Additional Information

No ESH is mapped within the SA (DSL 2024). Five auger holes (AG-1 through AG-5) were established to measure water table depth and to examine soils along the boundary of Wetland A.

- AG-1 was located outside of the wetland boundary south of the middle portion and no water table was observed on November 8 after the pit had been open for several hours. AG-1 was observed again on November 20 and no water table

was observed, even though a large rain event had occurred on the days preceding the visit. Soil color was 10YR 4/3.

- AG-2 was located just outside the wetland boundary near the northwestern corner and no water table was observed; soil color was 10YR 4/3.
- AG-3 was located just within the wetland boundary on the eastern side of Wetland A. Water table was observed at a depth of 3 inches and soil color was 2.5Y 3/1 with some redox features visible.
- AG-4 was located just outside of the wetland boundary, also on the eastern side of Wetland A. No water was observed on November 20 and soil color was 10YR 4/3.
- AG-5 was located just west of the eastern finger of Wetland A in a log scar that was previously identified as wetland in the 2009 Wetland Delineation. The auger hole did not have water after several hours on November 8, and the hole was left open until November 20 and still no water table was present. Soil color was 10YR 4/3.

As described in the Methods section above, the auger holes were open long enough for the water table to equilibrate, and some water levels were investigated over several days.

## I. Results and Conclusions

HHPR delineated one wetland (Wetland A) and one stream (Stream 1) within the SA. Characteristics of these features are summarized below in Table 4.

***Table 4: Jurisdictional Status***

| Name | Type | Extent in SA | DSL Jurisdiction | USACE Jurisdiction |
|---|---|---|---|---|
| Wetland A | PEM Wetland | 0.66 acres | Yes | Assumed Yes |
| Stream 1 | Intermittent Stream | 225 linear feet | Yes | Yes |

## J. Required Disclaimer

This report documents the investigation, best professional judgement and conclusions of the investigator. It is correct and complete to the best of my knowledge. It should be considered a Preliminary Jurisdictional Determination of wetlands and other waters and used at your own risk unless it has been reviewed and approved in writing by the DSL in accordance with OAR 141-090-0005 through 141-090-0055.

## K. References


Agricultural Applied Climate Information System (AgACIS). 2024. Monthly, daily, and WETS climatic data from Portland-Hillsboro Airport, OR weather station. URL: http://agacis.rcc-acis.org/ . Accessed November-December 2024.

Cowardin, L. M., V. Carter, F. C. Golet, E. T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States, U. S. Department of the Interior, Fish and Wildlife Service, Washington, D.C.

Google. 2024. Google Earth Pro aerial imagery 1994-2024. Accessed October-December 2024.

Nationwide Environmental Title Research Online (NETR). 2024. Historic Aerial Viewer. https://www.historicaerials.com/viewer. Accessed November 2024.

Oregon Department of State Lands (DSL). 2023. Essential Salmonid Habitat Map. https://maps.dsl.state.or.us/esh/ . Accessed October-December 2024.

Oregon Department of State Lands (DSL). 2024. Oregon Department of State Lands Statewide Wetland Inventory Map Viewer. https://maps.dsl.state.or.us/swi/. Accessed October-November 2024.

Oregon Explorer. 2024. Map Viewer. URL: https://tools.oregonexplorer.info/OE_HtmlViewer/Index.html?viewer=oe. Accessed November-December 2024.

ORMAP. 2024. State of Oregon. URL: https://ormap.net/. Accessed November 2024.

StreamNet Mapper. 2024. A Fisheries Data Project of The Pacific States Marine Fisheries Commission. URL: https://www.streamnet.org/home/data-maps/sn-mapper/ . Accessed November 2024.

US Army Corps of Engineers (USACE). 2022. National Wetland Plant List: Western Mountains, Valleys and Coast 2020 Regional Wetland Plant List v3.4.

US Army Corps of Engineers (USACE). 2010. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0). May 2010.

US Army Corps of Engineers (USACE). 1987. Corps of Engineers Wetlands Delineation Manual Wetlands Research Program Technical Report Y-87-1 (on-line edition). US Army Waterways Experiment Station Environmental Laboratory. Vicksburg, Mississippi.

USDA Natural Resources Conservation Service (NRCS). 2024. Web Soil Survey. URL: https://websoilsurvey.sc.egov.usda.gov/ . Accessed November-December 2024.

US Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI). 2024. National Wetlands Mapper. URL: https://www.fws.gov/wetlands/Data/Mapper.html . Accessed November 2024.

US Geologic Survey (USGS). 2024. Historic Topo Map Collection https://ngmdb.usgs.gov/topoview/viewer/#6/43.572/-117.499. Accessed October-November 2024.

Vigil-Agrimis, Inc. 2009. Wetland Delineation Determination Report for West Linn Solar Highway, Clackamas County (WD #2009-0342). Portland, OR.

*This page is intentionally left blank*

# Appendix A: Figures

*This page is intentionally left blank*

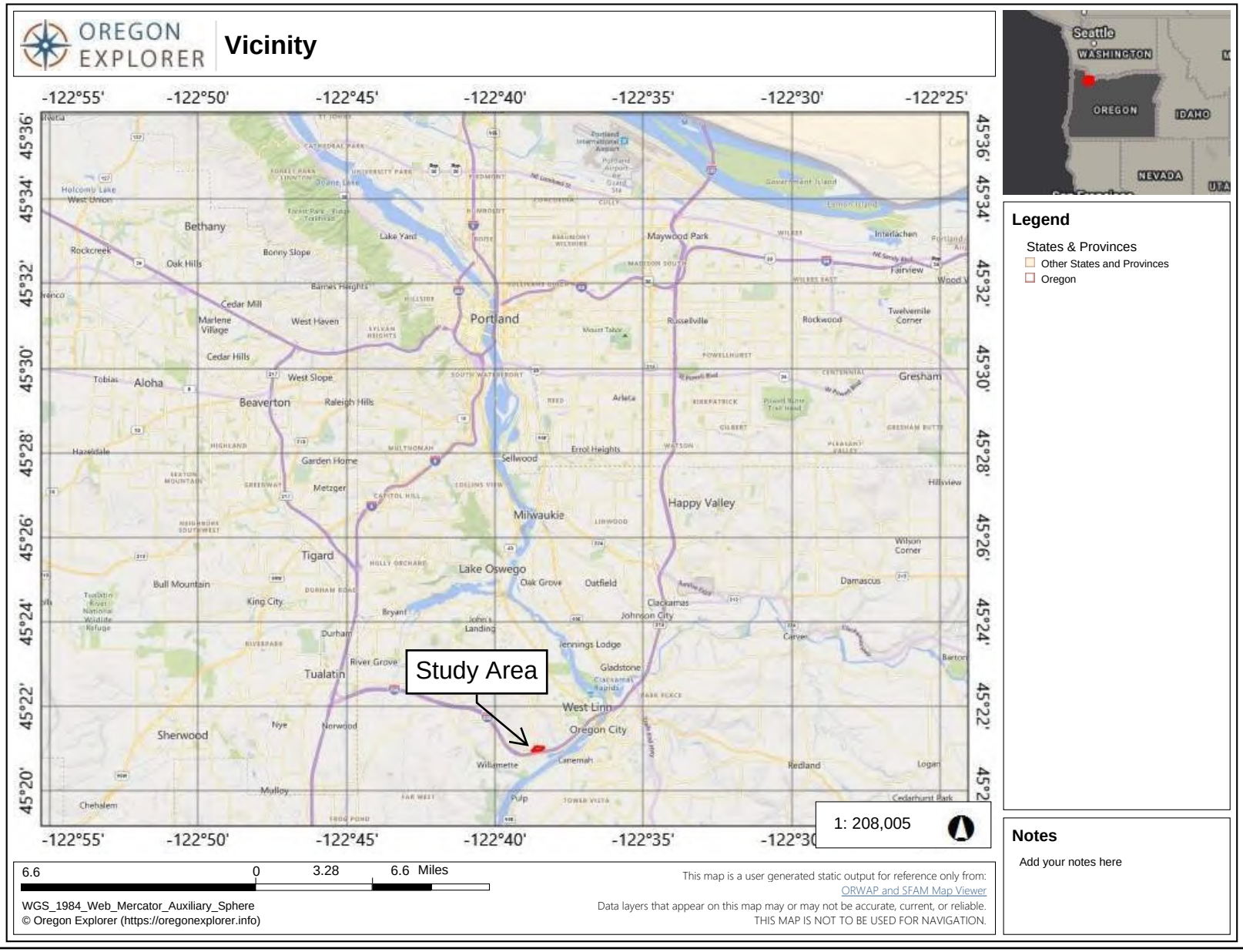



**Figure 1: Vicinity Map**

West Linn Public Works Facility
West Linn, OR

Harper Houf Peterson Righellis Inc.
ENGINEERS ◆ PLANNERS
LANDSCAPE ARCHITECTS ◆ SURVEYORS

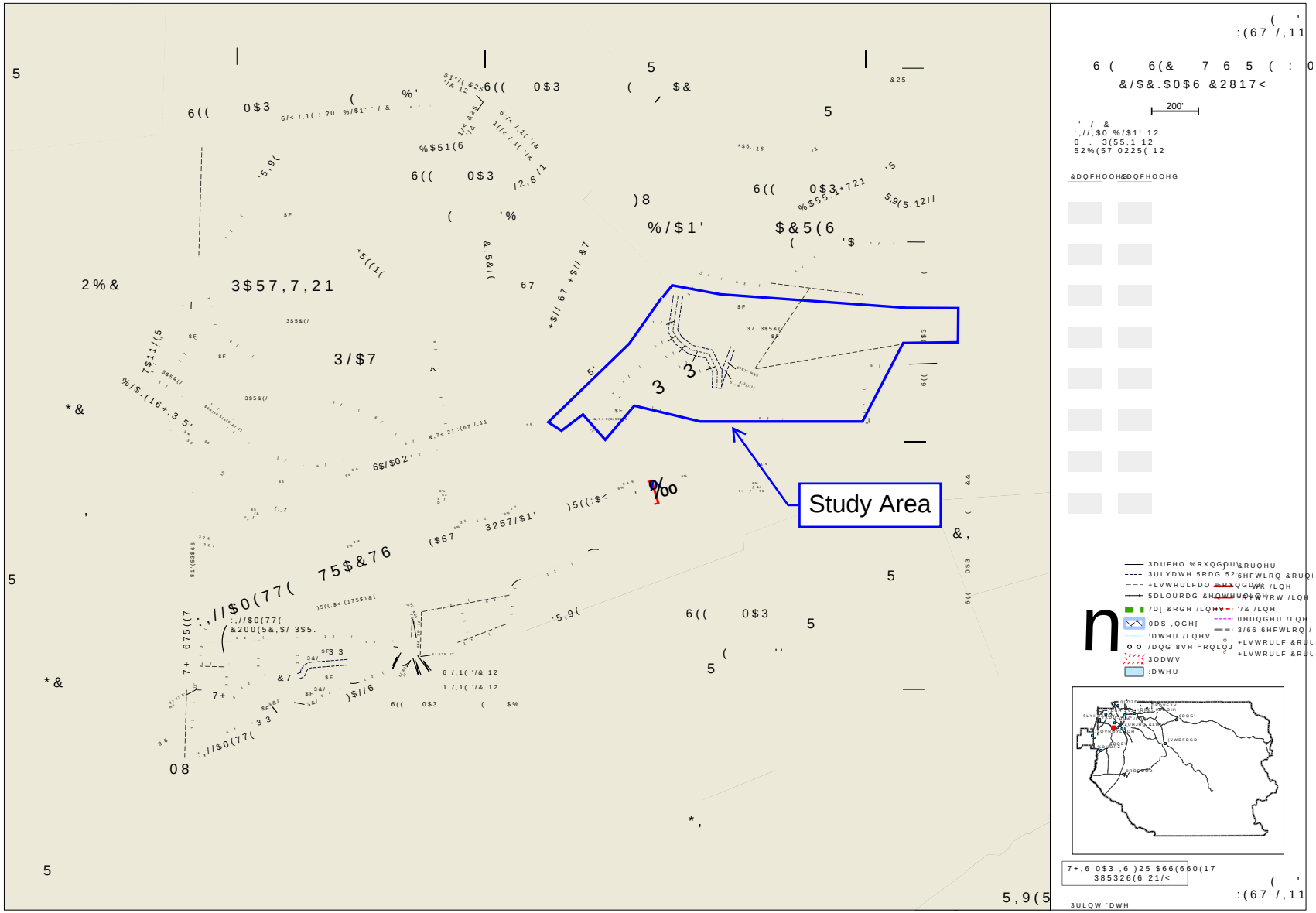



**Figure 2.0: ORMAP Tax Map**

West Linn Public Works Facility
West Linn, OR

Harper Houf Peterson Righellis Inc.
ENGINEERS ◆ PLANNERS
LANDSCAPE ARCHITECTS ◆ SURVEYORS

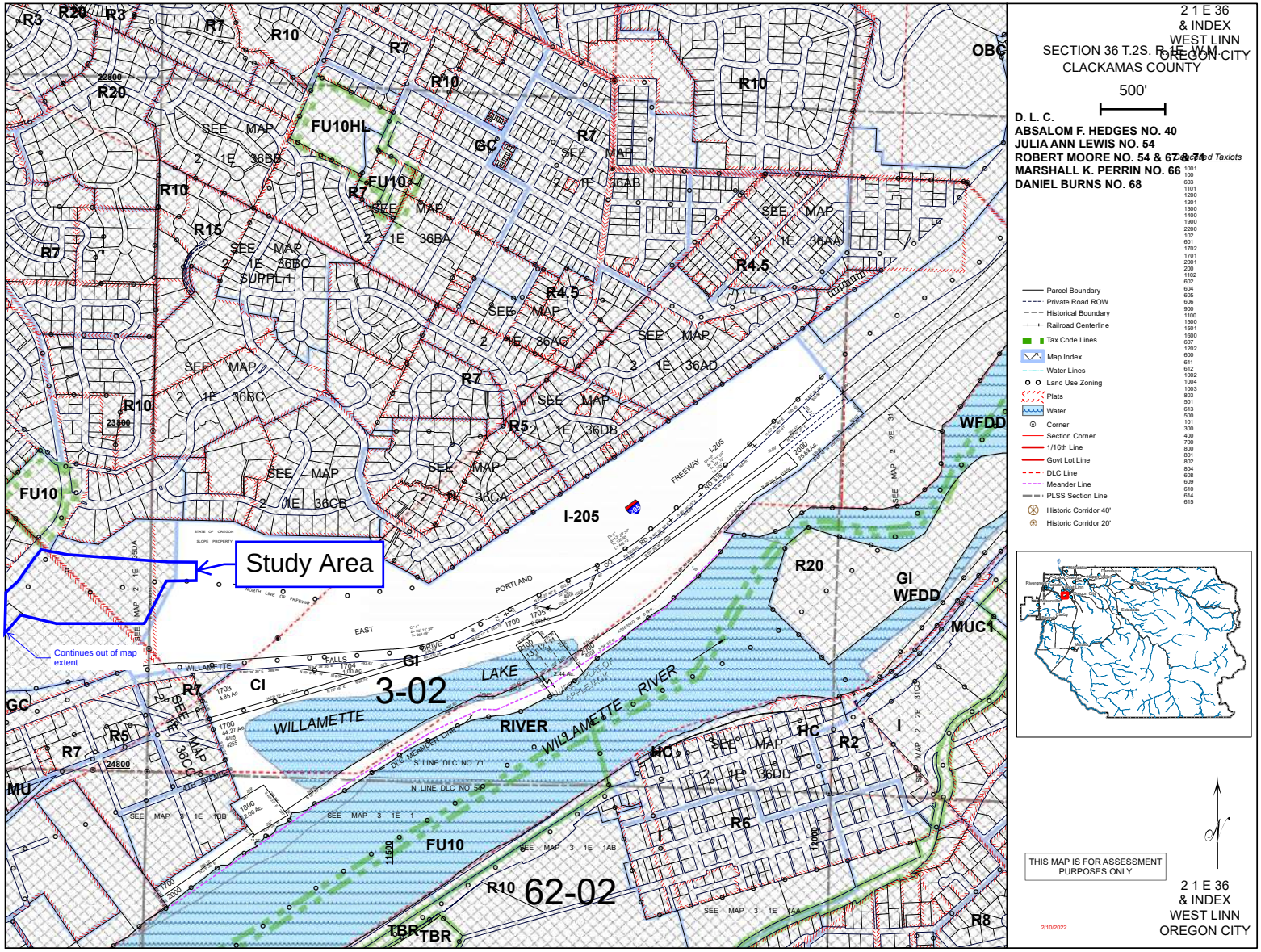



**Figure 2.1: ORMAP Tax Map**

West Linn Public Works Facility
West Linn, OR

Harper Houf Peterson Righellis Inc.
ENGINEERS ◆ PLANNERS
LANDSCAPE ARCHITECTS ◆ SURVEYORS

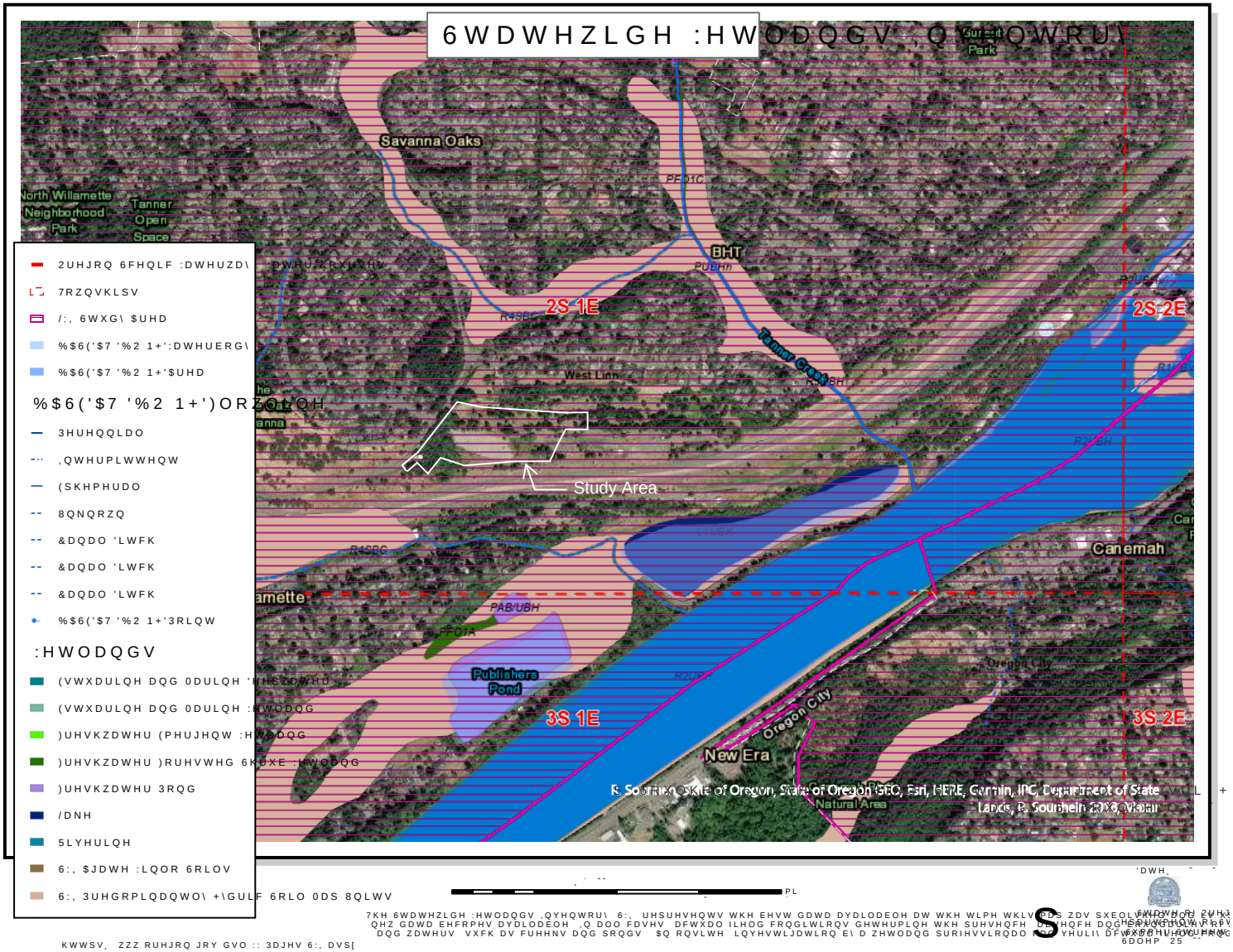
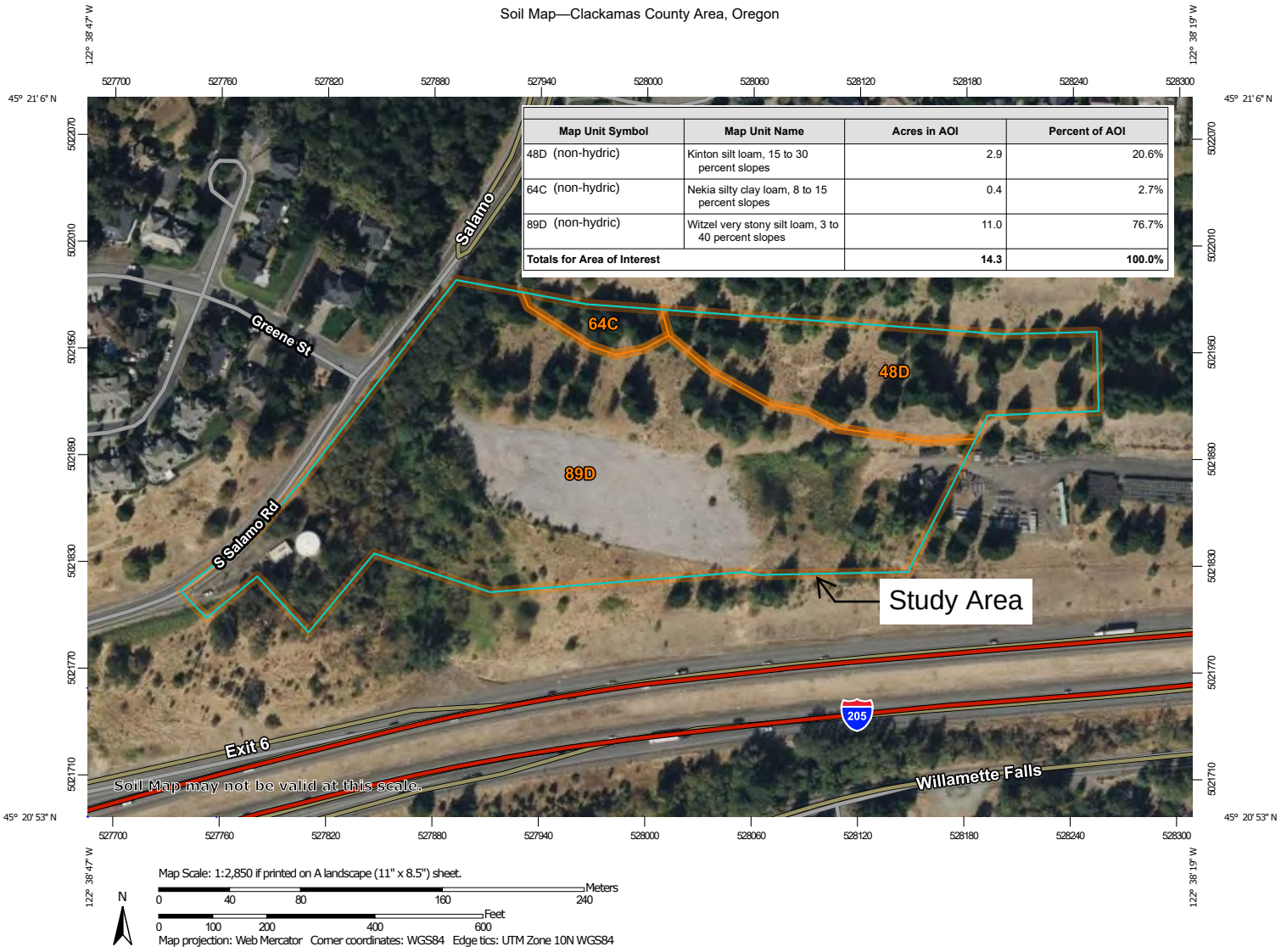



**Figure 3: SWI**

West Linn Public Works Facility
West Linn, OR

Harper Houf Peterson Righellis Inc.
ENGINEERS ◆ PLANNERS
LANDSCAPE ARCHITECTS ◆ SURVEYORS

Soil Map—Clackamas County Area, Oregon




| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
|---|---|---|---|
| 48D (non-hydric) | Kinton silt loam, 15 to 30 percent slopes | 2.9 | 20.6% |
| 64C (non-hydric) | Nekia silty clay loam, 8 to 15 percent slopes | 0.4 | 2.7% |
| 89D (non-hydric) | Witzel very stony silt loam, 3 to 40 percent slopes | 11.0 | 76.7% |
| **Totals for Area of Interest** | | **14.3** | **100.0%** |

Map Scale: 1:2,850 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 40 80 160 240

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

USDA **Natural Resources Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

1/17/2025
Page 1 of 3

**Figure 4: NRCS Soil Map**

West Linn Public Works Facility
West Linn, OR

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS ◆ PLANNERS
LANDSCAPE ARCHITECTS ◆ SURVEYORS

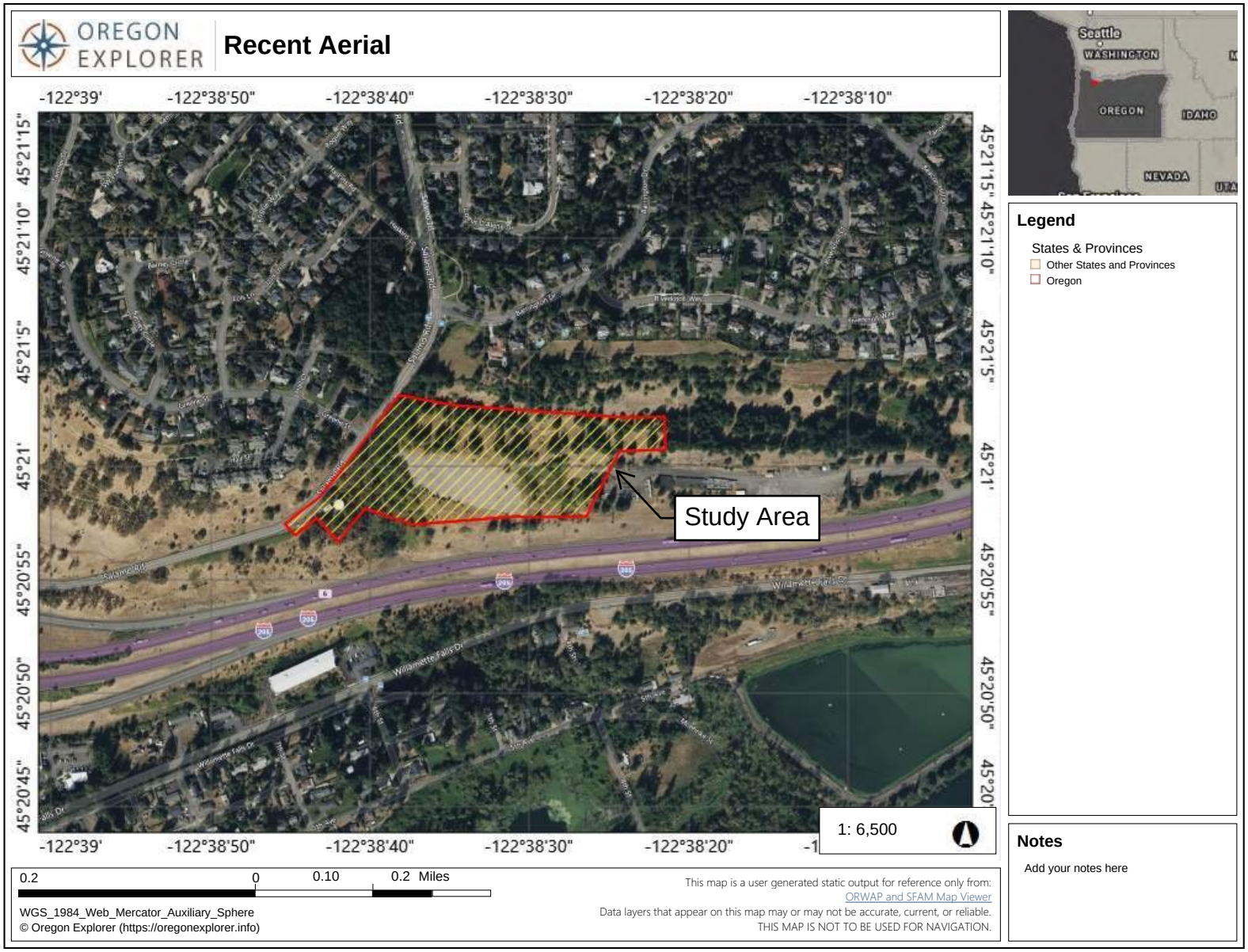
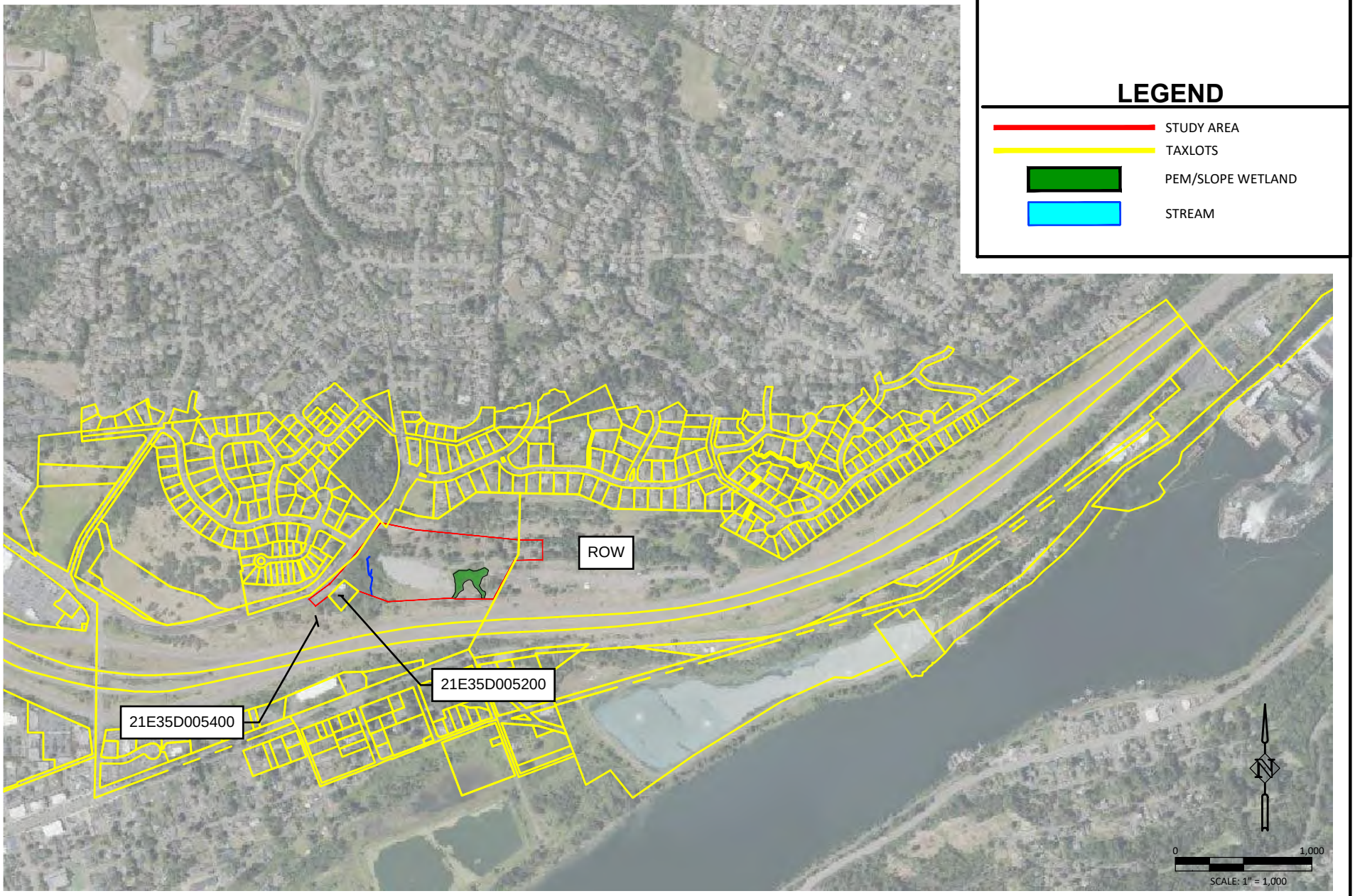



**Figure 5: Recent Aerial**

West Linn Public Works Facility
West Linn, OR

Harper Houf Peterson Righellis Inc.
ENGINEERS ◆ PLANNERS
LANDSCAPE ARCHITECTS ◆ SURVEYORS

NOTICE: REPORTS ARE CONSIDERED DRAFT DOCUMENTS UNTIL REVIEW IS COMPLETED BY DSL. WETLAND MAPS MAY CHANGE AS A RESULT OF DSL REVIEW.




| | | | |
|---|---|---|---|
| SHEET NO. **MAP** | | | DESIGNED: --- |
| | | | DRAWN: --- |
| | | | CHECKED: --- |
| | DATE | NO. | DESCRIPTION |
| JOB NO. ----- | R E V I S I O N S | | DATE: ----- |


Harper Houf Peterson Righellis Inc.
ENGINEERS♦PLANNERS
LANDSCAPE ARCHITECTS♦SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171


Figure 6: Wetland Delineation Exhibit

# West Linn Public Work Facilities

West Linn, Oregon

NOTICE: REPORTS ARE CONSIDERED DRAFT DOCUMENTS UNTIL REVIEW IS COMPLETED BY DSL. WETLAND MAPS MAY CHANGE AS A RESULT OF DSL REVIEW.

Note: GNSS located using Eos Arrow 100 Plus to sub-meter accuracy by HHPR

| | | | |
|---|---|---|---|
| SHEET NO. **MAP** | | | DESIGNED: HHPR |
| | | | DRAWN: HHPR |
| | | | CHECKED: HHPR |
| JOB NO. CWL-11 | DATE | NO. / DESCRIPTION | DATE: 1/24/25 |
| | R E V I S I O N S | | |

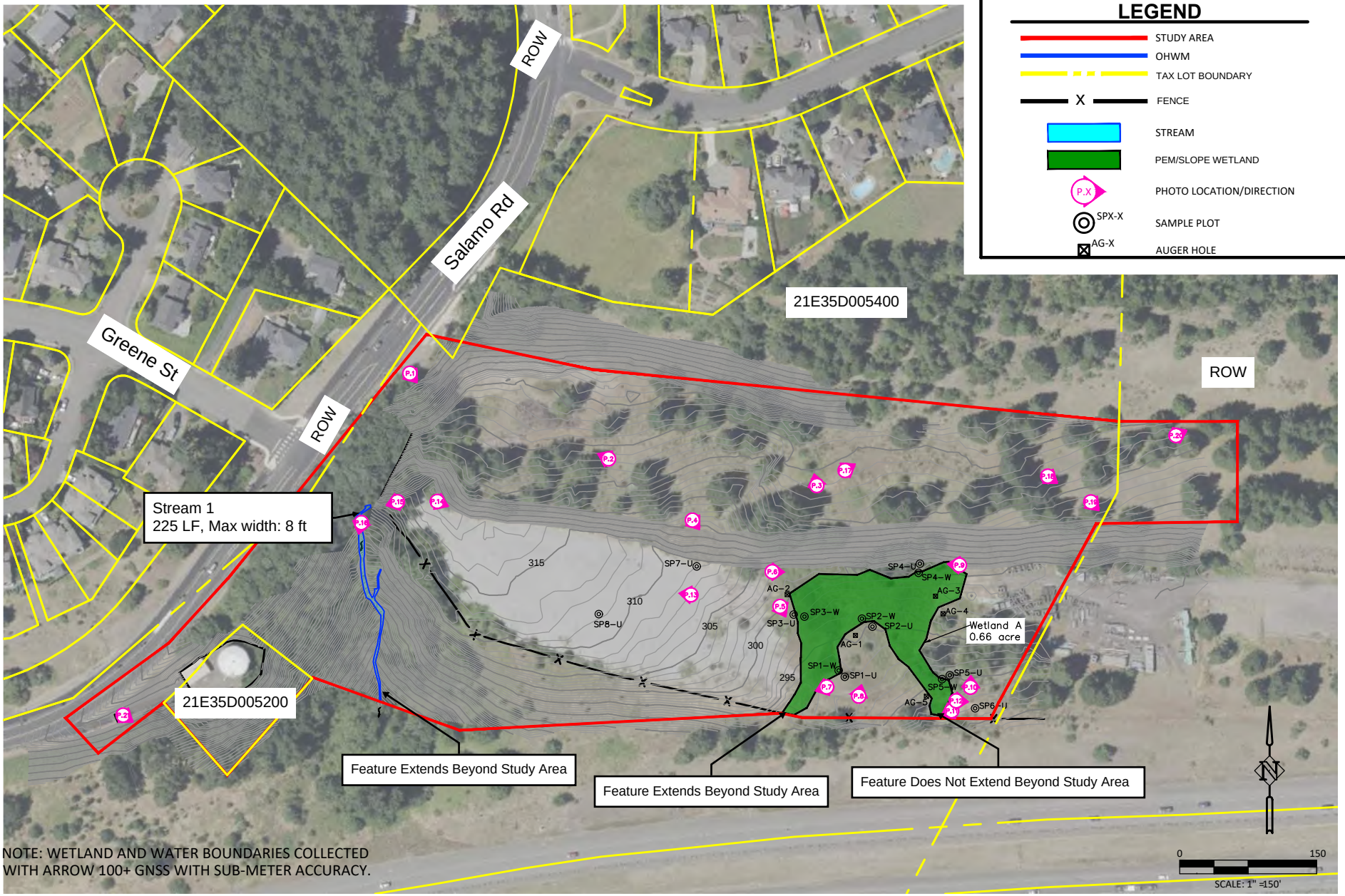

Harper Houf Peterson Righellis Inc.
ENGINEERS♦PLANNERS
LANDSCAPE ARCHITECTS♦SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171


Figure 6: Wetland Delineation Exhibit

# West Linn Public Work Facilities

West Linn, Oregon

NOTICE: REPORTS ARE CONSIDERED DRAFT DOCUMENTS UNTIL REVIEW IS COMPLETED BY DSL. WETLAND MAPS MAY CHANGE AS A RESULT OF DSL REVIEW.




Note: GNSS located using Eos Arrow 100 Plus to sub-meter accuracy by HHPR

| | | | |
|---|---|---|---|
| SHEET NO. 1 | | | DESIGNED: HHPR |
| | | | DRAWN: HHPR |
| | | | CHECKED: HHPR |
| JOB NO. CWL-11 | DATE | NO. | DESCRIPTION |
| | REVISIONS | | DATE: 1/24/25 |

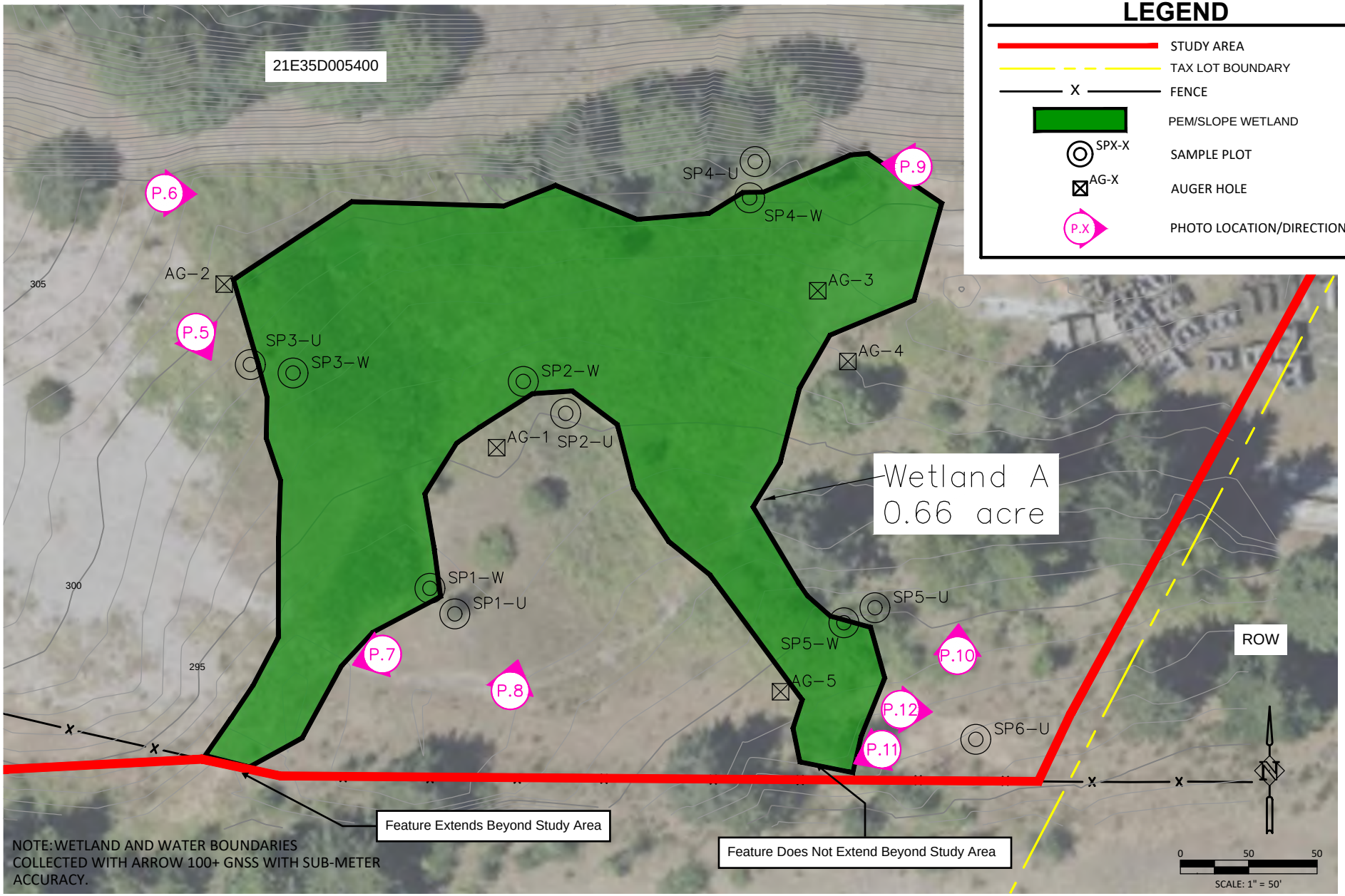

Harper Houf Peterson Righellis Inc.
ENGINEERS♦PLANNERS
LANDSCAPE ARCHITECTS♦SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171


Figure 6: Wetland Delineation Exhibit

# West Linn Public Works Facilities

West Linn, Oregon

NOTICE: REPORTS ARE CONSIDERED DRAFT DOCUMENTS UNTIL REVIEW IS COMPLETED BY DSL. WETLAND MAPS MAY CHANGE AS A RESULT OF DSL REVIEW.




Note: GNSS located using Eos Arrow 100 Plus to sub-meter accuracy by HHPR

| SHEET NO. | | | | DESIGNED: |
|---|---|---|---|---|
| 2 | | | | HHPR |
| | | | | DRAWN: HHPR |
| | | | | CHECKED: HHPR |
| JOB NO. | DATE | NO. | DESCRIPTION | DATE: |
| CWL-11 | R E V I S I O N S | | | 1/24/25 |


Harper Houf Peterson Righellis Inc.
ENGINEERS♦PLANNERS
LANDSCAPE ARCHITECTS♦SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171


Figure 6: Wetland Delineation Exhibit

# West Linn Public Works Facility

West Linn, Oregon

# Appendix B: Photo Log

*This page is intentionally left blank*

**Photo 1:** Dense Himalayan blackberry with lesser amounts of English ivy and swordfern under a bigleaf maple and Douglas fir canopy on the steep hillside along Salamo Road. Photo facing southeast. November 20, 2024.

**Photo 2:** Clearing of trees for an access road had begun as part of a separate project. Photo facing west toward Salamo Road. November 18, 2024.

**Photo 3:** Existing conditions on the upper terrace showing Douglas fir, scotch broom, and FAC grasses dominance. Photo facing north. November 18, 2024

**Photo 4:** View of the western portion of Wetland A, looking down at the lower terrace from the upper terrace. Photo facing southeast. November 18, 2024.

**Photo 5:** Photo facing southeast at the western edge Wetland A. Wetland boundary follows topographic break that corresponds to a shift in vegetation along the western boundary. November 18, 2024.

**Photo 6:** Photo facing east near the northwest corner of Wetland A. The northern boundary is below the cut wall of previous terracing of the slope above I-205. November 18, 2024.

**Photo 7:** Photo facing southwest at the southwest corner of Wetland A. The southwest corner of Wetland A is topographically constrained to a swale. Slightly flowing water was observed south of the cattails. November 20, 2024.

**Photo 8:** Upland vegetation in the middle of the upland area that splits Wetland A into two swales in their southern portion. Photo facing north. November 18, 2024.

**Photo 9:** Potential seep in the rocks at the toe of the cut slope in the northeast corner of Wetland A. Photo facing west. November 20, 2024.

**Photo 10:** Douglas fir tree patches with Pacific madrone, scotch broom, and grasses occurring between Wetland A and the ODOT maintenance yard. Photo facing north. November 20, 2024.

**Photo 11:** A sharp contrast of wetland vs upland vegetation at the southeast corner of Wetland A. Ponded surface water was observed in the cattails and then appears to go subsurface right before the barbed wire fence at the top of slope. Photo facing southwest. November 20, 2024.

**Photo 12:** Scotch broom dominated area between Douglas fir and the southern edge of the SA, east of Wetland A. Photo facing east. November 20, 2024.

**Photo 13:** One of several saplings observed growing out of the wood chip area onsite. Species observed included Douglas fir and Oregon white oak. Photo facing west. November 20, 2024

.

**Photo 14:** Upland vegetation on the cut slope above the wood chip area. Photo facing east. November 20, 2024.

**Photo 15:** Steep slopes dominated by blackberry with lesser amounts of swordfern anbd English ivy under bigleaf maple and cottonwood canopy near Stream 1. Photo facing southwest. November 20, 2024.

**Photo 16:** Stream 1 in the western portion of the SA, just downstream of the headwaters (two storm culverts) in the ravine below the lower terrace. Photo facing south. November 20, 2024.

**Photo 17:** Overview of conditions in the northeastern portion of the subject property. Photo facing northeast. November 08, 2024.

**Photo 18:** Pacific Madrone, Douglas fir, grasses, Queen Anne's lace, and moss in northeastern corner of the SA. Photo facing southeast. January 22,2025.

**Photo 19:** Queen Anne's lace, grasses, and Douglas fir in northeastern corner of SA. Photo facing southeast. January 22,2025.

**Photo 20:** Upland conditions at the toe of slope in the northeastern portion of the SA. Photo facing northeast. January 22,2025.

**Photo 21:** Upland conditions on slope on Parcel #21E35D5200 in the southwest corner of the SA. Photo facing east. November 08, 2024.

# Appendix C: Datasheets

*This page is intentionally left blank*

## WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: West Linn Public Works Facility | City/County: West Linn/Clackamas | Sampling Date: 11/8/24
Applicant/Owner: City of West Linn | State: OR | Sampling Point: SP1-U
Investigator(s): Dan Thew/Jake Ashford | Section, Township, Range: 35 T02S 01E
Landform (hillslope, terrace, etc.): terrace | Local relief (concave, convex, none): none | Slope (%): 1
Subregion (LRR): NW Forests and Coast | Lat: 45.349531 | Long: -122.641513 | Datum: NAD83, NAVD88
Soil Map Unit Name: 89D- Witzel very stony silt loam, 3 to 40 percent slopes | NWI classification: n/a
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | | |
|---|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes ___ | No X | **Is the Sampled Area within a Wetland?** | **Yes ___ No X** |
| Hydric Soil Present? | Yes ___ | No X | | |
| Wetland Hydrology Present? | Yes ___ | No X | | |

Remarks: Wetter than usual in the two weeks preceding the site visits.

### VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 ft) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. None | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | = Total Cover | | |

| Sapling/Shrub Stratum (Plot size: 5 ft) | | | |
|---|---|---|---|
| 1. *Cytisus scoparius* | 40 | Y | NL* |
| 2. *Quercus garryana* | 20 | Y | FACU |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 60 = Total Cover | | |

| Herb Stratum (Plot size: 5 ft) | | | |
|---|---|---|---|
| 1. *Agrostis capillaris* | 25 | Y | FAC |
| 2. *Daucus carota* | 20 | Y | FACU |
| 3. *Schedonorus arundinaceus* | 15 | N | FAC |
| 4. *Holcus lanatus* | 10 | N | FAC |
| 5. *Hypericum perforatum* | 5 | N | FACU |
| 6. *Epilobium sp.* | 2 | N | [FACW]** |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 78 = Total Cover | | |

| Woody Vine Stratum (Plot size: 30 ft) | | | |
|---|---|---|---|
| 1. none | | | |
| 2. | | | |
| | = Total Cover | | |

% Bare Ground in Herb Stratum 22%

**Dominance Test worksheet:**
Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | | x 1 = | |
| FACW species | | x 2 = | |
| FAC species | | x 3 = | |
| FACU species | | x 4 = | |
| UPL species | | x 5 = | |
| Column Totals: | (A) | | (B) |

Prevalence Index = B/A =

**Hydrophytic Vegetation Indicators:**
___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present? Yes ___ No x**

Remarks: *NL treated as Upland (UPL) per USACE guidance
**Unable to Identify to species, treated as FACW.
Bare ground with moss.

## SOIL

Sampling Point: SP1-U

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Redox Features Type[1] | Redox Features Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-6 | 10YR 4/3 | 100 | none | | | | GRL | Rock refusal at 6” |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

**Restrictive Layer (if present):**

Type: _____
Depth (inches): _____

**Hydric Soil Present?** **Yes** ____ **No** **x**

Remarks: Large gravels and rip-rap that could not be excavated/dug around at 6” depth.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) (**LRR A**)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) (**LRR A**)
___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes ___ No X Depth (inches): _____
Water Table Present? Yes ___ No X Depth (inches): _____
Saturation Present? (includes capillary fringe) Yes ___ No x Depth (inches): _____

**Wetland Hydrology Present?** **Yes** ____ **No** **x**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

## WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: West Linn Public Works Facility | City/County: West Linn/Clackamas | Sampling Date: 11/8/24
Applicant/Owner: City of West Linn | State: OR | Sampling Point: SP1-W
Investigator(s): Dan Thew/Jake Ashford | Section, Township, Range: 35 T02S 01E
Landform (hillslope, terrace, etc.): terrace | Local relief (concave, convex, none): concave | Slope (%): 2
Subregion (LRR): NW Forests and Coast | Lat: 45.349556 | Long: -122.64155 | Datum: NAD83, NAVD83
Soil Map Unit Name: 89D- Witzel very stony silt loam, 3 to 40 percent slopes | NWI classification: n/a
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes X | No ___ | **Is the Sampled Area within a Wetland?** **Yes X No ___** |
| Hydric Soil Present? | Yes X | No ___ | |
| Wetland Hydrology Present? | Yes X | No ___ | |

Remarks: Wetter than usual in the two weeks preceding the site visits. Plot located in concave swale.

### VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 ft) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. None | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | = Total Cover | | |

| Sapling/Shrub Stratum (Plot size: 5 ft) | | | |
|---|---|---|---|
| 1. None | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | = Total Cover | | |

| Herb Stratum (Plot size: 5 ft) | | | |
|---|---|---|---|
| 1. *Typha latifolia* | 50 | Y | OBL |
| 2. *Festuca rubra* | 25 | Y | FAC |
| 3. *Holcus lanatus* | 15 | N | FAC |
| 4. *Juncus effusus* | 10 | N | FACW |
| 5. *Epilobium sp.* | 10 | N | [FACW]* |
| 6. *Agrostis capillarus* | 5 | N | FAC |
| 7. *Lemna minor* | 3 | N | OBL |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 118 = Total Cover | | |

| Woody Vine Stratum (Plot size: 30 ft) | | | |
|---|---|---|---|
| 1. None | | | |
| 2. | | | |
| | = Total Cover | | |

% Bare Ground in Herb Stratum 3

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | | x 1 = | |
| FACW species | | x 2 = | |
| FAC species | | x 3 = | |
| FACU species | | x 4 = | |
| UPL species | | x 5 = | |
| Column Totals: | (A) | | (B) |

Prevalence Index = B/A =

**Hydrophytic Vegetation Indicators:**

___ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** **Yes X No ___**

Remarks:

## SOIL

Sampling Point: SP1-W

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Redox Features Type[1] | Redox Features Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-6 | 2.5Y 3/1 | 94% | 7.5YR 4/6 | 5 | C | M | GRL | Rock refusal at 6” |
| | | | 10YR 4/4 | 1 | C | M | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- x Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** **Yes** x **No** ___

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- x FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

| | | | | | | |
|---|---|---|---|---|---|---|
| Surface Water Present? | Yes | ___ | No | X | Depth (inches): | |
| Water Table Present? | Yes | X | No | ___ | Depth (inches): | 2” |
| Saturation Present? (includes capillary fringe) | Yes | X | No | ___ | Depth (inches): | Surface |

**Wetland Hydrology Present?** **Yes** x **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Within 1 foot of plot <1” barely flowing water observed

## WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: West Linn Public Works Facility | City/County: West Linn/Clackamas | Sampling Date: 11/8/24
Applicant/Owner: City of West Linn | State: OR | Sampling Point: SP2-U
Investigator(s): Dan Thew/Jake Ashford | Section, Township, Range: 35 T02S 01E
Landform (hillslope, terrace, etc.): terrace | Local relief (concave, convex, none): none | Slope (%): 3
Subregion (LRR): NW Forests and Coast | Lat: 45.349735 | Long: -122.641363 | Datum: NAD83, NAVD83
Soil Map Unit Name: 89D- Witzel very stony silt loam, 3 to 40 percent slopes | NWI classification: n/a
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes ___ | No X | **Is the Sampled Area within a Wetland?** **Yes** ___ **No** x |
| Hydric Soil Present? | Yes ___ | No X | |
| Wetland Hydrology Present? | Yes ___ | No x | |

Remarks: Wetter than usual in the two weeks preceding the site visits.

### VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 ft) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. None | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | = Total Cover | | |
| **Sapling/Shrub Stratum (Plot size: 5 ft)** | | | |
| 1. *Rubus armeniacus* | 70 | Y | FAC |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | = Total Cover | | |
| **Herb Stratum (Plot size: 5 ft)** | | | |
| 1. *Geranium lucidum* | 40 | Y | NL* |
| 2. *Tanacetum vulgare* | 35 | Y | FACU |
| 3. *Dipsacus follonum* | 15 | N | FAC |
| 4. *Agrostis capillaris* | 10 | N | FAC |
| 5. *Holcus lanatus* | 10 | N | FAC |
| 6. *Madia sp.* | 5 | N | [FACU]** |
| 7. *Schedonorus arundinaceus* | 5 | n | FAC |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 120 = Total Cover | | |
| **Woody Vine Stratum (Plot size: 30 ft)** | | | |
| 1. | | | |
| 2. | | | |
| | = Total Cover | | |

% Bare Ground in Herb Stratum 5

**Dominance Test worksheet:**
Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 33 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | | x 1 = | |
| FACW species | | x 2 = | |
| FAC species | | x 3 = | |
| FACU species | | x 4 = | |
| UPL species | | x 5 = | |
| Column Totals: | (A) | | (B) |

Prevalence Index = B/A =

**Hydrophytic Vegetation Indicators:**
___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** **Yes** ___ **No** x

Remarks:*NL treated as Upland (UPL) per USACE guidance
**Assumed to be FACU

## SOIL

Sampling Point: SP2-U

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Redox Features Type[1] | Redox Features Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-8 | 10YR 4/3 | 100 | none | | | | GRL | Rock refusal |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

**Restrictive Layer (if present):**

Type: _____
Depth (inches): _____

**Hydric Soil Present?** **Yes** ____ **No** **x**

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) (**LRR A**)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) (**LRR A**)
___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes ___ No X Depth (inches): _____
Water Table Present? Yes ___ No X Depth (inches): _____
Saturation Present? (includes capillary fringe) Yes ___ No x Depth (inches): _____

**Wetland Hydrology Present?** **Yes** ____ **No** **x**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

## WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: West Linn Public Works Facility | City/County: West Linn/Clackamas | Sampling Date: 11/8/24
Applicant/Owner: City of West Linn | State: OR | Sampling Point: SP2-W
Investigator(s): Dan Thew/Jake Ashford | Section, Township, Range: 35 T02S 01E
Landform (hillslope, terrace, etc.): terrace | Local relief (concave, convex, none): none | Slope (%): 2
Subregion (LRR): NW Forests and Coast | Lat: 45.349766 | Long: -122.641425 | Datum: NAD83, NAVD83
Soil Map Unit Name: 89D- Witzel very stony silt loam, 3 to 40 percent slopes | NWI classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes X | No ___ | **Is the Sampled Area within a Wetland?** **Yes X No ___** |
| Hydric Soil Present? | Yes X | No ___ | |
| Wetland Hydrology Present? | Yes X | No ___ | |

Remarks: Wetter than usual in the two weeks preceding the site visits.

### VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 ft) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. None | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0 | = Total Cover | |
| **Sapling/Shrub Stratum (Plot size: 5 ft)** | | | |
| 1. *Rubus armeniacus* | 25 | Y | FAC |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 25 | = Total Cover | |
| **Herb Stratum (Plot size: 5 ft)** | | | |
| 1. *Alopecurus pratensis* | 60 | Y | FAC |
| 2. *Agrostis capillaris* | 20 | N | FAC |
| 3. *Festuca rubra* | 20 | N | FAC |
| 4. *Dipsacus fullonum* | 5 | N | FAC |
| 5. *Holcus lanatus* | 5 | N | FAC |
| 6. *Vicia sp.* | 1 | N | [FAC]* |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 111 | = Total Cover | |
| **Woody Vine Stratum (Plot size: 30 ft)** | | | |
| 1. | | | |
| 2. | | | |
| | | = Total Cover | |

% Bare Ground in Herb Stratum ___

**Dominance Test worksheet:**
Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | | x 1 = | |
| FACW species | | x 2 = | |
| FAC species | | x 3 = | |
| FACU species | | x 4 = | |
| UPL species | | x 5 = | |
| Column Totals: | (A) | | (B) |

Prevalence Index = B/A =

**Hydrophytic Vegetation Indicators:**
___ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** **Yes X No ___**

Remarks: *Assumed FAC

## SOIL

Sampling Point: SP2-W

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Redox Features Type[1] | Redox Features Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-4 | 2.5Y 3/1 | 97 | 7.5YR 4/6 | 3 | C | M | GrLo | Refusal at 4” |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** **Yes** **X** **No** ____

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes ___ No X Depth (inches): _____

Water Table Present? Yes X No ___ Depth (inches): 2

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 1

**Wetland Hydrology Present?** **Yes** **X** **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

## WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: West Linn Public Works Facility | City/County: West Linn/Clackamas | Sampling Date: 11/8/24
Applicant/Owner: City of West Linn | State: OR | Sampling Point: SP3-U
Investigator(s): Dan Thew/Jake Ashford | Section, Township, Range: 35 T02S 01E
Landform (hillslope, terrace, etc.): terrace | Local relief (concave, convex, none): none | Slope (%): 2
Subregion (LRR): NW Forests and Coast | Lat: 45.349775 | Long: -122.641813 | Datum: NAD83, NAVD83
Soil Map Unit Name: 89D- Witzel very stony silt loam, 3 to 40 percent slopes | NWI classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | | |
|---|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes | X | No | |
| Hydric Soil Present? | Yes | | No | X |
| Wetland Hydrology Present? | Yes | X | No | |

**Is the Sampled Area within a Wetland?** **Yes** ___ **No** **X**

Remarks: Located above a slope break. Test pit 3 feet closer to wetland (on boundary). Water at 8".

### VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 ft) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. None | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0 | = Total Cover | |
| **Sapling/Shrub Stratum (Plot size: 5 ft)** | | | |
| 1. *Rubus armeniacus* | 20 | Y | FAC |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 20 | = Total Cover | |
| **Herb Stratum (Plot size: 5 ft)** | | | |
| 1. *Festuca arundinacea* | 65 | Y | FAC |
| 2. *Holcus lanatus* | 20 | Y | FAC |
| 3. *Agrostis capillaris* | 10 | N | FAC |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 95 | = Total Cover | |
| **Woody Vine Stratum (Plot size: 30 ft)** | | | |
| 1. | | | |
| 2. | | | |
| | | = Total Cover | |

% Bare Ground in Herb Stratum 5 (moss)

**Dominance Test worksheet:**
Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | | x 1 = | |
| FACW species | | x 2 = | |
| FAC species | | x 3 = | |
| FACU species | | x 4 = | |
| UPL species | | x 5 = | |
| Column Totals: | (A) | | (B) |

Prevalence Index = B/A =

**Hydrophytic Vegetation Indicators:**
___ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** **Yes** **X** **No** ___

Remarks:

## SOIL

Sampling Point: SP3-U

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Redox Features Type[1] | Redox Features Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-16 | 10Y 3/3 | 100 | | | | | GRL | 2% by volume 10YR 5/6 fill material |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** **Yes** ___ **No** **X**

Remarks: Some large (4" diameter) rocks

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

| | | | | | | |
|---|---|---|---|---|---|---|
| Surface Water Present? | Yes | | No | X | Depth (inches): | |
| Water Table Present? | Yes | X | No | | Depth (inches): | 13 |
| Saturation Present? (includes capillary fringe) | Yes | X | No | | Depth (inches): | 12 |

**Wetland Hydrology Present?** **Yes** **X** **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Pit open for ~30 minutes

## WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: West Linn Public Works Facility | City/County: West Linn/Clackamas | Sampling Date: 11/8/24
Applicant/Owner: City of West Linn | State: OR | Sampling Point: SP3-W
Investigator(s): Dan Thew/Jake Ashford | Section, Township, Range: 35 T02S 01E
Landform (hillslope, terrace, etc.): terrace/low shelf | Local relief (concave, convex, none): none | Slope (%): 2
Subregion (LRR): NW Forests and Coast | Lat: 45.349768 | Long: -122.641752 | Datum: NAD83, NAVD83
Soil Map Unit Name: 89D- Witzel very stony silt loam, 3 to 40 percent slopes | NWI classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes X | No ___ | **Is the Sampled Area within a Wetland?** **Yes X No ___** |
| Hydric Soil Present? | Yes X | No ___ | |
| Wetland Hydrology Present? | Yes X | No ___ | |

Remarks: Low shelf/terrace.

### VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 ft) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. None | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0 | = Total Cover | |
| **Sapling/Shrub Stratum (Plot size: 5 ft)** | | | |
| 1. *Rubus armeniacus* | 45 | Y | FAC |
| 2. *Fraxinus latifolia* | 10 | N | FACW |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 55 | = Total Cover | |
| **Herb Stratum (Plot size: 5 ft)** | | | |
| 1. *Typha latifolia* | 45 | Y | OBL |
| 2. *Holcus lanatus* | 40 | Y | FAC |
| 3. *Agrostis capillaris* | 5 | N | FAC |
| 4. *Juncus effusus* | 5 | N | FACW |
| 5. *Festuca rubra* | 5 | N | FAC |
| 6. *Vicia sp.* | 2 | N | [FAC]* |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 102 | = Total Cover | |
| **Woody Vine Stratum (Plot size: 30 ft)** | | | |
| 1. None | | | |
| 2. | | | |
| | 0 | = Total Cover | |

% Bare Ground in Herb Stratum 0

**Dominance Test worksheet:**
Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | | x 1 = | |
| FACW species | | x 2 = | |
| FAC species | | x 3 = | |
| FACU species | | x 4 = | |
| UPL species | | x 5 = | |
| Column Totals: | (A) | | (B) |

Prevalence Index = B/A =

**Hydrophytic Vegetation Indicators:**
___ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** **Yes X No ___**

Remarks: *Assumed FAC

## SOIL

Sampling Point: SP3-W

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Redox Features Type[1] | Redox Features Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-6 | 10YR 3/2 | 95 | 7.5YR 4/6 | 5 | C | M | GRL | Refusal at 6" |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** **Yes** X **No** ____

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

| | | | | | | |
|---|---|---|---|---|---|---|
| Surface Water Present? | Yes | ___ | No | X | Depth (inches): | ___ |
| Water Table Present? | Yes | X | No | ___ | Depth (inches): | 4 |
| Saturation Present? (includes capillary fringe) | Yes | X | No | ___ | Depth (inches): | 2 |

**Wetland Hydrology Present?** **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

## WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: West Linn Public Works Facility | City/County: West Linn/Clackamas | Sampling Date: 11/18/24
Applicant/Owner: City of West Linn | State: OR | Sampling Point: SP4-U
Investigator(s): Dan Thew/Jake Ashford | Section, Township, Range: 36 T02S 01E
Landform (hillslope, terrace, etc.): see remarks* | Local relief (concave, convex, none): convex | Slope (%): 1
Subregion (LRR): NW Forests and Coast | Lat: 45.350003 | Long: -122.641094 | Datum: NAD83, NAVD83
Soil Map Unit Name: 89D- Witzel very stony silt loam, 3 to 40 percent slopes | NWI classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ___ No X (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | | |
|---|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes ___ | No X | **Is the Sampled Area within a Wetland?** | **Yes ___ No X** |
| Hydric Soil Present? | Yes ___ | No X | | |
| Wetland Hydrology Present? | Yes ___ | No X | | |

Remarks: *Berm at base of cut slope

### VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 ft) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. *Pseudotsuga menziesii* | 25 | Y | FACU |
| 2. *Acer macrophyllum* | 10 | Y | FACU |
| 3. | | | |
| 4. | | | |
| | 35 | = Total Cover | |

| Sapling/Shrub Stratum (Plot size: 5 ft) | | | |
|---|---|---|---|
| 1. *Rubus armeniacus* | 80 | Y | FAC |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 80 | = Total Cover | |

| Herb Stratum (Plot size: 5 ft) | | | |
|---|---|---|---|
| 1. *Jacobaea vulgaris* | 5 | Y | FACU |
| 2. *Geranium robertianum* | 5 | Y | FACU |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 10 | = Total Cover | |

| Woody Vine Stratum (Plot size: 30 ft) | | | |
|---|---|---|---|
| 1. None | | | |
| 2. | | | |
| | 0 | = Total Cover | |

% Bare Ground in Herb Stratum 90

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 5 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 20 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | | x 1 = | |
| FACW species | | x 2 = | |
| FAC species | | x 3 = | |
| FACU species | | x 4 = | |
| UPL species | | x 5 = | |
| Column Totals: | (A) | | (B) |

Prevalence Index = B/A =

**Hydrophytic Vegetation Indicators:**

___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** **Yes ___ No X**

Remarks: Ash rooted in upland near spring/seep just above wetland boundary, on elevated step.

## SOIL

Sampling Point: SP4-U

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth | Matrix | | Redox Features | | | | | |
|---|---|---|---|---|---|---|---|---|
| (inches) | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
| 0-6 | 10YR 4/3 | 100 | | | | | GRL | Gravel refusal |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

**Restrictive Layer (if present):**

Type: _____
Depth (inches): _____

**Hydric Soil Present?** **Yes** ___ **No** **X**

Remarks: Large boulders (2+ feet diameter) along base of slope just behind (north of plot).

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) (**LRR A**)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) (**LRR A**)
___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes ___ No X Depth (inches): _____
Water Table Present? Yes ___ No X Depth (inches): _____
Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): _____

**Wetland Hydrology Present?** **Yes** ___ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Pit open for 30 minutes.

## WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: West Linn Public Works Facility | City/County: West Linn/Clackamas | Sampling Date: 11/18/24
Applicant/Owner: City of West Linn | State: OR | Sampling Point: SP4-W
Investigator(s): Dan Thew/Jake Ashford | Section, Township, Range: 36 T02S 01E
Landform (hillslope, terrace, etc.): terrace* | Local relief (concave, convex, none): none | Slope (%): 3
Subregion (LRR): NW Forests and Coast | Lat: 45.349861 | Long: -122.641121 | Datum: NAD83, NAVD83
Soil Map Unit Name: 89D- Witzel very stony silt loam, 3 to 40 percent slopes | NWI classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | | |
|---|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes | X | No | |
| Hydric Soil Present? | Yes | X | No | **Is the Sampled Area within a Wetland?** **Yes X No** |
| Wetland Hydrology Present? | Yes | X | No | |

Remarks: *Base of berm on a terrace. Wetter than normal conditions in two-week period before field visit.

### VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 ft) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. None | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0 | = Total Cover | |
| **Sapling/Shrub Stratum (Plot size: 5 ft)** | | | |
| 1. *Rubus armeniacus* | 85 | Y | FAC |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 85 | = Total Cover | |
| **Herb Stratum (Plot size: 5 ft)** | | | |
| 1. *Holcus lanatus* | 30 | Y | FAC |
| 2. *Juncus effusus* | 25 | Y | FACW |
| 3. *Dipsacus follonum* | 2 | N | FAC |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 57 | = Total Cover | |
| **Woody Vine Stratum (Plot size: 30 ft)** | | | |
| 1. None | | | |
| 2. | | | |
| | 0 | = Total Cover | |

% Bare Ground in Herb Stratum 43

**Dominance Test worksheet:**
Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | | x 1 = | |
| FACW species | | x 2 = | |
| FAC species | | x 3 = | |
| FACU species | | x 4 = | |
| UPL species | | x 5 = | |
| Column Totals: | (A) | | (B) |

Prevalence Index = B/A =

**Hydrophytic Vegetation Indicators:**
___ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** **Yes X No**

Remarks:

## SOIL

Sampling Point: SP4-W

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Redox Features Type[1] | Redox Features Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-6 | 10YR 3/2 | 95 | 10YR 4/6 | 5 | C | M/PL | GRL | |
| 6-12 | 2.5Y 3/1 | 90 | 10YR 4/6 | 10 | C | M | GRL | Gravel refusal |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** **Yes** **X** **No** ____

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes ____ No X Depth (inches): ____

Water Table Present? Yes X No ____ Depth (inches): 9

Saturation Present? (includes capillary fringe) Yes X No ____ Depth (inches): 4

**Wetland Hydrology Present?** **Yes** **X** **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Surface water present within 5 feet (<1")
Heavy rain within the last few days including this AM (11/18/24).

## WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: West Linn Public Works Facility | City/County: West Linn/Clackamas | Sampling Date: 11/18/24
Applicant/Owner: City of West Linn | State: OR | Sampling Point: SP5-U
Investigator(s): Dan Thew/Jake Ashford | Section, Township, Range: 36 T02S 01E
Landform (hillslope, terrace, etc.): terrace | Local relief (concave, convex, none): none | Slope (%): 1
Subregion (LRR): NW Forests and Coast | Lat: 45.349548 | Long: -122.640917 | Datum: NAD83, NAVD83
Soil Map Unit Name: 89D- Witzel very stony silt loam, 3 to 40 percent slopes | NWI classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes ___ | No x | **Is the Sampled Area within a Wetland?** **Yes** ___ **No** ___ |
| Hydric Soil Present? | Yes ___ | No X | |
| Wetland Hydrology Present? | Yes ___ | No X | |

Remarks: Conditions are wetter than typical.

### VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 ft) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. *Pseudotsuga menziesii* | 25 | Y | FACU |
| 2. *Populus trichocarpa* | 20 | Y | FAC |
| 3. | | | |
| 4. | | | |
| | 45 | = Total Cover | |

| Sapling/Shrub Stratum (Plot size: 5 ft) | | | |
|---|---|---|---|
| 1. *Rubus armeniacus* | 35 | Y | FAC |
| 2. *Populus trichocarpa* | 30 | Y | FAC |
| 3. *Cytisus scoparius* | 15 | N | [NL]* |
| 4. | | | |
| 5. | | | |
| | 80 | = Total Cover | |

| Herb Stratum (Plot size: 5 ft) | | | |
|---|---|---|---|
| 1. *Arrhenatherum elatius* | 40 | Y | UPL |
| 2. *Hypericum perforatum* | 20 | Y | FACU |
| 3. *Daucus carota* | 15 | N | FACU |
| 4. *Vicia sp.* | 10 | N | [FAC]* |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 85 | = Total Cover | |

| Woody Vine Stratum (Plot size: 30 ft) | | | |
|---|---|---|---|
| 1. None | | | |
| 2. | | | |
| | 0 | = Total Cover | |

% Bare Ground in Herb Stratum 15

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 6 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | | x 1 = | |
| FACW species | | x 2 = | |
| FAC species | | x 3 = | |
| FACU species | | x 4 = | |
| UPL species | | x 5 = | |
| Column Totals: | (A) | | (B) |

Prevalence Index = B/A =

**Hydrophytic Vegetation Indicators:**

___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** **Yes** ___ **No** x

Remarks: *Not listed, treated as upland
**Assumed FAC

## SOIL

Sampling Point: SP5-U

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth | Matrix | | Redox Features | | | | | |
|---|---|---|---|---|---|---|---|---|
| (inches) | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
| 0-6 | 10YR 4/3 | 100 | | | | | GRL | Gravel refusal |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** **Yes** ____ **No** **X**

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) (**LRR A**)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) (**LRR A**)
___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes ___ No X Depth (inches): _____

Water Table Present? Yes ___ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): _____

**Wetland Hydrology Present?** **Yes** ____ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

## WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: West Linn Public Works Facility | City/County: West Linn/Clackamas | Sampling Date: 11/18/24
Applicant/Owner: City of West Linn | State: OR | Sampling Point: SP5-W
Investigator(s): Dan Thew/Jake Ashford | Section, Township, Range: 36 T02S 01E
Landform (hillslope, terrace, etc.): swale | Local relief (concave, convex, none): concave | Slope (%): 1
Subregion (LRR): NW Forests and Coast | Lat: 45.349532 | Long: -122.640961 | Datum: NAD83, NAVD83
Soil Map Unit Name: 89D- Witzel very stony silt loam, 3 to 40 percent slopes | NWI classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | Yes X No ___ | **Is the Sampled Area within a Wetland?** **Yes X No ___** |
| Hydric Soil Present? | Yes X No ___ | |
| Wetland Hydrology Present? | Yes X No ___ | |

Remarks:

### VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 ft) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. *Populus trichocarpa* | 5 | Y | FAC |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 5 = Total Cover | | |
| **Sapling/Shrub Stratum (Plot size: 5 ft)** | | | |
| 1. *Rubus armeniacus* | 25 | Y | FAC |
| 2. *Populus trichocarpa* | 20 | Y | FAC |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 45 = Total Cover | | |
| **Herb Stratum (Plot size: 5 ft)** | | | |
| 1. *Typha latifolia* | 65 | Y | OBL |
| 2. *Juncus effusus* | 5 | N | FACW |
| 3. *Holcus lanatus* | 2 | N | FAC |
| 4. *Epilobium sp.* | 2 | N | [FAC]* |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 74 = Total Cover | | |
| **Woody Vine Stratum (Plot size: 30 ft)** | | | |
| 1. None | | | |
| 2. | | | |
| | 0 = Total Cover | | |

% Bare Ground in Herb Stratum 26

**Dominance Test worksheet:**
Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | | x 1 = | |
| FACW species | | x 2 = | |
| FAC species | | x 3 = | |
| FACU species | | x 4 = | |
| UPL species | | x 5 = | |
| Column Totals: | (A) | | (B) |

Prevalence Index = B/A =

**Hydrophytic Vegetation Indicators:**
___ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** **Yes X No ___**

Remarks: *Unable to identify to species, treated as FAC

## SOIL

Sampling Point: SP5-W

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Redox Features Type[1] | Redox Features Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-6 | 10Y 2.5/1 | 95 | 5YR 3/4 | 5 | C | M/PL | GRL | Refusal, gley |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- X Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** **Yes** **X** **No** _____

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- X Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

| | | | | | | |
|---|---|---|---|---|---|---|
| Surface Water Present? | Yes | | No | X | Depth (inches): | |
| Water Table Present? | Yes | X | No | | Depth (inches): | 2 |
| Saturation Present? (includes capillary fringe) | Yes | X | No | | Depth (inches): | surface |

**Wetland Hydrology Present?** **Yes** **X** **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Flowing water just outside of pit.

## WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: West Linn Public Works Facility | City/County: West Linn/Clackamas | Sampling Date: 11/18/24
Applicant/Owner: City of West Linn | State: OR | Sampling Point: SP6-U
Investigator(s): Dan Thew/Jake Ashford | Section, Township, Range: 36 T02S 01E
Landform (hillslope, terrace, etc.): terrace | Local relief (concave, convex, none): Slightly concave | Slope (%): 1
Subregion (LRR): NW Forests and Coast | Lat: 45.349419 | Long: -122.640769 | Datum: NAD83, NAVD83
Soil Map Unit Name: 89D- Witzel very stony silt loam, 3 to 40 percent slopes | NWI classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | | |
|---|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes ___ | No X | **Is the Sampled Area within a Wetland?** | **Yes ___ No X** |
| Hydric Soil Present? | Yes ___ | No X | | |
| Wetland Hydrology Present? | Yes ___ | No X | | |

Remarks: Plot taken in low spot with FAC grasses dominate

### VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 ft) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. None | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0 | = Total Cover | |
| **Sapling/Shrub Stratum (Plot size: 5 ft)** | | | |
| 1. *Cytisus scoparius* | 5 | Y | NL* |
| 2. *Populus trichocarpa* | 2 | N | FAC |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 7 | = Total Cover | |
| **Herb Stratum (Plot size: 5 ft)** | | | |
| 1. *Holcus lanatus* | 70 | Y | FAC |
| 2. *Schedonorus arundinaceus* | 20 | N | FAC |
| 3. *Agrostis capillaris* | 20 | N | FAC |
| 4. *Daucus carota* | 10 | N | FACU |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 120 | = Total Cover | |
| **Woody Vine Stratum (Plot size: 30 ft)** | | | |
| 1. None | | | |
| 2. | | | |
| | 0 | = Total Cover | |

% Bare Ground in Herb Stratum 0

**Dominance Test worksheet:**
Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | | x 1 = | |
| FACW species | | x 2 = | |
| FAC species | | x 3 = | |
| FACU species | | x 4 = | |
| UPL species | | x 5 = | |
| Column Totals: | (A) | | (B) |

Prevalence Index = B/A =

**Hydrophytic Vegetation Indicators:**
___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** **Yes ___ No X**

Remarks: *Not listed treated as upland.

## SOIL

Sampling Point: SP6-U

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth | Matrix | | Redox Features | | | | | |
|---|---|---|---|---|---|---|---|---|
| (inches) | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
| 0-4 | 10YR 3/2 | 100 | | | | | GRL | |
| 4-10 | 10YR 3/2 | 70 | 7.5YR 3/4 | 2 | C | M | GRL | Refusal at 10” |
| | 10YR 4/3 | 28 | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** **Yes** ____ **No** **X**

Remarks: Colors jumbled/splotchy in second layer. Obvious fill.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) (**LRR A**)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) (**LRR A**)
___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes ___ No X Depth (inches): _____

Water Table Present? Yes ___ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): _____

**Wetland Hydrology Present?** **Yes** ____ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

## WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: West Linn Public Works Facility | City/County: West Linn/Clackamas | Sampling Date: 12/0424
Applicant/Owner: City of West Linn | State: OR | Sampling Point: SP7-U
Investigator(s): Dan Thew/Ivy Watson | Section, Township, Range: 35 T02S 01E
Landform (hillslope, terrace, etc.): terrace | Local relief (concave, convex, none): none | Slope (%): 1%
Subregion (LRR): NW Forests and Coast | Lat: 45.349955 | Long: -122.642363 | Datum: NAD83, NAVD83
Soil Map Unit Name: 89D- Witzel very stony silt loam, 3 to 40 percent slopes | NWI classification: n/a
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation X , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ___ No X
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | | |
|---|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes ___ | No X | **Is the Sampled Area within a Wetland?** | **Yes ___ No X** |
| Hydric Soil Present? | Yes ___ | No X | | |
| Wetland Hydrology Present? | Yes ___ | No X | | |

Remarks: Wetter than usual in the two weeks preceding the site visits. Vegetation cleared from area in 2021, large volume of wood chips added to this portion of the SA.
Plot in wood chip area @ toe of slope

### VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 ft) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. None | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | = Total Cover | | |
| **Sapling/Shrub Stratum (Plot size: 5 ft)** | | | |
| 1. *Cytisus scoparius* | 45 | Y | NL* |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 45 = Total Cover | | |
| **Herb Stratum (Plot size: 5 ft)** | | | |
| 1. *Arrhenatherum elatius* | 30 | Y | UPL |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 30 = Total Cover | | |
| **Woody Vine Stratum (Plot size: 30 ft)** | | | |
| 1. none | | | |
| 2. | | | |
| | = Total Cover | | |

% Bare Ground in Herb Stratum 70%

**Dominance Test worksheet:**

| | | |
|---|---|---|
| Number of Dominant Species That Are OBL, FACW, or FAC: | 0 | (A) |
| Total Number of Dominant Species Across All Strata: | 2 | (B) |
| Percent of Dominant Species That Are OBL, FACW, or FAC: | 0 | (A/B) |

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | | x 1 = | |
| FACW species | | x 2 = | |
| FAC species | | x 3 = | |
| FACU species | | x 4 = | |
| UPL species | | x 5 = | |
| Column Totals: | (A) | | (B) |

Prevalence Index = B/A =

**Hydrophytic Vegetation Indicators:**

___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present? Yes ___ No X**

Remarks: All vegetation on slope above plot. All areas determined to be upland, therefore, vegetation on terrace and slope included within plot.
*Not listed, treated as UPL

## SOIL

Sampling Point: SP7-U

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth | Matrix | | Redox Features | | | | | |
|---|---|---|---|---|---|---|---|---|
| (inches) | Color (moist) | % | Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
| 0-2 | 10YR 2/2 | 100 | None | | | | SiL | High OM content feels greasy |
| 2-7 | 10YR 4/3 | 60 | none | | | | GRL | 2-5" rock fragments (Basalt) present |
| | 7.5YR 5/6 | 40 | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

**Restrictive Layer (if present):**

Type: Large rock, compacted
Depth (inches): 7"

**Hydric Soil Present?** **Yes** ___ **No** **X**

Remarks: Below 7" compacted Basalt rock >9" across prevented digging further. 8" decomposed woodchips on top of pit.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) (**LRR A**)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
X Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) (**LRR A**)
___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes ___ No X Depth (inches): ___
Water Table Present? Yes ___ No X Depth (inches): ___
Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

**Wetland Hydrology Present?** **Yes** ___ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Located at toe of slope where wetland conditions (hydrology) most likely to occur, if present.

## WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: West Linn Public Works Facility | City/County: West Linn/Clackamas | Sampling Date: 12/04/24
Applicant/Owner: City of West Linn | State: OR | Sampling Point: SP8-U
Investigator(s): Dan Thew/Ivy Watson | Section, Township, Range: 35 T02S 01E
Landform (hillslope, terrace, etc.): terrace | Local relief (concave, convex, none): none | Slope (%): 1%
Subregion (LRR): NW Forests and Coast | Lat: 45.349754 | Long: -122.642912 | Datum: NAD83, NAVD83
Soil Map Unit Name: 89D- Witzel very stony silt loam, 3 to 40 percent slopes | NWI classification: n/a
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation X , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | | |
|---|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes ___ | No X | **Is the Sampled Area within a Wetland?** | **Yes ___ No X** |
| Hydric Soil Present? | Yes X | No ___ | | |
| Wetland Hydrology Present? | Yes X | No ___ | | |

Remarks: Wetter than usual in the two weeks preceding the site visits. No vegetation since 2021. Wood chips hold water/heat. Lots of mushroom fruiting bodies and mycelium within woodchips. Woodchips are creating hydrology and accelerated microbial process.

### VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 ft) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. None | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | = Total Cover | | |

| Sapling/Shrub Stratum (Plot size: 5 ft) | | | |
|---|---|---|---|
| 1. None | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | = Total Cover | | |

| Herb Stratum (Plot size: 5 ft) | | | |
|---|---|---|---|
| 1. None | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | = Total Cover | | |

| Woody Vine Stratum (Plot size: 30 ft) | | | |
|---|---|---|---|
| 1. None | | | |
| 2. | | | |
| | = Total Cover | | |

% Bare Ground in Herb Stratum 100%

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: ___ (A)
Total Number of Dominant Species Across All Strata: ___ (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: ___ (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | | x 1 = | |
| FACW species | | x 2 = | |
| FAC species | | x 3 = | |
| FACU species | | x 4 = | |
| UPL species | | x 5 = | |
| Column Totals: | (A) | | (B) |

Prevalence Index = B/A =

**Hydrophytic Vegetation Indicators:**

___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** **Yes ___ No X**

Remarks: All woodchips

## SOIL

Sampling Point: SP8-U

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Redox Features Type[1] | Redox Features Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-2 | 10YR 2/2 | 100 | | | | | SiL | High OM content, decomposing wood |
| 2-7 | 10YR 3/2 | 80 | 7.5YR 3/4 | 2 | C | M | GRL | Signs of fill/mixing 2-5" rock fragments (basalt) |
| | 10YR 3/3 | 15 | 7.5YR 4/6 | 3 | C | M | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** **Yes** X **No** ___

Remarks: Soils and groundwater very warm. 12" of woodchips above soil.
Large chunk of N 3/ in lower horizon of soil profile that appears to be from fill mixing.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

| | | | | | | |
|---|---|---|---|---|---|---|
| Surface Water Present? | Yes | ___ | No | X | Depth (inches): | ___ |
| Water Table Present? | Yes | X | No | ___ | Depth (inches): | 6" |
| Saturation Present? (includes capillary fringe) | Yes | X | No | ___ | Depth (inches): | 6" |

**Wetland Hydrology Present?** **Yes** X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Water is warm to touch. Woodchips very wet, but not currently saturated.

# Appendix D: Previous Wetland Delineation Report

*This page is intentionally left blank*

# Wetlands/Waters Delineation Report for
# Highway Solar Project

**July 15, 2009**

**Prepared by**
Vigil-Agrimis, Inc.
819 SE Morrison Street Suite 310
Portland, OR 97214

# Table of Contents

**A Landscape Setting and Land Use ..... 1**
A.1 Landscape Setting ..... 1
A.2 Previous Land Use ..... 1
A.3 Current Land Use ..... 2
**B Site Alterations ..... 2**
**C Precipitation Data and Analysis ..... 2**
**D Methods ..... 3**
D.1 Soils ..... 4
D.2 Hydrology ..... 5
D.3 Vegetation ..... 5
**E Description of All Wetlands and Other Non-Wetland Waters ..... 6**
E.1 Wetlands ..... 6
E.1.1 Wetland A – PEM/Slope ..... 6
E.1.2 Wetland B – PEM/RFT ..... 7
E.1.3 Wetland C – PEM/DO ..... 8
E.1.4 Wetland D – PEM/DO ..... 8
E.1.5 Wetland E – PFO/RFT ..... 9
E.1.6 Wetland F – PEM/DO ..... 10
E.2 Non-Wetland Waters ..... 10
E.2.1 Willamette River ..... 10
E.2.2 Tanner Creek ..... 11
E.2.3 Bernert Creek ..... 11
E.2.4 Intermittent Stream to the East ..... 11
E.2.5 Intermittent Stream to the West ..... 11
**F Deviation from NWI and other sources ..... 12**
**G Mapping Method ..... 12**
**H Additional Information ..... 12**
**I Results and Conclusions ..... 12**
I.1 Wetlands ..... 12
I.2 Waters of the State/U.S. ..... 13
I.3 Conclusions ..... 13
**J Disclaimer ..... 13**
**Appendices ..... 14**

**List of Tables**

Table 1. Summary of Precipitation Three Months Prior to the Delineations: Portland, Oregon ... 3
Table 2. Soils Mapped by NRCS within the Study Area ..... 5
Table 3. Jurisdictional Wetlands within the Highway Solar Project Study Area ..... 13

# A Landscape Setting and Land Use

## A.1 Landscape Setting

Vigil-Agrimis, Inc. was contracted by Oregon Department of Transportation (ODOT) to delineate wetlands within a specified area of potential impact at the Highway Solar Project site at milepost 6.9 on Interstate 205 in West Linn, Clackamas County, Oregon. Figure 1 shows the project vicinity. All figures are located in Appendix A. A series of terraces were excavated during the construction of Interstate 205 in 1969. The project area is located on two of these terraces above Intestate 205. The Willamette River lies approximately 250 feet below the project site. Tanner Creek, a perennial stream flows southward, approximately 0.25 miles east of the project study area, and a small unnamed drainage lies to the west of the study area. The project site is approximately one mile northeast of the Tualatin River's confluence with the Willamette River. Upslope of the project site terraces, the land is occupied by residential and commercial development of West Linn as seen in Figure 2 Aerial Photo. The lower terrace of the project site is currently partially occupied by an ODOT storage yard.

An area in the southwestern portion of the project site has been identified to contain one or more wetlands. Investigation revealed this to be one spring fed, emergent wetland dominated by watercress (*Rorippa nasturtium aquaticum*), cattail (*Typha latifolia*) and common velvet grass (*Holcus lanatus*), and includes a disturbed area overgrown by Armenian blackberry (*Rubus armeniacus*). This area lies at the base of a cut-slope, and just west of the ODOT storage yard as seen in Figures 6a Wetland Delineation Overview Map and 6b Wetland Delineation Enlargement Map 1. Five additional roadside wetlands were identified along the north side of I-205. These wetlands are shown in Figure 6a and Figure 6c Wetland Delineation Enlargement Map 2.

The field work at the Solar Highway site was performed by Paul Agrimis and Hunter White on May 27, 2009 and June 19, 2009. The field team surveyed the entire delineation study area, focusing the field effort on the previously identified wetland located in the southwestern portion of the study area and the roadside ditch containing wetlands. A total of 12 plots were conducted to delineate the boundary of the wetland, Wetland A. An additional 10 plots were conducted on June 19 to delineate the boundaries of Wetlands B-F.

The study area for this project extends approximately 2,700 feet, east to west, along the north side of Interstate 205, and extends approximately 600 feet from north to south, starting at the edge of the interstate. The eastern portion of the study area is restricted to an 800 ft x 100 ft strip along the interstate to capture the roadside ditch wetlands.

## A.2 Previous Land Use

West Linn is across the river from Oregon City, the final destination for many early settlers making their way on the Oregon Trail. West Linn politically rivaled Oregon City, until a series of setbacks in the late 1850s-1860s ended the pioneer settlement. It was redeveloped decades later and eventually merged with the nearby communities including Willamette and Sunset City. The Canby 7.5 minute USGS Topographical Quad (1954) shows significant residential development in the areas around the project site, but the immediate project study area was an apparently undeveloped, concave hill sloping down towards a wastewater treatment plant on the Willamette River. As previously mentioned the hill slope was cut into terraces during the construction of Interstate 205 in 1969.

Historic precipitation information was available from the WETS Station at Portland International Airport that is located 17 miles north of the study area (Appendix B). Based on this station record (1971-2000) the growing season is nearly year around.

The general weather pattern that most observers would use to characterize the growing season in the study area for the May 27 and June 19 delineation would be moderately wet and warming; No data was available at the Highway Solar Project location but year-to-date precipitation at Portland International Airport (NWS 2009) prior to the delineation site visit was within the normal range. Overall rainfall for the three months prior to the May 27 delineation was just 0.48 inches above average as shown in Table 1. Since the May site visit followed the normal wet season and because the months preceding the site visit were within the range of normal precipitation, the observed hydrology is likely an accurate primary hydrology indicator. Furthermore, because the primary source of hydrology for Wetland A is groundwater discharge, the hydrology would likely be an accurate hydrology indicator for most of the year. Overall rainfall for the three months prior to the June 19 delineation fieldwork was 0.02 inches below normal. Including rainfall later in the day, overall rainfall was slightly above normal. Table 1 summarizes the precipitation at the time of the delineation.

**Table 1. Summary of Precipitation Three Months Prior to the Delineations: Portland, Oregon**

| Category | Recorded Precipitation Prior to Delineation | WETS Station Data Average Precipitation |
|---|---|---|
| March | 3.45 inches | 3.71 inches |
| April | 2.55 inches | 2.64 inches |
| May | 3.21 inches | 2.38 inches |
| **Total prior May 27 fieldwork** | **9.21 inches** | **8.73 inches** |
| | | |
| April | 2.55 inches | 2.64 inches |
| May | 3.34 inches | 2.38 inches |
| June | 0.70 inches | 1.59 inches |
| **Total prior to June 19 fieldwork** | **6.59 inches** | **6.61 inches** |

(NWS 2009) and WETS Station Data (Appendix B)

# D Methods

Wetlands areas were delineated using the "triple parameter" method described in the *US Army Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987), and the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* (Engineer Research and Development Center, 2008) . Wetlands are required to have a prevalence of wetland hydrology, hydric soils, and hydrophytic vegetation. Jurisdictional wetlands are determined when positive indicators of all of these three criteria are present. The wetland boundaries and classifications described herein represent best professional opinion based on the site conditions observed. Final boundaries may vary after review and acceptance by the Oregon Department of State Lands (DSL) and the U.S. Army Corps of Engineers (Corps).

The typical wetland delineation methodology was employed. Due to the very shallow soils, soil test pits were typically only 6-8 inches deep, rather than the typical 16-inch minimum depth. Specifics of the delineation included:

- Site visit dates: May 27, 2009 and June 19, 2009.
- Twelve sample plots (six pairs of plots) were taken to describe Wetland A. An additional 10 sample plots were taken to describe the roadside wetlands B-F (one pair per wetland). These were primarily paired plots on wetland boundaries. Paired plots were typically 4 to 10 feet apart. There were several different vegetation boundary conditions in Wetland A, necessitating additional pairs of plots. Paired plots were located in areas of representative wetland and upland. Wetlands B-F were relatively small and simple wetlands requiring only one pair of plots per wetland.
- On the eastern edge of Wetland A, there was evidence of disturbance, including remnant tire ruts and a prevalence of invasive vegetation including Armenian blackberry. On this heavily disturbed wetland edge, the wetland vegetation has been completely suppressed by the blackberry. In this location (Paired Plots 11 & 12), soils and hydrology were primarily used to delineate the boundary. Surprisingly, wetland Plot 12 contained 100 percent Armenian blackberry.

The process for locating wetland boundaries was based on identifying where slope break and saturated conditions occurred together with the presence of hydrophytic plants and hydric soils. The northern edge of Wetland A is closely correlated with the toe of the terrace cut slope. This toe of slope is where groundwater discharges in one or more locations. With the exception of the eastern blackberry edge of the wetland, the difference between wetland and upland vegetation species was often distinct, providing a good vegetative indicator of the boundary location. Once rough boundaries of wetlands were identified based on vegetation, pits were dug to refine the boundaries and to develop descriptive plots. Wetlands B through F were located within distinct drainage paths.

## D.1 Soils

Soils at each representative wetland sample point were typically inspected to a depth of 6-8 inches, rather than the minimum depth of 16 inches, to determine the presence or absence of hydric soils (wetland conditions). In all 22 soil test pits, rock refusal was met before digging the minimum 16 inches. At each sample location, the soil matrix color, soil texture, and presence of redoximorphic features or gleying were recorded. Soil hue, value, and chroma were determined using Munsell Soil Color Charts (Munsell Color Services 2000).

Soils in the study area are illustrated in Figure 4, Soils Map. The four soils present in the study area are 48C-Kinton silt loams, 8 to 15 percent slopes, 48D-Kinton silt loam, 15 to 30 percent slopes, 64C-Nekia silty clay loam, 8 to 15 percent slopes, and 89D-Witzel very stony silt loam, 3 to 40 percent slopes. These soils are listed and described in Table 2.

| Table 2. Soils Mapped by NRCS within the Study Area | | |
|---|---|---|
| **Soil Phase (Map Unit)** | **Hydric / Hydric Inclusions*** | **Location of Mapped Occurrence** |
| Kinton silt loam, 8 to 15 percent slopes (48C) | No/Yes, Delena depressions, 2B3 | Kinton silt loam, 8 to 15 percent slopes is the primary soil unit on the eastern end of the study area, also occurring in the north central portion of the site. No wetlands were identified within soil map unit 48C. |
| Kinton silt loam, 15 to 30 percent slopes (48D) | No/Yes, Delena depressions, 2B3 | Kinton silt loam, 15 to 30 percent slopes occurs in the study area as a large band in the upper terrace. No wetlands were identified within soil map unit 48D. |
| Nekia silty clay loam, 8 to 15 percent slopes (64C) | No/No | Nekia silty clay loam,8 to 15 percent slopes occurs only in a small area in the northwest corner of the study area. No wetlands were identified in soil map unit 64C. |
| Witzel very stony silt loam, 3 to 40 percent slopes (89D) | No/No | Witzel very stony silt loam, 3 to 40 percent slopes is the most prevalent soil unit in the southwestern quadrant of the study area. Soil map unit 89D includes the only wetland within the study area. |

*As determined by the US Department of Agriculture, Natural Resource Conservation Service (http://www.or.nrcs.usda.gov/pnw_soil/or_data.html accessed August 13, 2008)

Soils in the study area have been significantly altered from the state described in the Soil Survey. During the 1969 Interstate construction, large terraces were excavated and the majority of the topsoil was removed from the study area. While soil conditions mapped in the Soil Survey are no longer accurate, soils in study area were very stony silt loam as described in the Witzel soil unit 89D.

## D.2 Hydrology

The presence of wetland hydrology was determined by the presence of inundation, saturation, high water table, and algal mats/crust. Secondary indicators such as drainage patterns (B10) and shallow aquitard (D3) were observed but were not used to make hydrologic calls. The fieldwork was conducted on May 27 and June 19, and hydrologic conditions were within the range of normal precipitation. Wetland A is a spring-fed wetland. Groundwater discharges in one or more location on the north wide of Wetland A as shown in Figure 6B – Wetland Delineation Enlargement Map. Because Wetland A's primary source of hydrology is a spring, hydrology may be consistent throughout the year. Wetlands B through F were located in the roadside ditch or in the drainage on the west end of the study area. Wetland hydrology was observed in all delineated wetlands.

## D.3 Vegetation

At each sample point, the percent cover for each dominant species in the plot area was visually estimated and recorded. Each sample point has a 1.5-m (5-ft) radius for herbs and a 9-m (30-ft) radius for saplings, shrubs, trees and woody vines.

The USFWS National List of Plant Species that Occur in Wetlands: Northwest Region 9 was the reference used to determine the indicator status of the vegetation. There were some mosses that were not able to be identified.

Upland native vegetation in the study area typically included Douglas fir (*Pseudotsuga menziesii*), big-leaf maple (*Acer macrophyllum*), California brome (*Bromus carinatus*), and

fireweed (*Epilobium angustifolium*). Upland non-native vegetation included tall oatgrass (*Arrhenatherum elatius*), Scotch broom (*Cytisus scoparius*), Canada thistle (*Cirsium arvense*), oxeye daisy (*Chrysanthemum leucanthemum*), perennial ryegrass (*Lomium perenne*), hedgehog dogtail (*Cynosurus echinatus*), Armenian blackberry (*rubus armeniacus*).

Wetland native vegetation in the study area included black cottonwood (*Populus balsamifera*), Watson's willow-herb (*Epilobium watsonii*), small-flowered forget-me-not (*Myosotis laxa*), broad-leaf cattail (*Typha latifolia*), few-seeded bittercress (*Cardamine oligosperma*), soft rush (*juncus effuses*), dagger-leaf rush (*juncus ensifolius*), red fescue (*festuca rubra*), and American vetch (*Vicia americana*). Wetland non-native vegetation included watercress (*Rorippa nasturtium aquaticum*), common velvetgrass (*Holcus lanatus*), and prickly sow-thistle (*Sonchus asper*).

# E Description of All Wetlands and Other Non-Wetland Waters

Figure 5a – NWI Map shows a number of wetlands within a mile of the project site. Wetlands to the east of the study area are associated with Tanner Creek. Wetlands to the south of the project site are associated with the Willamette River and the wastewater treatment plant along the river. area short section of a tributary to Bernert Creek crosses the study area on the western end. Five palustrine emergent (PEM) wetlands and one palustrine forested (PFO) wetland were found within the study area. Figure 5b shows Local Wetland Inventory wetlands identified in the area. An overview of the wetlands and non-wetland waters in the study area vicinity is shown in Figure 6a – Wetland Delineation Overview Map. Figures 6b and 6c – Wetland Delineation Enlargement Maps show a more detailed view of the delineated wetlands including the approximate seep location and flow paths through the wetlands.

## E.1 Wetlands

Data from the twenty two plots (Appendix C) were analyzed and led to identification of six wetlands (Figures 6a and 6b). Color photographs of the wetlands and the plot locations are included in Appendix D.

### E.1.1 Wetland A – PEM/Slope

Wetland A (Figures 6a and 6b) is a spring-fed, Palustrine Emergent (PEM) wetland that is 0.542 acres. Groundwater discharges at the toe of a cut-slope providing hydrology to wetland A. Water flows through the wetland on the lower terrace in two main, meandering flow paths before falling down slope towards I-205. Because the spring water likely eventually flows to the Willamette River, the Corps would likely consider this wetland Jurisdictional. It would also be jurisdictional under Oregon Department of State Lands (DSL) Removal-Fill Law. With the exception of the eastern blackberry edge of the wetland, the difference between wetland and upland vegetation species was often distinct, providing a good vegetative indicator of the boundary location. Once rough boundaries of wetlands were identified based on vegetation, pits were dug to refine the boundaries and to develop descriptive plots.

Dominant vegetation within Wetland A included watercress, Watson's willow-herb, broad-leaf cattail, watercress, small flowered forget-me-not, and common velvetgrass. The wetland boundary typically included a distinct break in vegetation of common velvetgrass and Watson's

willow-herb to tall oatgrass and California brome in the adjacent upland. The wettest areas were occupied by watercress, often creating a meandering path of watercress following the main flow paths through the wetland. The wetland also included an area primarily covered with broad-leaf cattail. The eastern side of the wetland has been more disturbed, as evidenced by remnant tire ruts, and has been grown over with Armenian blackberry. Upon further investigation within the blackberry patch, the field investigators found distinct flow paths beneath the blackberries, with wetland extending outward from the flow paths.

Soils in Wetland A are predominantly 10YR 3/1 with up to 20 percent redoximorphic concentrations or depletions. The most common hydric soil indicator in the wetland was Redox Dark Surface (F6), though Depleted Dark Surface (F7) and Depleted Matrix (F3) were also observed. Soil depths within the wetland were typically only 6-8 inches. Shovel refusal occurred at between six and 10 inches in the test pits. The soils are gravelly silt loam as is consistent with the Multnomah County Soil Survey description of Soil Map Unit 89D – Witzel very stony silt loam, 3 to 40 percent slopes.

The source of hydrology for Wetland A is primarily groundwater being discharged at the seep locations shown on Figure 6b. Wetland A also receives runoff from adjacent uplands. The hummocky topography also provides for detention/retention of direct precipitation. Water that flows through Wetland A likely eventually flows into the Willamette River.

Wetland A was assigned a HGM classification of Slope Discharge Terrace (SDT). Wetland A's primary source of hydrology is groundwater that is discharged at the toe of a terrace cut-slope at the north end of the wetland. Wetland A also receives overland flow and runoff from adjacent uplands, and direct precipitation. An apparent groundwater discharge point was observed at the northeast portion of the wetland.

### E.1.2 Wetland B – PEM/RFT

Wetland B (Figures 6a and 6c) is Palustrine Emergent (PEM) wetland that is 0.073 acres. A shallow stream enters the wetland from outside of the study area providing hydrology to Wetland B. Water flows through the wetland in a roadside ditch before draining into a culvert at the access road entrance to the project site. Because the water likely eventually flows to the Willamette River, the Corps would likely consider this wetland Jurisdictional. It would also be jurisdictional under Oregon Department of State Lands (DSL) Removal-Fill Law. The break in vegetation was not well defined in many locations along the boundary. Soils and hydrology were used to locate the boundary. Changes in soil and hydrology were closely related to topographic position.

Dominant vegetation within Wetland B included broad-leaf cattail, tall fescue, soft rush, Watson's willowherb, dagger-leaf rush, and common velvetgrass. Black cottonwood dominates as a shrub at the east end of the site and in the canopy of this wetland outside of the study area. While the interior of the wetland contained obvious hydrophytic vegetation, some facultative plant species were also present just outside of the delineated boundary.

Soils in Wetland B are predominantly 10YR 3/2 with 5 percent redoximorphic concentrations in the matrix and on pore linings. The hydric soil indicator in the wetland was Redox Dark Surface (F6). Soil depths within the wetland were typically only 6-8 inches. Shovel refusal occurred at 8 inches in the test pits. The soils are gravelly silt loam as is consistent with the Multnomah

County Soil Survey description of Soil Map Unit 89D – Witzel very stony silt loam, 3 to 40 percent slopes, although Wetland B lies within the soil map unit 48C.

The source of hydrology for Wetland B is primarily surface water flow entering the wetland from outside of the study area. Wetland B also receives runoff from adjacent uplands, direct precipitation, and groundwater inputs. Water that flows through Wetland B eventually flows into the Willamette River.

Wetland B was assigned a HGM classification of Riverine Flow-Through (RFT). Wetland B's primary source of hydrology is surface water flowing into Wetland B from upstream. Wetland B also receives overland flow and runoff from adjacent uplands, and direct precipitation. Wetland B extends outside of the study area to the northeast, as shown in Figure 6c. Wetland B drains into a culvert at the western end of the wetland.

### E.1.3 Wetland C – PEM/DO

Wetland C (Figures 6a and 6c) is Palustrine Emergent (PEM) wetland that is 0.205 acres. There is a crushed CMP culvert located at the upstream/eastern end of Wetland C. It is unclear whether or not this culvert is connected to Wetland B. Water flows through the wetland in a roadside ditch before draining into a grated inlet at the downstream/western end of Wetland C. Because the water likely eventually flows to the Willamette River, the Corps would likely consider this wetland Jurisdictional. It would also be jurisdictional under Oregon Department of State Lands (DSL) Removal-Fill Law. Changes in vegetation, soils, and hydrology were closely related to local topographic position. The wetland was generally confined to the ditch feature.

Dominant vegetation within Wetland C included American brooklime, tall fescue, reed canarygrass, Watson's willowherb, soft rush, and common velvetgrass. While the interior of the wetland contained obvious hydrophytic vegetation, some facultative plant species, such as colonial bentgrass, were also present just outside of the delineated boundary.

Soils in Wetland C are predominantly GLEY1 2.5/10Y with up to 20 percent redoximorphic concentrations in the matrix and on pore linings. The hydric soil indicator identified in the wetland was Loamy Gleyed Matrix (F2), though other indicators may be present. Soil depths within the wetland were typically only 6-8 inches. Shovel refusal occurred at 8 inches in the test pits. The soils are gravelly silt loam as is consistent with the Multnomah County Soil Survey description of Soil Map Unit 89D – Witzel very stony silt loam, 3 to 40 percent slopes, although Wetland C lies within the soil map unit 48C.

The source of hydrology for Wetland C is groundwater intercepted at the base of the terrace slope. Wetland C also receives runoff from adjacent uplands, direct precipitation and may receive surface water inflow from the crushed culvert at the eastern end of the wetland. Water that flows through Wetland C eventually flows into the Willamette River.

Wetland C was assigned a HGM classification of Depressional Outflow (DO). Wetland C's primary source of hydrology is groundwater intercepted at the base of the terrace slope. Wetland C also receives overland flow and runoff from adjacent uplands and direct precipitation. Wetland C drains into a grated inlet at the western end of the wetland.

### E.1.4 Wetland D – PEM/DO

Wetland D (Figures 6a and 6c) is a Palustrine Emergent (PEM) wetland that is 0.045 acres. Wetland D is hydrologically connected Wetlands C and F via the roadside ditch. Water flows

through the wetland in a roadside ditch. Because the water likely eventually flows to the Willamette River, the Corps would likely consider this wetland Jurisdictional. It would also be jurisdictional under Oregon Department of State Lands (DSL) Removal-Fill Law. Changes in vegetation, soils, and hydrology were closely related to local topographic position. The wetland was generally confined to the ditch feature.

Dominant vegetation within Wetland D included sawbeak sedge, meadow barley, tall fescue, soft rush, slender rush, and common velvetgrass. There was a distinct change in plant community at the edges of Wetland D, driven by the change in elevation.

Soils in Wetland D are predominantly 10YR 2/2 with up to 30 percent redoximorphic concentrations in the matrix and on pore linings. The hydric soil indicator identified in the wetland was Redox Dark Surface (F6). Soil depths within the wetland were typically only 6-8 inches. Shovel refusal occurred at 8 inches in the test pits. The soils are gravelly silt loam as is consistent with the Multnomah County Soil Survey description of Soil Map Unit 89D – Witzel very stony silt loam, 3 to 40 percent slopes.

The source of hydrology for Wetland D is primarily surface water flow entering the wetland in the ditch from upstream. Wetland D also receives runoff from adjacent uplands, direct precipitation and surface flow from the upstream ditch. Water that flows through Wetland D eventually flows into the Willamette River.

Wetland D was assigned a hydrogeomorphic (HGM) classification of Depressional Outflow (DO). Wetland D's primary source of hydrology is groundwater intercepted at the base of the terrace slope. Wetland D also receives overland flow and runoff from adjacent uplands, direct precipitation, and surface flow from the upstream ditch. Water exits Wetland D in the roadside ditch to the west.

### E.1.5 Wetland E – PFO/RFT

Wetland E (Figures 6a and 6c) is a Palustrine Forested (PFO) wetland that is 0.011 acres. Water flows through the wetland in a defined stream channel. Because the water likely eventually flows to the Willamette River, the Corps would likely consider this wetland Jurisdictional. It would also be jurisdictional under Oregon Department of State Lands (DSL) Removal-Fill Law. Changes in vegetation, soils, and hydrology were closely related to local topographic position. The wetland extends outward from the center of the stream channel. Wetland F extends upstream of the study area boundary as shown on Figure 6c.

Dominant vegetation within Wetland E includes black cottonwood, common horsetail, Watson's willowherb, perennial ryegrass, and common velvetgrass. There was a distinct change in plant community at the edges of Wetland E, driven by the change in elevation. Armenian blackberry and sword fern are present outside of the wetland boundary.

Soils in Wetland E are predominantly 10YR 2/2 with up to 10 percent redoximorphic concentrations in the matrix. The hydric soil indicator identified in the wetland was Redox Dark Surface (F6). Soil depths within the wetland were typically only 6-8 inches. Shovel refusal occurred at 8 inches in the test pits. The soils are gravelly sandy loam. The soils here are sandier that the rest of the site likely because it is within the stream channel.

The source of hydrology for Wetland E is primarily surface water flow entering the wetland in the stream channel from upstream. Wetland E also receives runoff from adjacent uplands, direct

precipitation and some groundwater input. Water that flows through Wetland E eventually flows into the Willamette River.

Wetland E was assigned a hydrogeomorphic (HGM) classification of Riverine Flow-Through (RFT). Wetland E's primary source of hydrology is surface water flowing into Wetland E in the stream channel from upstream. Wetland E also receives overland flow and runoff from adjacent uplands, direct precipitation, and groundwater input. Water exits Wetland E in a large culvert under I-205.

### E.1.6 Wetland F – PEM/DO

Wetland F (Figures 6a and 6c) is a small Palustrine Emergent (PEM) wetland that is 0.003 acres. Wetland F is hydrologically connected Wetlands D and C via the roadside ditch. Water flows through the wetland in a roadside ditch. Because the water likely eventually flows to the Willamette River, the Corps would likely consider this wetland Jurisdictional. It would also be jurisdictional under Oregon Department of State Lands (DSL) Removal-Fill Law. Changes in vegetation, soils, and hydrology were closely related to local topographic position. The wetland was generally confined to the ditch feature.

Dominant vegetation within Wetland F included Watson's willowherb, colonial bentgrass, perennial ryegrass, toad rush, and common velvet grass. There was a distinct change in plant community at the edges of Wetland F, driven by the change in elevation.

Soils in Wetland F are predominantly 10YR 3/2 with up to 10 percent redoximorphic concentrations and depletions in the matrix. The hydric soil indicator identified in the wetland was Redox Dark Surface (F6). Soil depths within the wetland were typically only 6-8 inches. Shovel refusal occurred at 8 inches in the test pits. The soils are gravelly silt loam as is consistent with the Multnomah County Soil Survey description of Soil Map Unit 89D – Witzel very stony silt loam, 3 to 40 percent slopes.

The source of hydrology for Wetland F is primarily groundwater intercepted at the base of the terrace slope. Wetland D also receives runoff from adjacent uplands, direct precipitation and some surface flow from the upstream drainage ditch. Water that flows through Wetland F eventually flows into the Willamette River.

Wetland F was assigned a hydrogeomorphic (HGM) classification of Depressional Outflow (DO). Wetland F's primary source of hydrology is groundwater intercepted at the base of the terrace slope. Wetland F also receives overland flow and runoff from adjacent uplands, direct precipitation, and surface flow from the upstream drainage ditch. Water exits Wetland F in the roadside ditch to the west.

## E.2 Non-Wetland Waters

There are a number of waterways in the vicinity of the project area as seen in Figure 1 – Vicinity Map, most of which are associated with the wetlands described above. All of these waterways including the Willamette River, Tanner Creek and an unnamed drainage to the west of the project site are outside of the study area.

### E.2.1 Willamette River

The Willamette River is the 13$^{th}$ largest river by volume in the Unites States. The main stem is approximately 187 miles long and has an average flow of approximately 32,000 cubic feet per

second (cfs) at the confluence with the Columbia River. Including its tributaries, the Willamette River drains approximately 11,500 square miles. The Willamette River enters the Columbia River which flows into the Pacific Ocean. The Willamette River flows from Eugene to Portland through the Willamette Valley, a region of the state containing over 70 percent of Oregon's population. Historically the watershed was made up of open prairies, oak conifer woodlands, and old growth forests in the foothills of the Cascade and Coast Range mountains. Today the land is mostly agricultural, with only small portions of the riparian forests that previously existed. Flows have been significantly altered by the construction of 13 dams, built to control flooding and generate hydropower. One such dam was constructed at Willamette Falls, less than one mile from the study area.

### E.2.2 Tanner Creek

Tanner Creek, a tributary of the Willamette River, lies approximately 1,500 feet northeast of the study area. Flowing in a southerly direction, it drains into the Willamette River 0.5 miles upstream of Willamette Falls. The main stem of Tanner Creek is approximately 9000 feet long, and has a watershed area of over 1,000 acres. The Tanner Creek watershed is primarily composed of residential development of West Linn. Tanner Creek is piped beneath Interstate-205 before emerging near its confluence with the Willamette River.

### E.2.3 Bernert Creek

Bernert Creek, a tributary of the Willamette River, lies approximately 3,000 feet west (or 500 feet south) of the study area. Bernert Creek flows in a southerly direction along Tannler Drive crossing I-205 just west of the Exit 6 interchange. South of I-205, it turns to the east and flows through the wastewater treatment plan before draining into the Willamette River 1 mile upstream of Willamette Falls. The main stem of Bernert Creek is approximately 8,000 feet long, and has a watershed area of approximately 500 acres. The Bernert Creek watershed is primarily composed of residential and commercial development of West Linn.

### E.2.4 Intermittent Stream to the East

An intermittent stream is located on the eastern end of the study area. Wetland B is within this stream channel which widens at the downstream end. The intermittent stream flows into a culvert at the western end of Wetland B as shown on Figure 6c, and eventually drains into the Willamette River. The intermittent stream flows for approximately 700 feet upstream of the I-205 culvert and an additional 1,500 feet downstream of the culvert. Based on available topography data, this stream drains approximately 10 acres of land primarily within the ODOT rest area site. Some residential areas up slope may also contribute to this watershed.

### E.2.5 Intermittent Stream to the West

Another intermittent stream is located on the western end of the study area. Wetland E is within this stream channel. The intermittent stream flows into a culvert at the southern end of Wetland E as shown on Figure 6c, and drains into Bernert Creek eventually reaching the Willamette River. The intermittent stream flows for approximately 700 feet upstream of the I-205 culvert and an additional 600 feet downstream of the culvert. Upstream of the culvert, the stream has a steep gradient of approximately 20%. Based on available topography data, this stream drains approximately 5 acres of undeveloped land. Some residential areas up slope may also contribute to this watershed.

# F Deviation from NWI and other sources

Figure 5a shows wetland polygons mapped by the National Wetlands Inventory (NWI). The NWI indicates there are no mapped wetlands within the wetland delineation study area. One wetland is identified in the Tanner Creek drainage. The Willamette River is included on the NWI mapping as well as several wetlands associated with the wastewater treatment plant along the Willamette River. These wetlands are outside the study area.

West Linn's Goal 5 Local Wetland Inventory was approved by the Oregon Division of State Lands (DSL) in January 2005 and adopted by West Linn City Council in 2007. No wetlands are mapped within the delineation study area. Figure 5b shows wetlands indicated by West Linn's Goal 5 Local Wetlands Mapping.

# G Mapping Method

Wetland data plots and wetland boundaries were recorded using a 2005 Trimble GeoXT Global Positioning Systems (GPS). This unit has an inherent horizontal positional accuracy of +/- 3 feet. During data collection, point features had a minimum horizontal accuracy of +/- 3.0 feet and line features had a minimum horizontal accuracy of +/- 3.0 feet. Positions comprising point features that deviated from the 3.0 foot standard of precision were discarded. The site was generally free of tree canopy allowing a high level of accuracy.

Mapping Figures were developed in ArcGIS using Metro RLIS GIS data. Utilized shapefiles include freeways, arterial roads, streets, 5-ft contours, city boundaries, NRCS soil map unit boundaries, NWI mapped wetlands, stream routes, and rivers.

# H Additional Information

No additional information is provided.

# I Results and Conclusions

## I.1 Wetlands

Section 404 of the Clean Water Act gives the Corps jurisdiction over fresh water wetlands above the ordinary high water (OHW) line of streams. To be jurisdictional, these wetlands must be connected to waters of the U.S. either by wetlands, surface drainages, or culverts. Spring water flows through Wetland A, southward out of the study area and eventually drains to the Willamette River. The Corps would likely take jurisdiction over Wetland A due a water of the U.S.

Oregon Department of State Lands has jurisdiction over all Waters of the State including all tidal and non-tidal bays, intermittent streams, constantly flowing streams, lakes, wetlands, and other bodies of water as defined in the Oregon Removal-Fill Law (ORS 196.800-196.990). DSL asserts jurisdiction over wetlands regardless of their adjacency to other Waters of the State. DSL considers whether a wetland is natural or artificially created in determining jurisdiction.

Wetland A is a sloped discharge terrace emergent wetland that is fed primarily by a groundwater seep emerging at the base of a terrace cut-slope. The wetland also receives overland flow from adjacent wetlands as a source of hydrology. Wetland A extends offsite to the south in two separate outlets flow paths.

## I.2 Waters of the State/U.S.

Navigable waters of the United States are those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. A determination of navigability, once made, applies laterally over the entire surface of the water body, and is not extinguished by later actions or events which impede or destroy navigable capacity.

By this definition, all waters which eventually connect to the Willamette River are considered Waters of the U.S. The intermittent streams on the east and west ends of the study area may be considered Waters of the U.S. because of their apparent connection to the Willamette River. Tanner Creek to the east of the study area is likely a Water of the U.S., but it is outside of the study area. These drainage features are shown in Figures in Appendix A.

## I.3 Conclusions

Six wetlands were identified and delineated within the study area as shown in Figures 6a, 6b, and 6c and in Table 3.

**Table 3. Jurisdictional Wetlands within the Highway Solar Project Study Area**

| Wetland ID | Dominant Cowardin Class | Acres Within Project area | Sample Plot(s) | HGM Classification |
|---|---|---|---|---|
| **A** | PEM | 0.542 | P1 thru P12 | SDiT |
| **B** | PEM | 0.073 | P13, P14 | RFT |
| **C** | PEM | 0.205 | P15, P16 | DO |
| **D** | PEM | 0.045 | P17, P18 | DO |
| **E** | PFO | 0.011 | P19, P20 | RFT |
| **F** | PEM | 0.003 | P21, P22 | DO |
| **TOTAL** | - | **0.88** | - | - |

1. Cowardin Wetland Classification: PEM = Palustrine Emergent Wetland, PSS = Palustrine Scrub-Shrub; PFO = Palustrine Forested

2. Adamus: Oregon Statewide Hydrogeomorphic Classification: D = Depressional, R = Riverine, S = Slope
Subclass: FT = Flow-through, OF= Out Flow, CNP= Closed, Non-Permanent, H=Headwaters, Di = Discharge, T = terrace

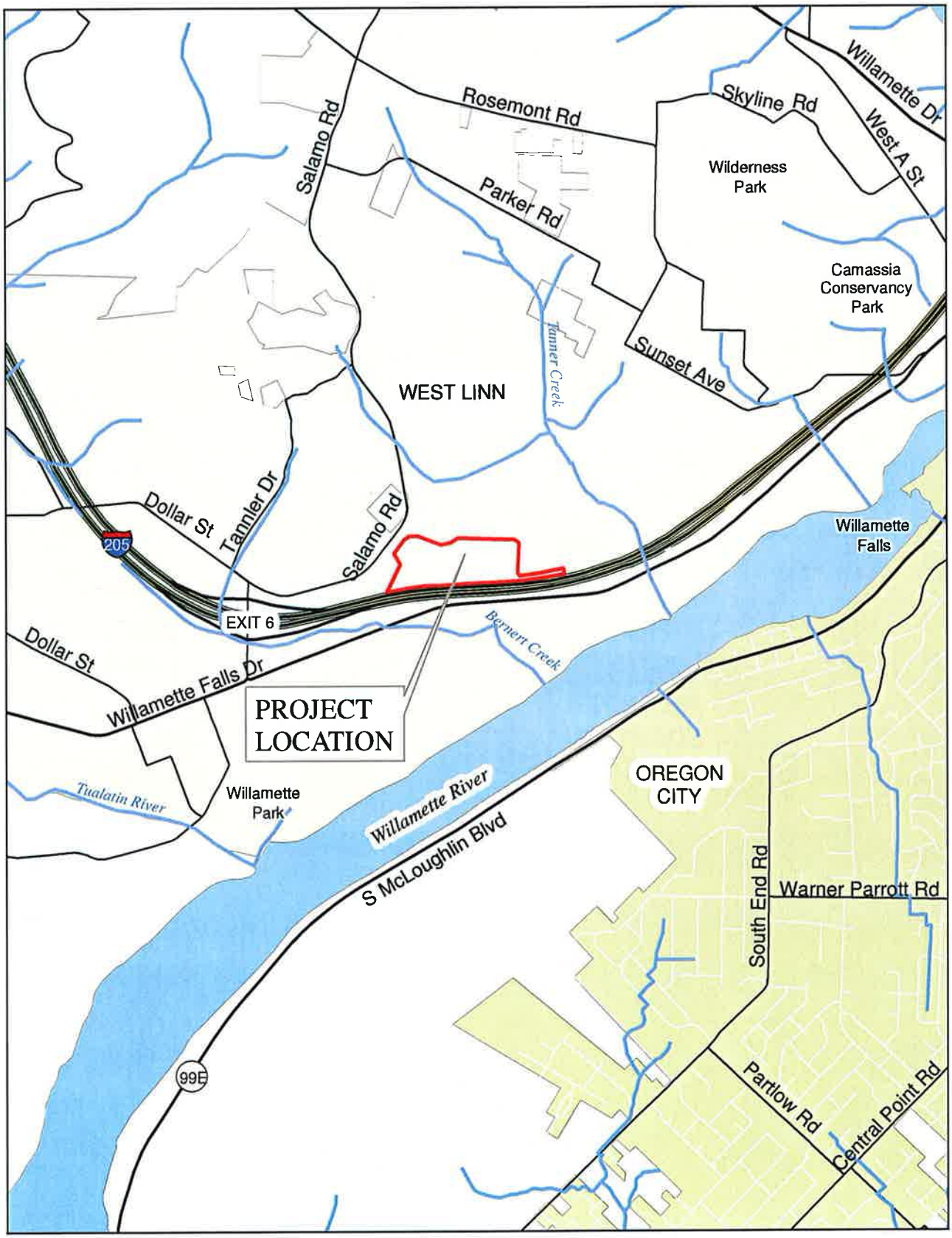
# J Disclaimer

This report documents the investigation, best professional judgment, and conclusions of the investigators. It should be considered a Preliminary Jurisdictional Determination and used at your own risk until it has been approved in writing by the Oregon Department of State Lands and the Corps of Engineers.

# Appendices

# Appendix A: Maps

Figure 1. Vicinity Map
Figure 2. Aerial Photo
Figure 3. Tax Lot Map
Figure 4. Soils Map
Figure 5a. NWI Map
Figure 5b. Goal 5 Local Wetlands Mapping
Figure 6a. Wetland Delineation Overview Map
Figure 6b. Wetland Delineation Enlargement Map 1
Figure 6c. Wetland Delineation Enlargement Map 2




Source: Roads & stream GIS data from METRO RLIS data

2,000 1,000 0 2,000 Feet

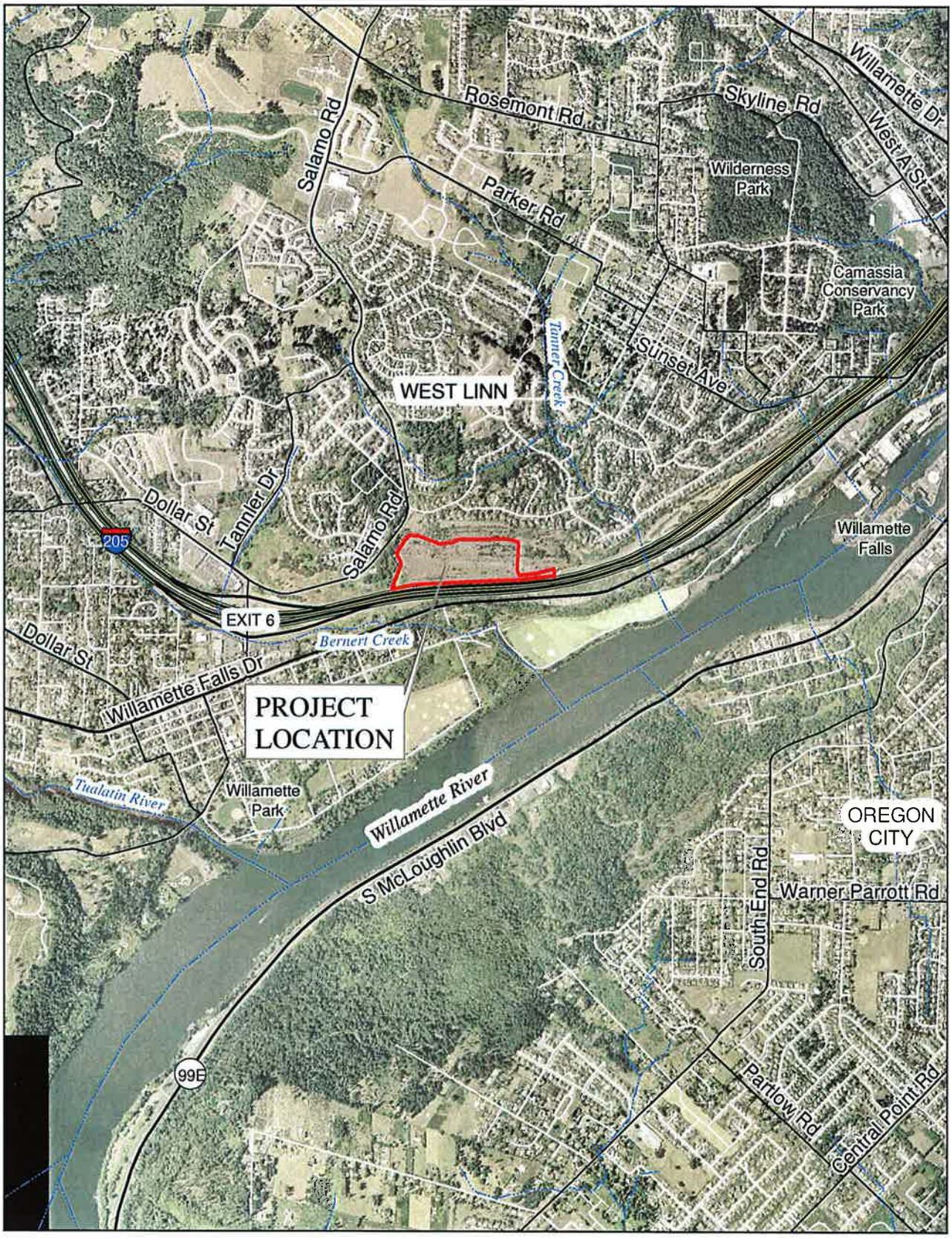
N

## Legend

Wetland delineation study area

**FIGURE 1.**
**Vicinity Map**

VIGIL AGRIMIS




Source: Roads & stream GIS data from METRO RLIS data

2,000 1,000 0 2,000 Feet

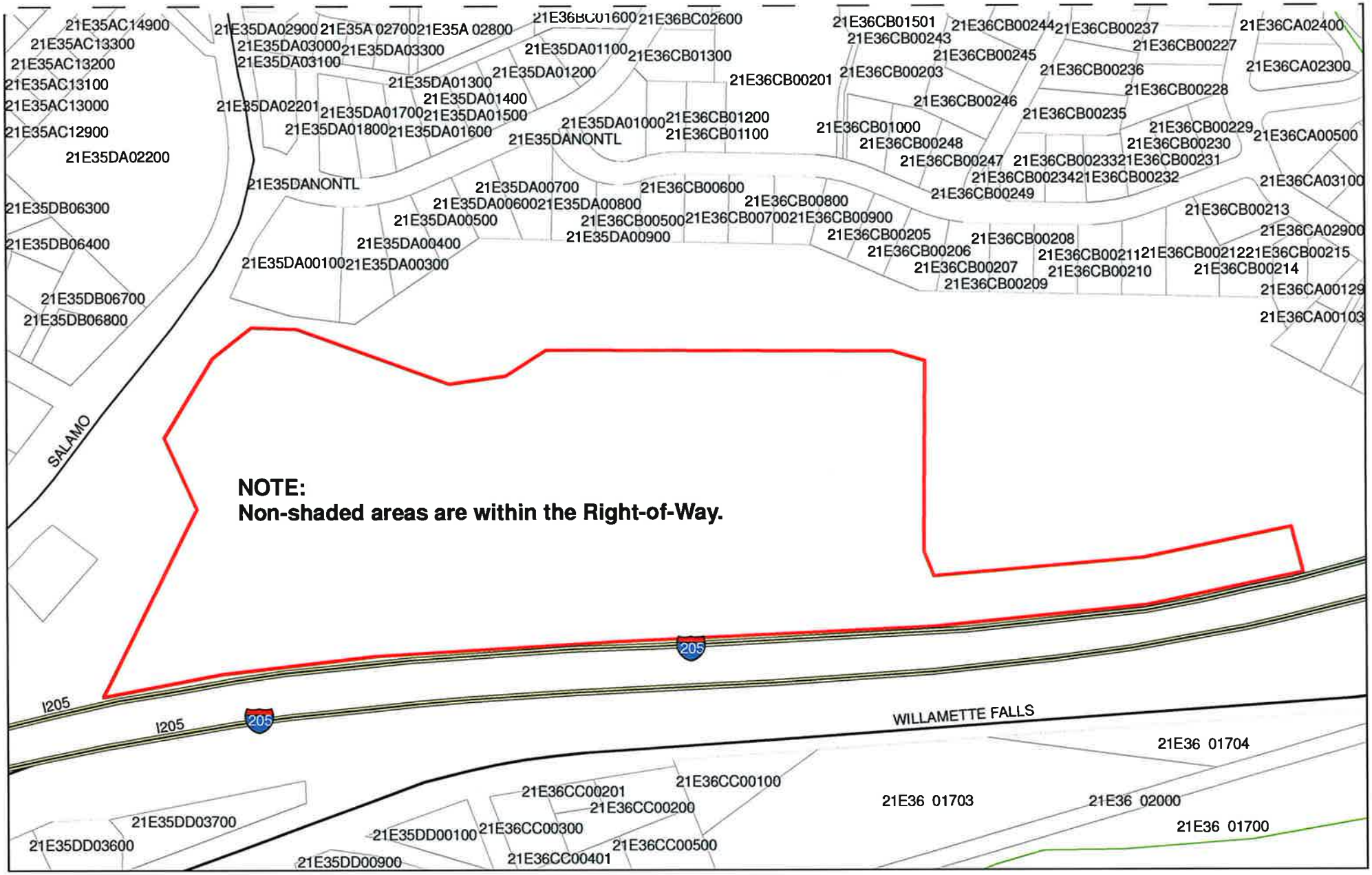
N

## Legend

Wetland delineation study area

**FIGURE 2.**
**Aerial Photo**

VIGIL AGRIMIS




Source: Taxlot data from METRO RLIS data, 2009.

300 150 0 300 Feet

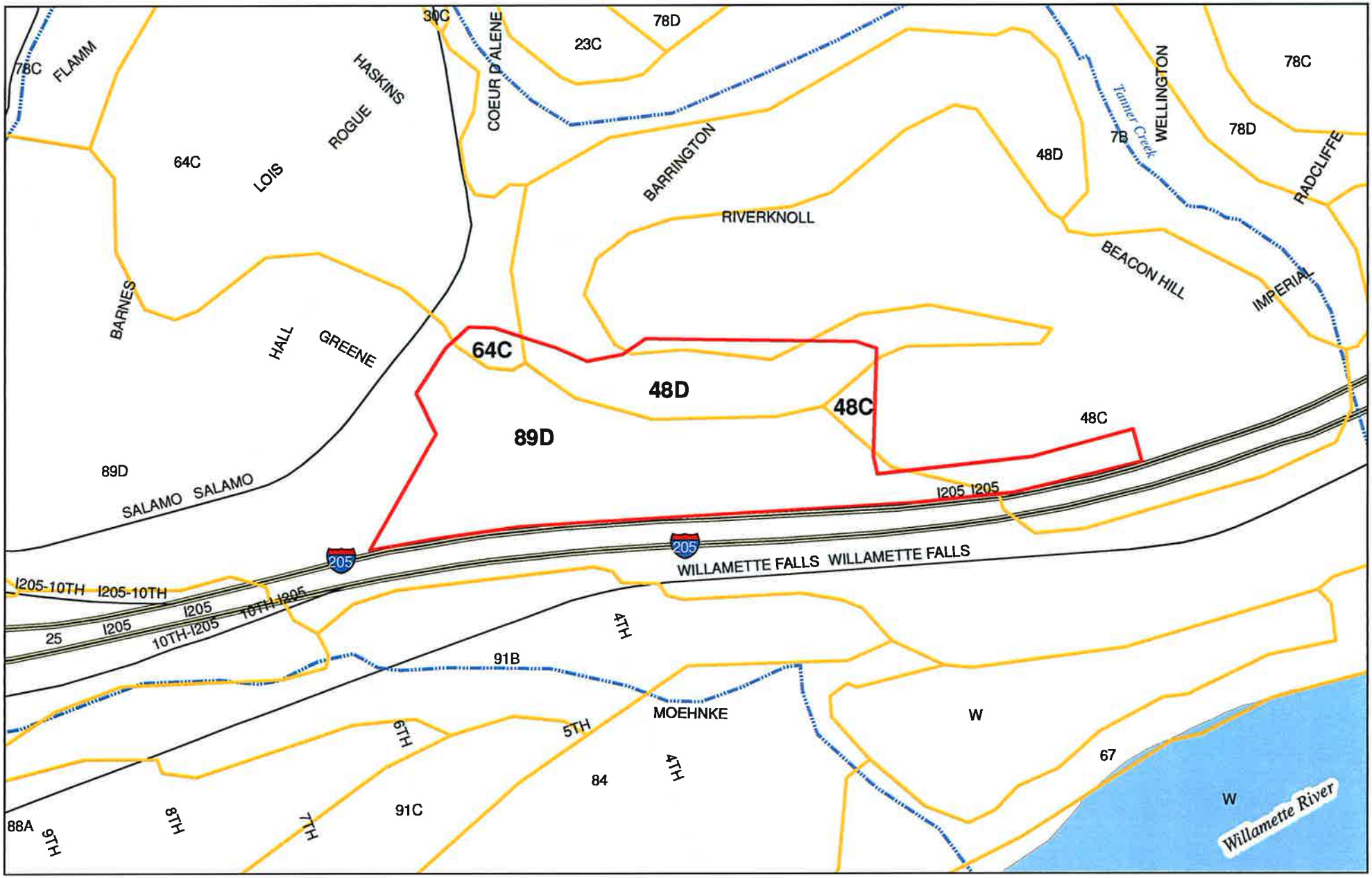
N

## Legend

Wetland delineation study area

**FIGURE 3.**
**Taxlot Map**

VIGIL AGRIMIS




Source: NWI data from METRO RLIS data, 2009, confirmed with USDA, NRCS Web Soil Survey 2.2.

500 250 0 500 Feet

N

## Legend

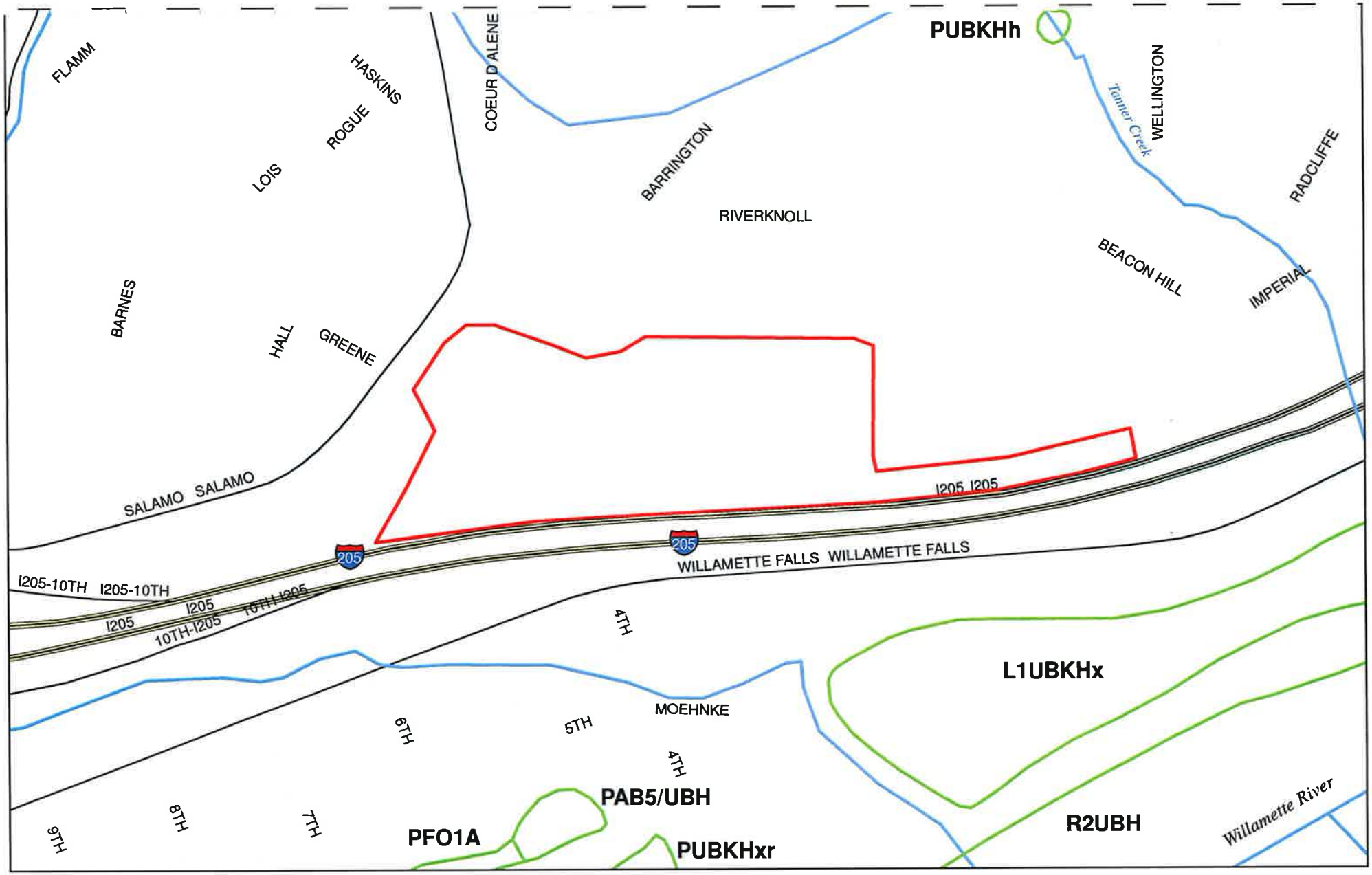
- Wetland delineation study area
- Soil Units

**SOIL UNITS WITHIN THE STUDY AREA:**

**48C - Kinton silt loam, 8 to 15 percent slopes**
**48D - Kinton silt loam, 15 to 30 percent slopes**
**64C - Nekia silty clay loam, 8 to 15 percent slopes**
**89D - Witzel very stony silt loam, 3 to 40 percent slopes**

**FIGURE 4.**
**Soils Map**

VIGIL AGRIMIS




Source: NWI data from METRO RLIS data, 2009, confirmed with USFWS Wetlands Mapper.

490 245 0 490 Feet

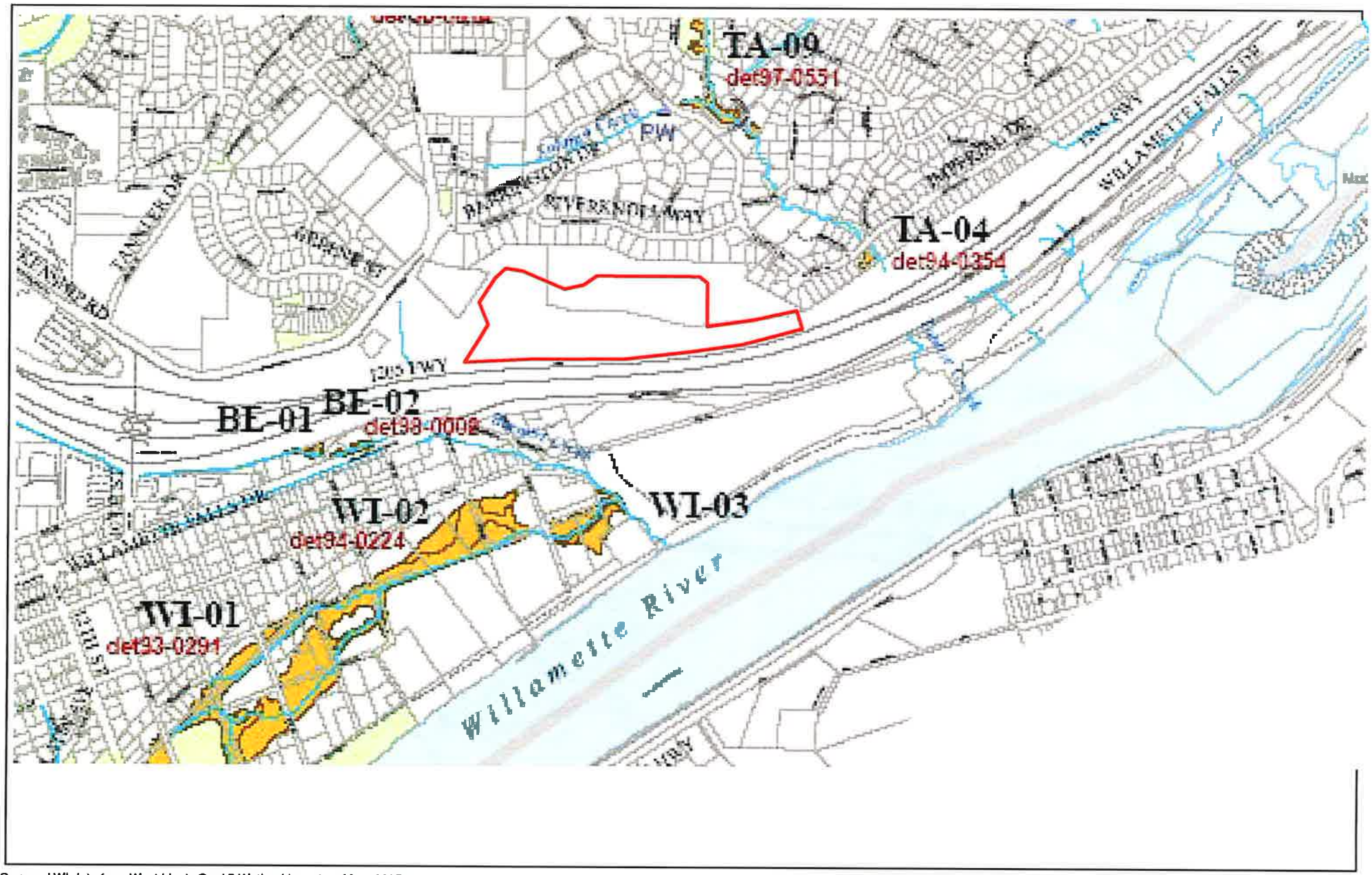
N

## Legend

- Wetland delineation study area
- NWI Wetlands

**FIGURE 5a.**
**National Wetlands Inventory (NWI) Map**

VIGIL AGRIMIS




Source: LWI data from West Linn's Goal 5 Wetland Inventory Map, 2005.

## Legend

- Wetland delineation study area
- Locally Significant Wetlands, DSL 2005
- Other Wetlands, DSL 2005
- PW Possible Wetlands DSL 2005

**BE-01** Wetland ID code

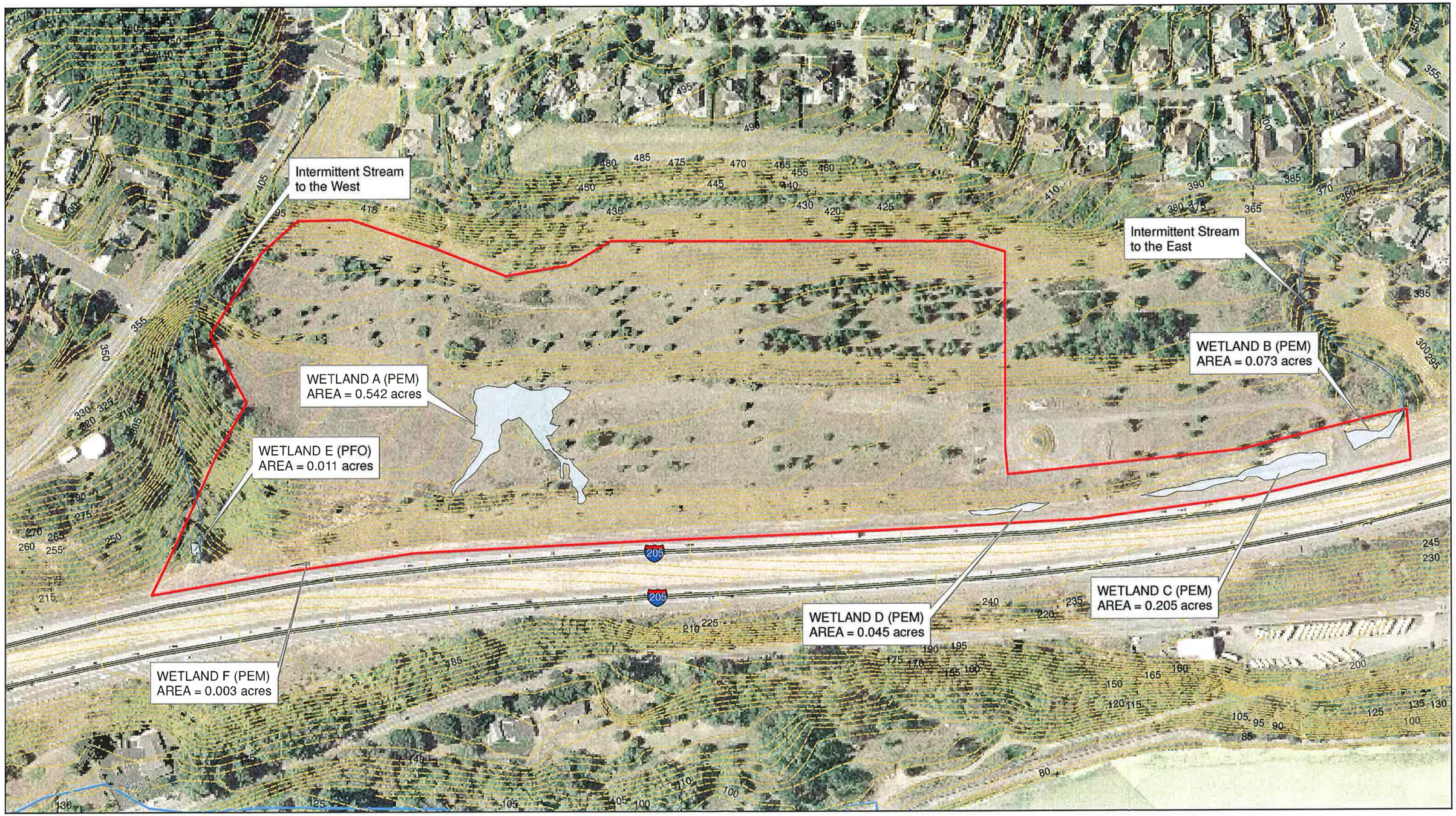
det98-0002 DSL Delineation Numbers

940 470 0 940 Feet

N

**FIGURE 5b.**
**Goal 5 Local Wetlands Mapping**

VIGIL AGRIMIS




Source: Roads & contours GIS data from METRO RLIS data

## Legend

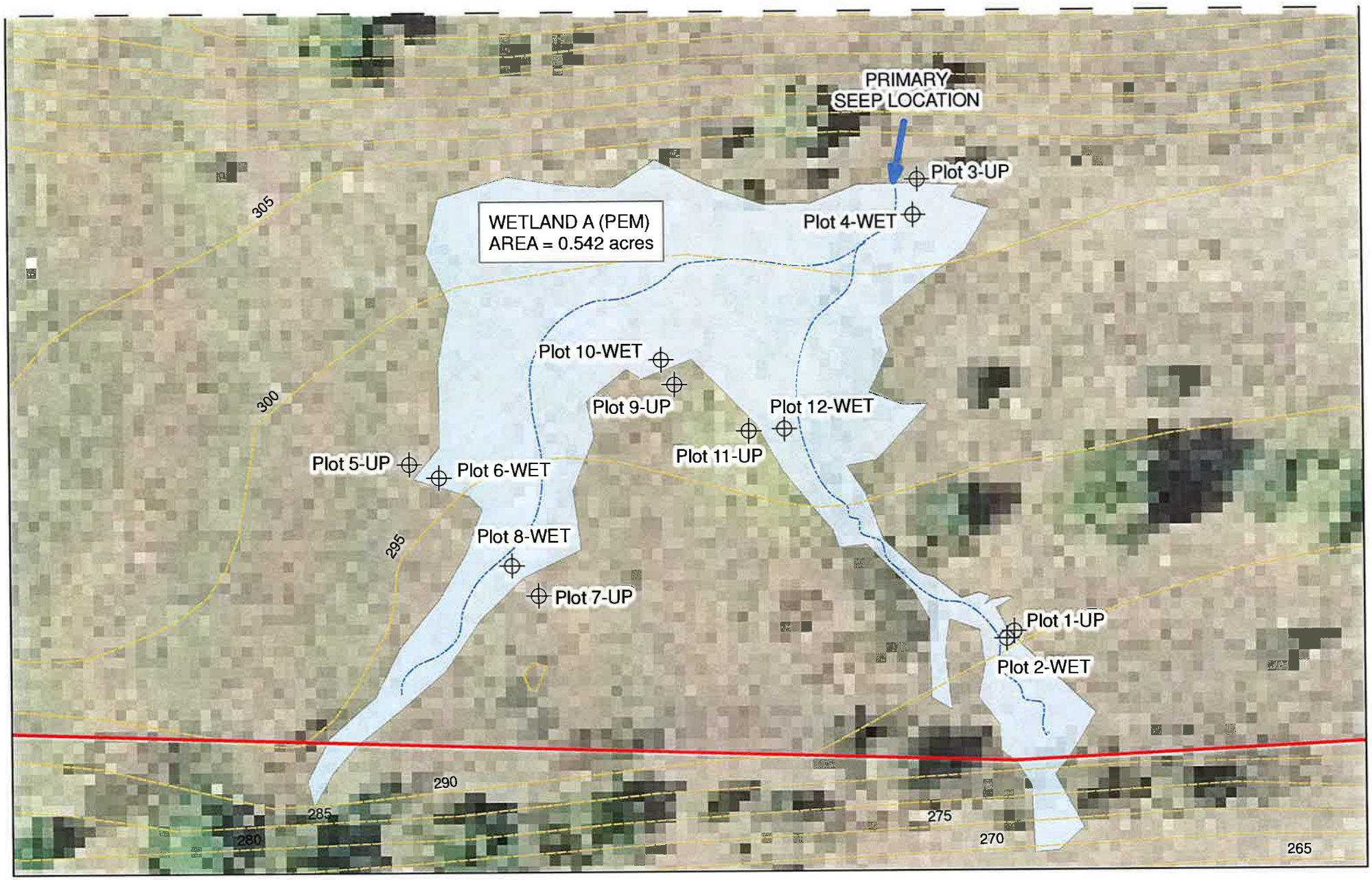
- Wetland delineation study area
- Wetland

200 100 0 200 Feet

N

**FIGURE 6a.**
**Wetland Delineation Overview Map**

VIGIL AGRIMIS




Source: Roads & Contours GIS data from METRO RLIS data

## Legend

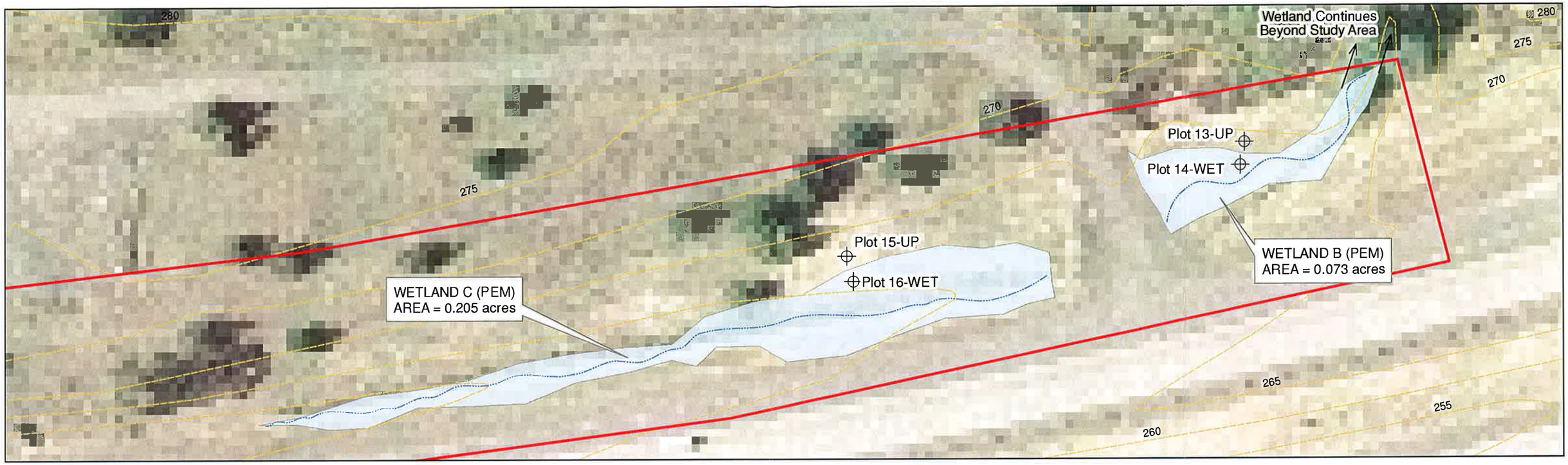
- Wetland delineation study area
- Wetland
- Wetland Plot Location
- Approximate Flow Path

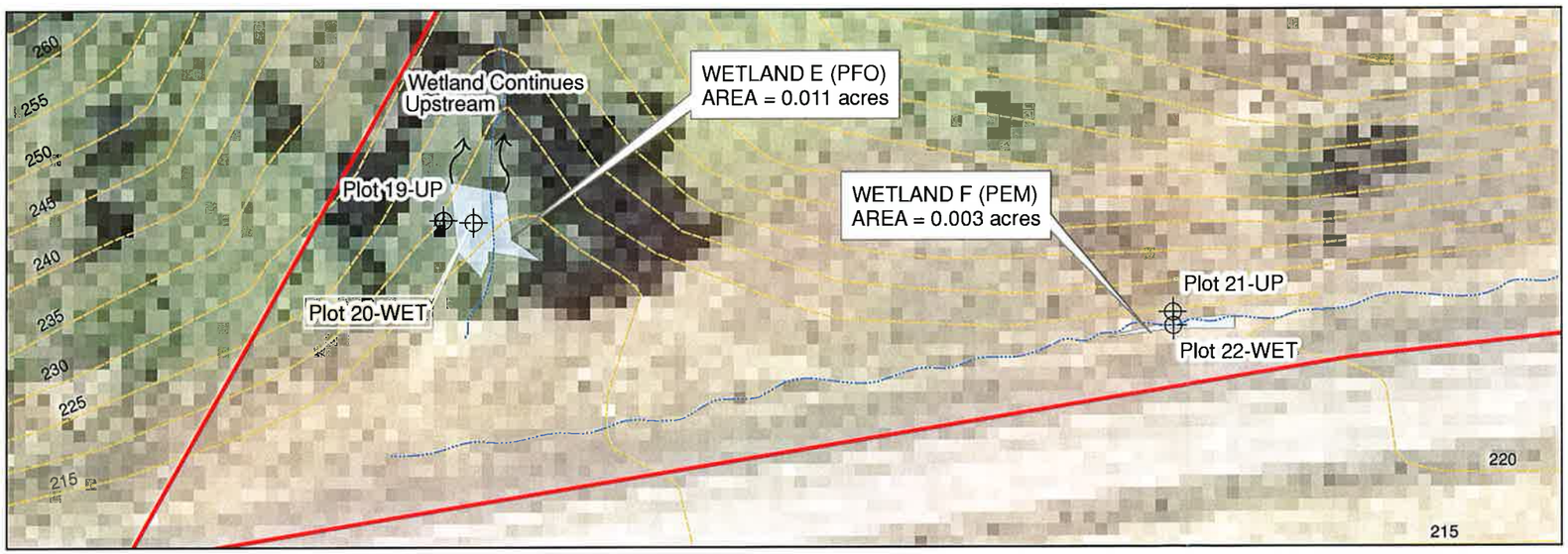
50 25 0 50 Feet

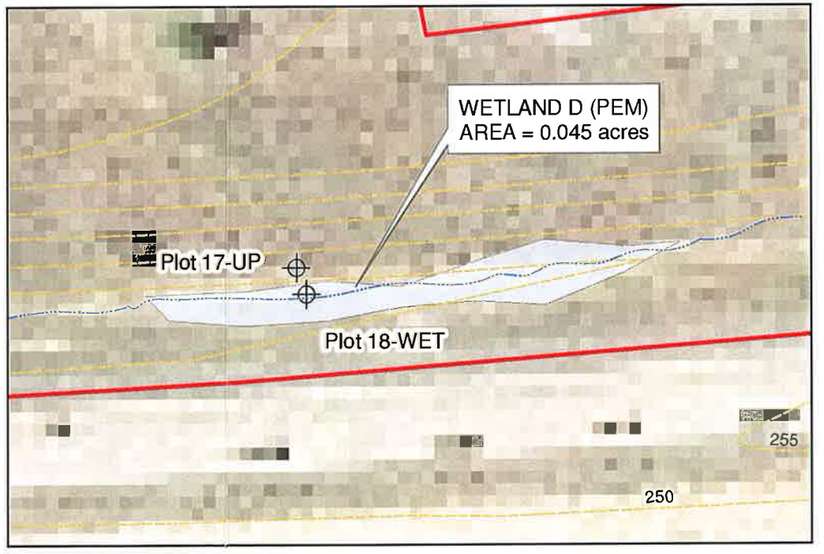
N

**FIGURE 6b.**
**Wetland Delineation Enlargement Map**

VIGIL AGRIMIS




Source: Roads & Contours GIS data from METRO RLIS data

## Legend

- Wetland delineation study area
- Wetland
- Wetland Plot Location
- Approximate Flow Path

**FIGURE 6c.**
**Wetland Delineation Enlargement Map 2**

VIGIL AGRIMIS

# Appendix B: Portland International Airport TAPS Station Data

TAPS Station : PORTLAND WSFO, OR6751 (AT PDX AIRPORT)
Start yr. - 1971 End yr. - 2000
Temperature: 30 years available out of 30 requested in this analysis
Precipitation: 30 years available out of 30 requested in this analysis

| Month | Temperature (Degrees F.) avg daily max | avg daily min | avg | 2 yrs in 10 will have max temp. >than | 2 yrs in 10 will have min temp. <than | avg # of grow deg days* | Precipitation (Inches) avg | 2 yrs in 10 will have less than | 2 yrs in 10 will have more than | avg # of days w/.1 or more | avg total snow fall |
|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 46.0 | 34.6 | 40.3 | 61 | 18 | 86 | 5.07 | 2.84 | 7.17 | 11 | 1.1 |
| February | 50.8 | 36.4 | 43.6 | 65 | 19 | 132 | 4.18 | 2.33 | 5.93 | 10 | 1.4 |
| March | 56.4 | 39.3 | 47.8 | 72 | 26 | 246 | 3.71 | 2.46 | 4.80 | 10 | 0.1 |
| April | 61.4 | 42.6 | 52.0 | 82 | 31 | 360 | 2.64 | 1.63 | 3.52 | 7 | 0.0 |
| May | 67.7 | 48.1 | 57.9 | 91 | 38 | 555 | 2.38 | 1.19 | 3.58 | 6 | 0.0 |
| June | 73.6 | 53.2 | 63.4 | 95 | 44 | 702 | 1.59 | 0.72 | 2.44 | 4 | 0.0 |
| July | 80.1 | 57.4 | 68.7 | 100 | 48 | 891 | 0.72 | 0.20 | 1.15 | 1 | 0.0 |
| August | 80.6 | 57.7 | 69.1 | 101 | 48 | 904 | 0.93 | 0.19 | 1.48 | 2 | 0.0 |
| September | 75.6 | 52.8 | 64.2 | 96 | 41 | 725 | 1.65 | 0.35 | 3.03 | 3 | 0.0 |
| October | 64.3 | 45.4 | 54.8 | 84 | 32 | 460 | 2.88 | 1.15 | 4.59 | 7 | 0.0 |
| November | 52.5 | 40.0 | 46.3 | 67 | 24 | 206 | 5.61 | 3.02 | 8.11 | 12 | 0.6 |
| December | 46.0 | 35.3 | 40.6 | 61 | 18 | 89 | 5.71 | 3.16 | 8.01 | 11 | 1.3 |
| Yearly : | | | | | | | | | | | |
| Average | 62.9 | 45.2 | 54.1 | --- | --- | --- | ---- | ---- | ---- | --- | --- |
| Extreme | 107 | 8 | --- | 103 | 13 | --- | ---- | ---- | ---- | --- | --- |
| Total | --- | --- | --- | --- | --- | 5357 | 37.07 | 30.58 | 43.00 | 84 | 4.4 |

Average # of days per year with at least 1 inch of snow on the ground: 2

*A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minumum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (Threshold : 40.0 deg. F)

# Appendix C: Plot Data Forms

# WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: ODOT Solar Highway Project City/County: West Linn / Clackamas County Sampling Date: May 27, 2009

Applicant/Owner: Oregon Department of Transportation State: OR Sampling Point: Plot 1-UP

Investigator(s): Paul Agrimis, Hunter White Section, Township, Range: Section 35, T2S, R1E, Willamette Meridian

Landform (hillslope, terrace, etc.): cut terrace above I-205 & Willamette River Local relief (concave, convex, none): none Slope (%): 2%

Subregion (LRR): LRR A, MLRA 2 Lat: 45° 20' 59.12"N Long: 122° 38' 28.53"W Datum: WGS84

Soil Map Unit Name: 89D – Witzel very stony silt loam, 3 to 40 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation ____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No X | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ | No X | |
| Wetland Hydrology Present? | Yes _____ | No X | |

Remarks:

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30-foot radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0 = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 30-foot radius) | | | |
| 1. Cytissus scoparius | 5 | Y | UPL |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | 5 = Total Cover | | |
| **Herb Stratum** (Plot size: 5-foot radius) | | | |
| 1. Arrhenatherum elatius | 95 | Y | UPL |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| | 95 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30-foot radius) | | | |
| 1. | | | |
| 2. | | | |
| | = Total Cover | | |

% Bare Ground in Herb Stratum 5

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species | x 1 = |
| FACW species | x 2 = |
| FAC species | x 3 = |
| FACU species | x 4 = |
| UPL species | x 5 = |
| Column Totals: (A) | (B) |

Prevalence Index = B/A =

**Hydrophytic Vegetation Indicators:**

__ Dominance Test is >50%

__ Prevalence Index is ≤3.0[1]

__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ Wetland Non-Vascular Plants[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes _____ No X

Remarks:

## SOIL

Sampling Point: Plot 1-UP

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-10" | 10YR 3/4 | 100 | | | | | sandy loam | w/ gravel & cobbles |
| | | | | | | | | Rock Refusal at 10" |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** Yes _____ No __X__

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes _____ No __X__ Depth (inches): _____

Water Table Present? Yes _____ No __X__ Depth (inches): >16"

Saturation Present? (includes capillary fringe) Yes _____ No __X__ Depth (inches): >16"

**Wetland Hydrology Present?** Yes _____ No __X__

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

# WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: ODOT Solar Highway Project City/County: West Linn / Clackamas County Sampling Date: May 27, 2009

Applicant/Owner: Oregon Department of Transportation State: OR Sampling Point: Plot 2-WET

Investigator(s): Paul Agrimis, Hunter White Section, Township, Range: Section 35, T2S, R1E, Willamette Meridian

Landform (hillslope, terrace, etc.): cut terrace above I-205 & Willamette River Local relief (concave, convex, none): concave Slope (%): 2%

Subregion (LRR): LRR A, MLRA 2 Lat: 45° 20' 59.12"N Long: 122° 38' 28.53"W Datum: WGS84

Soil Map Unit Name: 89D – Witzel very stony silt loam, 3 to 40 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation ____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | Yes X No _____ | **Is the Sampled Area within a Wetland?** Yes X No _____ |
| Hydric Soil Present? | Yes X No _____ | |
| Wetland Hydrology Present? | Yes X No _____ | |

Remarks:

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30-foot radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0 = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 30-foot radius) | | | |
| 1. Populus balsamifera | 2 | | FAC |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | 5 = Total Cover | | |
| **Herb Stratum** (Plot size: 5-foot radius) | | | |
| 1. Rorippa nasturtium-aquaticum | 70 | Y | OBL |
| 2. Epilobium watsonii | 15 | | FACW- |
| 3. Holcus lanatus | 5 | | FAC |
| 4. Myosotis laxa | 5 | | OBL |
| 5. Arrhenatherum elatius | 5 | | UPL |
| 6. | | | |
| 7. | | | |
| | 100 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30-foot radius) | | | |
| 1. | | | |
| 2. | | | |
| | = Total Cover | | |

% Bare Ground in Herb Stratum 0

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: | |
|---|---|---|
| OBL species | x 1 = | |
| FACW species | x 2 = | |
| FAC species | x 3 = | |
| FACU species | x 4 = | |
| UPL species | x 5 = | |
| Column Totals: (A) | | (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes X No _____

Remarks:

## SOIL

Sampling Point: Plot 2-WET

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-6" | 10YR 3/1 | 80 | GLEY2 4/5BG | 20 | D | M | sandy clay loam | w/ gravel |
| | | | | | | | | Rock Refusal below 6" |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- X Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (Inches): _____

**Hydric Soil Present?** Yes X No _____

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes X No _____ Depth (inches): 1"

Water Table Present? Yes X No _____ Depth (inches): to surface

Saturation Present? (includes capillary fringe) Yes X No _____ Depth (inches): to surface

**Wetland Hydrology Present?** Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

# WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: ODOT Solar Highway Project City/County: West Linn / Clackamas County Sampling Date: May 27, 2009

Applicant/Owner: Oregon Department of Transportation State: OR Sampling Point: Plot 3-UP

Investigator(s): Paul Agrimis, Hunter White Section, Township, Range: Section 35, T2S, R1E, Willamette Meridian

Landform (hillslope, terrace, etc.): cut terrace above I-205 & Willamette River Local relief (concave, convex, none): none Slope (%): 2%

Subregion (LRR): LRR A, MLRA 2 Lat: 45° 20' 59.12"N Long: 122° 38' 28.53"W Datum: WGS84

Soil Map Unit Name: 89D – Witzel very stony silt loam, 3 to 40 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation ____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No X | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ | No X | |
| Wetland Hydrology Present? | Yes _____ | No X | |

Remarks:

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30-foot radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Acer macrophyllum | 15 | Y | FACU |
| 2. Pseudotsuga menziesii | trace | | FACU |
| 3. | | | |
| 4. | | | |
| | 15 = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 30-foot radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | 5 = Total Cover | | |
| **Herb Stratum** (Plot size: 5-foot radius) | | | |
| 1. Arrhenatherum elatius | 40 | Y | UPL |
| 2. Holcus lanatus | 40 | Y | FAC |
| 3. Festuca rubra | 20 | Y | FAC+ |
| 4. Vicia americana | trace | | FAC |
| 5. Cirsium arvense | trace | | |
| 6. | | | |
| 7. | | | |
| | 100 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30-foot radius) | | | |
| 1. | | | |
| 2. | | | |
| | = Total Cover | | |

% Bare Ground in Herb Stratum 0

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: | |
|---|---|---|
| OBL species | x 1 = | |
| FACW species | x 2 = | |
| FAC species | x 3 = | |
| FACU species | x 4 = | |
| UPL species | x 5 = | |
| Column Totals: (A) | | (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes _____ No X

Remarks:

Vegetation is close, but soils and hydrology aren't present.

## SOIL

Sampling Point: Plot 3-UP

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-10" | 10YR 4/3 | 100 | | | | | gravelly loam | |
| | | | | | | | | Rock Refusal at 10" |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present? Yes _____ No __X__**

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes _____ No __X__ Depth (Inches): _____

Water Table Present? Yes _____ No __X__ Depth (inches): >16"

Saturation Present? (includes capillary fringe) Yes _____ No __X__ Depth (inches): >16"

**Wetland Hydrology Present? Yes _____ No __X__**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

# WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: ODOT Solar Highway Project City/County: West Linn / Clackamas County Sampling Date: May 27, 2009

Applicant/Owner: Oregon Department of Transportation State: OR Sampling Point: Plot 4-WET

Investigator(s): Paul Agrimis, Hunter White Section, Township, Range: Section 35, T2S, R1E, Willamette Meridian

Landform (hillslope, terrace, etc.): cut terrace above I-205 & Willamette River Local relief (concave, convex, none): concave Slope (%): 2%

Subregion (LRR): LRR A, MLRA 2 Lat: 45° 20' 59.12"N Long: 122° 38' 28.53"W Datum: WGS84

Soil Map Unit Name: 89D – Witzel very stony silt loam, 3 to 40 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | Yes X No _____ | **Is the Sampled Area within a Wetland?** Yes X No _____ |
| Hydric Soil Present? | Yes X No _____ | |
| Wetland Hydrology Present? | Yes X No _____ | |

Remarks:

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30-foot radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Acer macrophyllum | 10 | Y | FACU |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 10 = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 30-foot radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | 0 = Total Cover | | |
| **Herb Stratum** (Plot size: 5-foot radius) | | | |
| 1. Holcus lanatus | 50 | Y | FAC |
| 2. Juncus effusus | 30 | Y | FACW- |
| 3. Epilobium watsonii | 15 | | FACW- |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| | 95 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30-foot radius) | | | |
| 1. | | | |
| 2. | | | |
| | = Total Cover | | |

% Bare Ground in Herb Stratum 5

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species | x 1 = |
| FACW species | x 2 = |
| FAC species | x 3 = |
| FACU species | x 4 = |
| UPL species | x 5 = |
| Column Totals: (A) | (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

X Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes X No _____

Remarks:

## SOIL

Sampling Point: Plot 4-WET

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-6" | 10YR 2/2 | 95 | 10YR 3/4 | 5 | C | M | silt loam | w/ gravel |
| | | | | | | | | Rock Refusal below 6" |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** Yes X No _____

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- X Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes _____ No _____ Depth (inches): >16"

Water Table Present? Yes _____ No _____ Depth (inches): >16"

Saturation Present? (includes capillary fringe) Yes X No _____ Depth (inches): to surface

**Wetland Hydrology Present?** Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

# WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: ODOT Solar Highway Project City/County: West Linn / Clackamas County Sampling Date: May 27, 2009

Applicant/Owner: Oregon Department of Transportation State: OR Sampling Point: Plot 5-UP

Investigator(s): Paul Agrimis, Hunter White Section, Township, Range: Section 35, T2S, R1E, Willamette Meridian

Landform (hillslope, terrace, etc.): cut terrace above I-205 & Willamette River Local relief (concave, convex, none): none Slope (%): 2%

Subregion (LRR): LRR A, MLRA 2 Lat: 45° 20' 59.12"N Long: 122° 38' 28.53"W Datum: WGS84

Soil Map Unit Name: 89D – Witzel very stony silt loam, 3 to 40 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | Yes ____ No X | **Is the Sampled Area within a Wetland?** Yes ____ No X |
| Hydric Soil Present? | Yes ____ No X | |
| Wetland Hydrology Present? | Yes ____ No X | |

Remarks:

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30-foot radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0 = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 30-foot radius) | | | |
| 1. Cytisus scoparius | 5 | Y | UPL |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | 5 = Total Cover | | |
| **Herb Stratum** (Plot size: 5-foot radius) | | | |
| 1. Arrhenatherum elatius | 30 | Y | UPL |
| 2. Holcus lanatus | 30 | Y | FAC |
| 3. Chrysanthemum leucanthemum | 20 | Y | UPL |
| 4. Poa pratensis | 10 | | FAC |
| 5. Bromus carinatus | 10 | | UPL |
| 6. | | | |
| 7. | | | |
| | 100 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30-foot radius) | | | |
| 1. | | | |
| 2. | | | |
| | = Total Cover | | |

% Bare Ground in Herb Stratum 0

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 25 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species | x 1 = |
| FACW species | x 2 = |
| FAC species | x 3 = |
| FACU species | x 4 = |
| UPL species | x 5 = |
| Column Totals: (A) | (B) |

Prevalence Index = B/A =

**Hydrophytic Vegetation Indicators:**

- ___ Dominance Test is >50%
- ___ Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes ____ No X

Remarks:

## SOIL

Sampling Point: Plot 5-UP

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Redox Features Type[1] | Redox Features Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-10" | 10YR 5/4 | 100 | | | | | gravelly loam | |
| | | | | | | | | Rock Refusal at 10" |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** Yes _____ No __X__

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes _____ No __X__ Depth (inches): _____

Water Table Present? Yes _____ No __X__ Depth (inches): >16"

Saturation Present? (includes capillary fringe) Yes _____ No __X__ Depth (inches): >16"

**Wetland Hydrology Present?** Yes _____ No __X__

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

# WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: ODOT Solar Highway Project City/County: West Linn / Clackamas County Sampling Date: May 27, 2009

Applicant/Owner: Oregon Department of Transportation State: OR Sampling Point: Plot 6-WET

Investigator(s): Paul Agrimis, Hunter White Section, Township, Range: Section 35, T2S, R1E, Willamette Meridian

Landform (hillslope, terrace, etc.): cut terrace above I-205 & Willamette River Local relief (concave, convex, none): concave Slope (%): 2%

Subregion (LRR): LRR A, MLRA 2 Lat: 45° 20' 59.12"N Long: 122° 38' 28.53"W Datum: WGS84

Soil Map Unit Name: 89D – Witzel very stony silt loam, 3 to 40 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation ____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | Yes X No _____ | **Is the Sampled Area within a Wetland?** Yes X No _____ |
| Hydric Soil Present? | Yes X No _____ | |
| Wetland Hydrology Present? | Yes X No _____ | |

Remarks:

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30-foot radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | _____ = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 30-foot radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | 0 = Total Cover | | |
| **Herb Stratum** (Plot size: 5-foot radius) | | | |
| 1. Holcus lanatus | 60 | Y | FAC |
| 2. Festuca rubra | 30 | Y | FAC+ |
| 3. Sonchus asper | 5 | | FAC- |
| 4. Lolium perenne | trace | | FACU |
| 5. Myosotis laxa | trace | | OBL |
| 6. Vicia americana | trace | | FAC |
| 7. Epilobium angustifolium | trace | | FACU+ |
| | 95 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30-foot radius) | | | |
| 1. | | | |
| 2. | | | |
| | _____ = Total Cover | | |

% Bare Ground in Herb Stratum 5

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

X Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes X No _____

Remarks:

## SOIL

Sampling Point: Plot 6-WET

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-6" | 10YR 4/2 | 80 | GLEY1 4/10GY | 20 | D | M | gravelly loam | |
| | | | | | | | | Rock Refusal at 6" |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** Yes X No ___

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- X Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes ___ No X Depth (inches): 0"

Water Table Present? Yes X No ___ Depth (inches): 6"

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): to surface

**Wetland Hydrology Present?** Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

# WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: ODOT Solar Highway Project City/County: West Linn / Clackamas County Sampling Date: May 27, 2009

Applicant/Owner: Oregon Department of Transportation State: OR Sampling Point: Plot 7-UP

Investigator(s): Paul Agrimis, Hunter White Section, Township, Range: Section 35, T2S, R1E, Willamette Meridian

Landform (hillslope, terrace, etc.): cut terrace above I-205 & Willamette River Local relief (concave, convex, none): none Slope (%): 2%

Subregion (LRR): LRR A, MLRA 2 Lat: 45° 20' 59.12"N Long: 122° 38' 28.53"W Datum: WGS84

Soil Map Unit Name: 89D – Witzel very stony silt loam, 3 to 40 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes ____ | No X | **Is the Sampled Area within a Wetland?** Yes ____ No X |
| Hydric Soil Present? | Yes ____ | No X | |
| Wetland Hydrology Present? | Yes ____ | No X | |

Remarks:

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30-foot radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0 = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 30-foot radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | 0 = Total Cover | | |
| **Herb Stratum** (Plot size: 5-foot radius) | | | |
| 1. Bromus carinatus | 60 | Y | UPL |
| 2. Holcus lanatus | 5 | | FAC |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| | 65 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30-foot radius) | | | |
| 1. | | | |
| 2. | | | |
| | = Total Cover | | |

% Bare Ground in Herb Stratum 0

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species ____ | x 1 = ____ |
| FACW species ____ | x 2 = ____ |
| FAC species ____ | x 3 = ____ |
| FACU species ____ | x 4 = ____ |
| UPL species ____ | x 5 = ____ |
| Column Totals: ____ (A) | ____ (B) |

Prevalence Index = B/A = ____

**Hydrophytic Vegetation Indicators:**

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes ____ No X

Remarks:

## SOIL

Sampling Point: Plot 7-UP

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Redox Features Type[1] | Redox Features Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-6" | 10YR 4/3 | 100 | | | | | gravelly loam | |
| | | | | | | | | Rock Refusal at 6 " |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** Yes _____ No __X__

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes _____ No __X__ Depth (inches): _____

Water Table Present? Yes _____ No __X__ Depth (inches): >16"

Saturation Present? (includes capillary fringe) Yes _____ No __X__ Depth (inches): >16"

**Wetland Hydrology Present?** Yes _____ No __X__

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

# WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: ODOT Solar Highway Project City/County: West Linn / Clackamas County Sampling Date: May 27, 2009

Applicant/Owner: Oregon Department of Transportation State: OR Sampling Point: Plot 8-WET

Investigator(s): Paul Agrimis, Hunter White Section, Township, Range: Section 35, T2S, R1E, Willamette Meridian

Landform (hillslope, terrace, etc.): cut terrace above I-205 & Willamette River Local relief (concave, convex, none): concave Slope (%): 2%

Subregion (LRR): LRR A, MLRA 2 Lat: 45° 20' 59.12"N Long: 122° 38' 28.53"W Datum: WGS84

Soil Map Unit Name: 89D – Witzel very stony silt loam, 3 to 40 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation ____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | Yes X No _____ | **Is the Sampled Area within a Wetland?** Yes X No _____ |
| Hydric Soil Present? | Yes X No _____ | |
| Wetland Hydrology Present? | Yes X No _____ | |

Remarks:

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30-foot radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | _____ = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 30-foot radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | 0 = Total Cover | | |
| **Herb Stratum** (Plot size: 5-foot radius) | | | |
| 1. Holcus lanatus | 70 | Y | FAC |
| 2. Myosotis laxa | 25 | Y | OBL |
| 3. Festuca rubra | 5 | | FAC+ |
| 4. Bromus carinatus | trace | | UPL |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| | 100 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30-foot radius) | | | |
| 1. | | | |
| 2. | | | |
| | _____ = Total Cover | | |

% Bare Ground in Herb Stratum 0

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

X Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes X No _____

Remarks:

## SOIL

Sampling Point: Plot 8-WET

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-8" | 10YR 3/1 | 80 | 10YR 4/4 | 20 | C | M | gravelly loam | |
| | | | | | | | | Rock Refusal at 8" |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** Yes X No _____

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- X Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- X Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes _____ No X Depth (inches): 0"

Water Table Present? Yes X No _____ Depth (inches): 2"

Saturation Present? (includes capillary fringe) Yes X No _____ Depth (inches): to surface

**Wetland Hydrology Present?** Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

# WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: ODOT Solar Highway Project City/County: West Linn / Clackamas County Sampling Date: May 27, 2009

Applicant/Owner: Oregon Department of Transportation State: OR Sampling Point: Plot 9-UP

Investigator(s): Paul Agrimis, Hunter White Section, Township, Range: Section 35, T2S, R1E, Willamette Meridian

Landform (hillslope, terrace, etc.): cut terrace above I-205 & Willamette River Local relief (concave, convex, none): none Slope (%): 2%

Subregion (LRR): LRR A, MLRA 2 Lat: 45° 20' 59.12"N Long: 122° 38' 28.53"W Datum: WGS84

Soil Map Unit Name: 89D – Witzel very stony silt loam, 3 to 40 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation ____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ No X | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ No X | |
| Wetland Hydrology Present? | Yes _____ No X | |

Remarks:

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30-foot radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0 = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 30-foot radius) | | | |
| 1. Pyrus malus (cultivated crab apple) | 5 | Y | UPL |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | 0 = Total Cover | | |
| **Herb Stratum** (Plot size: 5-foot radius) | | | |
| 1. Arrhenatherum elatius | 50 | Y | UPL |
| 2. Holcus lanatus | 10 | Y | FAC |
| 3. Sonchus asper | 10 | Y | FAC- |
| 4. Epilobium angustifolium | 10 | Y | FACU+ |
| 5. Galium triflorum | 5 | | FACU |
| 6. Cirsium arvense | 5 | | FACU+ |
| 7. Vicia americana | 5 | | |
| | 95 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30-foot radius) | | | |
| 1. | | | |
| 2. | | | |
| | = Total Cover | | |

% Bare Ground in Herb Stratum 5

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 40 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species | x 1 = |
| FACW species | x 2 = |
| FAC species | x 3 = |
| FACU species | x 4 = |
| UPL species | x 5 = |
| Column Totals: (A) | (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes _____ No X

Remarks:

## SOIL

Sampling Point: Plot 9-UP

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Redox Features Type[1] | Redox Features Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-6" | 10YR 3/4 | 100 | | | | | gravelly loam | |
| | | | | | | | | Rock Refusal at 6" |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA** 1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** Yes _____ No __X__

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes _____ No __X__ Depth (inches): _____

Water Table Present? Yes _____ No __X__ Depth (inches): >16"

Saturation Present? (includes capillary fringe) Yes _____ No __X__ Depth (inches): >16"

**Wetland Hydrology Present?** Yes _____ No __X__

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

# WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: ODOT Solar Highway Project City/County: West Linn / Clackamas County Sampling Date: May 27, 2009

Applicant/Owner: Oregon Department of Transportation State: OR Sampling Point: Plot 10-WET

Investigator(s): Paul Agrimis, Hunter White Section, Township, Range: Section 35, T2S, R1E, Willamette Meridian

Landform (hillslope, terrace, etc.): cut terrace above I-205 & Willamette River Local relief (concave, convex, none): concave Slope (%): 2%

Subregion (LRR): LRR A, MLRA 2 Lat: 45° 20' 59.12"N Long: 122° 38' 28.53"W Datum: WGS84

Soil Map Unit Name: 89D – Witzel very stony silt loam, 3 to 40 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation ____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | Yes X No _____ | **Is the Sampled Area within a Wetland?** Yes X No _____ |
| Hydric Soil Present? | Yes X No _____ | |
| Wetland Hydrology Present? | Yes X No _____ | |

Remarks:

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30-foot radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | = Total Cover | | |
| **Sapling/Shrub Stratum (Plot size: 30-foot radius)** | | | |
| 1. Pyrus malus (cultivated crab apple) | 5 | Y | UPL |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | 5 = Total Cover | | |
| **Herb Stratum (Plot size: 5-foot radius)** | | | |
| 1. Typha latifolia | 50 | Y | OBL |
| 2. Holcus lanatus | 40 | Y | FAC |
| 3. Sonchus asper | 5 | | FAC- |
| 4. Vicia americana | trace | | FAC |
| 5. Epilobium watsonii | trace | | FACW- |
| 6. | | | |
| 7. | | | |
| | 95 = Total Cover | | |
| **Woody Vine Stratum (Plot size: 30-foot radius)** | | | |
| 1. | | | |
| 2. | | | |
| | = Total Cover | | |

% Bare Ground in Herb Stratum 5

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

X Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes X No _____

Remarks:

## SOIL

Sampling Point: Plot 10-WET

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-8" | 10YR 3/1 | 90 | 10YR 4/4 | 10 | C | M | gravelly loam | |
| | | | | | | | | Rock Refusal at 8" |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** Yes X No _____

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- X Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes X No _____ Depth (inches): 1"

Water Table Present? Yes X No _____ Depth (inches): 4"

Saturation Present? (includes capillary fringe) Yes X No _____ Depth (inches): to surface

**Wetland Hydrology Present?** Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

# WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: ODOT Solar Highway Project City/County: West Linn / Clackamas County Sampling Date: May 27, 2009

Applicant/Owner: Oregon Department of Transportation State: OR Sampling Point: Plot 11-UP

Investigator(s): Paul Agrimis, Hunter White Section, Township, Range: Section 35, T2S, R1E, Willamette Meridian

Landform (hillslope, terrace, etc.): cut terrace above I-205 & Willamette River Local relief (concave, convex, none): none Slope (%): 2%

Subregion (LRR): LRR A, MLRA 2 Lat: 45° 20' 59.12"N Long: 122° 38' 28.53"W Datum: WGS84

Soil Map Unit Name: 89D – Witzel very stony silt loam, 3 to 40 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation ____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No X | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ | No X | |
| Wetland Hydrology Present? | Yes _____ | No X | |

Remarks:

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30-foot radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0 = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 30-foot radius) | | | |
| 1. Rubus armeniacus | 100 | Y | UPL |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | 100 = Total Cover | | |
| **Herb Stratum** (Plot size: 5-foot radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| | 0 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30-foot radius) | | | |
| 1. | | | |
| 2. | | | |
| | _____ = Total Cover | | |

% Bare Ground in Herb Stratum 100

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes _____ No X

Remarks:

## SOIL

Sampling Point: Plot 11-UP

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Redox Features Type[1] | Redox Features Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-6" | 10YR 3/4 | 100 | | | | | gravelly loam | |
| | | | | | | | | Rock Refusal at 6" |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** **Yes** _____ **No** X

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): >16"

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): >16"

**Wetland Hydrology Present?** **Yes** _____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

# WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: ODOT Solar Highway Project City/County: West Linn / Clackamas County Sampling Date: May 27, 2009

Applicant/Owner: Oregon Department of Transportation State: OR Sampling Point: Plot 12-WET

Investigator(s): Paul Agrimis, Hunter White Section, Township, Range: Section 35, T2S, R1E, Willamette Meridian

Landform (hillslope, terrace, etc.): cut terrace above I-205 & Willamette River Local relief (concave, convex, none): concave Slope (%): 2%

Subregion (LRR): LRR A, MLRA 2 Lat: 45° 20' 59.12"N Long: 122° 38' 28.53"W Datum: WGS84

Soil Map Unit Name: 89D – Witzel very stony silt loam, 3 to 40 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ____ (If no, explain in Remarks.)

Are Vegetation X, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | Yes X No ____ | **Is the Sampled Area within a Wetland?** Yes X No ____ |
| Hydric Soil Present? | Yes X No ____ | |
| Wetland Hydrology Present? | Yes X No ____ | |

Remarks: All herbaceous vegetation has been suppressed by the Armenian blackberry, even in areas where surface water was present. This area may dry out later in the year, allowing blackberry to thrive.

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30-foot radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | ____ = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 30-foot radius) | | | |
| 1. Pyrus malus (culvitated crab apple) | 5 | Y | UPL |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | 5 = Total Cover | | |
| **Herb Stratum** (Plot size: 5-foot radius) | | | |
| 1. Typha latifolia | 50 | Y | OBL |
| 2. Holcus lanatus | 40 | Y | FAC |
| 3. Sonchus asper | 5 | | FAC- |
| 4. Vicia americana | trace | | FAC |
| 5. Epilobium watsonii | trace | | FACW- |
| 6. | | | |
| 7. | | | |
| | 95 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30-foot radius) | | | |
| 1. | | | |
| 2. | | | |
| | ____ = Total Cover | | |

% Bare Ground in Herb Stratum 5

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species ____ | x 1 = ____ |
| FACW species ____ | x 2 = ____ |
| FAC species ____ | x 3 = ____ |
| FACU species ____ | x 4 = ____ |
| UPL species ____ | x 5 = ____ |
| Column Totals: ____ (A) | ____ (B) |

Prevalence Index = B/A = ____

**Hydrophytic Vegetation Indicators:**

X Dominance Test is >50%

__ Prevalence Index is ≤3.0[1]

__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ Wetland Non-Vascular Plants[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes X No ____

Remarks:

## SOIL

Sampling Point: Plot 12-WET

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-8" | 10YR 3/1 | 90 | 10YR 4/4 | 10 | C | M | gravelly loam | |
| | | | | | | | | Rock Refusal at 8" |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** Yes X No _____

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- X Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes X No _____ Depth (inches): 1"

Water Table Present? Yes X No _____ Depth (inches): 4"

Saturation Present? (includes capillary fringe) Yes X No _____ Depth (Inches): to surface

**Wetland Hydrology Present?** Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

# WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: ODOT Solar Highway Project City/County: West Linn / Clackamas County Sampling Date: June 19, 2009

Applicant/Owner: Oregon Department of Transportation State: OR Sampling Point: Plot 13-UP

Investigator(s): Paul Agrimis, Hunter White Section, Township, Range: Section 35, T2S, R1E, Willamette Meridian

Landform (hillslope, terrace, etc.): Ditched flow path along I-205 Local relief (concave, convex, none): slight slope Slope (%): 5%

Subregion (LRR): LRR A, MLRA 2 Lat: 45° 20' 59.12"N Long: 122° 38' 28.53"W Datum: WGS84

Soil Map Unit Name: 89D – Witzel very stony silt loam, 3 to 40 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation ____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No X | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ | No X | |
| Wetland Hydrology Present? | Yes _____ | No X | |

Remarks:

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 20ft x 20ft) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0 = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 30-foot radius) | | | |
| 1. Rubus armeniacus | 5 | Y | FACU |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | 5 = Total Cover | | |
| **Herb Stratum** (Plot size: 5-foot radius) | | | |
| 1. Agrostis tenuis | 40 | Y | FAC |
| 2. Plantago lanceolata | 20 | Y | FAC |
| 3. Festuca arundinacea | 20 | Y | FAC- |
| 4. Hypochaeris radicata | 10 | | FACU |
| 5. Taraxacum officinale | 10 | | FACU |
| 6. | | | |
| 7. | | | |
| | 100 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30-foot radius) | | | |
| 1. | | | |
| 2. | | | |
| | = Total Cover | | |

% Bare Ground in Herb Stratum 5

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

X Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes X No _____

Remarks:

## SOIL

Sampling Point: Plot 13-UP

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Redox Features Type[1] | Redox Features Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-6" | 10YR 3/3 | 100 | | | | | silt loam | w/ gravel & cobbles |
| | | | | | | | | Rock Refusal at 6" |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** Yes ____ No __X__

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes ____ No __X__ Depth (inches): _____

Water Table Present? Yes ____ No __X__ Depth (inches): >16"

Saturation Present? (includes capillary fringe) Yes ____ No __X__ Depth (inches): >16"

**Wetland Hydrology Present?** Yes ____ No __X__

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

# WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: ODOT Solar Highway Project City/County: West Linn / Clackamas County Sampling Date: June 19, 2009

Applicant/Owner: Oregon Department of Transportation State: OR Sampling Point: Plot 14-WET

Investigator(s): Paul Agrimis, Hunter White Section, Township, Range: Section 35, T2S, R1E, Willamette Meridian

Landform (hillslope, terrace, etc.): Ditched flow path along I-205 Local relief (concave, convex, none): slight slope Slope (%): 5%

Subregion (LRR): LRR A, MLRA 2 Lat: 45° 20' 59.12"N Long: 122° 38' 28.53"W Datum: WGS84

Soil Map Unit Name: 89D – Witzel very stony silt loam, 3 to 40 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | Yes X No _____ | **Is the Sampled Area within a Wetland?** Yes X No _____ |
| Hydric Soil Present? | Yes X No _____ | |
| Wetland Hydrology Present? | Yes X No _____ | |

Remarks:

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 10ft x 20ft) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0 = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 10ft x 20ft) | | | |
| 1. Populus balsamifera | 20 | Y | FAC |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | 20 = Total Cover | | |
| **Herb Stratum** (Plot size: 5-foot radius) | | | |
| 1. Festuca arundinacea | 25 | Y | FAC- |
| 2. Juncus effuses | 10 | Y | FACW |
| 3. Epilobium watsonii | 5 | | FACW- |
| 4. Holcus lanatus | 5 | | FAC |
| 5. Juncus ensifolius | 5 | | FACW |
| 6. | | | |
| 7. | | | |
| | 50 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30-foot radius) | | | |
| 1. | | | |
| 2. | | | |
| | = Total Cover | | |

% Bare Ground in Herb Stratum 50

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species | x 1 = |
| FACW species | x 2 = |
| FAC species | x 3 = |
| FACU species | x 4 = |
| UPL species | x 5 = |
| Column Totals: (A) | (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

X Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes X No _____

Remarks:

## SOIL

Sampling Point: Plot 14-WET

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-8" | 10YR 3/2 | 95 | 7.5YR 4/6 | 5 | C | M | silt loam | w/ gravel |
| | | | | | | | | Rock Refusal at 8" |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** Yes X No _____

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- X Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- X Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes X No _____ Depth (inches): 1ft away

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes X No _____ Depth (inches): to surface

**Wetland Hydrology Present?** Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

# WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: ODOT Solar Highway Project City/County: West Linn / Clackamas County Sampling Date: June 19, 2009

Applicant/Owner: Oregon Department of Transportation State: OR Sampling Point: Plot 15-UP

Investigator(s): Paul Agrimis, Hunter White Section, Township, Range: Section 35, T2S, R1E, Willamette Meridian

Landform (hillslope, terrace, etc.): Ditched flow path along I-205 Local relief (concave, convex, none): slight slope Slope (%): 5%

Subregion (LRR): LRR A, MLRA 2 Lat: 45° 20' 59.12"N Long: 122° 38' 28.53"W Datum: WGS84

Soil Map Unit Name: 89D – Witzel very stony silt loam, 3 to 40 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | Yes X No _____ | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ No X | |
| Wetland Hydrology Present? | Yes _____ No X | |

Remarks:

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 20ft x 20ft) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Pseudotsuga menziesii | 10 | Y | FACU |
| 2. Acer macrophyllum | 5 | Y | FACU |
| 3. | | | |
| 4. | | | |
| | 15 = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 30-foot radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | _____ = Total Cover | | |
| **Herb Stratum** (Plot size: 5-foot radius) | | | |
| 1. Agrostis tenuis | 35 | Y | FAC |
| 2. Centaurium muhlenbergii | 30 | Y | FACW |
| 3. Plantago lanceolata | 20 | Y | FAC |
| 4. Hypochaeris radicata | 5 | | FACU |
| 5. Linum lewisii | 5 | | UPL |
| 6. Cynosurus echinatus | 5 | | UPL |
| 7. Sonchus asper | trace | | FAC- |
| | 100 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30-foot radius) | | | |
| 1. | | | |
| 2. | | | |
| | _____ = Total Cover | | |

% Bare Ground in Herb Stratum 0

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

X Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes X No _____

Remarks:

## SOIL

Sampling Point: Plot 15-UP

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-6" | 10YR 3/3 | 100 | | | | | silt loam | w/ gravel & cobbles |
| | | | | | | | | Rock Refusal at 6" |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** Yes _____ No X

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): >16"

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): >16"

**Wetland Hydrology Present?** Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

# WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: ODOT Solar Highway Project City/County: West Linn / Clackamas County Sampling Date: June 19, 2009

Applicant/Owner: Oregon Department of Transportation State: OR Sampling Point: Plot 16-WET

Investigator(s): Paul Agrimis, Hunter White Section, Township, Range: Section 35, T2S, R1E, Willamette Meridian

Landform (hillslope, terrace, etc.): Ditched flow path along I-205 Local relief (concave, convex, none): slight slope Slope (%): 5%

Subregion (LRR): LRR A, MLRA 2 Lat: 45° 20' 59.12"N Long: 122° 38' 28.53"W Datum: WGS84

Soil Map Unit Name: 89D – Witzel very stony silt loam, 3 to 40 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation ____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | Yes X No _____ | **Is the Sampled Area within a Wetland?** Yes X No _____ |
| Hydric Soil Present? | Yes X No _____ | |
| Wetland Hydrology Present? | Yes X No _____ | |

Remarks:

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 10ft x 20ft) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0 = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 10ft x 20ft) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | = Total Cover | | |
| **Herb Stratum** (Plot size: 5-foot radius) | | | |
| 1. Festuca arundinacea | 40 | Y | FAC- |
| 2. Phalaris arundinacea | 30 | Y | FACW |
| 3. Holcus lanatus | 20 | Y | FAC |
| 4. Epilobium watsonii | 5 | | FACW- |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| | 95 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30-foot radius) | | | |
| 1. | | | |
| 2. | | | |
| | = Total Cover | | |

% Bare Ground In Herb Stratum 5

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: | |
|---|---|---|
| OBL species | x 1 = | |
| FACW species | x 2 = | |
| FAC species | x 3 = | |
| FACU species | x 4 = | |
| UPL species | x 5 = | |
| Column Totals: (A) | | (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

X Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes X No _____

Remarks:

## SOIL

Sampling Point: Plot 16-WET

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-8" | GLEY1 2.5/10Y | 80 | 7.5YR 4/4 | 20 | C | M & P | silt loam | w/ gravel |
| | | | | | | | | Rock Refusal at 8" |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- X Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present? Yes X No _____**

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- X Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes X No _____ Depth (inches): 3ft away

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes X No _____ Depth (inches): 2"

**Wetland Hydrology Present? Yes X No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

# WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: ODOT Solar Highway Project City/County: West Linn / Clackamas County Sampling Date: June 19, 2009

Applicant/Owner: Oregon Department of Transportation State: OR Sampling Point: Plot 17-UP

Investigator(s): Paul Agrimis, Hunter White Section, Township, Range: Section 35, T2S, R1E, Willamette Meridian

Landform (hillslope, terrace, etc.): Ditched flow path along I-205 Local relief (concave, convex, none): slight slope Slope (%): 5%

Subregion (LRR): LRR A, MLRA 2 Lat: 45° 20' 59.12"N Long: 122° 38' 28.53"W Datum: WGS84

Soil Map Unit Name: 89D – Witzel very stony silt loam, 3 to 40 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation ____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ No X | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ No X | |
| Wetland Hydrology Present? | Yes _____ No X | |

Remarks:

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 20ft x 20ft) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 30-foot radius) | | | |
| 1. Rubus discolor | 10 | Y | FACU |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | 10 = Total Cover | | |
| **Herb Stratum** (Plot size: 5-foot radius) | | | |
| 1. Bromus carinatus | 40 | Y | UPL |
| 2. Anthoxanthum odoratum | 20 | Y | FACU |
| 3. Arrhenatherum elatius | 10 | | UPL |
| 4. Avena fatua | 10 | | UPL |
| 5. Latuca serriola | 5 | | FACU |
| 6. | | | |
| 7. | | | |
| | 85 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30-foot radius) | | | |
| 1. | | | |
| 2. | | | |
| | = Total Cover | | |

% Bare Ground in Herb Stratum 15

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species | x 1 = |
| FACW species | x 2 = |
| FAC species | x 3 = |
| FACU species | x 4 = |
| UPL species | x 5 = |
| Column Totals: (A) | (B) |

Prevalence Index = B/A =

**Hydrophytic Vegetation Indicators:**

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes _____ No X

Remarks:

## SOIL

Sampling Point: Plot 17-UP

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-6" | 10YR 4/3 | 100 | | | | | silt loam | w/ gravel & cobbles |
| | | | | | | | | Rock Refusal at 6" |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** Yes _____ No __X__

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes _____ No __X__ Depth (inches): _____

Water Table Present? Yes _____ No __X__ Depth (inches): >16"

Saturation Present? (includes capillary fringe) Yes _____ No __X__ Depth (inches): >16"

**Wetland Hydrology Present?** Yes _____ No __X__

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

# WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: ODOT Solar Highway Project City/County: West Linn / Clackamas County Sampling Date: June 19, 2009

Applicant/Owner: Oregon Department of Transportation State: OR Sampling Point: Plot 18-WET

Investigator(s): Paul Agrimis, Hunter White Section, Township, Range: Section 35, T2S, R1E, Willamette Meridian

Landform (hillslope, terrace, etc.): Ditched flow path along I-205 Local relief (concave, convex, none): slight slope Slope (%): 5%

Subregion (LRR): LRR A, MLRA 2 Lat: 45° 20' 59.12"N Long: 122° 38' 28.53"W Datum: WGS84

Soil Map Unit Name: 89D – Witzel very stony silt loam, 3 to 40 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation ____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | Yes X No _____ | **Is the Sampled Area within a Wetland?** Yes X No _____ |
| Hydric Soil Present? | Yes X No _____ | |
| Wetland Hydrology Present? | Yes X No _____ | |

Remarks:

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 10ft x 20ft) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0 = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 10ft x 20ft) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | = Total Cover | | |
| **Herb Stratum** (Plot size: 5-foot radius) | | | |
| 1. Carex stipata | 40 | Y | OBL |
| 2. Hordeum brachyantherum | 25 | Y | FACW- |
| 3. Festuca arundinacea | 10 | | FAC- |
| 4. Juncus effusus | 10 | | FACW |
| 5. Juncus tenuis | 10 | | FACW- |
| 6. Holcus lanatus | trace | | FAC |
| 7. | | | |
| | 95 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30-foot radius) | | | |
| 1. | | | |
| 2. | | | |
| | = Total Cover | | |

% Bare Ground in Herb Stratum 5

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species | x 1 = |
| FACW species | x 2 = |
| FAC species | x 3 = |
| FACU species | x 4 = |
| UPL species | x 5 = |
| Column Totals: (A) | (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

X Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes X No _____

Remarks:

## SOIL

Sampling Point: Plot 18-WET

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-8" | 10YR 2/2 | 70 | 5YR 5/6 | 30 | C | M & P | silt loam | w/ gravel |
| | | | | | | | | Rock Refusal at 8" |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present? Yes X No _____**

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- X Water Marks (B1)
- ___ Sediment Deposits (B2)
- X Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- X Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes X No _____ Depth (inches): 2"

**Wetland Hydrology Present? Yes X No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

# WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: ODOT Solar Highway Project City/County: West Linn / Clackamas County Sampling Date: June 19, 2009

Applicant/Owner: Oregon Department of Transportation State: OR Sampling Point: Plot 19-UP

Investigator(s): Paul Agrimis, Hunter White Section, Township, Range: Section 35, T2S, R1E, Willamette Meridian

Landform (hillslope, terrace, etc.): Ditched flow path along I-205 Local relief (concave, convex, none): slight slope Slope (%): 5%

Subregion (LRR): LRR A, MLRA 2 Lat: 45° 20' 59.12"N Long: 122° 38' 28.53"W Datum: WGS84

Soil Map Unit Name: 89D – Witzel very stony silt loam, 3 to 40 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation ____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No X | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ | No X | |
| Wetland Hydrology Present? | Yes _____ | No X | |

Remarks:

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30-foot radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Populus balsimifera | 90 | Y | FAC |
| 2. Acer macrophyllum | 10 | | FACU |
| 3. | | | |
| 4. | | | |
| | 100 = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 30-foot radius) | | | |
| 1. Rubus armeniacus | 40 | Y | FACU |
| 2. Cytisus scoparius | 10 | | UPL |
| 3. Toxicodendron diversilobum | 10 | | UPL |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | 60 = Total Cover | | |
| **Herb Stratum** (Plot size: 5-foot radius) | | | |
| 1. Holcus lanatus | 10 | Y | FAC |
| 2. Polystichum munitum | 5 | Y | FACU |
| 3. Lolium perenne | 5 | Y | FACU |
| 4. Bromus carinatus | 5 | Y | UPL |
| 5. Lapsana communis | trace | | UPL |
| 6. | | | |
| 7. | | | |
| | 25 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30-foot radius) | | | |
| 1. | | | |
| 2. | | | |
| | = Total Cover | | |

% Bare Ground In Herb Stratum 75

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes _____ No X

Remarks: sandy eroded soil... 75% bare ground

## SOIL

Sampling Point: Plot 19-UP

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-6" | 10YR 4/3 | 100 | | | | | sandy loam | w/ gravel & cobbles |
| | | | | | | | | Rock Refusal at 6" |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** Yes _____ No X

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): >16"

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): >16"

**Wetland Hydrology Present?** Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

# WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: ODOT Solar Highway Project City/County: West Linn / Clackamas County Sampling Date: June 19, 2009

Applicant/Owner: Oregon Department of Transportation State: OR Sampling Point: Plot 20-WET

Investigator(s): Paul Agrimis, Hunter White Section, Township, Range: Section 35, T2S, R1E, Willamette Meridian

Landform (hillslope, terrace, etc.): Ditched flow path along I-205 Local relief (concave, convex, none): slight slope Slope (%): 5%

Subregion (LRR): LRR A, MLRA 2 Lat: 45° 20' 59.12"N Long: 122° 38' 28.53"W Datum: WGS84

Soil Map Unit Name: 89D – Witzel very stony silt loam, 3 to 40 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | Yes X No _____ | **Is the Sampled Area within a Wetland?** Yes X No _____ |
| Hydric Soil Present? | Yes X No _____ | |
| Wetland Hydrology Present? | Yes X No _____ | |

Remarks:

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30-ft radius ) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Populus balsamifera | 70 | Y | FAC |
| 2. Acer macrophyllum | 10 | | FACU |
| 3. | | | |
| 4. | | | |
| | 80 = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 30-ft radius ) | | | |
| 1. Rubus armeniacus | 10 | Y | FACU |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | 10 = Total Cover | | |
| **Herb Stratum** (Plot size: 5-foot radius ) | | | |
| 1. Equisetum arvense | 25 | Y | FAC |
| 2. Epilobium watsonii | 5 | | FACW- |
| 3. Holcus lanatus | 5 | | FAC |
| 4. Lolium perenne | 5 | | FACW |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| | 40 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30-foot radius ) | | | |
| 1. | | | |
| 2. | | | |
| | = Total Cover | | |

% Bare Ground in Herb Stratum 60

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

X Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes X No _____

Remarks:

## SOIL

Sampling Point: Plot 20-WET

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-8" | 10YR 2/2 | 90 | 7.5YR 4/6 | 10 | C | M | sandy loam | w/ gravel |
| | | | | | | | | Rock Refusal at 8" |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA** 1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** Yes X No _____

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- X Water Marks (B1)
- X Sediment Deposits (B2)
- X Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- X Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes X No _____ Depth (inches): 1-3"

Water Table Present? Yes X No _____ Depth (inches): 2"

Saturation Present? (includes capillary fringe) Yes X No _____ Depth (inches): to surface

**Wetland Hydrology Present?** Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

# WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: ODOT Solar Highway Project City/County: West Linn / Clackamas County Sampling Date: June 19, 2009

Applicant/Owner: Oregon Department of Transportation State: OR Sampling Point: Plot 21-UP

Investigator(s): Paul Agrimis, Hunter White Section, Township, Range: Section 35, T2S, R1E, Willamette Meridian

Landform (hillslope, terrace, etc.): Ditched flow path along I-205 Local relief (concave, convex, none): slope Slope (%): 30%

Subregion (LRR): LRR A, MLRA 2 Lat: 45° 20' 59.12"N Long: 122° 38' 28.53"W Datum: WGS84

Soil Map Unit Name: 89D – Witzel very stony silt loam, 3 to 40 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation ____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No X | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ | No X | |
| Wetland Hydrology Present? | Yes _____ | No X | |

Remarks:

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30-foot radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Populus balsimifera | 5 | Y | FAC |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 5 = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 30-foot radius) | | | |
| 1. Cytisus scoparius | 10 | Y | UPL |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | 10 = Total Cover | | |
| **Herb Stratum** (Plot size: 5-foot radius) | | | |
| 1. Bromus carinatus | 90 | Y | UPL |
| 2. Avena fatua | 5 | | UPL |
| 3. Lactuca serriola | 5 | | FACU |
| 4. Festuca arundinacea | trace | | UPL |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| | 100 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30-foot radius) | | | |
| 1. | | | |
| 2. | | | |
| | _____ = Total Cover | | |

% Bare Ground in Herb Stratum 0

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes _____ No X

Remarks:

## SOIL

Sampling Point: Plot 21-UP

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Redox Features Type[1] | Redox Features Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-6" | 10YR 4/3 | 100 | | | | | silty loam | w/ gravel & cobbles |
| | | | | | | | | Rock Refusal at 6" |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** **Yes** _____ **No** X

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): >16"

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): >16"

**Wetland Hydrology Present?** **Yes** _____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

# WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: ODOT Solar Highway Project City/County: West Linn / Clackamas County Sampling Date: June 19, 2009

Applicant/Owner: Oregon Department of Transportation State: OR Sampling Point: Plot 22-WET

Investigator(s): Paul Agrimis, Hunter White Section, Township, Range: Section 35, T2S, R1E, Willamette Meridian

Landform (hillslope, terrace, etc.): Ditched flow path along I-205 Local relief (concave, convex, none): slight slope Slope (%): 5%

Subregion (LRR): LRR A, MLRA 2 Lat: 45° 20' 59.12"N Long: 122° 38' 28.53"W Datum: WGS84

Soil Map Unit Name: 89D – Witzel very stony silt loam, 3 to 40 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | Yes X No _____ | **Is the Sampled Area within a Wetland?** Yes X No _____ |
| Hydric Soil Present? | Yes X No _____ | |
| Wetland Hydrology Present? | Yes X No _____ | |

Remarks:

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30-ft radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 30-ft radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | = Total Cover | | |
| **Herb Stratum** (Plot size: 5-foot radius) | | | |
| 1. Epilobium watsonii | 10 | Y | FACW |
| 2. Holcus lanatus | 10 | Y | FAC |
| 3. Agrostis tenuis | 10 | Y | FAC |
| 4. Lolium perenne | 10 | Y | FACU |
| 5. Juncus bufonius | 5 | | FACW |
| 6. | | | |
| 7. | | | |
| | 45 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30-foot radius) | | | |
| 1. | | | |
| 2. | | | |
| | = Total Cover | | |

% Bare Ground in Herb Stratum 55

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: | |
|---|---|---|
| OBL species | x 1 = | |
| FACW species | x 2 = | |
| FAC species | x 3 = | |
| FACU species | x 4 = | |
| UPL species | x 5 = | |
| Column Totals: (A) | | (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

X Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes X No _____

Remarks:

## SOIL

Sampling Point: Plot 22-WET

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-6" | 10YR 3/2 | 80 | 10YR 4/6 | 10 | C | M | silt loam | w/ gravel |
| | | | 10YR 4/2 | 10 | D | M | | Rock Refusal at 8" |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** Yes X No _____

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- X Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- X Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- X Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes X No _____ Depth (inches): 1 ft away

Water Table Present? Yes X No _____ Depth (inches): 4"

Saturation Present? (includes capillary fringe) Yes X No _____ Depth (inches): 1"

**Wetland Hydrology Present?** Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

# Appendix D: Ground Level Color Photographs

Plot 1- Upland

Plot 2 – Wetland

Plot 3 – Upland, facing east

Plot 4 – Wetland

Plots 3 & 4, on northern boundary of Wetland A

Watercress & cattails, south of Plot 4

Plot 5 – Upland

Plot 6 – Wetland

Plot 7 – Upland

Plot 8 - Wetland

Plot 9 – Upland

Plot 10 – Wetland

Plot 11 – Upland

Plot 12 – Wetland (within blackberry patch)

Plot 13 – Upland

Plot 14 - Wetland

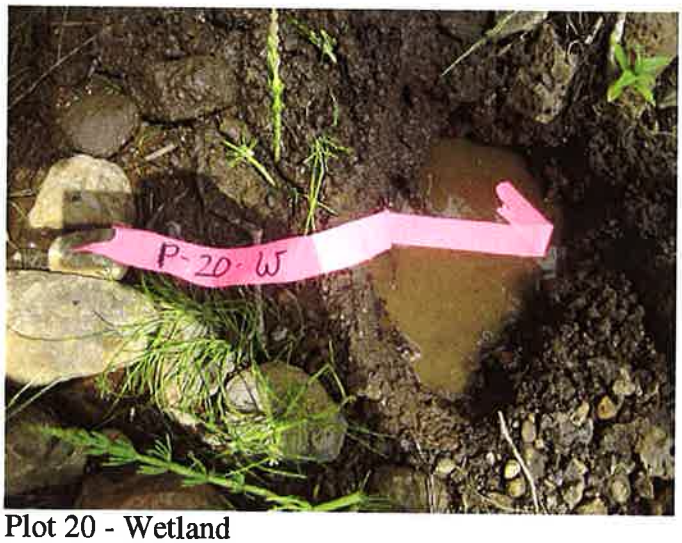
Plot 15 – Upland

Plot 16 – Wetland

Plot 17 – Upland

Plot 18 – Wetland

Plot 19 – Upland



Plot 20 - Wetland

Plot 21 – Upland

Plot 22 – Wetland

NE corner of Wetland A, facing west-southwest

NE corner of Wetland A, facing east

Overview photos of Wetland A, from northern boundary, facing south

NW portion of Wetland A, facing north, from Plot 8

Overview from Plot 8, facing northeast

Overview from Plot 7, facing north

Overview from east of Plot 7, facing northeast

Western flow path, from south of Plot 8, facing north

Overview from Plots 1 & 2, facing northwest

Wetland A in blackberry patch, facing north

NE corner wetland A, from blackberry, facing NW

Algal crust near Plot 8

Algal mat in flow path, near Plot 8, facing SW

Near plots 1 & 2, facing northwest

.

Watercress & cattails south of Plot 2, facing southwest, at study area boundary

Wetland B, from north side of wetland facing west

Wetland B, from outlet culvert, facing east

Wetland C, facing west

Wetland C, from plots 15 & 16, facing southwest

Western end of Wetland C, facing southwest

Outlet of Wetland C, drains under I-205

Wetland D, facing east

Wetland E, facing north

Outlet of Wetland C, drains under I-205

# Appendix E: References

Brinson, M.M. 1993. A Hydrogeomorphic Classification for Wetlands. Technical Report WRP-DE-4. US Army Engineer Waterways Experiment Station: Vicksburg, Mississippi.

Cowardin, Lewis M., and Virginia Carter, Francis C. Golet, and Edward T. LaRoe. 1992. Classification of Wetlands and Deepwater Habitats of the United States. US Department of the Interior, Fish and Wildlife Service: Washington, D.C.

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1. US Army Engineer Waterways Experiment Station: Vicksburg, Mississippi.

Johnson, J. and Maser, J., 1999. Nehalem River Watershed Assessment. Portland State University, Portland, Oregon.

Munsell Color. 2000. Munsell Soil Color Charts. GretagMacbeth. Windsor, New York.

National Climate Data Center (NCDC). http://www.ncdc.noaa.gov/oa/ncdc.html Last accessed July 13, 2008.

National Weather Service (NWS). http://www.weather.gov/climate/index.php?wfo=pqr Last accessed July 13, 2009.

Pojar, Jim and MacKinnon, Andy. 1994. Plants of the Pacific Northwest Coast. Lone Pine Publishing: Vancouver, British Columbia.

Taylor, Ronald J. 1990. Northwest Weeds, the Ugly and Beautiful Villains of Fields, Gardens, and Roadsides. Mountain Press Publishing Company: Missoula, Montana.

U.S. Army Corps of Engineers. 2008. *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region,* ed. J.S. Wakely, R.W. Lichar, and C.V. Noble. ERDC/EL TR-08-13. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

U.S. Department of Agriculture. 2008. NRCS soils data (http://www.or.nrcs.usda.gov/pnw_soil/or_data.html - accessed April 4, 2008)

U.S. Department of the Interior, U.S. Fish and Wildlife Service. National Wetlands Inventory. Office of Biological Services.

U.S. Department of the Interior, U.S. Fish and Wildlife Service. 1988. National List of Plant Species That Occur in Wetlands: Northwest (Region 9).

U.S. Department of the Interior, U.S. Fish and Wildlife Service. 1993. Supplement to the List of Plant Species That Occur in Wetlands: Northwest (Region 9).

U.S. Department of the Interior, U.S. Geological Survey. 1986. Canby, Oregon 7.5-minute quadrangle.

City of West Linn. 2005. Local Wetland Inventory, West Linn Goal 5 Inventory, Jan 2005. http://westlinnoregon.gov/files/gis/g5_wetlands20060605_draft02.pdf Last accessed June 15, 2009.

# Appendix C: Department of State Lands (DSL) Wetland Concurrence

Oregon
Tina Kotek, Governor

**Department of State Lands**
775 Summer Street NE, Suite 100
Salem, OR 97301-1279
(503) 986-5200
FAX (503) 378-4844
www.oregon.gov/dsl

July 2, 2025

**State Land Board**

Tina Kotek
Governor

Tobias Read
Secretary of State

Elizabeth Steiner
State Treasurer

City of West Linn
Attn: Erich Lais
22500 Salamo Road
West Linn, OR 97068

Re: WD # 2025-0055 **Approved**
Wetland Delineation Report for City of West Linn Public Works Facility
Clackamas County; 2S 1E S35D TLs 5400 (Portion), 5200, ROW; 2S 1E S36 ROW

Dear Erich Lais:

The Department of State Lands has reviewed the wetland delineation report prepared by Harper Houf Peterson Righellis Inc. for the site referenced above. Please note that the study area includes a portion of the tax lots described above (see the attached maps). Based upon the information presented in the report, we concur with the wetland and waterway boundaries as mapped in Figure 6, 6-1, and 6-2 of the report. Please replace all copies of the preliminary wetland maps with these final Department-approved maps.

Within the study area, one wetland (Wetland A), totaling approximately 0.66 acres, and one waterway (Stream 1) were identified. These features are subject to the permit requirements of the state Removal-Fill Law. Under current regulations, a state permit is required for cumulative fill or annual excavation of 50 cubic yards or more in wetlands or below the ordinary high-water line (OHWL) of the waterway (or the 2-year recurrence interval flood elevation if OHWL cannot be determined).

This concurrence is for purposes of the state Removal-Fill Law only. We recommend that you attach a copy of this concurrence letter to any subsequent state permit application to speed application review. Federal, other state agencies or local permit requirements may apply as well. The U.S. Army Corps of Engineers will determine jurisdiction under the Clean Water Act, which may require submittal of a complete Wetland Delineation Report.

This concurrence is based on information provided to the agency. The jurisdictional determination is valid for five years from the date of this letter unless new information necessitates a revision. Circumstances under which the Department may change a determination are found in OAR 141-090-0045 (available on our web site or upon

request). In addition, laws enacted by the legislature and/or rules adopted by the Department may result in a change in jurisdiction; individuals and applicants are subject to the regulations that are in effect at the time of the removal-fill activity or complete permit application. The applicant, landowner, or agent may submit a request for reconsideration of this determination in writing within six months of the date of this letter.

Thank you for having the site evaluated. If you have any questions, please contact the Wetland Ecologist for Clackamas County, Trevor Griffiths, at (971) 375-8886.

Sincerely,

Daniel Evans Digitally signed by Daniel Evans
Date: 2025.07.02 16:53:25 -07'00'

Daniel Evans, PWS
Wetland Ecology Specialist

Enclosures

ec: Dan Thew, Harper Houf Peterson Righellis Inc
West Linn Planning Department
Morgan Castilla, Corps of Engineers
Mike DeBlasi, DSL

# WETLAND DELINEATION / DETERMINATION REPORT COVER FORM

A complete report and signed report cover form, along with applicable review fee, are required before a report review timeline can be initiated by the Department of State Lands. All applicants will receive an emailed confirmation that includes the report's unique file number and other information.

**Ways to submit report:**

- **Under 50MB** - A single unlocked PDF can be emailed to: wetland.delineation@dsl.oregon.gov.
- **50MB or larger** - A single unlocked PDF can be uploaded to DSL's Box.com website. After upload notify DSL by email at: wetland.delineation@dsl.oregon.gov.
- OR a hard copy of the unbound report and signed cover form can be mailed to: Oregon Department of State Lands, 775 Summer Street NE, Suite 100, Salem, OR 97301-1279.

**Ways to pay review fee:**

- By credit card on DSL's epayment portal after receiving the unique file number from DSL's emailed confirmation.
- By check payable to the Oregon Department of State Lands attached to the unbound mailed hardcopy OR attached to the complete signed cover form if report submitted electronically.

## Contact and Authorization Information

☒ Applicant ☐ Owner Name, Firm and Address:
Erich Lais
City of West Linn
22500 Salamo Road
West Linn, OR 97068

Business phone # (503) 722-3434
Mobile phone # (optional)
E-mail: elais@westlinnoregon.gov

☐ Authorized Legal Agent, Name and Address (if different):

Business phone #
Mobile phone # (optional)
E-mail:

I either own the property described below or I have legal authority to allow access to the property. I authorize the Department to access the property for the purpose of confirming the information in the report, after prior notification to the primary contact.

**Typed/Printed Name:** Erich Lais **Signature:** Erich Lais

Date: 1/31/25 Special instructions regarding site access: _____

## Project and Site Information

Project Name: City of West Linn Public Works Facility

Latitude: 45.349955 Longitude: -122.642363
**decimal degree** - centroid of site or start & end points of linear project

Proposed Use:
The proposed development includes a public works facility, parking lot, and proposed access road connecting the facility to Salamo Road.

Tax Map # 21E35D
Tax Lot(s) ROW, 005400, 005200

Tax Map # 21E36
Tax Lot(s) ROW

Project Street Address (or other descriptive location):
East of Salamo Road and Greene Street intersection

Township 02S Range 01E Section 35&36 QQ
Use separate sheet for additional tax and location information

City: West Linn County: Clackamas

Waterway: Stream 1 River Mile: n/a

## Wetland Delineation Information

Wetland Consultant Name, Firm and Address:
Dan Thew
HHPR
205 SE Spokane Street Suite 200
Portland, OR 97202

Phone # (503) 221-1131
Mobile phone # (if applicable)
E-mail: dant@hhpr.com

The information and conclusions on this form and in the attached report are true and correct to the best of my knowledge.

**Consultant Signature:** Dan Thew Digitally signed by Dan Thew DN: C=US, E=dant@hhpr.com, CN=Dan Thew Date: 2025.01.31 10:31:20-08'00' Date: 1/31/25

**Primary Contact** for report review and site access is ☒ Consultant ☐ Applicant/Owner ☐ Authorized Agent

Wetland/Waters Present? ☒ Yes ☐ No Study Area size: 14.3 acres Total Wetland Acreage: 0.6600

## Check Applicable Boxes Below

☐ R-F permit application submitted
☐ Fee payment submitted $ _____
☐ Mitigation bank site
☐ Resubmittal of rejected report ($100)
☐ EFSC/ODOE Proj. Mgr: _____
☐ Request for Reissuance. See eligibility criteria. (no fee)
DSL # _____ Expiration date _____
☐ Wetland restoration/enhancement project (not mitigation)
☒ Previous delineation/application on parcel
If known, previous DSL # WD2009-0342
☐ LWI shows wetlands or waters on parcel
Wetland ID code _____

## For Office Use Only

DSL Reviewer: TG Fee Paid Date: ____ / ____ / ____ DSL WD # 2025-0055

Date Delineation Received: 01 / 31 / 2025 DSL App.# _____

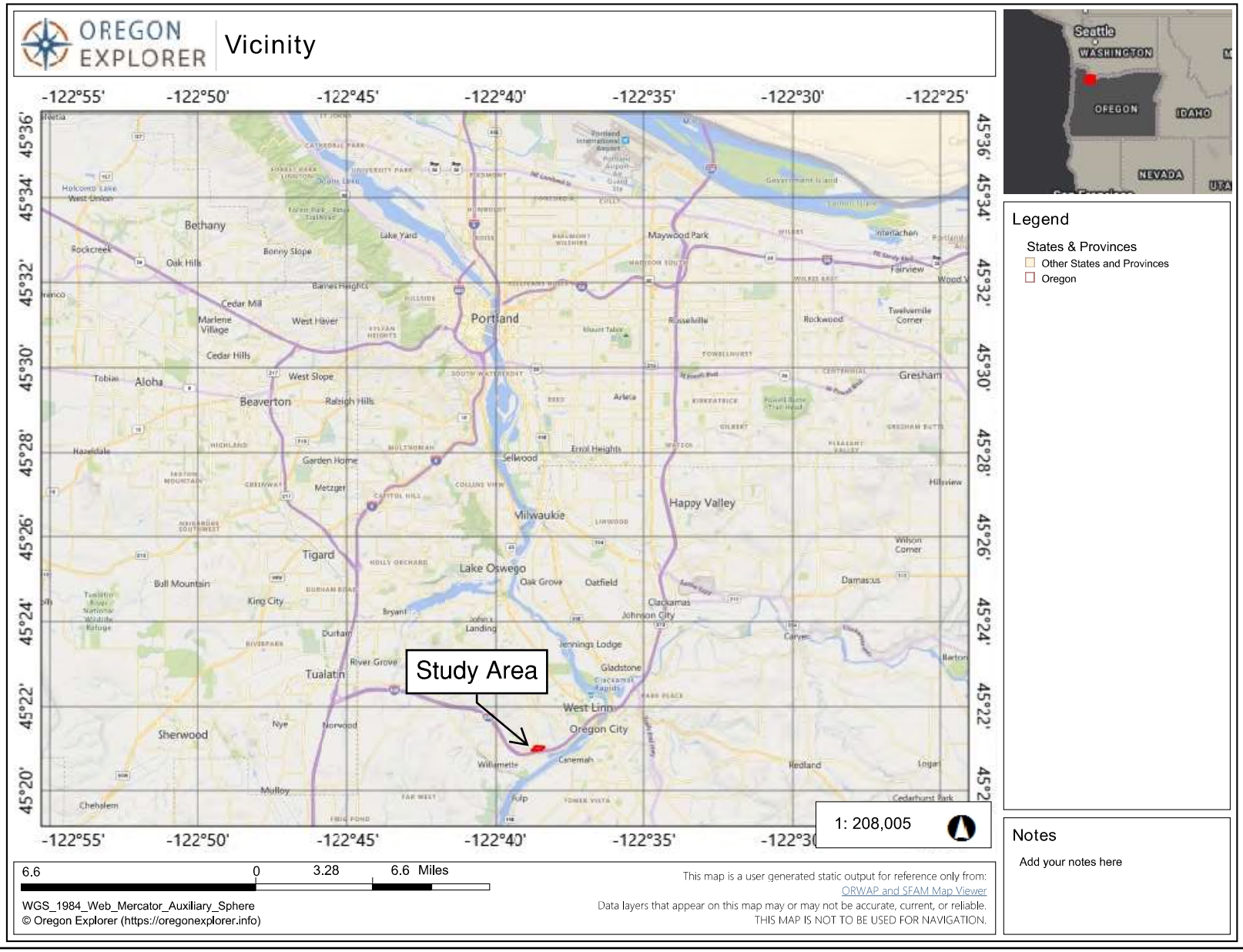



**Figure 1: Vicinity Map**

West Linn Public Works Facility
West Linn, OR

Harper Houf Peterson Righellis Inc.
ENGINEERS ♦ PLANNERS
LANDSCAPE ARCHITECTS ♦ SURVEYORS

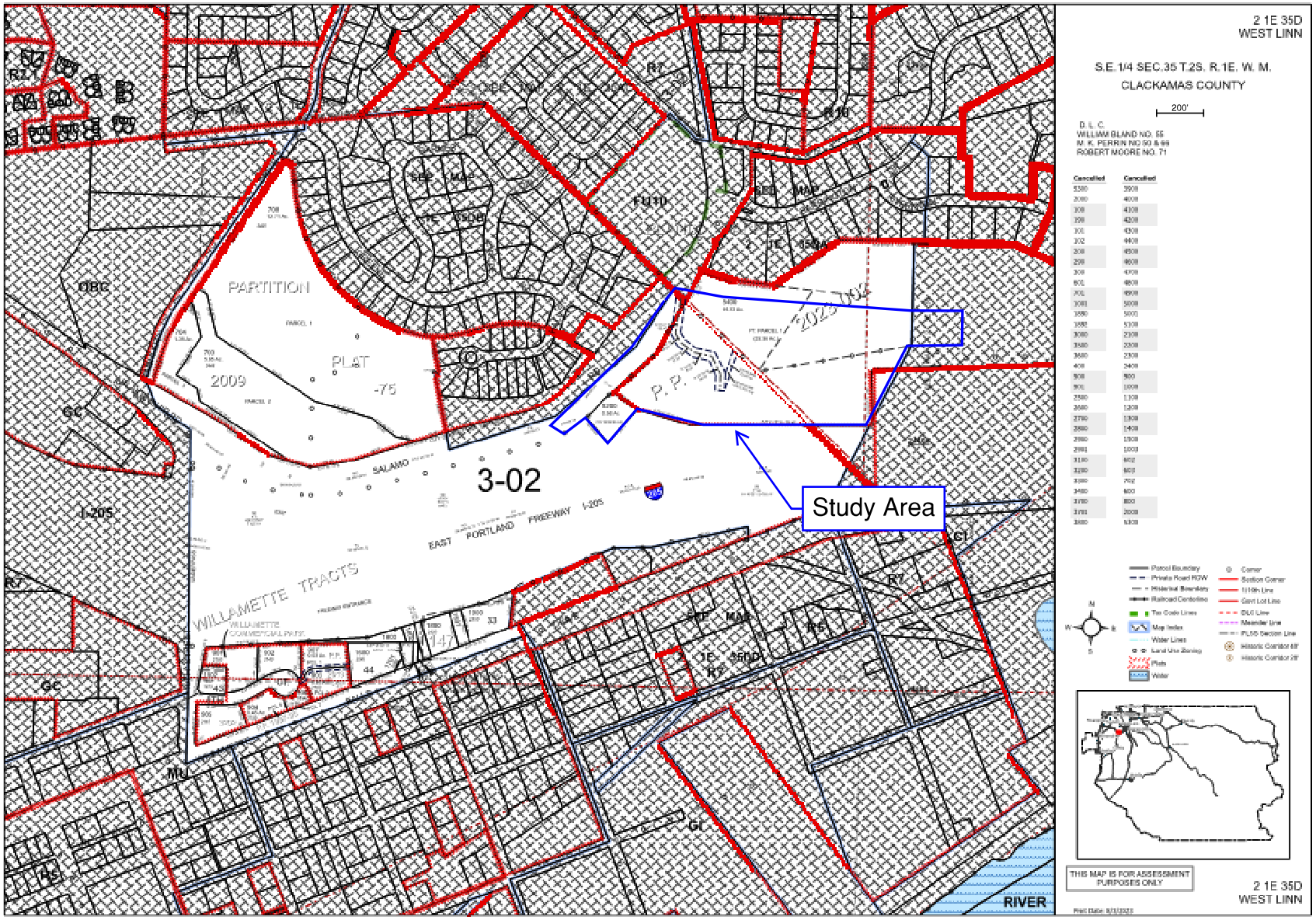



**Figure 2.0: ORMAP Tax Map**

West Linn Public Works Facility
West Linn, OR

Harper Houf Peterson Righellis Inc.
ENGINEERS ♦ PLANNERS
LANDSCAPE ARCHITECTS ♦ SURVEYORS

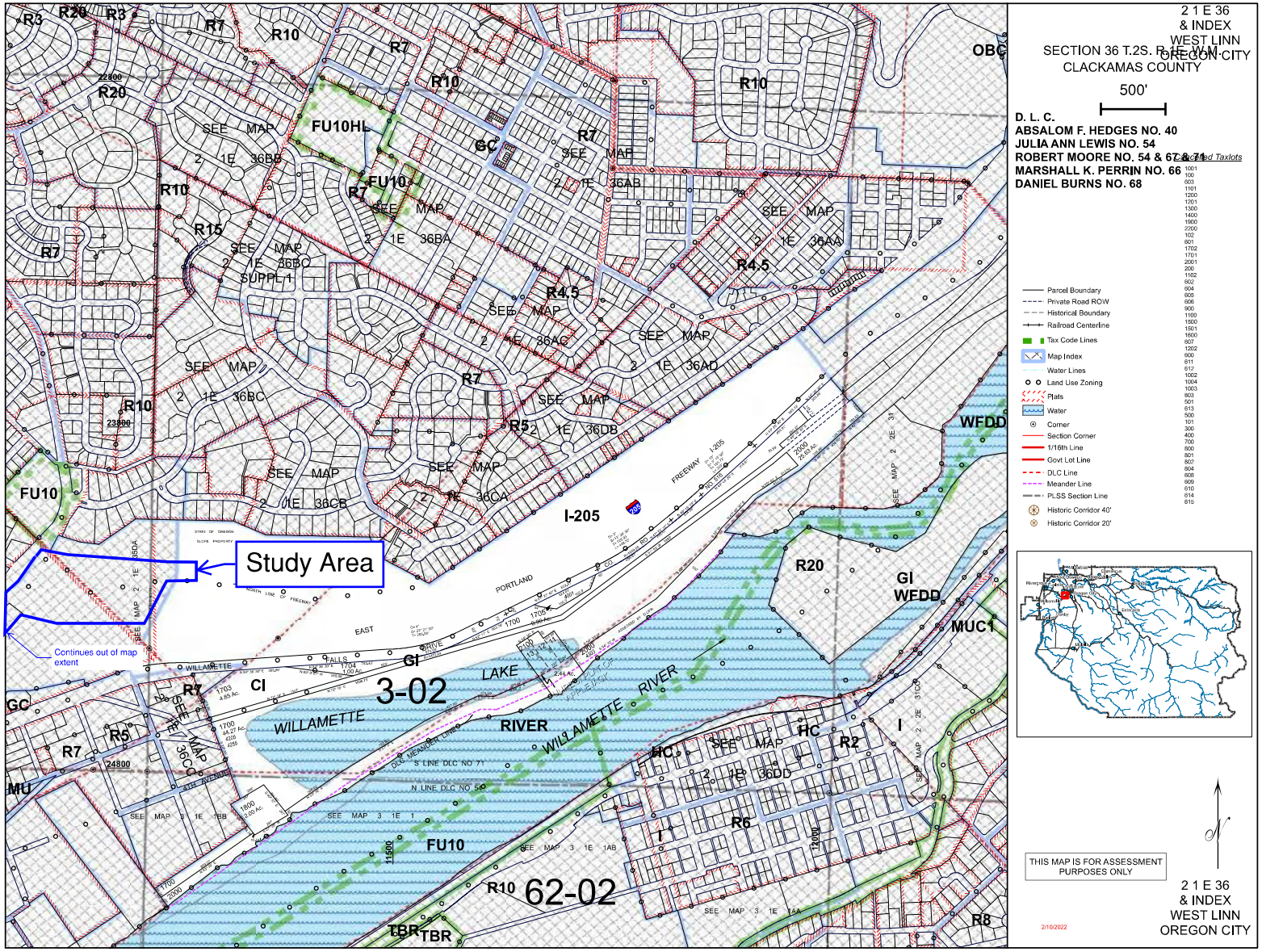
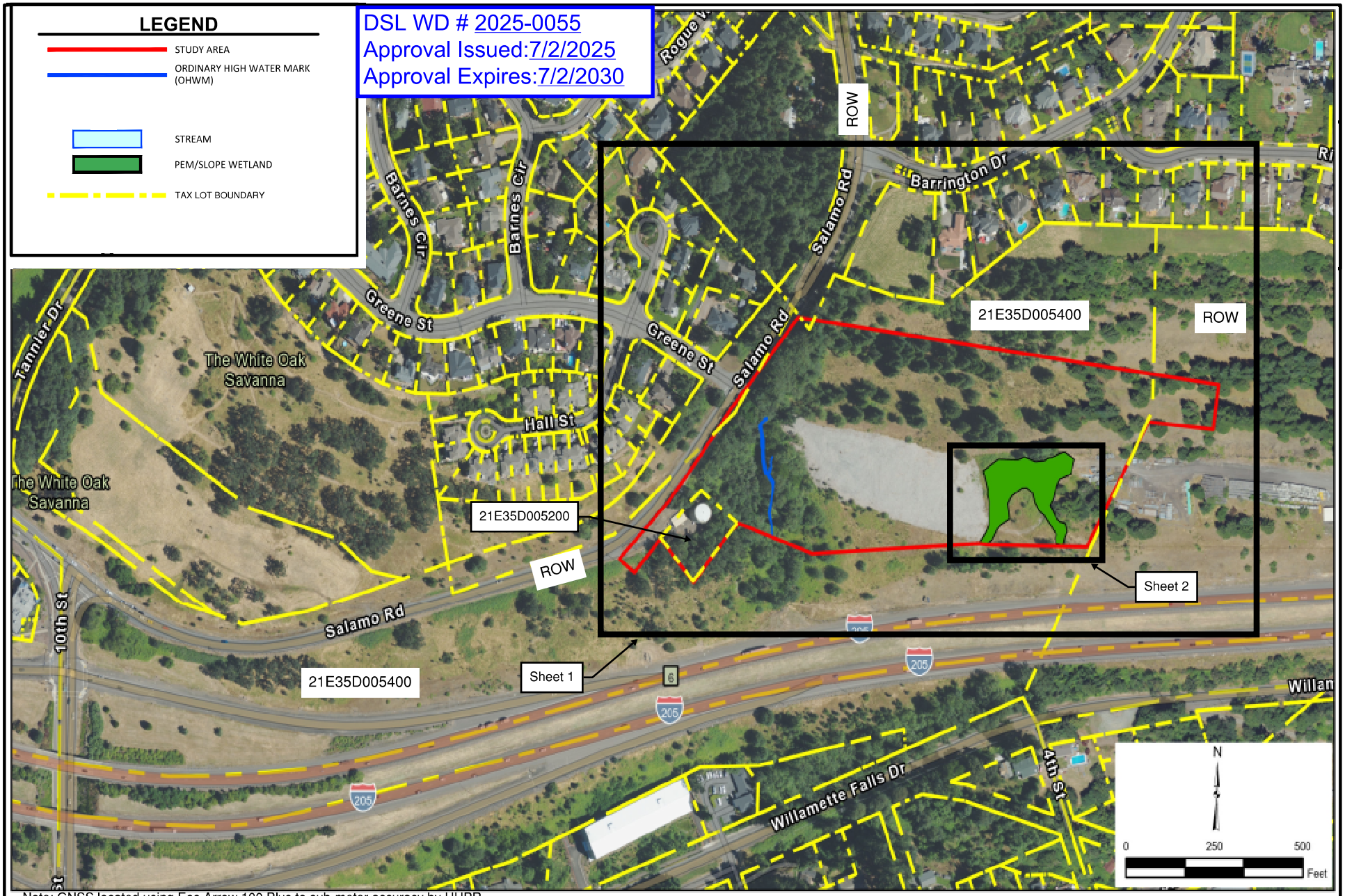



**Figure 2.1: ORMAP Tax Map**

West Linn Public Works Facility
West Linn, OR

Harper Houf Peterson Righellis Inc.
ENGINEERS ♦ PLANNERS
LANDSCAPE ARCHITECTS ♦ SURVEYORS




Note: GNSS located using Eos Arrow 100 Plus to sub-meter accuracy by HHPR

| | | | |
|---|---|---|---|
| SHEET NO. **MAP** | | | DESIGNED: HHPR |
| | | | DRAWN: HHPR |
| | | | CHECKED: HHPR |
| JOB NO. CWL-11 | DATE | NO. DESCRIPTION | DATE: 1/24/25 |
| | REVISIONS | | |

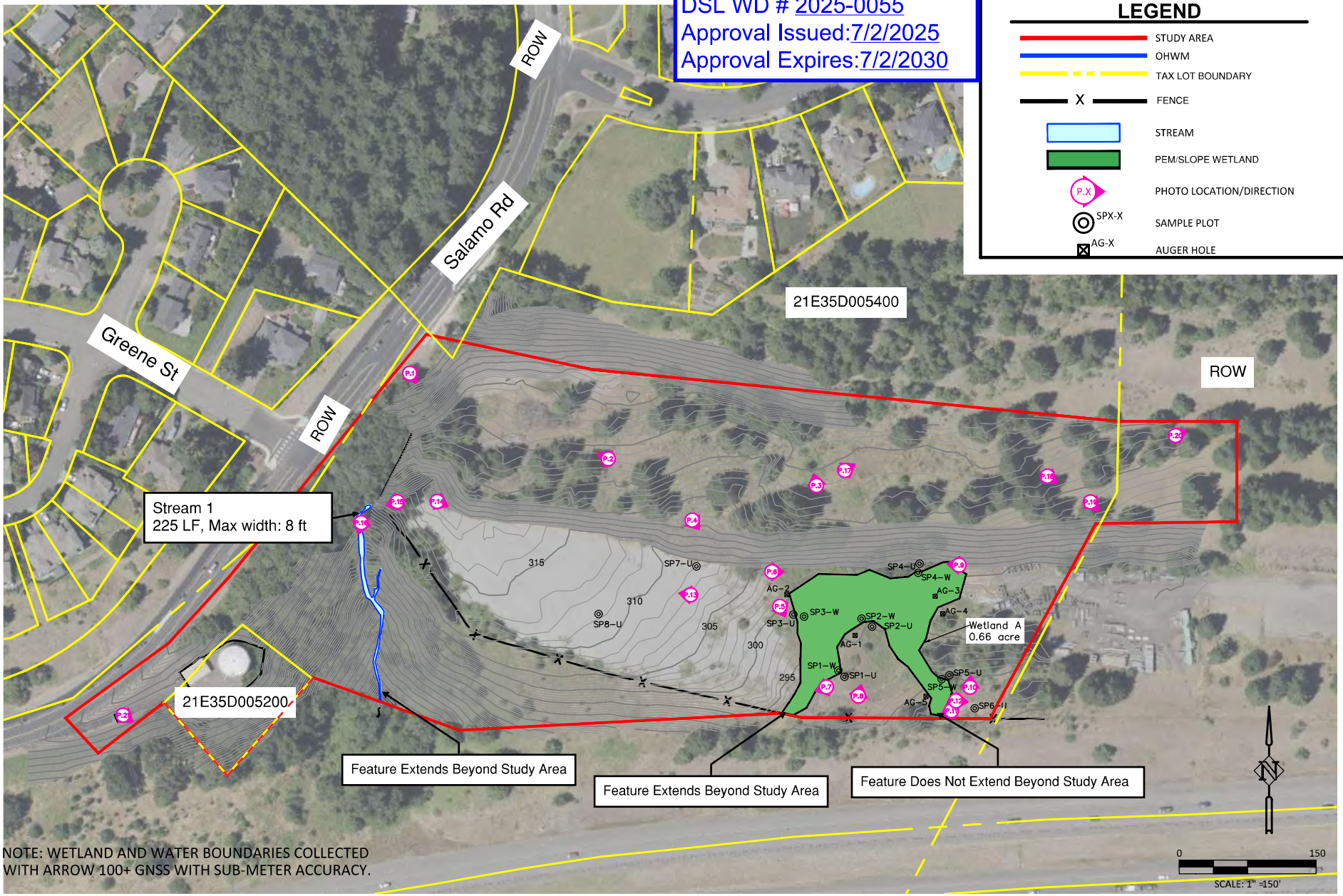

Harper Houf Peterson Righellis Inc.
ENGINEERS♦PLANNERS
LANDSCAPE ARCHITECTS♦SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171


Figure 6: Wetland Delineation Exhibit

# West Linn Public Work Facilities

West Linn, Oregon

DSL WD # 2025-0055
Approval Issued:7/2/2025
Approval Expires:7/2/2030




Note: GNSS located using Eos Arrow 100 Plus to sub-meter accuracy by HHPR

| SHEET NO. | | | | DESIGNED: |
|---|---|---|---|---|
| 1 | | | | HHPR |
| | | | | DRAWN: HHPR |
| | | | | CHECKED: HHPR |
| JOB NO. | DATE | NO. | DESCRIPTION | DATE: |
| CWL-11 | REVISIONS | | | 1/24/25 |


Harper Houf Peterson Righellis Inc.
ENGINEERS♦PLANNERS
LANDSCAPE ARCHITECTS♦SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171


Figure 6: Wetland Delineation Exhibit

# West Linn Public Works Facilities

West Linn, Oregon

# GEOTECHNICAL REPORT

# Report of Geotechnical Engineering Services

## Operations Center

## West Linn, Oregon

**April 3, 2025**

Geotechnical ■ Environmental ■ Special Inspections

**Columbia West**

Engineering, Inc

www.columbia-west.com

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

Vancouver, Washington • Phone: 360-823-2900
Portland, Oregon • Phone: 971-384-1666
www.columbia-west.com

April 3, 2025

City of West Linn
22500 Salamo Road
West Linn, OR 97068

Attn: Morgan Lovell

**Re: Report of Geotechnical Engineering Services**
**Operations Center**
**Salamo Road and Greene Street**
**West Linn, Oregon**
**CWE Project: WestL-1-01-1**

Columbia West Engineering, Inc. (Columbia West) is pleased to present this report of geotechnical engineering services for the proposed Operations Center located east of the Salamo Road and Greene Street intersection in West Linn, Oregon. Our services were conducted in accordance with the Geotechnical Consulting Services Agreement with the City of West Linn dated January 30, 2025.

We appreciate the opportunity to work on the project. Please contact us if you have any questions regarding this report.

Sincerely,

Jonathan A. Nasr, PE
Project Engineer

Najib A. Kalas, PE
Principal Engineer

cc: Erich Lais, City of West Linn
Jeff Dunn, Scott Edwards Architecture
Brandon Dole, Scott Edwards Architecture
Trent Jorgensen, Scott Edwards Architecture

JAN:NAK:kat
Attachments
Document ID: WestL-1-01-1-040325-geor-DRAFT.docx

## EXECUTIVE SUMMARY

This executive summary presents the primary geotechnical considerations associated with the proposed City of West Linn's Operations Center located in West Linn, Oregon. Our conclusions and recommendations are based on the subsurface information presented in the report and proposed development information provided by the design team. Detailed discussion of the geotechnical considerations summarized here is presented in respective sections of the report.

- Based on our understanding of the proposed development and the results of our explorations and engineering analyses, it is our opinion that the proposed development can be constructed at the site.

- Undocumented fill was encountered to depths between 1 foot and 31 feet BGS in 15 of our 18 explorations and to depths between 10.5 and 49.5 feet BGS in prior explorations by others. The composition and consistency of the fill are highly variable and generally include medium stiff to hard clay with varying proportions of sand and gravel or very loose to very dense gravel and sand with varying proportions of clay and silt. The fill also includes cobbles and boulders. Bark chip fill was encountered in seven of our explorations to depths between 6 and 24 inches. To prevent excessive differential settlement, foundations and floor slabs should not bear on the undocumented fill, unless it has been improved. This material should be evaluated during construction and removed from foundation and floor slab subgrade.

- Based on the assumed foundation loads, buildings in areas not underlain by undocumented fill or underlain by less than a few feet of undocumented fill can be supported on conventional spread footings, provided the undocumented fill is removed and replaced with structural fill and the buildings can safely withstand the predicted static foundation settlement.

- In lieu of removal of undocumented fill where the fill is more than a few feet thick, the buildings can be supported on deep foundation or ground improvement. Ground improvement is typically more economical than deep foundations. Therefore, this report focuses on ground improvement. If requested, our office can provide additional recommendations for deep foundations.

- The native, dense gravel, cobbles, and boulders encountered at shallow depths will result in difficult excavation with conventional equipment in both fill and decomposed/weathered basalt as well as the underlying intact basalt. In addition, because of the presence of cobbles and boulders in the near-surface fill and decomposed/weathered basalt, we expect difficult excavation at shallow depths. Utility trenches may result in slowed excavation and larger backfill volumes due to the presence of cobbles, boulders, and related caving.

- The project budget should include a contingency for removal of boulders.

- Static groundwater was measured at depths as shallow as 79.3 feet BGS in the VWPs installed at the site. Based on planned development grades, static groundwater is not a design consideration. Perched groundwater could be encountered at shallow depths following periods of heavy or prolonged rainfall.

- Based on soil and groundwater conditions at the site, liquefaction and lateral spreading are not design considerations at the site.

- Eleven of our 18 explorations encountered topsoil in the upper 6 to 12 inches, which includes an approximately 4- to 6-inch-thick root zone. In general, the topsoil is soft and contains organic material. This material exhibits low or highly variable strength and generally does not provide consistent subgrade support for foundations, floor slabs, or pavement. We recommend that the topsoil be removed, stabilized, or scarified and compacted as recommended for structural fill where it is present.

- Minor to severe caving was observed in 6 of our 13 test pits, starting at depths between 0 feet and 1 foot BGS. Caving was observed to occur within the fill.

- The on-site soil is suitable for use as structural fill, provided it is properly moisture conditioned and free of oversized materials. Moisture conditioning (drying) of the soil will likely be required depending on location and depth. It will be impossible to dry the soil during periods of extended wet weather.

- As an alternative to the use of thickened granular sections to support construction traffic, cement amendment can be used to obtain suitable support properties. However, depending on the grade and location, cobbles and boulders could be present in the subgrade. These oversized materials can damage cement tilling equipment when encountered and may require removal before cement amendment.

- Perimeter building foundation drains are recommended based on the preliminary grading plan and site surface and subsurface conditions. Columbia West should be contacted to review the final grading plans to verify our recommendations.

- The site is classified as Site Class C according to the 2022 SOSSC and ASCE 7-16 based on site-specific shear wave velocity measurements. Buildings founded directly on basalt can be designed using Site Class B.

- Due to the presence of steep slopes at the site and subsurface conditions, we do not recommend that stormwater drainage be infiltrated on the site. Stormwater should be routed to an appropriate stormwater system.

## TABLE OF CONTENTS

ABBREVIATIONS AND ACRONYMS

1.0 INTRODUCTION 1
2.0 PROJECT UNDERSTANDING 1
3.0 BACKGROUND 2
4.0 PURPOSE AND SCOPE 3
5.0 SITE CONDITIONS 4
5.1 Geologic Conditions 4
5.2 Surface Conditions 6
5.3 Subsurface Conditions 6
5.4 Slope Stability Analysis 9
5.5 Seismic Hazards 12
6.0 DESIGN 12
6.1 General 12
6.2 Areal Settlement Considerations 13
6.3 Shallow Foundations 14
6.4 Ground Improvement 15
6.5 Seismic Design Considerations 17
6.6 Floor Slabs 17
6.7 Retaining Structures 18
6.8 Ground Anchors 23
6.9 Pavement 23
6.10 Drainage 26
6.11 Permanent Slopes 27
7.0 CONSTRUCTION 27
7.1 Site Preparation 27
7.2 Construction Traffic and Staging 30
7.3 Excavation and Shoring 31
7.4 Construction Dewatering 32
7.5 Temporary Drainage 34
7.6 Materials 34
7.7 Fill Placement and Compaction 39
7.8 Erosion Control 40
8.0 OBSERVATION OF CONSTRUCTION 40
9.0 LIMITATIONS 41

REFERENCES 42

## TABLE OF CONTENTS

FIGURES

| | |
|---|---|
| Vicinity Map | Figure 1 |
| Site Plan – Existing Conditions | Figure 2 |
| Site Plan – Proposed Conditions | Figure 3 |
| Groundwater Level Monitoring | Figure 4 |
| Typical Settlement Plate Detail | Figure 5 |
| Surcharge-Induced Lateral Earth Pressures | Figure 6 |
| Cantilevered and Braced Wall Design Criteria | Figure 7 |
| Typical Perimeter Footing Drain Detail | Figure 8 |
| Typical Underslab Drain Detail | Figure 9 |
| Typical Perforated Drainpipe Trench Detail | Figure 10 |
| Typical Cut and Fill Slope Cross Section | Figure 11 |

APPENDICES

| | |
|---|---|
| Appendix A | |
| Field Explorations | A-1 |
| Exploration Legend | |
| Soil Classification System | |
| Rock Classification System | |
| Boring Logs | |
| Test Pit Logs | |
| SPT Hammer Calibration | |
| Appendix B | |
| Laboratory Testing | B-1 |
| Moisture Content, Percent Passing No. 200 Sieve by Washing | |
| Atterberg Limits Report | |
| Direct Shear Report | |
| Particle-Size Analysis Report | |
| Basalt Core Compressive Strength | |
| Appendix C | |
| Seismic Survey | C-1 |
| Array Location Plan | Figure C-1 |
| Array Photograph | Figure C-2 |
| Shear Wave Velocity Profile | Figure C-3 |
| Appendix D | |
| Slope Stability Results | D-1 |
| SLOPE/W Output | |
| Appendix E | |
| Site-Specific Seismic Hazard Evaluation | E-1 |
| Quaternary Fault Map | Figure E-1 |
| Historical Seismicity Map | Figure E-2 |
| Appendix F | |
| Photo Log | F-1 |

## TABLE OF CONTENTS

APPENDICES (continued)
Appendix G
Background Information G-1
Excerpts from Prior Reports by Others
Appendix H
Schematic Site Plans H-1
Plans
Appendix I
Report Limitations and Important Information I-1

DRAFT

## ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| AASHTO | American Association of State Highway and Transportation Officials |
| AC | asphalt concrete |
| ACP | asphalt concrete pavement |
| ADT | average daily traffic |
| ASCE | American Society of Civil Engineers |
| ASTM | ASTM International |
| BGS | below ground surface |
| CIP | cast-in-place |
| CLSM | controlled low strength material |
| CRBG | Columbia River Basalt Group |
| CSZ | Cascadia subduction zone |
| DEM | digital elevation model |
| DOGAMI | Oregon Department of Geology and Mineral Industries |
| ESAL | equivalent single-axle load |
| FHWA | Federal Highway Administration |
| fps | feet per second |
| g | gravitational acceleration (32.2 feet/second$^2$) |
| GEG | Geotechnical Engineering Group |
| GPS | global positioning system |
| H:V | horizontal to vertical |
| IBC | International Building Code |
| km | kilometer(s) |
| ksf | kips per square foot |
| LiDAR | light detection and ranging |
| MCE | maximum considered earthquake |
| mm | millimeter |
| mm/yr | millimeters per year |
| MSE | mechanically stabilized earth |
| $M_W$ | moment magnitude |
| NA | not applicable |
| NAVD 88 | North American Vertical Datum of 1988 |
| ODOT | Oregon Department of Transportation |
| OSHA | Occupational Safety and Health Administration |
| OSHD | Oregon State Highway Department |
| OSSC | 2024 Oregon Standard Specifications for Construction |
| pcf | pounds per cubic foot |
| pci | pounds per cubic inch |
| PG | performance grade |
| PGA | peak ground acceleration |
| $PGA_M$ | maximum considered earthquake geometric mean peak ground acceleration adjusted for site effects |
| psf | pounds per square foot |
| psi | pounds per square inch |
| RAP | rammed aggregate pier |

| | |
|---|---|
| ReMi | refraction microtremor |
| RI | rigid inclusion |
| RQD | rock quality designation |
| SOSSC | State of Oregon Structural Specialty Code |
| SPT | standard penetration test |
| USGS | U.S. Geological Survey |
| $Vs_{100}$ | average shear wave velocity for the upper 100 feet of the soil profile |
| VWP | vibrating wire piezometer |

DRAFT

# REPORT OF GEOTECHNICAL ENGINEERING SERVICES
# OPERATIONS CENTER
# WEST LINN, OREGON

## 1.0 INTRODUCTION

Columbia West is pleased to submit this report of geotechnical engineering services for the proposed City of West Linn's Operations Center located east of the Salamo Road and Greene Street intersection in West Linn, Oregon.

The site is shown relative to surrounding physical features on Figure 1. The existing site conditions and proposed site layout are shown on Figures 2 and 3, respectively, as well as the approximate exploration locations. Logs of our explorations are presented in Appendix A. Results of our laboratory testing program are presented in Appendix B. Results of our seismic survey are presented in Appendix C. Results of our global slope stability analysis are presented in Appendix D. Our site-specific seismic hazard evaluation is presented in Appendix E. A photo log is presented in Appendix F. Pertinent information from prior geotechnical studies completed at the site are presented in Appendix G. Relevant schematic site plans are presented in Appendix H.

Abbreviations and acronyms used herein are defined immediately following the Table of Contents.

## 2.0 PROJECT UNDERSTANDING

The schematic site plans dated February 14, 2025, shows proposed improvements that include the following:

- An approximately 14,000-gross-square-foot, single-story administration building (Building C) with a finished floor elevation of 342 feet
- An approximately 14,000-square-foot, two-story storage building (Building B) with a finished floor elevation of 310 feet
- An approximately 13,500-gross-square-foot, single-story maintenance building (Building A) with a finished floor elevation of 310 feet
- A retaining wall with a maximum exposed height of approximately 32 feet north of the proposed maintenance and storage buildings
- Upper and lower access roads, via Salamo Road, and upper and lower parking lots
- Other improvements, including concrete pads, uncovered storage yards, covered and uncovered bulk storage, a manual car wash with a hot water boiler, a fueling station, and a deicer tank

All of the proposed developments will occur generally north and west of the existing wetland/wetland buffer zone that occupies the southeast portion of the site.

Foundation loads were not available at the time of this report; however, we have assumed maximum column loads will be less than 200 kips and maximum wall loads will be less than 5 kips per lineal foot. We estimate the distributed slab live load is less than 200 psf.

The schematic grading plans indicate that cuts and fills will be up to approximately 20 feet and 25 feet, respectively. The thickest fills are required for the proposed access road near the intersection with Salamo Road and the deepest cuts are required for the north side of the storage building.

The proposed administration building is classified as structural Risk Category IV per Table 1604.5 of the 2022 SOSSC as a designated operations center required for emergency response. Therefore, a site-specific seismic hazard evaluation is required for the building per SOSSC Section 1803.

We should be contacted to revise our recommendations if the assumptions stated above are incorrect.

## 3.0 BACKGROUND

The site is located within an area of mapped shallow landslide deposits (Burns et al. 2013) stemming from a slope failure that occurred in the 1960s during original construction of Interstate 205 (I-205). Details regarding the landslide and subsequent remediation efforts are discussed later in this report.

Prior geotechnical studies at the site and in the site vicinity have been conducted by GeoDesign, Inc. (2010, 2013), NV5 (2022, 2023), and CH2M Hill (1969). Subsurface conditions encountered in the field explorations for the above-referenced reports generally consist of topsoil, fill, or colluvium underlain by CRBG. The fill, up to approximately 50 feet thick, is described primarily as medium dense to very dense gravel with varying proportions of clay, silt, and sand. Varying proportions of basaltic gravel, cobbles, and boulders were observed in surface exposures of the fill. Fill comprised of reworked native colluvium was encountered in the southwest portion of the site. Medium stiff to stiff silt and medium dense to very dense silty gravel colluvium with varying proportions of sand and clay were encountered at the ground surface in the southwest portion of the site.

Basalt bedrock underlies the colluvium in the southwest portion of the site and the fill over the majority of the site. The top of the bedrock unit is weathered to a silty gravel soil with sand. Weathering and silt content generally decreases with depth. The silty gravel is very dense. Prior borings encountered practical refusal at depths between approximately 15 and 32 feet BGS within the ravine area in the southwest portion of the site. Prior test pits encountered refusal at depths as shallow as 2.5 feet BGS in the southwest portion of the site. Refusal depths likely represent the approximate depth of intact bedrock. The CRBG was encountered below the fill over the majority of the site at depths between approximately 9 and 49.5 feet BGS. In general, the basalt is medium hard to hard.

During prior field investigations by others, areas of standing water were observed at the site. Also, active running water was observed at the wetland feature in the east portion of the site.

## 4.0 PURPOSE AND SCOPE

The purpose of our services was to provide geotechnical engineering recommendations for use in design and construction of the proposed development. Specifically, we completed the following tasks:

- Reviewed published geologic data and our in-house files for existing information on subsurface conditions in the site vicinity.
- Conducted a site reconnaissance and marked exploration locations prior to conducting the explorations.
- Coordinated and managed the field exploration program, which included locating public utilities, coordinating site access, and scheduling subcontractors and Columbia West field staff.
- Completed the following explorations at the site:
  - Drilled five borings to depths between 50 and 139 feet BGS using mud rotary and rock coring methods
  - Excavated 13 test pits to depths between 1.5 and 20.5 feet BGS
- Classified the soil and rock encountered in the explorations and maintained a detailed log of each exploration. Observed groundwater conditions in the explorations.
- Collected disturbed and relatively undisturbed soil samples from the explorations for laboratory testing.
- Completed a seismic survey using the ReMi technique to measure the shear wave velocity of the upper 100 feet of soil/rock at the site to support the site-specific seismic hazard evaluation.
- Installed three VWPs to measure the variation of groundwater levels beneath the site.
- Completed a laboratory testing program on select soil and rock samples, which included the following:
  - Twenty-four moisture content determinations in general accordance with ASTM D2216
  - Five particle-size analyses in general accordance with ASTM D1140
  - One particle-size analyses in general accordance with ASTM D6913
  - Three Atterberg limits tests in general accordance with ASTM D4318
  - One 3-point direct shear test in general accordance with ASTM D3080
  - Three dry density determinations in general accordance with ASTM D2937
  - Three unconfined compressive strength tests in general accordance with ASTM D7012-09
- Attended project meetings with the design and construction team.
- Conducted a two-dimensional limit equilibrium slope stability analysis.
- Conducted site-specific seismic hazard evaluation in accordance with the 2022 SOSSC and ASCE 7-16.
- Prepared this geotechnical report for use in design and construction of the site that includes the following:
  - Summary of soil, rock, and groundwater conditions at the site
  - Summary of laboratory testing results
  - Recommendations for foundation support, including preferred foundation type, allowable bearing capacity, and lateral resistance parameters
  - Recommendations for floor slab subgrade preparation

- Recommendations for use in design of retaining walls, including backfill and drainage requirements and lateral earth pressures
- Recommendations for site preparation, including grading, temporary and permanent slopes, fill placement criteria, suitability of on-site soil for fill, subgrade preparation, and wet weather construction
- The results of our slope stability analysis and any relevant recommendations
- Recommendations for excavation and excavation support
- Recommendations for construction of AC pavement for on-site access roads and parking areas, including subbase, base course, and paving thickness
- Evaluation of groundwater conditions at the site and general recommendations for dewatering during construction and subsurface drainage
- Evaluation of liquefaction potential and associated settlement
- Seismic design parameters in accordance with the 2022 SOSSC and ASCE 7-16

# 5.0 SITE CONDITIONS

## *5.1 GEOLOGIC CONDITIONS*

### 5.1.1 General

The site is located in the uplands, forming the boundary between the Portland Basin to the north and east, the Tualatin Basin to the west, and the Central Willamette Valley to the south, within the Willamette-Puget Sound Physiographic Province. Geologic mapping by Schlicker and Finlayson (1979) and Madin (2009) indicates that the site is situated on bedrock consisting of basalt flows of the middle Miocene age (16 million to 12 million years old) CRBG.

CRBG flows originated in southeast Washington and northeast Oregon approximately 15 million years ago. The flows traveled down the Columbia River during repeated eruptions and filled topographic lows within the Portland Basin, creating thick sequences of basalt flows locally, with associated unconformities and interbeds between flows created as a result of lulls between volcanic episodes. The basalt bedrock generally consists of dense, gray to black, fine-grained basalt that is locally deeply weathered, producing silty and clayey soil. Madin (2009) shows that the contact of the Wanapum and underlying Grande Ronde Basalts, two formations within the CRBG, is located in the vicinity of the site. Interbeds of saprolite are found between flows of the CRBG, and an extensive zone of thick saprolite is found at the contact of the Wanapum Basalt and Grande Ronde Basalt. This sedimentary interbed is referred to as the Vantage Horizon.

Bedding-plane landslides commonly occur within the Vantage Horizon where the interbed dips 10 degrees or more out of slope faces cut at steeper inclinations (Schlicker and Finlayson 1979). Outcrops of CRBG were exposed in the upper slope at an elevation of approximately 400 feet (NAVD 88) during prior site reconnaissance. We previously observed variable thicknesses of gravel, cobble, and boulder fill across the site associated with construction of the existing graded benches on the slopes above and beneath the roadbed of I-205.

### 5.1.2 Landslide History

#### *5.1.2.1 Pre-November 1969*

A large landslide occurred on the site during construction of I-205. According to Schlicker and Finlayson (1979), the landslide was activated by slope cuts that adversely exposed the Vantage Horizon during construction of I-205.

The headscarp of the landslide caused ground cracking at the Willamette Reservoir, which was part of the West Linn water supply system. The headscarp of this landslide as mapped in the CH2M Hill geotechnical report and mapped through the Willamette Reservoir is shown on Figure 2 from GeoDesign (2010) in Appendix G. The City of West Linn reported acceleration in the loss of water from the reservoir as a consequence of the landsliding. The reservoir was drained in the summer of 1969 and abandoned at a later date during the slide remediation.

While there is only limited documentation of this landslide and its remediation, CH2M Hill investigated the landslide and provided some details for the remediation efforts (CH2M Hill 1969). CH2M Hill reported that they drilled nine borings (SM-1 through SM-9; cross sections are presented in Appendix G, but boring logs are not available) within the landslide mass and installed slope inclinometers in each boring. These borings encountered unweathered, dense basalt overlain by weathered basalt and clay soil. A continuous, thin (1 foot to 2 feet thick) layer of micaceous silt was interbedded between the unweathered and weathered basalt units. This silt layer was identified as the Vantage Horizon.

Slippage measured using the slope inclinometers indicated that the failure surface of the landslide was located within the Vantage Horizon and was a translational landslide occurring along the bedding plane. CH2M Hill (1969) indicated that during the summer of 1969, OSHD, which would later become ODOT, started to flatten the cut slopes from 1.5H:1V to 2H:1V and widen the intervening benches. This slope flattening did little to stop the landslide movement. During the fall of 1969, OSHD began to install horizontal drains to intercept groundwater. The drains were not considered effective in intercepting groundwater (CH2M Hill 1969). The slope flattening and horizontal drains were inadequate in mitigating this landslide, and this was confirmed in a State of Oregon Geotechnical Engineering Group (GEG) interoffice memorandum (GEG 1991).

#### *5.1.2.2 Post-November 1969*

GeoDesign, Inc. (2010) previously prepared a map showing the difference in elevation in the vicinity of the landslide using a 10-meter DEM obtained from USGS (pre I-205 construction) and a DEM based on LiDAR surveying performed by the Puget Sound LiDAR Consortium (post I-205 construction). Based on the resulting elevation differences, GeoDesign determined that the ground surface elevation had been lowered by approximately 30 to 100 feet across much of the site.

Based on their study, GeoDesign, Inc. (2010) developed an interpretation of the actions undertaken by OSHD after November 1969. Their primary conclusions were as follows:

1. OSHD excavated the landslide mass down past the Vantage Horizon from the headscarp down to the I-205 alignment.
2. The area upslope of the headscarp was cut to a 1.5H:1V slope to facilitate removal of the landslide mass. The Vantage Horizon is still present in this zone.

3. Two large fill embankments were placed as toe buttresses after mass excavation of the slide mass. Records are generally incomplete or unavailable; therefore, specifics regarding the buttress size and extent are unknown.
4. The buttresses may be up to 50 feet thick and rock cuts, during mass excavation of the slide mass, were on the order of 140 feet deep.

The State of Oregon GEG interoffice memo (1991) states, "*In 1971 and 1972, a 20 to 40-foot wide and 2,400-foot long buttress was constructed near the middle of the landslide mass. Later a 400-foot section of the buttress was later enlarged to increase the stability.*

*This buttress was designed for low/marginal stability. No indication of movement is evident. Existing construction records are incomplete and little is known of buttress size."*

We are unaware of any documented slope movement since that memo was issued in 1991, and we did not observe any signs of slope instability during our site reconnaissance and field explorations.

## *5.2 SURFACE CONDITIONS*

The approximately 26.3-acre site is bordered to the west by Salamo Road and a topographic hollow/ravine that might include an abandoned aggregate borrow pit (based on our prior site reconnaissance), to the south by I-205, to the east by an ODOT storage yard and vacant lots, and to the north by vacant lots and residential developments. The site is vegetated with grass, shrubs, poison oak, blackberry bushes, and Douglas fir and deciduous trees; some of the trees had been felled. Site grades range between approximately 480 and 230 feet (NAVD 88) from north to south.

The site is located on a south-facing slope that consists of two graded benches separating I-205 to the south and the top of a prominent ridge line to the north. The lower bench is covered with a thick layer of wood chips, generally 6 to 24 inches thick at the locations explored. The benches and adjacent slopes are large fill buttresses constructed as part of the landslide mitigation described in Section 5.1.2 (Landslide History). The fill slopes have an existing grade of approximately 1.5H:1V.

A wetland feature with active running water is present within the southeast portion of the site. A wetlands/water delineation report prepared for the site by Vigil-Agrimis, Inc. (2009) indicates that the wetland is spring fed.

## *5.3 SUBSURFACE CONDITIONS*

### 5.3.1 General

Our field explorations included drilling 5 borings (B-1 through B-5) to depths between 50 and 139 feet BGS and excavating 13 test pits (TP-1 through TP-13) to depths between 1.5 and 20.5 feet BGS. Exploration locations are shown on Figures 2 and 3. A description of our field exploration program and the exploration logs are presented in Appendix A. A description of our laboratory testing program and the testing results are presented in Appendix B. In addition to the test pits and borings, we also completed a seismic survey using the ReMi technique to estimate

the shear wave velocity of the subsurface soil and rock to a depth of 100 feet BGS. The location of the ReMi array is shown on Figures 2 and 3, and results of the seismic survey are presented in Appendix C.

A summary of the subsurface conditions is presented below.

### 5.3.2 Soil Conditions

#### *5.3.2.1 Topsoil and Bark Chips*

All of our explorations encountered either topsoil or bark chips at the ground surface.

The bark chips were encountered in borings B-3 and B-4 and test pits TP7, TP-8, TP-10, TP-12, and TP-13, all of which are located on the relatively flat bench where the proposed maintenance and storage buildings will be located. The bark chip layer is between 12 and 24 inches thick in all explorations where it was encountered, except for test pit TP-7 where it is 6 inches thick.

All other explorations (borings B-1, B-2, and B-5 and test pits TP-1 through TP-6, TP-9, and TP-11) encountered 6 to 12 inches thick of topsoil that includes a 4- to 6-inch-thick root zone.

#### *5.3.2.2 Undocumented Fill*

Fill was encountered beneath the topsoil or bark chips in borings B-2 and B-5 and test pits TP-3 through TP-7, TP-9, and TP-11. The fill generally extends to depths between 15 and 31 feet BGS, except in test pits TP-7, TP-9, and TP-11 where it is present to depths between 2.5 and 5.5 feet BGS. Test pits TP-3 through TP-6 were terminated in fill.

The fill is highly variable in nature and generally includes medium stiff to hard clay with varying proportions of sand and gravel or very loose to very dense gravel and sand with varying proportions of clay and silt. The fill also includes cobbles and boulders up to 48 inches in diameter.

A sloping contact between the fill and the underlying basalt was observed in test pits TP-9 and TP-11 at depths between 5.5 and 8.5 feet BGS and between 3 and 7.5 feet BGS, respectively.

Test pit TP-5 was terminated in fill at a depth of 19 feet BGS due to refusal on a large boulder.

Laboratory testing on select samples of the fill material indicates the moisture content varied from approximately 8 to 41 percent at the time of exploration. Atterberg limits testing and field classifications indicate that the clay fill exhibits low to medium plasticity. Fines content analysis of select sand and gravel fill samples indicates a fines content of between 10 and 15 percent.

Based on our understanding of historical grading at the site as a part of the landslide mitigation efforts, the encountered fill is associated with embankments constructed as part of the landslide mitigation. The explorations that encountered thicker fills were likely drilled or excavated at or near the middle portion of the buttresses.

#### *5.3.2.3 Native Soil*

In boring B-1, which was drilled in a relatively flat bench south of Barrington Drive (north of the proposed access road), the topsoil is underlain by sandy silt with varying proportions of gravel to a depth of 11 feet BGS. The sandy silt is medium stiff to stiff.

#### *5.3.2.4 Decomposed Basalt*

Beneath the native soil in boring B-1 and the topsoil, bark chips, or fill in borings B-2 through B-5 and test pit TP-2, we encountered what we interpret as decomposed basalt. The decomposed basalt consists of layers of hard silt or clay with varying proportions of sand and gravel; medium dense to very dense gravel with varying proportions of sand, silt, clay, and cobbles; or very dense sand with silt. The decomposed basalt was encountered to depths between 4 and 46 feet BGS. The bottom of this unit is deepest in borings B-2 and B-5. The thickness of the decomposed basalt generally ranges between 0.5 foot and 19 feet.

Laboratory testing on select samples of the decomposed basalt indicates the moisture content varied from approximately 16 to 55 percent at the time of exploration. Fines content analysis of a select silt (decomposed basalt) sample indicates a fines content of 59 percent.

#### *5.3.2.5 Basalt*

Beneath the fill, topsoil, bark chips, native soil, or decomposed basalt, all of our explorations encountered basalt, except test pits TP-3 through TP-6 that were terminated in the fill unit. In borings B-1 through B-5, this unit is present at depths between 4 and 46 feet BGS and extends to the maximum depths explored, which ranges from 50 to 139 feet BGS. The top of the basalt was deeper in the borings that encountered the thicker fill unit associated with the existing stability buttress.

In test pits TP-1, TP-2, and TP-7 through TP-13, this unit was encountered at depths between 0.5 foot and 5.5 feet BGS and was observed to the maximum depths explored, which range from 1.5 to 17 feet BGS. The majority of the test pits that encountered the basalt were terminated due to practical refusal after 0.5 foot to 3.5 feet of excavation into the basalt unit, but test pits TP-9 and TP-11 were excavated 11.5 and 7 feet below the top of the basalt, respectively, due to the level of weathering and close joint spacing of the rock in these two test pits. The strength classification of the basalt ranged from extremely weak (R0) to very strong (R5).

Laboratory testing on select core samples of the basalt material indicates a compressive strength of between 5,860 and 17,340 psi.

Thin clay beds, between 1 and 12 inches thick (generally 3 inches thick), were encountered in the basalt unit at variable depths between basalt flows. The clay beds were encountered in borings B-1, B-2, B-3, and B-5. Also, a 12-inch-thick layer interpreted as relict basalt or weathered sandy interflow was encountered in boring B-5 at a depth of 92 feet BGS.

Laboratory testing on a select clay bed sample indicates a moisture content of 50 percent at the time of exploration. Atterberg limits testing and field classifications indicate that the clay beds generally exhibit low plasticity.

### 5.3.3 Groundwater

Groundwater was not encountered in the test pits excavated to a maximum depth of 20.5 feet BGS, and groundwater could not be observed in the drilled borings due to the use of mud rotary drilling and rock coring methods.

Data collected from VWPs installed in borings B-2, B-3, and B-5 show groundwater levels varied from 79.3 to 94.3 feet BGS between February 26 and March 28, 2025, in borings B-3 and B-5. Groundwater is more than 98 feet BGS in boring B-2. The groundwater measurements from the VWPs are summarized in Table 1 and presented on Figure 4.

**Table 1. Summary of VWP Data**

| Boring | Ground Surface Elevation (feet) | Installation Depth (feet BGS) | Depth to Groundwater (feet BGS / elevation in feet) | |
|---|---|---|---|---|
| | | | High | Low |
| B-2 | 345 | 98 | >98 / <247 | |
| B-3 | 315 | 97.5 | 94.3 / 220.7 | 91.2 / 223.8 |
| B-5 | 332.5 | 98 | 83.8 / 248.7 | 79.3 / 253.2 |

Given the relatively shallow depth to basalt, the fill mantling the site, and prior site reconnaissance notes (by others), perched water may occur at shallow depths following extended periods of heavy rainfall. This possibility is further supported by the presence of a delineated spring-fed wetland on the east portion of the site (Vigil-Agrimis, Inc. 2009). Seasonal fluctuations in groundwater depth are anticipated due to factors such as prolonged rainfall, surface topography changes, and other influences not observed during this study.

### 5.3.4 Caving

Minor to severe caving was observed in six test pits (TP-3 through TP-6, TP-9, and TP-11) excavated through the gravel fill starting at depths between 0 feet and 1 foot BGS. Test pits TP-4 and TP-6 were terminated due to severe caving.

## *5.4 SLOPE STABILITY ANALYSIS*

### 5.4.1 General

We completed limit equilibrium slope stability analyses of the slopes near the structures using the software SLOPE/W version 2024.1 by GeoStudio. Our analyses considered three critical cross sections that were selected based on slope geometry and proximity of proposed structures to the slopes. The locations of the cross sections are shown on Figures 2 and 3. Elevation data for existing conditions was gathered from publicly available LiDAR data from the Oregon LIDAR Consortium, and post-construction topography was developed from the schematic grading plan provided by Scott Edwards Architecture, which is shown on Figure 3.

### 5.4.2 Subsurface Model

Soil strength parameters were estimated based on soil classification, laboratory testing, measured SPT blow counts, and the analysis discussed in Section 5.4.3 (Quasi Back-Analysis). The basalt was modeled as a composite strength material in SLOPE/W, where the parent material was the basalt

mass and the secondary material was used to represent joint pairs oriented between 10 and 30 degrees and between 60 and 80 degrees. The parent material was modeled using Hoek-Brown rock strength parameters and the secondary material was modeled using Barton shear failure criteria for rock joints, both as implemented in the SLOPE/W program.

Where we interpreted prominent flow contacts or soil-filled discontinuities in the basalt that were correlated between borings, we model them as discrete layers. Based on our interpretation, these layers, including the Vantage Horizon that is present within the basalt north of the site, have an apparent dip of approximately 3 degrees to the south. The strength parameters used in the slope stability model are presented in Appendix D.

Based on the results of our groundwater monitoring, the static groundwater level is expected to be within the basalt unit, well below the bottoms of the analyzed slopes. In addition, the use of impervious surfaces, drains in fill slopes (as discussed in Section 6.10 (Drainage)), diversion by grading, and stormwater collection systems will assist in control of perched groundwater within new and modified slopes. However, given the presence of the Vantage Horizon upslope of the proposed development and the existing fill that will remain in place beneath the site, we ultimately modeled a perched groundwater condition that could occur on a seasonal basis.

Given the depth to groundwater at the site, even with the perched groundwater condition considered in the slope stability modeling, the soil units are generally unsaturated, with the exception of the deeper existing fill (generally classified as silty or clayey gravel) and decomposed basalt. Neither of these units is considered susceptible to liquefaction or strain softening based on field and laboratory classifications. Therefore, drained strengths were used for all slope stability analyses.

### 5.4.3 Quasi Back-Analysis

As previously discussed, the site has experienced landsliding in the past as a result of man-made slope cuts during construction of I-205. Sufficient information on the geometry of the slope and subsurface was not available to conduct a traditional back-analysis of the prior slope failure. Although geotechnical analysis of the landslide and documentation of subsequent remediation efforts are sparse, we attempted to refine the soil properties used in the slope stability modeling by analyzing the existing conditions and targeting a marginal factor of safety against slope failure, consistent with discussion in the 1991 GEG memorandum. In a typical slope stability back-analysis, the goal is to work backward from a failure to establish model properties that result in a computed factor of safety equal to or close to 1.0. This is different from the quasi back-analysis we performed, which was focused on establishing reasonable lower end estimates of the strength parameters for fill and the Vantage Horizon. The soil properties shown in Appendix D reflect this analysis.

### 5.4.4 Stability Under Proposed Conditions

Fo each of the three cross sections we analyzed, we considered static and pseudo-static stability of slopes directly impacted by the planned grading, as well as global stability of the proposed retaining wall where it intersected the cross sections. When analyzing global wall stability, we assigned a minimum embedment for the toe of the wall and made the wall infinitely strong so that

the potential failure surfaces were a true global failure; internal and external stability of the retaining wall should be considered by the wall designer once grading plans are finalized.

In the case of the pseudo-static analysis, we used a horizontal seismic coefficient ($k_h$) equal to one-half of the $PGA_M$. The analyses were carried out in SLOPE/W using the Morgenstern-Price method, which satisfies all conditions of equilibrium and considers over 10,000 potential non-circular slip surfaces. Table 2 summarizes the results of the slope stability analyses, and software output is presented in Appendix D.

Typically, factors of safety of 1.5 and 1.1 under static and pseudo-static conditions are considered minimum values at which point static slope instability and seismic displacements greater than 1 inch to 2 inches is unlikely. Computed factors of safety for cross sections 1 and 2 are greater than the minimum values for the various scenarios we analyzed, indicating that slope instability is unlikely.

For cross section 3, which includes a proposed fill slope with an approximate gradient of 2H:1V, results indicate that the slope is expected to be stable under static conditions but is only marginally stable under seismic loading. The results in Appendix D show that the critical failure surface with a factor of safety of 1.0 for seismic loading passes through the existing fill that comprises the bottom half of the slope. Based on the limited extents of the fill slope and the locations of critical and other nearly critical failure surfaces, large displacement of a deep failure mass is not likely, but enough slope movement could occur to impact trafficability of the proposed access road.

We conducted a supplementary analysis that considers an improved condition in which the proposed slope includes a benched-in sliver fill and shear key, both constructed of new structural fill. The conceptual geometry of the proposed slope is shown in Appendix D. Under this condition, the resulting pseudo-static factor of safety increase from 1.0 to 1.1, indicating that slope displacements greater than a few inches is unlikely (ODOT 2024a). This option for improving stability of the fill slope should be considered if maintaining unobstructed roadway access during a seismic event is critical.

**Table 2. Slope Stability Results**

| Cross Section | Scenario | Factor of Safety | |
|---|---|---|---|
| | | Static | Pseudo-Static |
| 1 | Upper slope | 2.2 | 1.3 |
| | Proposed roadway fill slope | 2.8 | 1.5 |
| | Proposed retaining wall | 2.7 | 2.2 |
| 2 | Upper slope | 1.9 | 1.2 |
| | Proposed retaining wall | 1.8 | 1.4 |
| | Slope south of proposed maintenance building | 1.9 | 1.3 |
| 3 | Proposed roadway fill slope | 1.6 | 1.0 |
| | Proposed roadway fill slope – improved | 1.7 | 1.1 |

As previously discussed, our analysis assumes that the proposed development includes measures sufficient to mitigate the potential for perched water within new fill and behind retaining walls. Drainage recommendations are presented in Section 6.10 (Drainage) and Section 6.11 (Permanent Slopes).

In addition, we recommend careful planning and execution of tree removal to eliminate disturbance to tree stumps and roots, existing vegetation, and topsoil zones. Such disturbance and removal of existing vegetation on or near slopes may adversely impact the surficial stability.

## *5.5 SEISMIC HAZARDS*

### 5.5.1 General

We completed a site-specific seismic hazard evaluation in accordance with the 2022 SOSSC and ASCE 7-16. A detailed discussion of seismic-induced geologic hazards is presented in Appendix E. The sections below highlight key considerations associated with seismic hazards at the site.

### 5.5.2 Liquefaction and Cyclic Softening

Based depth to groundwater as measured in the VWPs installed at the site and the soil conditions encountered in our explorations, liquefaction and cyclic softening are not considered design considerations for the project.

### 5.5.3 Seismic Settlement

Liquefaction and cyclic softening are not considered design considerations, and our explorations did not encounter thick deposits of very loose to loose, cohesionless soil beneath the site that is susceptible to seismic densification. Widespread seismic settlement is not a design consideration for this project.

Differential settlement between portions of the administration building bearing on undocumented fill and basalt is addressed in Section 6.3 (Shallow Foundations) and Section 6.4 (Ground Improvement).

### 5.5.4 Lateral Spreading

Materials that comprise the slopes at the site are not subject to significant strength loss during or after an earthquake; therefore, lateral spreading is not a design consideration for this project.

### 5.5.5 Surface Fault Rupture

The nearest Quaternary-aged fault, the Bolton fault, is more than 2 km northeast of the site. Accordingly, surface fault rupture is not a significant design consideration.

# 6.0 DESIGN

## *6.1 GENERAL*

As discussed in Section 5.3 (Subsurface Conditions) and shown on Figures 2 and 3 and in Appendix A, our explorations encountered undocumented fill to depths between 1 foot and 31 feet BGS. Prior explorations encountered fill to depths between 10.5 and 49.5 feet BGS. The fill

is highly variable and generally includes gravel and sand with varying proportions of silt and clay or clay with varying proportions of gravel and sand. The fill contains varying proportions of cobbles and boulders.

To minimize the risk of future foundation settlement due to the presence of undocumented fill, we recommend ground improvement systems be used to support the administration building foundations, including floor slabs in areas where thick undocumented fill is present. Based on our experience, RIs or the Geopier X1® system is a suitable option for foundation support.

Drilling through cobbles and boulders from prior grading operations will likely be challenging to the ground improvement contractors. We recommend the project budget include a contingency for removal of obstructions using excavation or specialty drilling equipment if encountered during ground improvement system installation.

Our explorations and the schematic grading plan indicate the subgrade at the base of the proposed maintenance and storage buildings will likely consist of native, dense gravel and sand (decomposed/weathered basalt) or intact basalt. Where undocumented fill is encountered, we recommend this material be removed from under building foundations and replaced with structural fill underlain by native, dense gravel and sand or bedrock. The structural fill under the maintenance and storage building footings should consist of granular pads. We recommend that foundation subgrade be evaluated at the time of construction to determine if undocumented fill is present.

We have provided additional recommendations for foundation support alternatives in the following sections.

## *6.2 AREAL SETTLEMENT CONSIDERATION*

The schematic grading plan indicates cuts on the order of 5 feet may be required for the maintenance building and fills on the order of approximately 2 and 5 feet may be required for the administration and storage buildings, respectively. The administration building should be supported by a ground improvement system. Based on our explorations, we anticipate fill-induced settlement will be negligible under the buildings. Fills of up to approximately 25 and 5 feet will be required for the access road and east parking lot, respectively. The undocumented fill will be compressible under proposed fill-induced loads. Fill-induced settlement will vary based on fill thickness and subsurface soil conditions. Time-rate of settlement will also vary based on fill thickness; however, fill-induced areal settlement will generally be complete within 8 to 16 weeks of material placement. Paving is typically completed more than four months after placement of fill material, and settlement monitoring will likely not be required in areas of roadway or parking lot construction. However, settlement monitoring plates should be installed to monitor fill-induced settlement and evaluate the appropriate time to begin construction of settlement-sensitive project elements such as hardscape and underground utilities. We recommend Columbia West be allowed to review the final grading plans and verify our recommendations.

### 6.2.1 Areal Settlement Monitoring

Settlement monitoring plates should be used to monitor fill-induced settlement for fills greater than 5 feet, unless construction of settlement-sensitive features is conducted a minimum of

16 weeks after the completion of filling. Settlement monitoring plates should be installed and surveyed prior to fill placement. The casing and rod portions of the settlement plate are usually installed in 5-foot sections to facilitate handling by contractor personnel. As fill placement progresses, couplings are used to install additional rod sections. Continuity in the monitoring data is maintained by surveying the top of the measurement rod immediately prior to and following the addition of new rod sections. Special precautions must be taken by the contractor during fill placement to prevent bending or breaking the rods and settlement plates.

A typical settlement plate detail is presented on Figure 5. The settlement plates should be installed prior to site filling and immediately surveyed. Survey shots should be taken at each settlement plate at least twice per week during fill construction and for at least one month after fill construction, followed by once weekly thereafter. The settlement plates should be monitored using survey equipment with accuracy of at least 1/100$^{th}$ of a foot referenced to a stationary datum established at least 500 feet from the edge of the fill.

In addition to recording the elevation of the settlement plates during each survey event, a complete record of the preload history requires reading and recording the fill height at each settlement plate.

## *6.3 SHALLOW FOUNDATIONS*

### 6.3.1 General

Based on our explorations and the schematic grading plan, the maintenance and storage buildings can be supported on conventional spread footings underlain by decomposed/weathered basalt or intact basalt or underlain by granular pads overlying decomposed/weathered basalt or intact basalt.

As discussed in Section 6.10 (Drainage), we recommend foundation drains be constructed for the buildings. Our recommendations assume that maximum column and wall loads will be less than 200 kips and 5 kips per lineal foot, respectively. The following sections provide our recommendation for use in foundation design and construction.

### 6.3.2 Granular Footing Pads

Granular footing pads should extend 6 inches beyond the margins of the footings for every foot excavated below the base grade of the footing. The gravel pads should consist of imported granular material compacted to not less than 95 percent of maximum dry density as determined by ASTM D1557 or until well keyed as determined by our geotechnical staff. We recommend that Columbia West observe all foundation subgrade to determine final footing pad depth.

### 6.3.3 Bearing Capacity

Continuous perimeter wall and isolated spread footings should have minimum widths of 18 and 24 inches, respectively. The bases of exterior footings should be at least 18 inches below the lowest adjacent exterior grade. The bases of interior footings not exposed to frost should bear at least 12 inches below the base of the floor slab.

Footings bearing on dense, weathered bedrock subgrade or granular pads underlain by bedrock should be sized based on an allowable bearing pressure of 5,000 psf. The bearing pressure can

be increased to 8,000 psf for footings established on hard, intact bedrock. As the allowable bearing pressure is a net bearing pressure, the weight of the footing and associated backfill may be ignored when calculating footing sizes. The recommended allowable bearing pressure applies to the total of dead plus long-term live loads and may be increased by 30 percent for transient (short-term) lateral forces such as seismic or wind forces.

### 6.3.4 Settlement

Settlement of shallow foundations founded on dense decomposed/weathered or hard intact bedrock should be negligible.

### 6.3.5 Resistance to Sliding

Lateral loads on building and retaining wall footings can be resisted by passive earth pressure on the sides of the structures and by friction on the bases of footings. Our analysis indicates that the available passive earth pressure for footings confined by the on-site soil or structural fill is 350 pcf, modeled as an equivalent fluid pressure, assuming that static groundwater remains below the base of the footing throughout the year. A passive resistance of 180 pcf should be used below groundwater. This will require that compacted structural fill be placed between the excavations and footings if passive pressure is relied on for lateral resistance. The recommended passive pressure can be increased to 500 pcf and 290 pcf for footings confined entirely by basalt bedrock above and below groundwater, respectively. Adjacent floor slabs, pavement, or the upper 12-inch depth of unpaved areas should not be considered when calculating passive resistance. In order to rely on passive resistance, a minimum of 10 feet of horizontal clearance must exist between the face of the footings and adjacent down slopes.

For footings in contact with basalt bedrock or granular pads, a coefficient of friction equal to 0.40 may be used when calculating resistance to sliding. The passive earth pressure and friction components may be combined, provided the passive component does not exceed two-thirds of the total.

### 6.3.6 Subgrade Observation and Preparation

Footing and floor subgrade soil should be evaluated by Columbia West prior to placing forms or reinforcing bar to verify subgrade support conditions are as anticipated in this report. Subgrade observation should confirm that all disturbed material, organic debris, unsuitable fill, remnant topsoil zones, and softened subgrade (if present) have been removed. Over excavation of footing subgrade soil may be required to remove deleterious material, particularly if footings are constructed during wet weather conditions.

## *6.4 GROUND IMPROVEMENT*

Due to the presence of thick undocumented fill, the administration building can be supported on conventional spread footings that bear on improved ground. For minimum embedment and dimension requirements for the spread footings, refer to Section 6.3 (Shallow Foundations).

### 6.4.1 Spread Footings Bearing on RIs

The foundation system for the new administration building may consist of spread footings and floor slabs underlain by RIs. This method of ground improvement is typically design-build. The RIs are designed as a ground improvement system and rely on support both from the subgrade soil

and RIs. The RI columns are installed using drilling techniques. Once the drill reaches the target depth, CLSM is pumped through the drill rods to the bottom of the hole. CLSM continues to be pumped as the drill rods are withdrawn from the hole. The completed RI columns consist of a continuous shaft of CLSM material.

The RI column is typically 24 to 36 inches in diameter and should be founded in basalt. The RI system could result in an allowable bearing pressure of up to 6,000 psf. We anticipate that this value can be increased by one-third when considering transient loads such as wind and seismic forces, but should be verified by the designer.

The contractor can use the information in this report and, if necessary, should conduct additional explorations if the geotechnical information is insufficient. The design-build contractor should complete a settlement analysis for the RIs. We recommend a load testing program be implemented for RIs to confirm design capacity.

Conventional spread foundations and floor slabs can be constructed over the completed RIs. The footings are typically supported on a 12- to 24-inch-thick granular pad between the footing and top of the RIs (full dimension of footing) to transfer the load.

### 6.4.2 Spread Footings Bearing on Geopier X1® System

The Geopier X1® system can be installed to provide support to a conventional spread footing system and floor slabs. The Geopier X1® piers are constructed using a track-mounted auger to drill out unsuitable fill soil and a specialty mandrel mounted to a mast rig to construct the RAP elements. The end result is a dense column of aggregate surrounded by stiffened matrix soil to control settlement and allow for higher bearing capacities typically on the order of 3,000 to 6,000 psf. The RAPs are typically 24 inches in diameter and should be founded in basalt. A one-third increase in allowable bearing pressure is also typical for such systems when resisting short-term loads such as wind and seismic forces. Geopier X1® is a proprietary design-build foundation system. Accordingly, if Geopier X1® is used, we recommend that the design-build contractor be contacted to provide the actual allowable bearing pressures and aggregate pier configurations. The contractor can use the information in this report and, if necessary, should conduct additional explorations if the geotechnical information is insufficient.

Installing RAPs will require drilling through soft and loose fill soil, which will be prone to raveling, sloughing, and running conditions if groundwater is encountered. Spoils that are generated during installation can be used as fill at the site or disposed of offsite. Also, the presence of cobbles and boulders in the fill from prior grading activities might result in caving/sloughing and hard drilling conditions or refusal. We recommend the project budget include a contingency for removal of obstructions using excavation or specialty drilling equipment if encountered during ground improvement system installation.

The design-build contractor should complete a settlement analysis for the RAPs. We recommend a load testing program be implemented for RAPs to confirm design capacity.

Conventional spread foundations can be constructed over the completed RAPs. The footing will typically be supported on a minimum 3-inch-thick granular pad that extends the full dimension (width and length) of the footing (on and between the piers).

### 6.4.3 Foundation Settlement

We anticipate the ground improvement system can be installed to meet the settlement criteria for the administration building. The design-build contractor should complete settlement analysis for the ground improvement system.

## *6.5 SEISMIC DESIGN CONSIDERATIONS*

### 6.5.1 Seismic Design Criteria

We anticipate that seismic design will be performed in accordance with the 2022 SOSSC, which references ASCE 7-16. Based on shear wave velocity measurements made at the site and results of our field explorations, the seismic site class per ASCE 7-16 is Site Class C for structures founded within the existing fill embankment or Site Class B for structures founded on the basalt.

We understand the proposed development is designated as an operations center for emergency response. Per Table 1604.5 of the 2022 SOSSC, emergency response facilities are classified as Risk Category IV and require a site-specific seismic hazard evaluation. Details regarding our shear wave velocity measurements at the site are presented in Appendix C, and our site-specific seismic hazard evaluation, which includes seismic design parameters, is presented in Appendix E.

## *6.6 FLOOR SLABS*

Satisfactory subgrade support for building floor slabs supporting floor loads of up to 200 psf can be obtained, provided the building pads are prepared as described in Section 7.0 (Construction). To help reduce moisture transmission and slab shifting, we recommend a minimum 6-inch-thick layer of floor slab base rock be placed and compacted over a subgrade that has been prepared in conformance with Section 7.1 (Site Preparation). The floor slab base rock should meet the requirements in Section 7.6.1 (Structural Fill) and be compacted to at least 95 percent of maximum dry density as determined by ASTM D1557. Load-bearing slabs on grade may be designed assuming a modulus of subgrade reaction of 150 pci, assuming the floor slab is underlain by native soil or structural fill overlying native soil.

Settlement of floor slabs supporting the anticipated design loads and constructed as recommended is not expected to exceed approximately ½ inch.

Due to the presence of thick undocumented fill, we recommend the administration building floor slabs be supported by a ground improvement system to mitigate excessive settlement as discussed in the preceding sections. The modulus of subgrade reaction and settlement estimate for floor slabs that are supported by a ground improvement system should be provided by the design-build ground improvement contractor.

If ground improvement is not implemented, disturbed soil, undocumented fill, and debris in proposed slab locations should be completely removed and replaced with structural fill to mitigate excessive settlement.

Some flooring manufacturers will not warrant their product unless a vapor barrier has been installed. Selection and design of an appropriate vapor barrier should be decided upon by all members of the design team.

All slab subgrade should be evaluated by a member of our staff to confirm suitable bearing conditions. Observations should also confirm that loose or soft material, organic material, unsuitable fill, prior topsoil zones, and softened subgrade have been removed and replaced with structural fill. In addition, contaminated base rock for the slabs should be removed and replaced prior to pouring the slab.

### 6.6.1 Radon Gas Mitigation

We understand the building code requires radon gas mitigation measures for projects located in Clackamas County. Where the below-slab passive radon system will be installed, we recommend a minimum 6-inch-thick layer of floor slab base rock be placed and compacted over the coarse (gas-permeable) aggregates for proper grading and compaction of the base rock and to protect the gas-permeable pipe from damage. We recommend the use of hand-operated tamping equipment (such as a jumping jack or vibratory plate compactor) for base rock compaction for at least a 2-foot-wide zone around the gas-permeable pipe to protect the pipe from damage during compaction. We recommend subgrade geotextile fabric be installed to assist as a barrier between the subgrade and the coarse aggregates. We understand soil gas retarder will be installed between the floor slab base rock and the coarse aggregates and will assist as a barrier between the two materials. The coarse aggregates and the geotextile fabric should meet the specifications in Section 7.6 (Materials).

## *6.7 RETAINING STRUCTURES*

### 6.7.1 Assumptions

Our retaining wall design recommendations are based on the following assumptions: (1) the walls are cantilevered walls, (2) the walls consist of CIP or MSE-type retaining walls, (3) the walls are less than 10 feet in height, (4) drainage is provided behind the walls, (5) the retained soil has a slope flatter than 4H:1V, and (6) the ground surface at the toes of the walls has an inclination flatter than 5H:1V. Re-evaluation of our recommendations will be required if the retaining wall design criteria for the project varies from these assumptions.

Lateral earth pressures should be considered during design of retaining walls and below-grade structures. Hydrostatic pressure and additional surcharge loading should also be considered. Wall foundation construction and bearing capacity should adhere to the specifications in Section 6.3 (Shallow Foundations) and Section 6.4 (Ground Improvement).

### 6.7.2 Retaining Wall Design Parameters

Permanent retaining walls that are not restrained from rotation should be designed for active earth pressures using an equivalent fluid pressure of 35 pcf. Walls that are restrained from rotation should be designed for an at-rest equivalent fluid pressure of 55 pcf. Lateral earth pressures induced by surcharge loads may be estimated using the criteria presented on Figure 6. Seismic lateral earth pressure for walls retaining level backfill may be calculated assuming an equivalent fluid weight of 13 pcf. The result of the triangular distribution increasing with depth should be

applied at a height of 0.34H above the base of the wall, where H is the wall height. The lateral seismic earth pressure force should be superimposed with static active earth pressure.

The design equivalent fluid pressure should be increased for walls that retain sloping soil. We recommend the above lateral earth pressures be increased using the factors presented in Table 3 when designing walls that retain sloping soil. Where the total lateral earth pressure includes static and seismic components, the increase factors shown in Table 3 should be applied to static and seismic components separately and then combined.

**Table 3. Lateral Earth Pressure Increase Factors for Sloping Soil**

| Slope of Retained Soil (degrees) | Lateral Earth Pressure Increase Factor | |
|---|---|---|
| | Static (active or at-rest) | Seismic |
| 0 | 1.00 | 1.00 |
| 5 | 1.06 | 1.11 |
| 10 | 1.12 | 1.27 |
| 20 | 1.33 | 1.84 |
| 25 | 1.52 | 2.73 |
| 30 | 2.27 | 3.69 |

The above design parameters have been provided assuming adequate drainage is provided behind the walls to prevent hydrostatic pressures from developing. If a drainage system is not installed, our office should be contacted for revised design forces.

#### *6.7.2.1 Wall Drainage and Backfill*

A minimum 6-inch-diameter, perforated collector pipe should be placed at the base of the retaining wall. The pipe should be embedded in a minimum 2-foot-wide zone of angular drain rock that is wrapped in a drainage geotextile fabric and extends up the back of the wall to within 1 foot of finished grade. The drain rock should meet the specifications in Section 7.6 (Materials). The perforated collector pipes should discharge at an appropriate location away from the base of the wall and any slopes. The discharge pipes should not be tied directly into stormwater drainage systems, unless measures are taken to prevent backflow into the drainage system of the wall.

Backfill material placed behind walls and extending a horizontal distance of ½H, where H is the height of the retaining wall, should consist of select granular material placed and compacted as described in Section 7.6.1 (Structural Fill).

Settlement of up to 1 percent of the wall height commonly occurs immediately adjacent to the wall as the wall rotates and develops active lateral earth pressures. Consequently, we recommend that construction of flatwork adjacent to retaining walls be delayed at least four weeks after placement of wall backfill, unless survey data indicates that settlement is complete prior to that time.

### 6.7.3 MSE Wall Design Parameters

We anticipate MSE retaining walls may be required for the project. Detailed wall layouts and geometries were not available at the time of this report. We provided the following general information if the MSE walls become a contractor design-build product for the project.

We recommend the soil parameters presented in Table 4 be used for design of the MSE retaining walls. The material used to backfill behind the walls is discussed in Section 6.7.3.1 (Wall Backfill and Drains) and Section 7.6 (Materials).

**Table 4. MSE Wall Design Parameters**

| Soil Type | Unit Weight (pcf) | Friction Angle, ϕ (degrees) | Cohesion (psf) |
|---|---|---|---|
| Reinforcing zone backfill: select granular wall backfill[1] | 130 | 36 | 0 |
| Retained soil: general fill | 120 | 28 | 0 |
| Foundation soil: native, dense gravel and sand[2] | 130 | 36 | 0 |

1. Select granular wall backfill, as described in Section 7.6.1 (Structural Fill).
2. Foundation soil should be native decomposed/weathered basalt or structural fill soil prepared in conformance with Section 7.1 (Site Preparation).

#### *6.7.3.1 Wall Backfill and Drains*

Drainage should consist of a minimum 12-inch-wide zone of drain rock placed behind the retaining wall blocks and extending from the base of the wall to within 12 inches of finished grade. Perforated collector pipes should be embedded at the base of the drain rock. The drain rock should meet the requirements provided in Section 7.6 (Materials). The perforated collector pipes should discharge at an appropriate location away from the base of the wall. The discharge pipe(s) should not be tied directly into stormwater drain systems, unless measures are taken to prevent backflow into the drainage system of the wall. The backfill material placed behind the walls should consist of retaining wall select backfill placed and compacted in conformance with Section 7.6 (Materials).

#### *6.7.3.2 Surcharge Loads*

Where traffic loads are located within a horizontal distance from the top of the wall equal to one-half the wall height, the lateral earth pressure shall be increased by a surcharge load equal to 2 feet of soil (assuming a soil density of 125 pcf). The traffic load should not be included for seismic analysis.

The design equivalent fluid pressures and lateral earth pressures (derived from Table 4) should be increased for walls that retain sloping soil. We recommend the lateral earth pressures be increased using the factors (presented in Table 3) when designing walls that retain sloping soil.

Seismic forces should be modeled based on the pseudo-static approach developed by the Mononobe-Okabe method. We recommend using a seismic coefficient of one-half of the PGA when analyzing internal stability.

The wall design should include all internal and external stability requirements, as well as global slope stability requirements.

#### *6.7.3.3 Base Excavation*

Excavation may be required to achieve internal and external stability, as well as global slope stability. All existing fill and topsoil should be removed from the wall alignment. This may locally require over excavation of the wall base. The excavation subgrade should expose competent native soil, extend in front of the wall face for at least 3 horizontal feet before the slope breaks, and allow for the minimum design embedment of the toe of the wall. A geotextile fabric should be placed over the excavation backslope prior to backfilling in order to keep on-site soil separate from the granular backfill and to prevent clay and silt migration.

All earthwork and excavation should be conducted in conformance with Section 7.6.1 (Structural Fill). If the wall is constructed during wet weather, measures should be taken to protect exposed subgrade from moisture. If sloughing of the backslope occurs during construction, granular wall backfill contaminated with silt or clay soil should be removed from the backfill zone.

#### *6.7.3.4 Wall Settlement*

Settlement of up to 1 percent of the wall height commonly occurs immediately adjacent to retaining walls as the wall rotates and develops active lateral earth pressures. Consequently, we recommend that construction of flatwork adjacent to retaining walls be postponed at least four weeks after backfilling of the wall, unless survey data indicates that settlement is complete prior to that time.

### 6.7.4 Soldier Pile Wall

#### *6.7.4.1 General*

An up to 32-foot-tall cut and fill wall will be required for the proposed storage building as well as pavement areas north of the maintenance building (see Figure 3). Support for the proposed cut and fill can be provided by installing soldier piles with timber lagging and tieback anchors. Typical wall facing may also include shotcrete or precast concrete panels for aesthetics. We understand the wall will be designed as a permanent installation. If a portion of the wall is designed as temporary shoring at the storage building, embedded walls constructed in contact with temporary shoring (if any) should be designed to resist the earth pressures developed by the shoring system, unless the shoring is designed as a permanent installation. Wall depth/design should take into consideration the excavation needed for the granular pads as recommended in Section 6.3 (Shallow Foundations). Tieback anchors will likely be required where the wall is tall. The height limit for cantilever walls is typically on the order of 10 feet. Cantilever shoring might be possible to support excavations of less than 10 feet if some settlement or horizontal movement can be tolerated. Settlement of the ground surface will be approximately 1 inch at the wall face and become negligible a horizontal distance of 10 feet from the wall. Cobbles and boulders will

be encountered in the fill and decomposed/weathered basalt. The soldier pile contractor should be prepared to advance through or modify their procedures where cobbles and boulders and basalt are encountered.

#### *6.7.4.2 Cantilever Wall*

A soldier pile wall embedded into basalt can be designed using the values presented on Figure 7. These values do not include surcharged-induced lateral earth pressures. Figure 6 should be used to compute surcharge-induced lateral earth pressures. We recommend a vertical live load of 250 psf be applied at the surface of the retained soil where the wall shoring retains roadways. Dewatering below the base of the shoring will result in higher passive resistance as noted on Figure 7.

#### *6.7.4.3 Anchored Wall*

An anchored soldier pile wall embedded into basalt can be designed using the values presented on Figure 7. These values do not include surcharged-induced lateral earth pressures. Figure 6 should be used to compute surcharge-induced lateral earth pressures. We recommend a vertical live load of 250 psf be applied at the surface of the retained soil where the wall shoring retains roadways. Dewatering below the base of the shoring will result in higher passive resistance as noted on Figure 7.

Structural design of the soldier piles should consider the lateral earth pressures discussed above. In addition to lateral earth pressures, the soldier piles will be subject to compressive forces as a result of the downward component of the tieback anchor loads. We recommend the tips of soldier piles be embedded at least 10 feet below the base of the excavation or a minimum of 5 feet into basalt. An allowable bearing pressure of 4,000 psf may be used for the base of the soldier piles resting on the dense gravel and sand (decomposed/weathered basalt). Skin friction along the sides of the soldier piles will also be able to resist downward forces. An allowable skin friction of 3 ksf may be used for the gravel (decomposed/weathered basalt) and 1 ksf for the fill. Concrete backfill should be placed using tremie pipe methods, unless the bottom of the hole is dry.

The bonded zone for the tieback anchors should be maintained outside of the "unbonded zone for anchors" shown on Figure 7. We anticipate that the tieback anchors can achieve an ultimate adhesion of between 2 and 4 ksf in the fill and between 5 and 10 ksf in the native gravel and sand (decomposed/weathered basalt), depending on the method of construction. A variety of methods are available for construction of tieback anchors. Therefore, we recommend that the contractor be responsible for selecting the appropriate bonded length and installation methods to achieve the required anchor capacity. Tieback anchors should be locked off at 100 percent of the design load.

Prior to installing production anchors, we recommend that performance testing be conducted on a minimum of two anchors. The purpose of this testing is to verify the installation procedure selected by the contractor before a large number of anchors are installed. We recommend that proof testing be conducted on all production anchors. Performance and proof testing should be performed in accordance with the guidelines provided in *Recommendations for Prestressed Rock and Soil Anchors* (Post Tensioning Institute 2014).

We anticipate that wood lagging, shotcrete, or precast concrete panels will be used for the wall. To maintain the integrity of the excavation, prompt and careful installation of lagging, particularly in areas of seepage and loose soil, is recommended. All voids behind the lagging should be completely backfilled with grout slurry.

A back-of-wall drain should be installed behind the shoring system and extend to the base of the lagging. The drain may consist of a conventional drain rock and filter fabric system but will likely consist of prefabricated drainage panels; collector pipes may be used to discharge the water. We recommend a minimum coverage of 30 to 50 percent if drainage panels are used, increased to 100 percent in areas where water seepage is encountered during wall construction. We recommend that a collector pipe be installed at the lowest point of the wall and extend to an appropriate discharge.

#### *6.7.4.4 Installation Considerations*

Perched groundwater may be encountered in soldier pile foundation excavations. Sloughing, caving, and the potential for "running conditions" will likely occur if the excavation extends below the groundwater table or if the excavations are dry but left open for extended periods of time (more than a few hours). Depending on the foundation installation methods, dewatering and use of temporary casing, drilling slurries, or both will likely be required for soldier pile excavations. The use of open-hole drilling methods will likely not be feasible for soldier pile foundation excavations.

Construction of the soldier pile wall may require some temporary cuts. However, excavations for construction will need to be carefully planned and executed so as not to destabilize the existing slopes. In addition, water should not be allowed to flow over the face of temporary cuts. We recommend that temporary excavation slopes are protected using plastic sheeting. If seepage is observed from the cut, we should be contacted immediately to evaluate stabilization options.

### *6.8 GROUND ANCHORS*

It may be necessary to install ground anchors to resist uplift forces. Uplift loads should be developed by the structural engineer for design of the anchors. Design and construction of the anchor system should be completed by specialty contractors who will be responsible for selecting the appropriate type and depth.

### *6.9 PAVEMENT*

Pavement should be installed on native subgrade or new engineered fill prepared in conformance with the Section 7.1 (Site Preparation) and Section 7.6.1 (Structural Fill).

Undocumented fill was encountered in our explorations to depths of up to 31 feet BGS at the locations explored. Due to the variable composition of the undocumented fill and the unknown methods of placement and compaction, reliable strength properties for undocumented fill are extremely difficult to predict. There is a risk of differential settlement of the pavement between cut and fill areas and associated maintenance given the variable conditions (thickness and composition) of the undocumented fill. The design parameters provided below assume the pavement is underlain by post-stripping native soil, structural fill, or at least 18 inches of improved undocumented fill by scarification and compaction per Section 7.1 (Site Preparation) and

Section 7.7 (Fill Placement and Compaction). If encountered, boulders, large cobbles, and deleterious material should be removed before compaction. If this approach is used, it should be understood that the risk of pavement distress and associated maintenance is acceptable. If this risk is not acceptable, full removal of the undocumented fill and replacement with structural fill will be required.

Specific traffic information was not provided to us at the time of this report. Our pavement recommendations are based on the following assumptions:

- A resilient modulus of 20,000 psi was estimated for the aggregate base.
- Initial and terminal serviceability indices of 4.2 and 2.0, respectively.
- Reliability of 75 percent and standard deviation of 0.45.
- Structural coefficients of 0.42 and 0.10 for the AC and aggregate base, respectively.
- No growth.
- A resilient modulus of 3,500 psi for site subgrade assuming the surface 18 inches of subgrade is scarified and compacted to at least 92 percent of maximum dry density as defined by ASTM D1557.
- The pavement section of access roadways associated with the fire access road will support an imposed fire apparatus load of 75,000 pounds on an infrequent basis.
- Design life of 20 years.
- No growth.

If any of these assumptions are incorrect, our office should be contacted with the appropriate information so that the pavement designs can be revised.

Pavement design is strongly influenced by the type and frequency of truck traffic. The breakdown of truck traffic (relative to FHWA classification) used in our analysis is presented in Table 5. If any of these assumptions vary from project design values, our office should be contacted with the appropriate information so that the pavement designs can be revised.

**Table 5. Truck Traffic Breakdown**

| FHWA Class Group | Description | Percent |
|---|---|---|
| 4 | Bus and fire truck | 2 |
| 5 | 2-axle, single unit | 50 |
| 6 | 3-axle, single unit | 48 |
| 7 | 4-axle, single unit | 0 |
| 8 | Tractor/trailer 3- to 4-axle | 0 |
| 9 | Tractor/trailer 3- to 4-axle | 0 |
| 10 | Tractor/trailer 3- to 4-axle | 0 |
| 11 | 5-axle, multi-trailer | 0 |
| 12 | 6-axle, multi-trailer | 0 |

Our pavement design recommendations assuming a truck ADT between 10 and 40 are presented in Table 6.

**Table 6. Recommended Standard Pavement Sections**

| Traffic Levels | Trucks per Day[1] | ESALs | AC[2] (inches) | Aggregate Base[2] (inches) |
|---|---|---|---|---|
| Car parking stalls | 0 | 10,000 | 3 | 8 |
| Truck/drive aisles[1] | 10 | 35,000 | 3 | 12 |
| | 20 | 70,000 | 3.5 | 12 |
| | 30 | 105,000 | 3.5 | 14 |
| | 40 | 139,000 | 4 | 14 |

1. See Table 5 for the assumed breakdown of the trucks.
2. All thicknesses are intended to be the minimum acceptable.

If the subgrade is cement amended to the thicknesses indicated below and the amended soil achieves a seven-day unconfined compressive strength of at least 100 psi, the pavement can be constructed as recommended in Table 7.

**Table 7. Recommended Pavement Sections using Cement Amendment**

| Traffic Levels | Trucks per Day[1] | ESALs | AC[2] (inches) | Aggregate Base[2] (inches) | Cement Amendment[2,3] (inches) |
|---|---|---|---|---|---|
| Car parking stalls | 0 | 10,000 | 3 | 4 | 12 |
| Truck/drive aisles[1] | 10 | 35,000 | 3 | 4 | 12 |
| | 20 | 70,000 | 3.5 | 4 | 12 |
| | 30 | 105,000 | 3.5 | 5 | 12 |
| | 40 | 139,000 | 4 | 6 | 12 |

1. See Table 5 for the assumed breakdown of the trucks.
2. All thicknesses are intended to be the minimum acceptable.
3. Assumes a minimum seven-day unconfined compressive strength of 100 psi.

To prevent strength loss during curing, cement-amended soil should be allowed to cure for at least four days prior to construction traffic or placing aggregate base. Lastly, the amended subgrade should be protected with a minimum of 4 inches of aggregate base prior to construction traffic access.

All thicknesses are intended to be the minimum acceptable. Design of the recommended pavement section is based on the assumption that construction will be completed during an extended period of dry weather. Wet weather construction could require an increased thickness of aggregate base. In addition, the pavement sections recommended above are for support of post-construction design traffic. The aggregate (with or without cement-amended subgrade) is not designed to support construction traffic. Increased aggregate thicknesses will likely be required to support construction traffic as discussed in Section 7.2 (Construction Traffic and Staging).

The AC, aggregate base, and cement amendment should meet the requirements outlined in Section 7.6 (Materials).

Construction traffic should be limited to non-building, unpaved portions of the site or haul roads. Construction traffic should not be allowed on new pavement. If construction traffic is to be allowed on newly constructed road sections, an allowance for this additional traffic will need to be made in the design pavement section.

## *6.10 DRAINAGE*

### 6.10.1 Temporary

During work at the site, the contractor should be made responsible for temporary drainage of surface water as necessary to prevent standing water and/or erosion at the working surface. During rough and finished grading of the site, the contractor should keep all pads and subgrade free of ponding water.

### 6.10.2 Surface Drains

Where possible, the finished ground surfaces around buildings should be sloped away from the structures at a minimum 2 percent gradient for a distance of at least 5 feet. Downspouts or roof scuppers should discharge into a storm drain system that carries the collected water to an appropriate stormwater system. Trapped planter areas should not be created adjacent to buildings without providing means for positive drainage (e.g., swales or catch basins).

### 6.10.3 Foundation Drains

We recommend that perimeter foundation drains be installed for the buildings, considering the layouts and elevations of the proposed buildings and site conditions. Also, the use of these drains should be considered in areas where landscaping planters are placed proximate to the foundations.

Foundation drains should be constructed at a minimum slope of approximately ½ percent and pumped or drained by gravity to a suitable discharge. The perforated drainpipe should not be tied to a stormwater drainage system without backflow provisions. Foundation drains should consist of 4-inch-diameter, perforated drainpipe embedded in a minimum 2-foot-wide zone of crushed drain rock that extends to the ground surface. The invert elevation of the drainpipe should be installed at least 18 inches below the elevation of the floor slab.

The drain rock and geotextile should meet the requirements specified in Section 7.6 (Materials). The drain rock and geotextile should extend up the sides of embedded walls to within a foot of the ground surface with geotextile wrapped over the top of the drain rock, as recommended in Section 6.7 (Retaining Structures). A typical perimeter footing drain detail is presented on Figure 8.

### 6.10.4 Underslab Drainage

In addition to the recommendations for foundation drains (see above), underslab drains may be necessary in cut areas. Floor slabs established below existing grades may encounter shallow

perched groundwater conditions. Further details regarding permanent dewatering systems will need to be developed once grading plans have been finalized and/or site conditions are exposed. A typical underslab drain detail is presented on Figure 9.

### 6.10.5 Subdrains

Subdrains should be considered for portions of the site that are cut below surrounding grades. Shallow groundwater or seepage should be conveyed via a drainage channel or perforated pipe into an approved discharge. Recommendations for design and installation of perforated drainage pipe may be performed on a case-by-case basis by Columbia West during construction. Failure to provide adequate surface and subsurface drainage may result in soil slumping or unanticipated settlement of structures exceeding tolerable limits. A typical perforated drainpipe trench detail is presented on Figure 10.

### 6.10.6 Infiltration System

Due to the presence of steep slopes on the site and subsurface conditions, we do not recommend that stormwater drainage be infiltrated on the site. Stormwater should be routed to an appropriate stormwater system.

## *6.11 PERMANENT SLOPES*

The schematic grading plan indicates fill slopes with gradients of approximately 2.2H:1V or flatter are proposed. All new permanent cut and fill slopes should be evaluated by a qualified geotechnical engineer. Access roads and pavement should be located at least 5 feet from the top of cut and fill slopes. The setback should be increased to 10 feet for buildings. The slopes should be planted with appropriate vegetation to provide protection against erosion as soon as possible after grading. Surface water runoff should be collected and directed away from slopes to prevent water from running down the face of the slope. Columbia West should be allowed to review final grading plans and building and pavement setbacks from cut and fill slopes.

Where seepage is encountered at the face of cut slopes, it will be necessary to install a subdrain to collect the water. The subdrain shall consist of a minimum 18-inch-deep trench excavated through the base of the seepage area and at least 5 feet beyond the limits of the seepage. The trench shall be filled with drain rock with a perforated collector pipe and should be lined with a geotextile fabric. The drain rock and fabric should meet specifications provided in Section 7.6 (Materials). The collector pipe shall discharge at the toe of the slope, preferably directly into the storm drain system. We also recommend that a 2-foot-deep “toe drain” be installed at the toes of cut and fill slopes to collect groundwater seepage and protect adjacent pavement subgrade. A Typical cut and fill slope detail is presented on Figure 11.

# 7.0 CONSTRUCTION

## *7.1 SITE PREPARATION*

Site grading activities should be performed in accordance with the requirements specified in the 2021 IBC, Chapter 18 and Appendix J, with exceptions noted in this report. Site preparation should be observed and documented by Columbia West.

### 7.1.1 Demolition

Demolition includes complete removal of existing site improvements within 5 feet of areas to receive new pavement, buildings, retaining walls, or engineered fill. Underground vaults, tanks, manholes, and other subsurface structures should be removed from areas of new improvements. Utility lines should be completely removed or grouted full and left in place.

Voids resulting from removal of existing improvements should be backfilled with compacted structural fill, as discussed in Section 7.6.1 (Structural Fill). The bottoms of such excavations should be excavated to expose a firm subgrade before filling and their sides sloped at a minimum of 1H:1V to allow for more uniform compaction at the edges of the excavations.

Material generated during demolition should be transported offsite for disposal or stockpiled in areas designated by the owner. In general, these materials will not be suitable for reuse as engineered fill.

The project budget may need to include a contingency for removal of boulders or other buried elements from previous site grading activities.

### 7.1.2 Grubbing and Stripping

Trees and shrubs should be removed from fill areas. In addition, root balls should be grubbed out to the depth of the roots, which could exceed 3 feet BGS. Depending on the methods used to remove root balls, considerable disturbance and loosening of the subgrade could occur during site grubbing. We recommend that soil disturbed during grubbing operations be removed to expose firm, undisturbed subgrade. The resulting excavations should be backfilled with structural fill.

The existing root zone should be stripped and removed from all fill areas. Based on our observations, we estimate the average depth of stripping will be approximately 5 inches, although greater stripping depths may be required to remove localized zones of loose or organic soil. The stripping depth of the bark chips area in the south portion of the site is expected to range between approximately 6 and 24 inches. Greater stripping depths may be anticipated in areas with thicker vegetation and shrubs. The actual stripping depth should be based on field observations at the time of construction. Stripped material should be transported offsite for disposal or used in landscaped areas.

We recommend careful planning and execution of tree removal to eliminate disturbance to tree stumps and roots, existing vegetation, and topsoil zones. Such a disturbance may adversely impact the stability of the surficial slope soil.

### 7.1.3 Topsoil

An approximately 6- to 12-inch-deep topsoil zone was observed at the ground surface in our explorations. Reliable strength properties are extremely difficult to predict for the topsoil material. There is a high risk for poor performance of floor slabs and pavement established directly over topsoil. In order to reduce the risk of settlement, we recommend the topsoil be improved during site preparation in areas where planned cuts do not extend to the bottom of the topsoil (up to

12 inches). Before fill placement and construction, the topsoil should be improved by removing and replacing it with structural fill or scarifying and re-compacting to structural fill requirements.

As discussed in Section 7.6.1 (Structural Fill), the on-site soil can be sensitive to small changes in moisture content and will be difficult, if not impossible, to compact adequately during wet weather. While scarification and compaction of the subgrade is the best option for subgrade improvement, it will likely only be possible during extended dry periods and following moisture conditioning of the soil. As discussed further on in this report, cement amendment is an option for conditioning the soil for use as structural fill during periods of wet weather or when drying the soil is not an option.

### 7.1.4 Undocumented Fill

#### *7.1.4.1 General*

Our explorations encountered undocumented fill to depths between 1 foot and 31 feet BGS. Prior explorations encountered fill to depths between 10.5 and 49.5 feet BGS. The fill is highly variable and generally includes gravel and sand with varying proportions of silt and clay or clay with varying proportions of gravel and sand. The fill contains varying proportions of cobbles and boulders. Due to the variable thickness, composition, and consistency of the fill, there is a risk of settlement of foundations, floor slabs, and pavement founded on undocumented fill. The undocumented fill should be evaluated at the time of construction.

#### *7.1.4.2 Foundation and Floor Slab Areas*

Undocumented fill should be removed from under new building foundations and floor slabs, and the footings and floor slabs should be supported on structural fill or by a ground improvement system if the fill is left in place as discussed in Section 6.3 (Shallow Foundations), Section 6.4 (Ground Improvement), and Section 6.6 (Floor Slabs).

#### *7.1.4.3 Pavement Areas*

There is a risk for settlement and poor performance of pavement established directly over the undocumented fill. Removal and replacement of the undocumented fill would eliminate all risk. However, provided the risk of settlement and distress is understood and accepted, there is an option to limit the subgrade stabilization to removal and replacement or scarifying and recompacting the upper 18 inches of the undocumented fill material within pavement areas as discussed in Section 6.9 (Pavement).

#### *7.1.4.5 Subgrade Observations*

Considerable soil processing, including moisture conditioning and the removal of deleterious material (organic material, cobbles, and boulders) from the existing fill, may be required during scarification and compaction or when using the excavated material as structural fill. We recommend that the exposed subgrade be closely evaluated by a geotechnical engineer during the process. Compaction should be performed as described in Section 7.6.1 (Structural Fill) and Section 7.7 (Fill Placement and Compaction).

### 7.1.5 Subgrade Evaluation

Upon completion of stripping and subgrade stabilization and before fill or pavement is placed, the exposed subgrade should be evaluated by proof rolling. The subgrade should be proof rolled

with a fully loaded dump truck or similarly heavy, rubber-tired construction equipment to identify soft, loose, or unsuitable areas. A member of our geotechnical staff should observe proof rolling to evaluate yielding of the ground surface. If soft or yielding subgrade areas are identified during evaluation, we recommend the subgrade be over excavated and backfilled with compacted structural fill.

During wet weather, subgrade evaluation should be performed by probing with a foundation probe rather than proof rolling. Areas that appear soft or loose should be improved in accordance with subsequent sections of this report.

### 7.1.6 Compacting Test Pit Locations

The test pit excavations were backfilled using the relatively minimal compactive effort of the excavator bucket. Soft spots can be expected at these locations. We recommend this relatively uncompacted soil be removed from the test pits to a depth of 3 feet below finished subgrade. If a test pit is located within 10 feet of a footing, we recommend full-depth removal of the uncompacted soil. The resulting excavation should be brought back to grade with structural fill.

## *7.2 CONSTRUCTION TRAFFIC AND STAGING*

Near-surface silt- and clay-rich soil will be easily disturbed during construction. If not carefully executed, site preparation, utility trench work, and roadway excavation can create extensive soft areas and significant repair costs can result. Earthwork planning, regardless of the time of year, should include considerations for minimizing subgrade disturbance.

If construction occurs during or extends into the wet season or if the moisture content of the surficial soil is more than a couple percentage points above optimum, site stripping and cutting may need to be accomplished using track-mounted equipment. Likewise, the use of granular haul roads and staging areas will be necessary for support of construction traffic during the rainy season or when the moisture content of the surficial soil is more than a few percentage points above optimum. The base rock thickness for pavement and slab areas is intended to support post-construction design traffic loads. This design base rock thickness will likely not support construction traffic or pavement construction. Moreover, if construction is planned for periods when the subgrade soil is wet, staging and haul roads with increased thicknesses of base rock will be required.

The amount of staging and haul road areas, as well as the required thickness of granular material, will vary with the contractor's sequencing of a project and type/frequency of construction equipment and should, therefore, be the responsibility of the contractor. Based on our experience, between 12 and 18 inches of imported granular material are generally required in staging areas and between 18 and 24 inches in haul road areas. The contractor should also be responsible for selecting the type of material for construction of haul roads and staging areas. A geotextile fabric can be placed as a barrier between the subgrade and imported granular material in areas of repeated construction traffic to help prevent fines migration into the base rock. Imported granular material, stabilization material, and geotextile fabric should meet the specifications in Section 7.6 (Materials).

As an alternative to thickened crushed rock sections, haul roads and utility work zones may be constructed using cement-amended subgrade overlain by a crushed rock wearing surface. If this approach is used, the thickness of granular material in staging areas and along haul roads can typically be reduced to between 6 and 9 inches. This recommendation is based on an assumed minimum unconfined compressive strength of 100 psi for subgrade amended to a depth of 12 to 16 inches. The actual thickness of the amended material and imported granular material will depend on the contractor's means and methods and should be the contractor's responsibility. Cement amendment is discussed in Section 7.6 (Materials).

## *7.3 EXCAVATION AND SHORING*

### 7.3.1 Basalt Bedrock

The upper portions of the basalt bedrock are weathered and fractured and could generally be penetrated to varying degrees by the Kobelco SK140SR trackhoe used to excavate our test pits (see Appendix A). While excavation of weathered bedrock is expected to be difficult, we do not expect special excavation equipment to be necessary in the moderately weathered material. The test pit excavator could not penetrate the intact bedrock. Special excavation techniques (such as hydraulic breakers, rock trenchers, or blasting) will likely be required to excavate the intact basalt bedrock where our test pits encountered refusal. The depths to weathered or intact bedrock encountered in our explorations is presented Figures 2 and 3.

The contract bid documents should require that contractors list a unit cost for rock excavation using in-place (bank) volumes, which can be measured by surveying. The unit cost should not be provided in excavated (swelled) volumes, which are more difficult to accurately measure.

### 7.3.2 Rockfall Hazards

Grading and excavation should be conducted by the earthwork contractor in a sequence that will prevent overhanging rock material that might become dislodged. The contractor should also be responsible for providing protection for property and personnel. This might include sloping of cut areas, building protective berms, or providing catchment netting or equipment at the base of a slope excavation, depending on the final grading plan and construction sequence.

### 7.3.3 Trench Cuts and Shoring

In general, the fill soil at the site should be readily excavatable with conventional grading equipment. However, as mentioned previously, cobbles and boulders will be encountered in the existing fill and decomposed/weathered basalt. The native, dense gravel, cobbles, and boulders encountered at shallow depths will result in difficult excavation with conventional equipment in both fill and decomposed/weathered basalt. In addition, because of the presence of cobbles and boulders in the near-surface fill and decomposed/weathered basalt, we expect difficult excavation at shallow depths. Utility trenches may result in slowed excavation and larger backfill volumes due to the presence of cobbles, boulders, and related caving.

Temporary construction excavations adjacent to level ground (without adjacent structures) should stand vertical for short periods of time to a depth of approximately 4 feet BGS, provided groundwater seepage is not observed in the trench walls. However, where retaining walls, soft or loose fills, or sloping ground is located above the excavation, or the excavation is greater than 4 feet high or groundwater seepage is present, the cuts will need to be shored or trimmed back

and should be carefully planned so as not to destabilize the excavation or nearby improvements. Open excavation techniques may be used to excavate trenches with depths between 4 and 8 feet BGS, provided the walls of the excavation are cut at a slope of 1.5:1V or flatter and groundwater seepage is not present. At this inclination, the slopes with soft silt and clay or loose gravel and sand, cobbles, and boulders may ravel and require some ongoing repair. Excavations should be flattened to 2H:1V if excessive sloughing or raveling occurs. In lieu of large and open cuts, approved temporary shoring may be used for excavation support. Use of approved temporary shoring is recommended where the slopes cannot be cut back, within the influence area of structural elements, and for cuts below the water table. The influence area can be defined as a 1H:1V slope extending down from a 5-foot setback from the edge of a foundation element. A wide variety of shoring and dewatering systems are available. Consequently, we recommend that the contractor be responsible for selecting the appropriate shoring and dewatering systems.

If box shoring is used, it should be understood that box shoring is a safety feature used to protect workers and does not prevent caving. If excavations are left open for extended periods of time, caving of the sidewalls may occur. The presence of caved material will limit the ability to properly backfill and compact the trenches. The contractor should be prepared to fill voids between the box shoring and the sidewalls of the trenches with sand or gravel before caving occurs.

If shoring is used, we recommend that the type and design of the shoring system be the responsibility of the contractor, who is in the best position to choose a system that fits the overall plan of operation.

#### 7.3.4 Open Excavations

Open excavations may be necessary for building cuts. Cuts in slightly weathered to intact bedrock will likely stand vertical and do not require shoring or sloping. We recommend that cuts in the overlying gravel and sand (decomposed/weathered basalt) layers be sloped in accordance with OSHA regulations. Temporary shoring may be possible to support cuts in soil, but may be difficult to install due to the underlying bedrock. If shoring is used, we recommend that the type and design of the shoring system be the responsibility of the contractor, who is in the best position to choose a system that fits the overall plan of operation.

#### 7.3.5 Safety

All excavations should be made in accordance with applicable OSHA requirements and regulations of the state, county, and local jurisdiction. While this report describes certain approaches to excavation and dewatering, the contract documents should specify that the contractor is responsible for selecting excavation and dewatering methods, monitoring the excavations for safety, and providing shoring (as required) to protect personnel and adjacent structural elements.

### *7.4 CONSTRUCTION DEWATERING*

#### 7.4.1 General

Groundwater was measured in the VWPs installed at the site at depths as shallow as 79.3 feet BGS. Based on the proposed site grading, we do not expect that static groundwater will impact the proposed development.

Areas of perched water may be encountered, particularly within the fill or on top of the decomposed/weathered basalt. We expect that perched groundwater may be encountered in trench excavations and possibly during mass grading. Temporary and permanent dewatering systems will likely be required.

### 7.4.2 Construction Dewatering

The contractor should be made responsible for temporary drainage of surface water, perched water, and groundwater as necessary to prevent standing water and/or erosion at the working surface.

Because of the instability of saturated, low plasticity silt, sand, and gravel, sloughing and "running" conditions can occur if the excavation extends below groundwater seepage levels. Accordingly, positive control of groundwater seepage will be required to maintain stable trench sides and base. The proposed dewatering plan should be capable of maintaining groundwater levels at least 2 feet below the base of the trench excavation (including the depth required for trench bedding and stabilization material). In addition to safety considerations, running soil, caving, or other loss of ground will increase backfill volumes and can result in damage to adjacent structures or utilities. Flow rates for dewatering are likely to vary depending on location, soil type, and the season in which the excavation occurs. The dewatering systems should be capable of adapting to variable flows.

Trench dewatering will be required to maintain dry working conditions if the invert elevations of the proposed utilities encounter groundwater. If perched water is encountered, pumping from a sump located within trenches may be effective in dewatering localized groundwater seepage. Given the silt and sand present, pumping from sumps located within the trench may result in excessive sloughing, caving, or running conditions, and dewatering by well points may be required.

If groundwater is present at the base of utility excavations, we recommend placing 1 foot to 2 feet of stabilization material at the base of the excavation. The use of a subgrade geotextile fabric may reduce the amount of stabilization material required. The actual thickness should be based on field observations during construction.

Trench stabilization material and the subgrade geotextile fabric should meet the requirements described in Section 7.6 (Materials). Trench stabilization material should be placed in one lift and compacted until well keyed.

While we have described certain approaches to the excavation dewatering, it is the contractor's responsibility to select the dewatering methods.

### 7.4.3 Permanent Dewatering

Permanent dewatering systems may be required along the bases of cut and fill slopes, in areas where upwelling water conditions are observed, or at other susceptible areas identified by our office in the field. If required, we anticipate the systems may typically consist of a series of gravel blanket drains beneath paved areas in cut conditions, sub-drains at the toes of the cut and fill slopes, and retaining wall drains.

Further details regarding permanent dewatering systems will need to be developed once development plans have been finalized and/or site conditions are exposed. Also, refer to Section 6.10 (Drainage) for additional discussion regarding site drainage.

## *7.5 TEMPORARY DRAINAGE*

The contractor should be made responsible for temporary drainage of surface water as necessary to prevent standing water or erosion at the working surface. During rough and finished grading of the building site, the contractor should keep all footing excavations and building pads free of water.

## *7.6 MATERIALS*

### 7.6.1 Structural Fill

#### *7.6.1.1 General*

Areas proposed for fill placement should be appropriately prepared as described in Section 7.1 (Site Preparation). Engineered fill placement should be observed by Columbia West. Compaction of engineered structural fill should be verified by nuclear gauge field compaction testing performed in accordance with ASTM D6938. Field compaction testing should be performed for each vertical foot of engineered fill placed.

Various materials may be acceptable for use as structural fill. Structural fill should be free of organic material or other unsuitable material and should meet the specifications provided in the following sections. Representative samples of proposed engineered structural fill should be submitted for laboratory testing and approval by Columbia West prior to placement.

#### *7.6.1.2 On-Site Soil*

The material at the site should be suitable for use as general structural fill, provided it is properly moisture conditioned and free of debris, organic material, and particles over 6 inches in diameter. Occasional cobbles greater than 6 inches in diameter may be acceptable if they can be properly mixed into the fill matrix to reduce void creation and are spaced sufficiently to allow compaction of the soil. Material greater than 10 inches in diameter shall not be placed in fills. Fine grading of soil may result in segregating cobbles or coarse gravel from the soil matrix, resulting in unsatisfactory (poorly graded or "bony") fill. Fill material should be maintained as well graded with gravel, sand, and silt or clay material for proper compaction during fill placement and mass grading. A qualified geotechnical engineer should observe fill material prior to placement.

During our explorations, we observed the on-site soil was wet of optimum. Consequently, we anticipate that the near-surface soil will require significant moisture conditioning (drying) prior to use as on-site soil for structural fill. Accordingly, extended dry weather will be required to adequately condition and place the soil as structural fill. It will be difficult, if not impossible, to adequately compact on-site soil during the rainy season or during prolonged periods of rainfall.

When used as structural fill, on-site soil should be placed in lifts with a maximum uncompacted thickness of 8 to 10 inches and compacted to not less than 92 percent of maximum dry density as determined by ASTM D1557.

#### *7.6.1.3 Imported Granular Materials*

Imported granular material used as structural fill should be pit- or quarry-run rock, crushed rock, or crushed gravel and sand. The imported granular material should also be durable, angular, and fairly well graded between coarse and fine material; should have less than 5 percent fines by dry weight; and should have at least two mechanically fractured faces.

Imported granular material should be placed in lifts with a maximum uncompacted thickness of 12 inches and compacted to not less than 95 percent of maximum dry density as determined by ASTM D1557. During the wet season or when wet subgrade conditions exist, the initial lift should be approximately 18 inches in uncompacted thickness and should be compacted by rolling with a smooth drum roller without using vibratory action.

#### *7.6.1.4 Trench Backfill*

Trench backfill placed beneath, adjacent to, and for at least 12 inches above utility lines (i.e., the pipe zone) should consist of durable, well-graded granular material with a maximum particle size of 1½ inches, should have less than 7 percent fines by dry weight, and should have at least two mechanically fractured faces. The pipe zone backfill should be compacted to at least 90 percent of maximum dry density as determined by ASTM D1557 or as required by the pipe manufacturer or local building department.

Within roadway alignments, the remainder of the trench backfill up to the subgrade elevation should consist of durable, well-graded granular material with a maximum particle size of 2½ inches, should have less than 7 percent fines by dry weight, and should have at least two mechanically fractured faces. This material should be compacted to at least 92 percent of maximum dry density as determined by ASTM D1557 or as required by the pipe manufacturer or local building department. The upper 3 feet of the trench backfill should be compacted to at least 95 percent of maximum dry density as determined by ASTM D1557.

Outside of structural improvement areas (e.g., roadway alignments or building pads), trench backfill placed above the pipe zone may consist of general fill material that is free of organic material and material over 6 inches in diameter. This general trench backfill should be compacted to at least 90 percent of maximum dry density as determined by ASTM D1557 or as required by the pipe manufacturer or local building department.

#### *7.6.1.5 Stabilization Material*

Stabilization material used in staging or haul road areas or in trenches should consist of 4- or 6-inch-minus pit- or quarry-run rock, crushed rock, or crushed gravel and sand. The material should have a maximum particle size of 6 inches, should have less than 5 percent by dry weight passing the U.S. Standard No. 4 sieve, and should have at least two mechanically fractured faces. The material should be free of organic material and other deleterious material. Stabilization material should be placed in lifts between 12 and 24 inches thick and compacted to a firm condition.

#### *7.6.1.6 Drain Rock*

Drain rock should consist of angular, granular material with a maximum particle size of 2 inches. The material should be free of roots, organic material, and other unsuitable material; should have less than 2 percent fines by dry weight; and should have at least two mechanically fractured faces. Drain rock should be compacted to a well-keyed, firm condition.

#### *7.6.1.7 Retaining Wall Backfill*

Backfill placed behind retaining walls and extending a horizontal distance of ½H, where H is the height of the retaining wall, should consist of imported granular material as described above and should have less than 7 percent fines by dry weight. We recommend the wall backfill be separated from general fill, native soil, and/or topsoil using a geotextile fabric that meets the specifications provided below for drainage geotextiles.

Backfill should be placed and compacted as recommended for structural fill, with the exception of backfill placed immediately adjacent to walls. Backfill adjacent to walls should be compacted to a lesser standard to reduce the potential for generation of excessive pressure on the walls. Backfill located within a horizontal distance of 3 feet from retaining walls should be compacted to approximately 90 percent of maximum dry density as determined by ASTM D1557. Backfill placed within 3 feet of a wall should be compacted in lifts less than 6 inches thick using hand-operated tamping equipment (such as a jumping jack or vibratory plate compactor). If flatwork (slabs, sidewalk, or pavement) will be placed adjacent to a wall, we recommend that the upper 2 feet of fill be compacted to 95 percent of maximum dry density as determined by ASTM D1557.

#### *7.6.1.8 Retaining Wall Leveling Pad*

Imported granular material placed at the bases of retaining wall footings should consist of select granular material. The granular material should be ¾- to 1½-inch-minus aggregate size and should have at least two mechanically fractured faces. The leveling pad material should be placed in a 6- to 12-inch-thick lift and compacted to not less than 95 percent of maximum dry density as determined by ASTM D1557.

#### *7.6.1.9 Floor Slab and Pavement Aggregate Base*

Imported granular material used as base rock for building floor slabs and pavement should consist of ¾- or 1½-inch-minus material (depending on the application). In addition, the aggregate should have less than 5 percent fines by dry weight. The aggregate base should be compacted to not less than 95 percent of maximum dry density as determined by ASTM D1557.

### 7.6.2 Soil Amendment with Cement

#### *7.6.2.1 General*

As an alternative to the use of imported granular material for wet weather structural fill, an experienced contractor may be able to amend the on-site soil with portland cement to obtain suitable support properties. Successful use of soil amendment depends on the use of correct mixing techniques, soil moisture content, and amendment quantities. The amount of cement used during amendment should be based on an assumed soil dry unit weight of 100 pcf.

In addition, the new Oregon Department of Environmental Quality requirements, under 1200C permits, include additional requirements for routing and testing runoff from sites where cement amendment is used.

Depending on the grade and location, cobbles and boulders could be present in the subgrade. Cobbles and boulders can damage cement tilling equipment and when encountered may require removal before cement amendment.

#### *7.6.2.2 Subbase Stabilization*

Specific recommendations based on exposed site conditions for soil amendment can be provided if necessary. However, for preliminary design purposes, we recommend a target strength for cement-amended subgrade for building and pavement subbase (below aggregate base) of 100 psi. The amount of cement used to achieve this target generally varies with moisture content and soil type. It is difficult to predict field performance of soil to cement amendment due to variability in soil response, and we recommend laboratory testing to confirm expectations. In general, 6 percent cement by weight of dry soil can be used when the soil moisture content does not exceed approximately 20 percent. If the soil moisture content is in the range of 25 to 35 percent, 7 to 8 percent by weight of dry soil is recommended. The amount of cement added to the soil may need to be adjusted based on field observations and performance. Moreover, depending on the time of year and moisture content levels during amendment, water may need to be applied during tilling to appropriately condition the soil moisture content.

We recommend assuming a minimum cement ratio of 6 percent by dry weight, with higher rates as discussed above. Because of the higher organic content and moisture, we recommend using a higher cement ratio when stabilizing topsoil zone material, likely a minimum of 7 percent.

We recommend cement amendment equipment be equipped with balloon tires to reduce rutting and disturbance of the fine-grained soil. A sheepsfoot or segmented pad roller with a minimum static weight of 40,000 pounds should be used for initial compaction of the fine-grained soil without the use of vibratory action. A smooth drum roller with a minimum applied linear force of 700 pounds per inch should be used for final compaction. The amended soil should be compacted to at least 92 percent of the achievable dry density at the moisture content of the material as defined in ASTM D1557.

A minimum curing time of four days is required between amendment and construction traffic access. Construction traffic should not be allowed on unprotected, cement-amended subgrade. To protect the cement-amended surfaces from abrasion or damage, the finished surface should be covered with 4 to 6 inches of imported granular material.

Amendment depths for subgrade beneath buildings and pavement, haul roads, and staging areas are typically approximately 12, 16, and 12 inches, respectively. The crushed rock typically becomes contaminated with soil during construction. Contaminated base rock should be removed and replaced with clean rock in pavement areas. The actual thickness of the amended material and imported granular material for haul roads and staging areas will depend on the anticipated traffic as well as the contractor's means and methods and should be the contractor's responsibility.

Cement amendment should not be attempted when air temperature is below 40 degrees Fahrenheit or during moderate to heavy precipitation. Cement should not be placed when the ground surface is saturated or standing water exists.

#### *7.6.2.3 Cement-Amended Structural Fill*

On-site soil that would not otherwise be suitable for structural fill may be amended and placed as fill over a subgrade prepared in conformance with Section 7.1 (Site Preparation). The cement ratio for general cement-amended fill can generally be reduced by 1 percent (by dry weight). Typically, a minimum curing time of four days is required between amendment and construction traffic access. Consecutive lifts of fill may be amended immediately after the previous lift has been amended and compacted (e.g., the four-day wait period does not apply). However, where the final lift of fill is a building or roadway subgrade, the four-day wait period is in effect.

#### *7.6.2.4 Other Considerations*

Portland cement-amended soil is hard and has low permeability. This soil does not drain well and it is not suitable for planting. Future planted areas should not be cement amended, if practical, or accommodations should be made for drainage and planting. Moreover, cement amendment of soil within building areas must be done carefully to avoid trapping water under floor slabs. We should be contacted if this approach is considered. Cement amendment should not be used if runoff during construction cannot be directed away from adjacent wetlands. In general, cement amendment is not recommended during cold weather (temperatures less than 40 degrees Fahrenheit) or during steady rainfall.

### 7.6.3 Pavement

#### *7.6.3.1 AC*

The AC should be Level 2, ½-inch, dense ACP according to OSSC 00744 (Asphalt Concrete Pavement) and compacted to 92 percent of the theoretical maximum density of the mix as determined by AASHTO T 209 or ASTM D2041. The minimum and maximum lift thicknesses are 2 and 3 inches, respectively, for ½-inch ACP. Asphalt binder should be performance graded and conform to PG 64-22 or better. The binder grade should be adjusted depending on the aggregate gradation and amount of recycled asphalt pavement and/or recycled asphalt shingles in the contractor's mix design submittal.

#### *7.6.3.2 Cold Weather Paving Considerations*

In general, AC paving is not recommended during cold weather (temperatures less than 40 degrees Fahrenheit). Compacting under these conditions can result in low compaction and premature pavement distress. Each AC mix design has a recommended compaction temperature range that is specific for the particular AC binder used. In colder temperatures, it is more difficult to maintain the temperature of the AC mix, as it can lose heat while stored in the delivery truck, as it is placed, and in the time between placement and compaction. In Oregon, the AC surface temperature during paving should be at least 40 degrees Fahrenheit for lift thicknesses greater than 2.5 inches and at least 50 degrees Fahrenheit for lift thicknesses between 2 and 2.5 inches.

If AC paving must take place during cold weather construction as defined in this section, the contractor and design team should discuss options for minimizing risk to pavement serviceability.

### 7.6.4 Geotextile Fabric

#### 7.6.4.1 Subgrade Geotextile

Subgrade geotextile should conform to OSSC Table 02320-4 and OSSC 00350 (Geosynthetic Installation). A minimum initial aggregate base lift of 6 inches is required over geotextiles. All drainage aggregate and stabilization material should be underlain by a subgrade geotextile.

#### 7.6.4.2 Drainage Geotextile

Drainage geotextile should conform to Type 2 material of OSSC Table 02320-1 and OSSC 00350 (Geosynthetic Installation). A minimum initial aggregate base lift of 6 inches is required over geotextiles.

## *7.7 FILL PLACEMENT AND COMPACTION*

Fill soil should be compacted at a moisture content that is near optimum. The maximum allowable moisture content varies with the soil gradation and should be evaluated during construction.

Fill and backfill material should be placed in uniform, horizontal lifts and compacted with appropriate equipment. The maximum lift thickness will vary depending on the material and compaction equipment used but should generally not exceed the loose thicknesses provided in Table 8. Fill material should be compacted in accordance with the compaction criteria provided in Table 9.

**Table 8. Recommended Uncompacted Lift Thickness**

| Compaction Equipment | Recommended Uncompacted Lift Thickness (inches) | | |
|---|---|---|---|
| | On-Site Silty, Clayey, and Sandy Soil | Granular and Crushed Rock Maximum Particle Size ≤ 1½ Inches | Crushed Rock Maximum Particle Size > 1½ Inches |
| Hand tools: Plate compactor and jumping jack | 4 to 8 | 4 to 8 | Not recommended |
| Rubber-tired equipment | 6 to 8 | 10 to 12 | 6 to 8 |
| Light roller | 8 to 10 | 10 to 12 | 8 to 10 |
| Heavy roller | 10 to 12 | 12 to 18 | 12 to 16 |
| Hoe pack equipment | 12 to 16 | 18 to 24 | 12 to 16 |

The table above is based on our experience and is intended to serve only as a guideline. The information provided in this table should not be included in the project specifications.

**Table 9. Compaction Criteria**

| Fill Location | Compaction Requirements in Structural Zones | | |
|---|---|---|---|
| | Percent Maximum Dry Density Determined by ASTM D1557 | | |
| | 0 to 2 Feet Below Subgrade (percent) | > 2 Feet Below Subgrade (percent) | Pipe Zone (percent) |
| Beneath footings and columns | 95[1] | 95 | -- |
| Beneath interior slabs | 95 | 95 | -- |
| Beneath pavement | 95 | 95 | -- |
| Utility trenches | 95[1] | 92 | 90[2] |
| Sidewalks | 95 | 92 | -- |
| Retaining wall backfill | 95[1,3] | 92[3] | -- |
| Area fills | 95[1] | 92 | -- |
| Non-structural (landscape) areas | 85 | 80 | -- |

1. May be reduced to 92 percent if fine-grained soil is used.
2. Or as recommended by the pipe manufacturer.
3. Should be reduced to 90 percent within a horizontal distance of 3 feet from the retaining wall.

### *7.8 EROSION CONTROL*

Soil at this site is susceptible to erosion by wind and water; therefore, erosion control measures should be carefully planned and installed before construction begins. Surface water runoff should be collected and directed away from sloped areas to prevent water from running down the slope face. Measures that can be employed to reduce erosion include the use of silt fences, hay bales, buffer zones of natural growth, sedimentation ponds, and granular haul roads. All erosion control methods should be in accordance with local jurisdiction standards.

## 8.0 OBSERVATION OF CONSTRUCTION

Satisfactory pavement, earthwork, and foundation performance depends to a large degree on the quality of construction. Sufficient observation of the contractor's activities is a key part of determining that the work is completed in accordance with the construction drawings and specifications. Columbia West should be retained to observe subgrade preparation, fill placement, foundation excavations, ground improvement installation, drainage system installation, and pavement placement and to review laboratory compaction and field moisture-density information.

Subsurface conditions observed during construction should be compared with those encountered during the subsurface explorations. Recognition of changed conditions requires experience; therefore, qualified personnel should visit the site with sufficient frequency to detect whether subsurface conditions change significantly from those anticipated.

## 9.0 LIMITATIONS

We have prepared this report for use by the addressee and members of the design and construction team for the proposed project. This report is subject to the limitations expressed in Appendix I.

♦ ♦ ♦

We appreciate the opportunity to be of service to you. Please call if you have questions concerning this report or if we can provide additional services.

Sincerely,

Jonathan A. Nasr, PE
Project Engineer

Najib A. Kalas, PE
Principal Engineer

DRAFT

## REFERENCES

AASHTO 1993. *AASHTO Guide for Design of Pavement Structures*.

ASCE 2016. *Minimum Design Loads and Associated Criteria for Buildings and Other Structures.* ASCE Standard ASCE/SEI 7-16.

ASTM International 2022. *Annual Book of ASTM Standards,* Volume 04.08: Soil and Rock (I), D420-D5876/D5876m.

Burns, W.J., K.A. Mickelson, C.B. Jones, S.G. Pickner, K.L.B. Hughes, and R. Sleeter 2013. *Landslide Hazard and Risk Study of Northwestern Clackamas County, Oregon,* Oregon Department of Geology and Mineral Industries, Open-File Report O-13-08.

CH2M Hill 1969. *Willamette Reservoir and FAI-205 Landslide,* dated November 10, 1969, Project No. P5572.0.

GEG 1991. Interoffice Memo, Sit*ing of City Reservoir; West Linn Slide; I-205, M. P. 7.0, Clackamas County,* dated January 9, 1991, State of Oregon Geotechnical Engineering Group.

GeoDesign, Inc. 2010. *Slope Stability Evaluation; Oregon Solar Highway – West Linn Project Site; West Linn, Oregon,* dated February 4, 2010, GeoDesign Project: ODOT-51-01.

GeoDesign, Inc. 2013. *Report of Geotechnical Engineering Services; West Linn Trail Bike/Pedestrian Path; West Linn, Oregon,* dated March 7, 2013, GeoDesign Project: ODOT-71-01.

International Code Council 2021. *2021 International Building Code*.

Madin, I.P. 2009. *Geologic Map of the Oregon City 7.5' Quadrangle, Clackamas County, Oregon,* Oregon Department of Geology and Mineral Industries, GMS 119, 1 plate.

NV5 2022. *Due Diligence Geotechnical Engineering Services; Public Works Facility; Salamo Road and Greene Street; West Linn, Oregon,* dated May 23, 2022, Project: WestLinn-11-01.

NV5 2023. *Geologic Summary; I-205 Rest Area Landslide; West Linn, Oregon,* dated December 11, 2023, Project: WestLinn-10-02.

ODOT 1987. *Soil and Rock Classification Manual,* Oregon Department of Transportation, Highway Division, 44 p.

ODOT 2024a. *Geotechnical Design Manual,* Oregon Department of Transportation, Delivery & Operations Division, Engineering & Technical Services Branch, May 2024.

ODOT 2024b. *Oregon Standard Specifications for Construction,* Oregon Department of Transportation.

Oregon Building Codes Division 2022. *2022 Oregon Structural Specialty Code*.

OSHA, Safety and Health Regulations for Construction, 29 CFR Part 1926, revised 2024.

Post-Tensioning Institute 2014. *Recommendations for Prestressed Rock and Soil Anchors,* Fifth Edition.

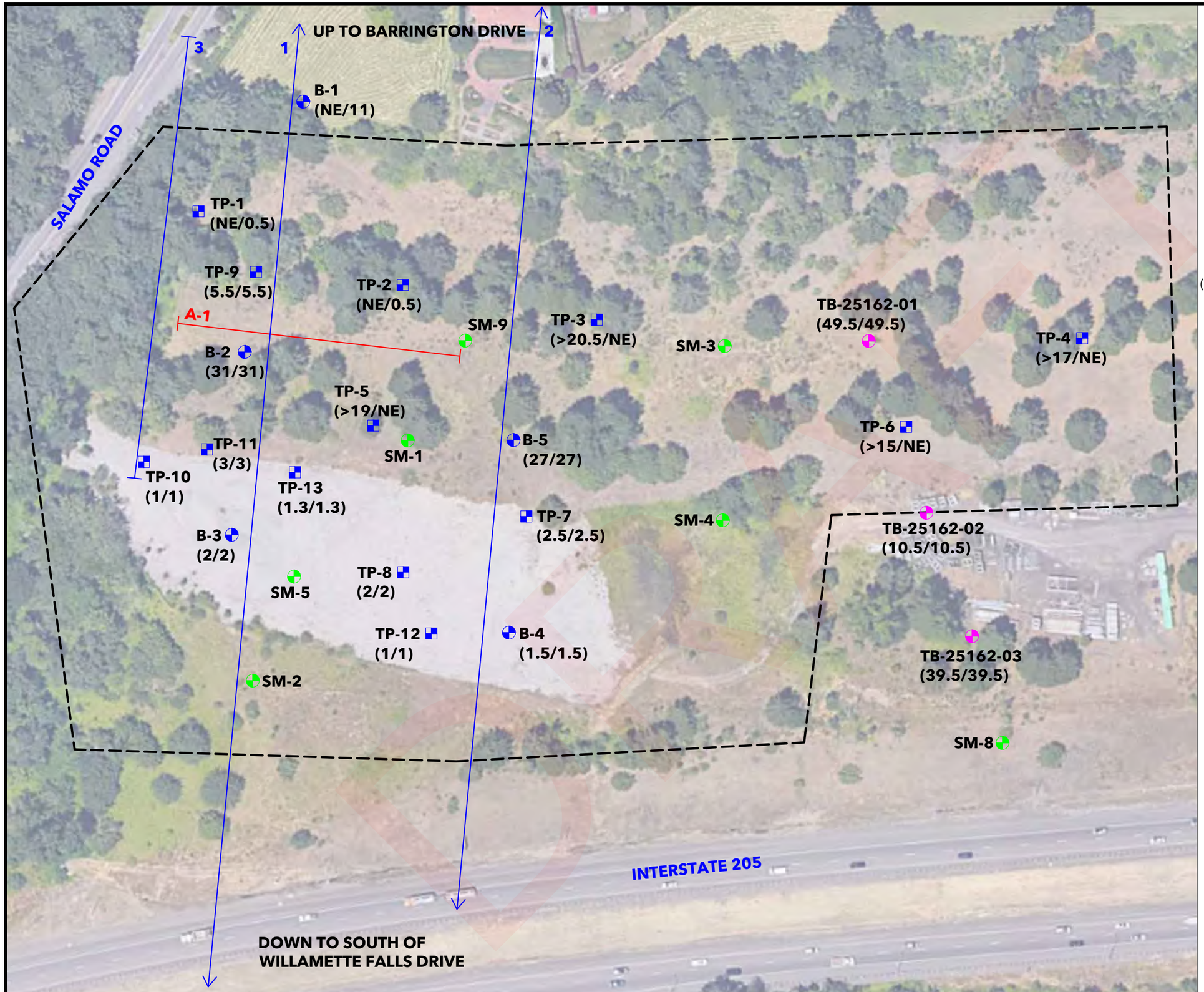
Schlicker, H.G., and C.T. Finlayson 1979. *Geology and Geologic Hazards of Northwestern Clackamas County, Oregon,* Oregon Department of Geology and Mineral Industries, Bulletin 99, 79 p., 8 maps, scale 1:24,000.

Vigil-Agrimis, Inc. 2009. *Wetlands/Waters Delineation Report for Highway Solar Project,* dated July 15, 2009.

DRAFT

# FIGURES

| | | | |
|---|---|---|---|
| Geotechnical ▪ Environmental ▪ Special Inspections Columbia West Engineering, Inc | PROJECT NO.: WESTL-1-01-1<br>APRIL 2025 | VICINITY MAP<br>OPERATIONS CENTER<br>WEST LINN, OREGON | FIGURE 1 |




LEGEND

- APPROXIMATE SITE BOUNDARY
- BORING (COLUMBIA WEST 2025)
- TEST PIT (COLUMBIA WEST 2025)
- BORING (GEODESIGN 2010)
- BORING (CH2M HILL 1969 - SEE NOTE 4)
- APPROXIMATE REMI ARRAY
- SLOPE STABILITY CROSS SECTION
- (NE/11) DEPTH OF FILL/DEPTH TO BASALT, WHERE ENCOUNTERED (FEET BGS)
- NE NOT ENCOUNTERED

N

0 20 40 60 80 100 200

NOTES:
1. AERIAL PHOTO SOURCED FROM GOOGLE EARTH.
2. EXPLORATION LOCATIONS ARE APPROXIMATE AND NOT SURVEYED.
3. REFER TO REPORT TEXT FOR EXPLORATION DESCRIPTIONS.
4. BORING LOGS NOT AVAILABLE.

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West
Engineering, Inc

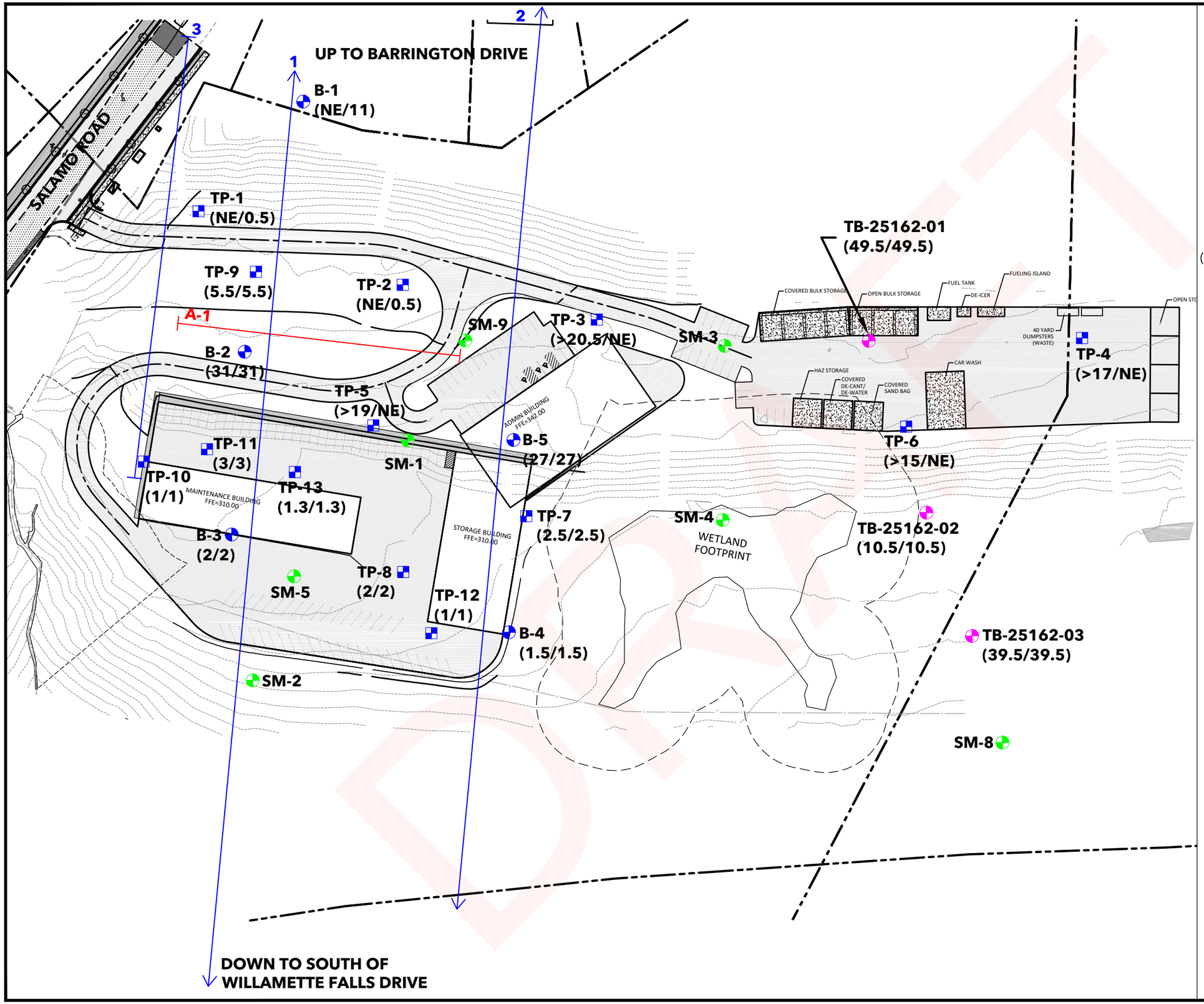
# OPERATIONS CENTER
# WEST LINN, OREGON
SALAMO ROAD AND GREEN STREET

## SITE PLAN - EXISTING CONDITIONS

PROJECT NO:
WESTL-1-01-1

APRIL 2025

FIGURE
2




## LEGEND

- BORING (COLUMBIA WEST 2025)
- TEST PIT (COLUMBIA WEST 2025)
- BORING (GEODESIGN 2010)
- BORING (CH2M HILL 1969 - SEE NOTE 4)
- APPROXIMATE REMI ARRAY
- SLOPE STABILITY CROSS SECTION
- (NE/11) DEPTH OF FILL/DEPTH TO BASALT, WHERE ENCOUNTERED (FEET BGS)
- NE NOT ENCOUNTERED

N

0 20 40 60 80 100 200

NOTES:
1. PROPOSED DEVELOPMENT PLAN PROVIDED BY SCOTT EDWARDS ARCHITECTURE.
2. EXPLORATION LOCATIONS ARE APPROXIMATE AND NOT SURVEYED.
3. REFER TO REPORT TEXT FOR EXPLORATION DESCRIPTIONS.
4. BORING LOGS NOT AVAILABLE.

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

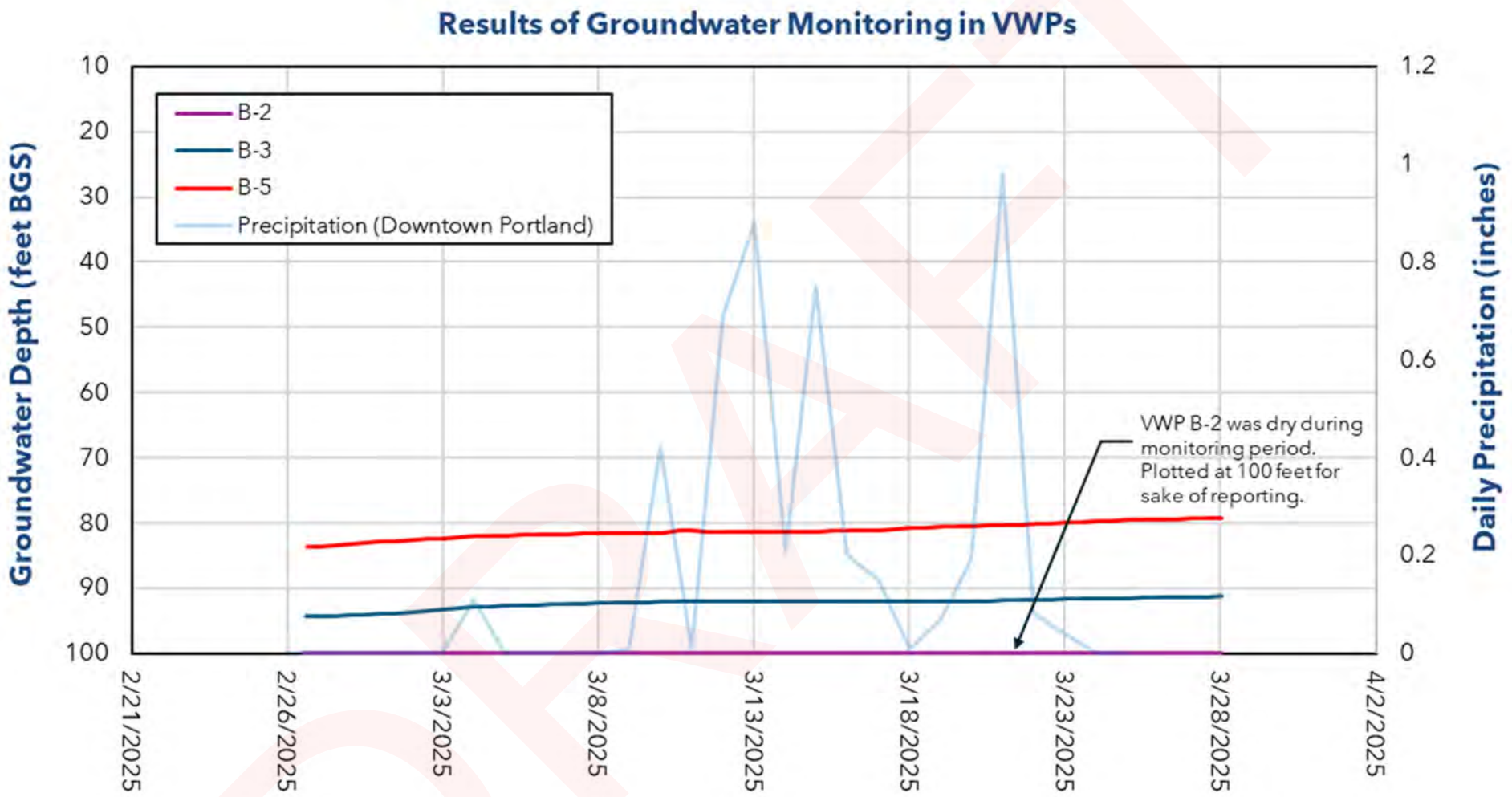
# OPERATIONS CENTER
# WEST LINN, OREGON
SALAMO ROAD AND GREEN STREET

## SITE PLAN - PROPOSED CONDITIONS

PROJECT NO:
WESTL-1-01-1

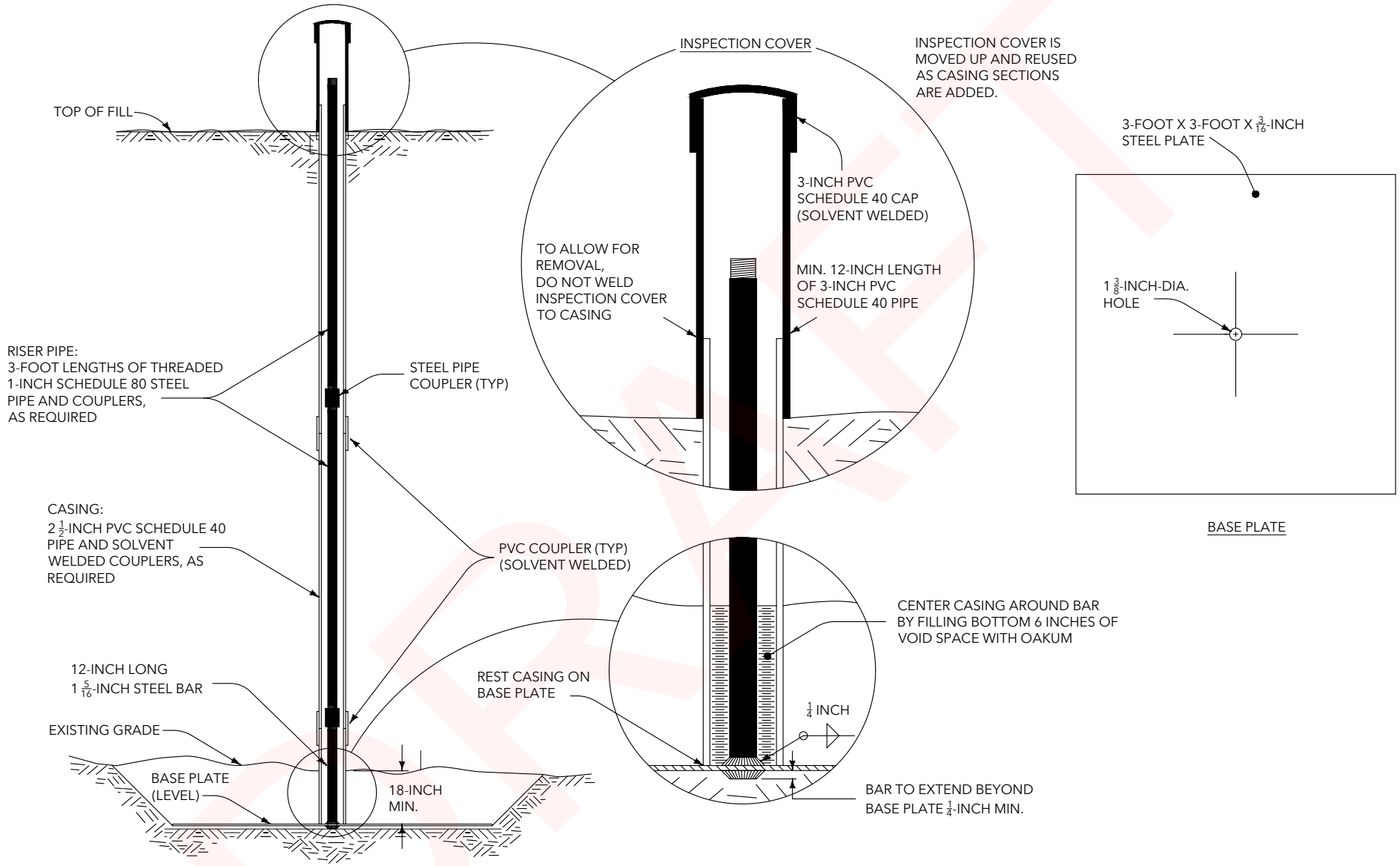
APRIL 2025

FIGURE
3




DRAFT

| | | | |
|---|---|---|---|
| Geotechnical ▪ Environmental ▪ Special Inspections<br>Columbia West Engineering, Inc | PROJECT NO.:<br>WESTL-1-01-1<br><br>APRIL 2025 | GROUNDWATER LEVEL MONITORING<br>OPERATIONS CENTER<br>WEST LINN, OREGON | FIGURE<br>4 |




Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

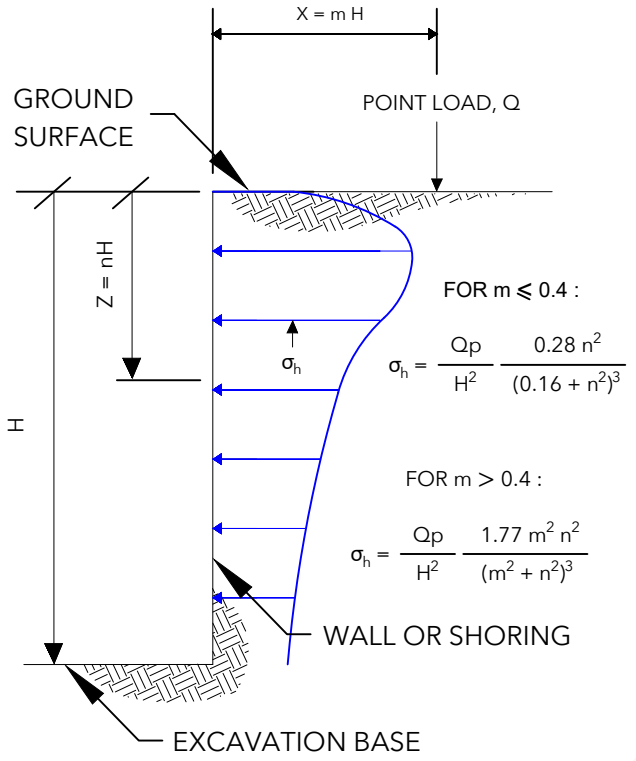
# TYPICAL SETTLEMENT PLATE DETAIL

NOTES:
1. DRAWING IS NOT TO SCALE.

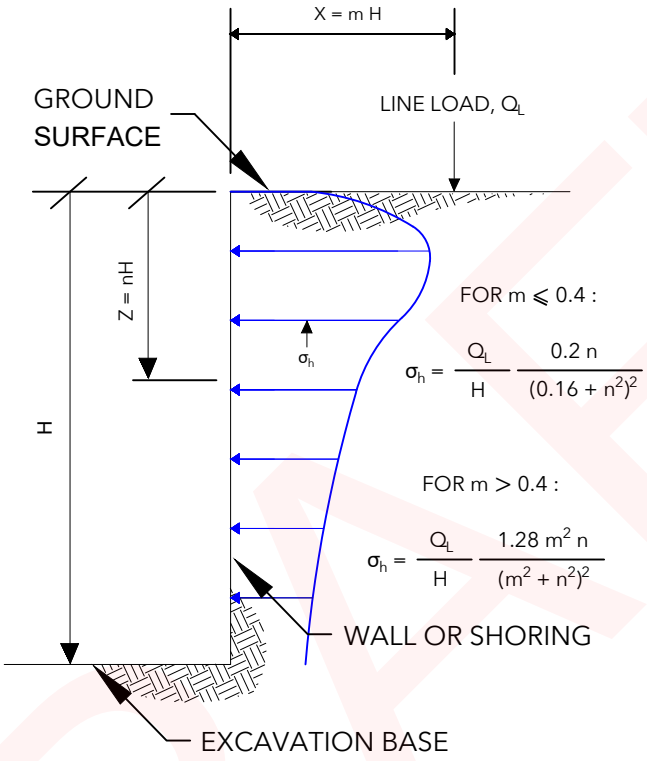
FIGURE 5

DRAFT

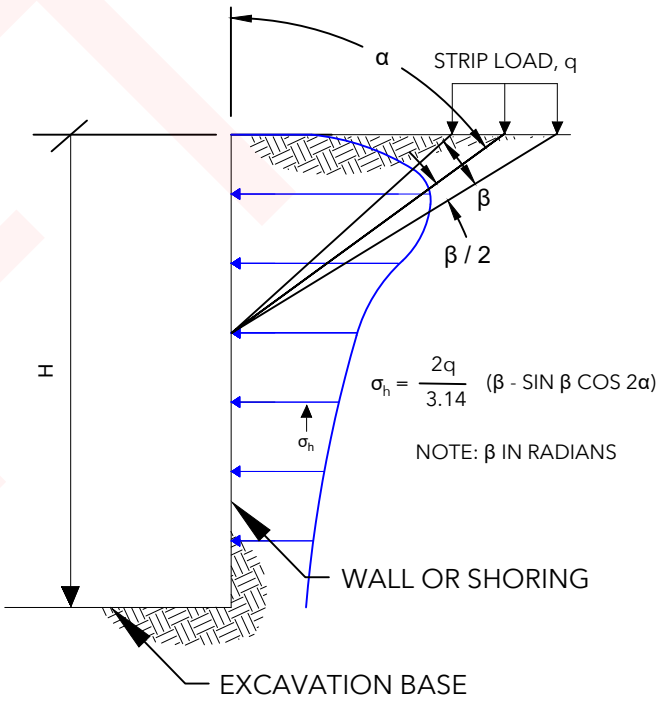
VERTICAL POINT LOAD



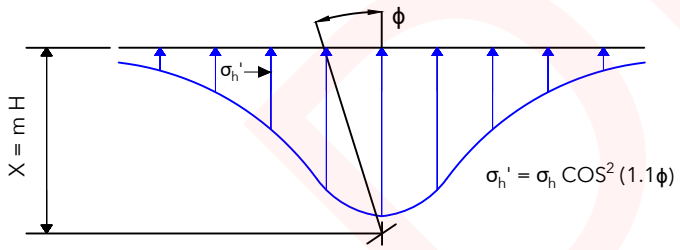

LINE LOAD PARALLEL TO WALL




STRIP LOAD PARALLEL TO WALL



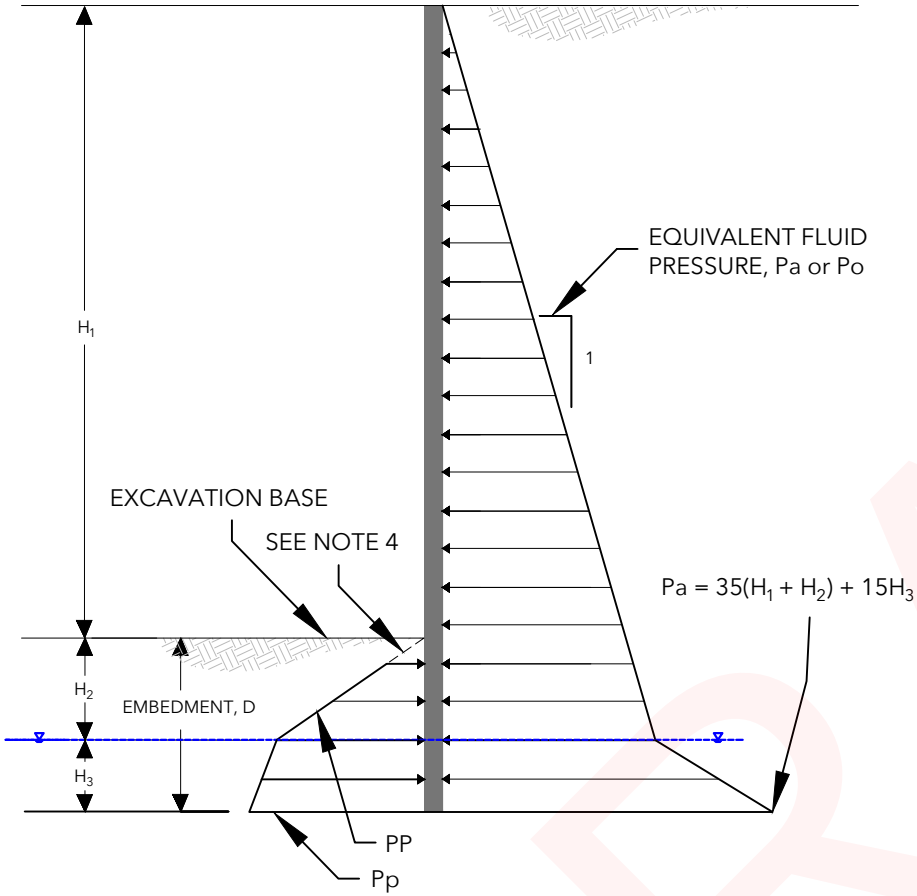

VERTICAL POINT LOAD
HORIZONTAL PRESSURE DISTRIBUTION




NOTES:
1. FIGURE SHOULD BE USED JOINTLY WITH RECOMMENDATIONS PRESENTED IN THE REPORT TEXT.
2. LATERAL EARTH PRESSURES ASSUME RIGID WALLS WITH BACKFILL MATERIALS HAVING A POISSON'S RATIO OF 0.5.
3. TOTAL LATERAL EARTH PRESSURES RESULTING FROM COMBINED LOADS MAY BE CALCULATED USING SUPERPOSITION.
4. DRAWING IS NOT TO SCALE.

DRAFT

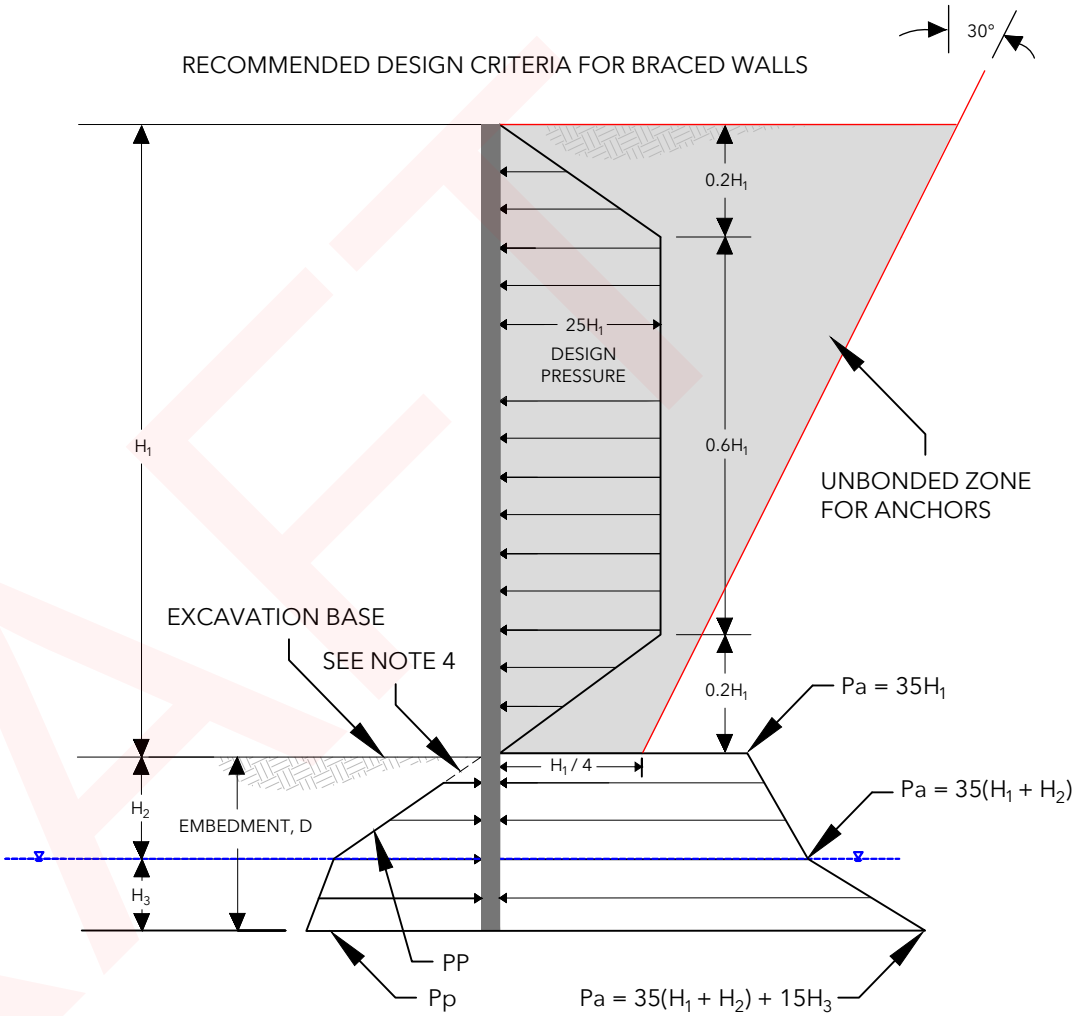
## RECOMMENDED DESIGN CRITERIA FOR CANTILEVERED WALLS




Pa = ACTIVE EQUIVALENT FLUID PRESSURE = 35 PCF (ASSUMES WALL IS FREE TO ROTATE)
Po = AT-REST EQUIVALENT FLUID PRESSURE = 55 PCF (ASSUMES WALL IS RESTRAINED FROM ROTATION)
PP = PASSIVE EQUIVALENT FLUID PRESSURE ABOVE GROUNDWATER TABLE = 500 PCF
Pp = PASSIVE EQUIVALENT FLUID PRESSURE BELOW GROUNDWATER TABLE = 290 PCF
H1 = EXPOSED HEIGHT OF SOLIDER PILE WALL
D = EMBEDMENT DEPTH IN FEET
PASSIVE PRESSURE RESISTANCE ACTS OVER 3X THE PILE WIDTH.
ACTIVE AND AT-REST EARTH PRESSURES ACT OVER 1X THE PILE WIDTH BELOW THE EXCAVATION BASE.

NOTES:
1. PRESSURE DISTRIBUTIONS DO NOT INCLUDE SEISMIC OR SURCHARGE LOADING.
2. LATERAL EARTH PRESSURES ASSUME THAT GROUNDWATER TABLE IS BELOW THE BASE OF THE EXCAVATION.
3. LATERAL EARTH PRESSURES ARE PRESENTED WITHOUT A FACTOR OF SAFETY.
4. PASSIVE PRESSURE RESISTANCE SHOULD BE NEGLECTED 24 INCHES BELOW THE EXCAVATION BASE.
5. DRAWING IS NOT TO SCALE.
6. REFER TO GEOTECHNICAL REPORT FOR APPROPRIATE GROUNDWATER ELEVATION.

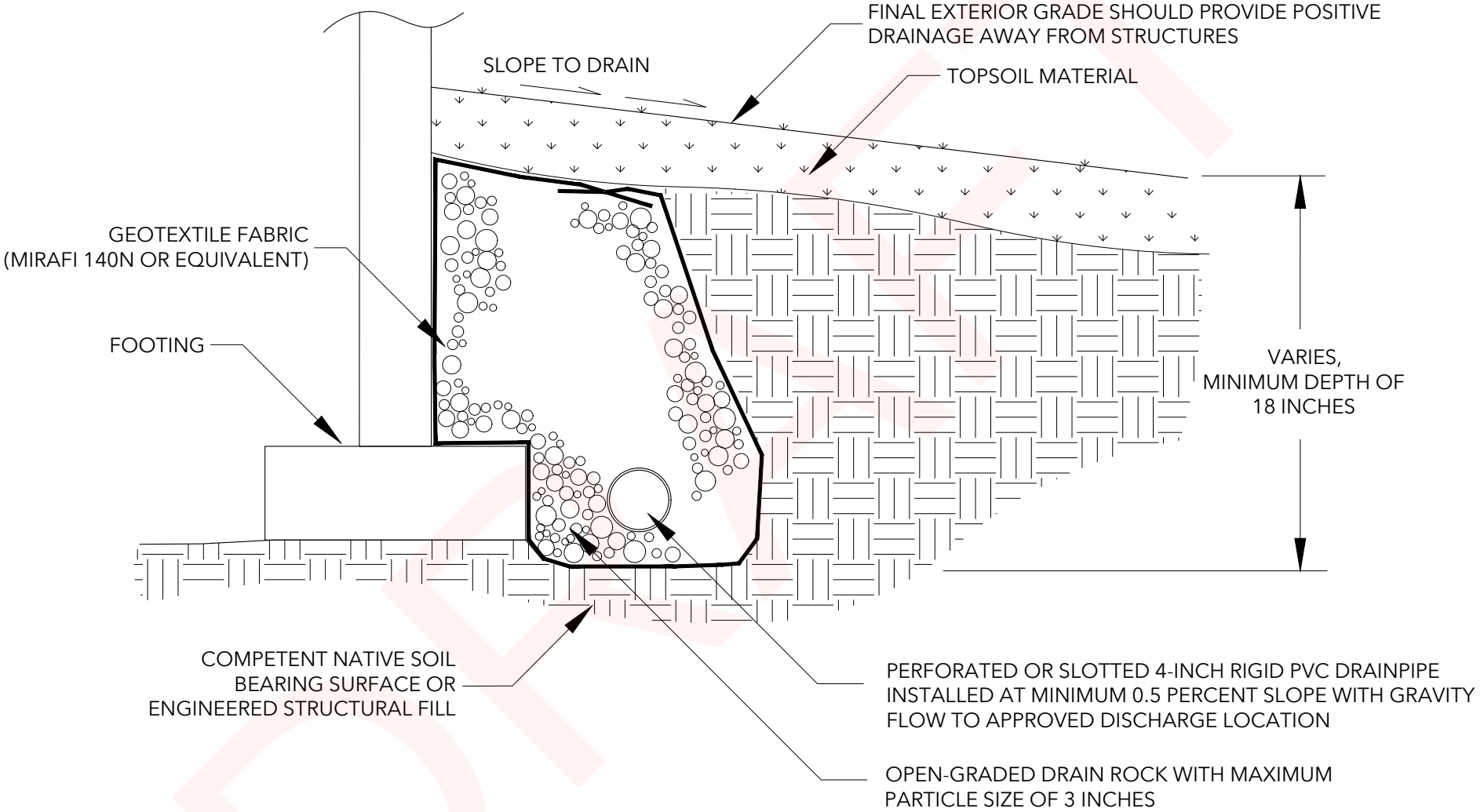
## RECOMMENDED DESIGN CRITERIA FOR BRACED WALLS




PP = PASSIVE EQUIVALENT FLUID PRESSURE ABOVE GROUNDWATER TABLE = 500 PCF
Pp = PASSIVE EQUIVALENT FLUID PRESSURE BELOW GROUNDWATER TABLE = 290 PCF
H1 = EXPOSED HEIGHT OF SOLIDER PILE WALL
D = EMBEDMENT DEPTH IN FEET
PASSIVE PRESSURE RESISTANCE ACTS OVER 3X THE PILE WIDTH.
ACTIVE AND AT-REST EARTH PRESSURES ACT OVER 1X THE PILE WIDTH BELOW THE EXCAVATION BASE.

NOTES:
1. PRESSURE DISTRIBUTIONS DO NOT INCLUDE SEISMIC OR SURCHARGE LOADING.
2. LATERAL EARTH PRESSURES ASSUME THAT GROUNDWATER TABLE IS BELOW THE BASE OF THE EXCAVATION.
3. LATERAL EARTH PRESSURES ARE PRESENTED WITHOUT A FACTOR OF SAFETY.
4. PASSIVE PRESSURE RESISTANCE SHOULD BE NEGLECTED 24 INCHES BELOW THE EXCAVATION BASE.
5. DRAWING IS NOT TO SCALE.
6. REFER TO GEOTECHNICAL REPORT FOR APPROPRIATE GROUNDWATER ELEVATION.

DRAFT



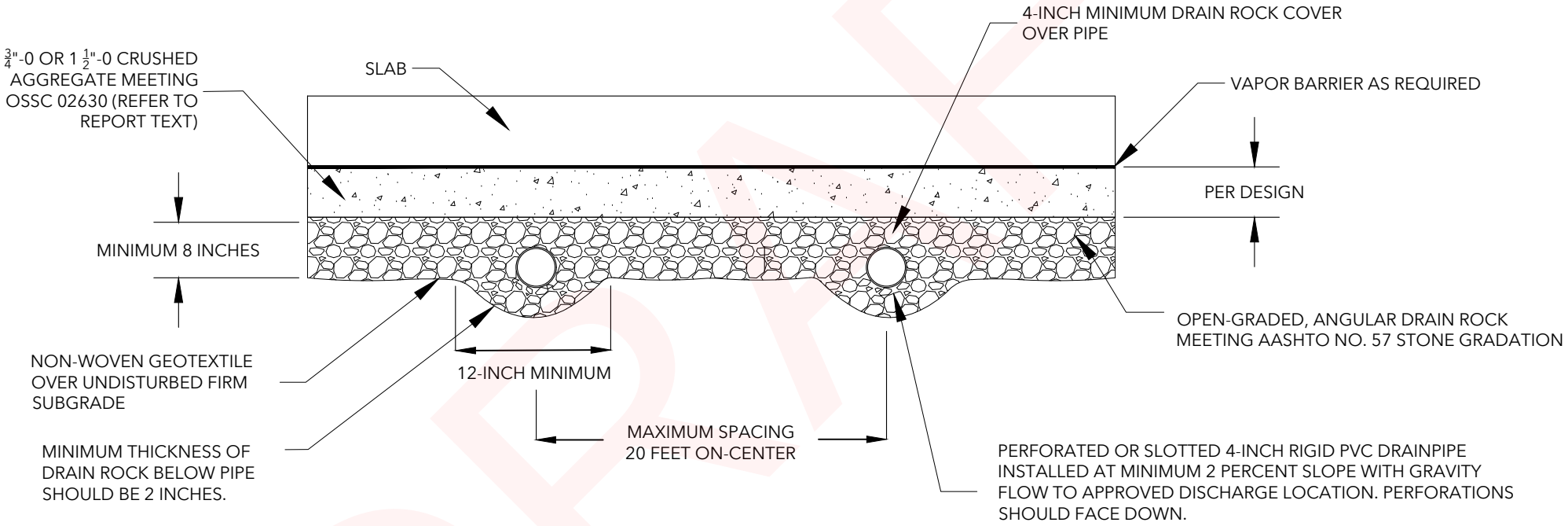

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# TYPICAL PERIMETER FOOTING DRAIN DETAIL

NOTES:
1. DRAWING IS NOT TO SCALE.
2. DRAWING REPRESENTS TYPICAL PERIMETER FOOTING DRAIN DETAIL AND MAY NOT BE SITE-SPECIFIC.

FIGURE 8



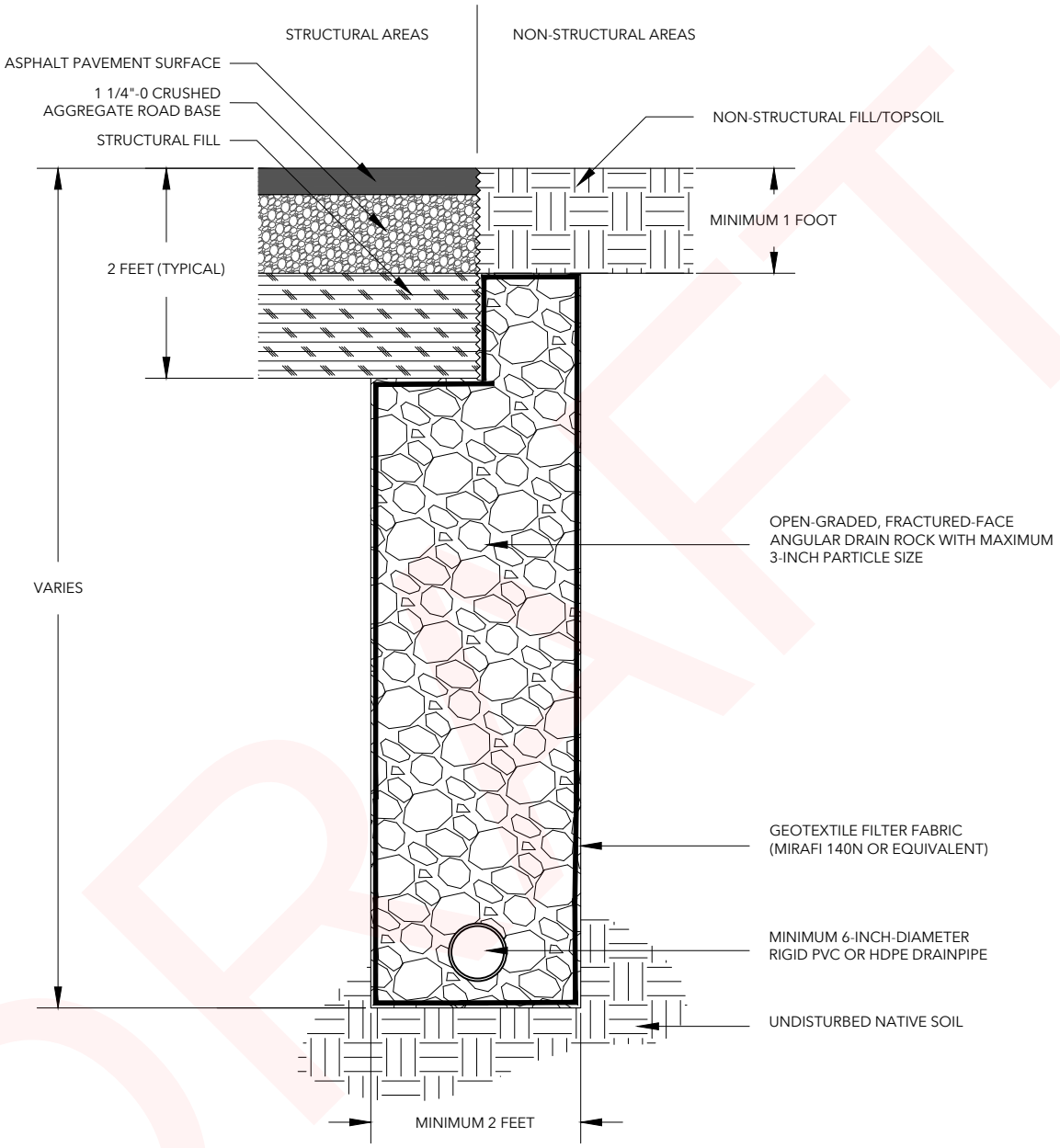

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

TYPICAL UNDERSLAB DRAIN DETAIL

NOTES:
1. DRAWING IS NOT TO SCALE.
2. DRAWING REPRESENTS TYPICAL UNDERSLAB DRAIN DETAIL AND MAY NOT BE SITE-SPECIFIC.

FIGURE 9




NOTE: LOCATION, INVERT ELEVATION, DEPTH OF TRENCH, AND EXTENT OF PERFORATED PIPE REQUIRED MAY BE MODIFIED BY THE SITE GEOTECHNICAL ENGINEER DURING CONSTRUCTION BASED UPON FIELD OBSERVATION AND SITE-SPECIFIC SOIL CONDITIONS.

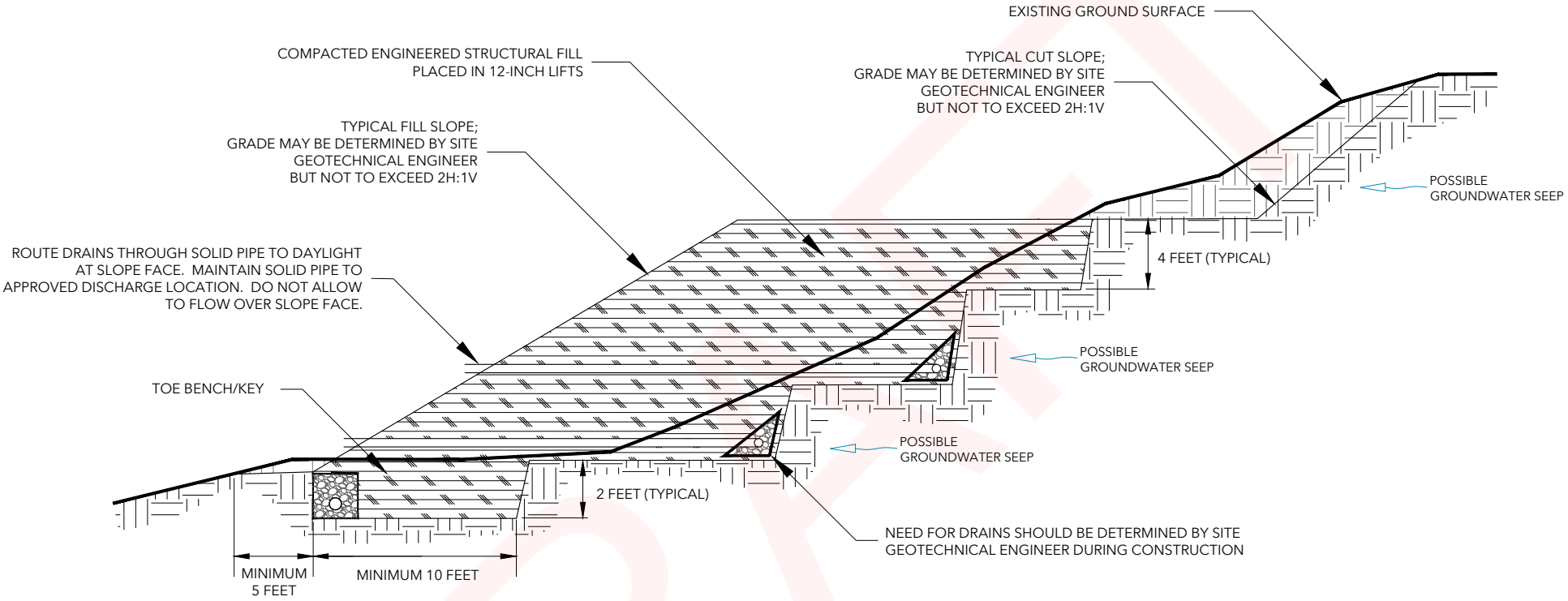
DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

TYPICAL PERFORATED DRAINPIPE TRENCH DETAIL

NOTES:
1. DRAWING IS NOT TO SCALE.
2. DRAWING REPRESENTS TYPICAL PERFORATED DRAINPIPE TRENCH DETAIL AND MAY NOT BE SITE-SPECIFIC.

FIGURE 10

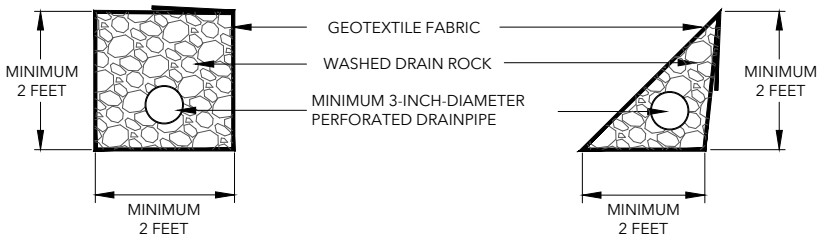



## DRAIN SPECIFICATIONS

GEOTEXTILE FABRIC SHALL CONSIST OF MIRAFI 140N OR APPROVED EQUIVALENT WITH AOS BETWEEN U.S. STANDARD NO. 70 AND NO. 100 SIEVES.

WASHED DRAIN ROCK SHALL BE OPEN-GRADED ANGULAR DRAIN ROCK WITH LESS THAN 2 PERCENT PASSING THE U.S. STANDARD NO. 200 SIEVE AND A MAXIMUM PARTICLE SIZE OF 3 INCHES.

## TYPICAL DRAIN SECTION DETAIL




Geotechnical ■ Environmental ■ Special Inspections
Columbia West Engineering, Inc

# TYPICAL CUT AND FILL SLOPE CROSS SECTION

NOTES:
1. DRAWING IS NOT TO SCALE.
2. DRAWING REPRESENTS TYPICAL CUT AND FILL SLOPE CROSS SECTION AND MAY NOT BE SITE-SPECIFIC.

FIGURE 11

DRAFT

# APPENDIX A

# APPENDIX A
# FIELD EXPLORATIONS

## *GENERAL*

We explored subsurface conditions at the site by drilling 5 borings (B-1 through B-5) to depths between 50 and 139 feet BGS and excavating 13 test pits (TP-1 through TP-13) to depths between 1.5 and 20.5 feet BGS. Drilling services were provided by Western States Soil Conservation, Inc., of Hubbard, Oregon, using a track-mounted drill rig and a combination of mud rotary and HQ wire line rock coring methods. Drilling was conducted between January 27 and February 7, 2025. The test pits were excavated by Dan J. Fischer Excavating, Inc., of Forest Grove, Oregon, using a Kobelco SK140SR trackhoe on January 23 and 24, 2025. The explorations were conducted under the supervision of Columbia West personnel. The exploration logs are presented in this appendix.

The exploration locations are shown on Figures 2 and 3. The explorations were located in the field by pacing from existing site features. This information should be considered accurate only to the degree implied by the methods used. A member of our staff observed the explorations.

## *SOIL AND ROCK SAMPLING*

Soil samples were collected from the borings using a split-barrel SPT sampler in general accordance with ASTM D1586, Dames & Moore sampler in general accordance with ASTM D3550, or modified California sampler in general accordance with ASTM D3550. The samplers were driven a total distance of 18 inches with a 140-pound hammer free falling 30 inches. The number of blows required to drive the samplers the final 12 inches, or as otherwise indicated, into the soil is shown adjacent to the sample symbols on the boring log. Disturbed samples were collected from the samplers or subsequent classification and index testing. The average efficiency of the automatic SPT hammer used by Western States Soil Conservation, Inc. was 82.8 percent. The calibration testing results are presented at the end of this appendix. Sampling methods and intervals are shown on the exploration logs.

Rock cores were collected from the borings. Rock was continuously cored using HQ wire line rock coring methods in general accordance with ASTM D2113-99. Percent core recovery and RQD are noted on the boring logs. RQD is determined by summing the length of intact pieces of core longer than 100 mm (4 inches) and dividing by the length of the core advance.

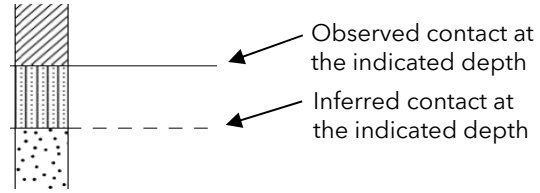
Representative disturbed samples of soil observed in the test pit explorations were collected from the test pit walls and base using the excavator's bucket. Sampling methods and intervals are shown on the exploration logs.

## *SOIL AND ROCK CLASSIFICATION*

The soil and rock samples were classified in the field in accordance with the "Exploration Legend," "Soil Classification System," and "Rock Classification System," which are presented in this appendix. The exploration logs indicate the depths at which the soil and rock characteristics change, although the change could be gradual. If the change occurred between sample locations, the depth was interpreted. Classifications are shown on the exploration logs.

# EXPLORATION LEGEND

| SAMPLER TYPE | DESCRIPTION |
|---|---|
| SPT | Sample collected from the indicated depth in general accordance with ASTM D1586, *Standard Test Method Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils,* using an SPT sampler and 140-pound hammer |
| SH | Sample collected from the indicated depth in general accordance with ASTM D1587, *Standard Practice for Thin-Walled Tube Sampling of Fine-Grained Soils for Geotechnical Purposes,* using a thin-walled Shelby tube |
| D&M | Sample collected from the indicated depth in general accordance with ASTM D3550, *Standard Practice for Thick Wall, Ring-Lined, Split Barrel, Drive Sampling of Soils,* using a Dames & Moore sampler and 140-pound hammer or pushed |
| CSS | Sample collected from the indicated depth in general accordance with ASTM D3550, *Standard Practice for Thick Wall, Ring-Lined, Split Barrel, Drive Sampling of Soils,* using a 3-inch-outside diameter California split-spoon sampler and 140-pound hammer |
| DP | Sample collected from the indicated depth in general accordance with ASTM D6282, *Standard Guide for Direct Push Soil Sampling for Environmental Site Characterizations,* using a direct push soil sampler |
| GRAB | Grab sample collected from the indicated depth |
| CORE | Pavement or rock core interval at the indicated depth |




| GEOTECHNICAL ABBREVIATIONS | | | |
|---|---|---|---|
| ATT | Atterberg limits | PP | Pocket penetrometer |
| CBR | California bearing ratio | P200 | Percent passing No. 200 sieve |
| CON | Consolidation test | RES | Resilient modulus |
| DD | Dry density | SIEV | Sieve analysis |
| DS | Direct shear | TS | Torvane shear |
| HYD | Hydrometer | tsf | Tons per square foot |
| MC | Moisture content | UC | Unconfined compressive strength |
| MD | Moisture-density relationship | UU | Unconsolidated undrained triaxial test |
| NP | Non-plastic | VS | Vane shear |
| OC | Organic content | WD | Wet density |
| **ENVIRONMENTAL ABBREVIATIONS** | | | |
| CA | Sample submitted for chemical analysis | ND | Not detected |
| | | NS | No sheen |
| PID | Photoionization detector headspace analysis | SS | Slight sheen |
| | | MS | Moderate sheen |
| ppm | Parts per million | HS | Heavy sheen |

# SOIL CLASSIFICATION SYSTEM

## PARTICLE-SIZE CLASSIFICATION

| COMPONENT | ASTM / USCS | | AASHTO | |
|---|---|---|---|---|
| | Size Range | Sieve Size Range | Size Range | Sieve Size Range |
| Boulders | Greater than 300 mm | Greater than 12 inches | -- | -- |
| Cobbles | 75 mm to 300 mm | 3 inches to 12 inches | Greater than 75 mm | Greater than 3 inches |
| Gravel | 75 mm to 4.75 mm | 3 inches to No. 4 sieve | 75 mm to 2.00 mm | 3 inches to No. 10 sieve |
| Coarse | 75 mm to 19.0 mm | 3 inches to 3/4-inch sieve | -- | -- |
| Fine | 19.0 mm to 4.75 mm | 3/4-inch to No. 4 sieve | -- | -- |
| Sand | 4.75 mm to 0.075 mm | No. 4 to No. 200 sieve | 2.00 mm to 0.075 mm | No. 10 to No. 200 sieve |
| Coarse | 4.75 mm to 2.00 mm | No. 4 to No. 10 sieve | 2.00 mm to 0.425 mm | No. 10 to No. 40 sieve |
| Medium | 2.00 mm to 0.425 mm | No. 10 to No. 40 sieve | -- | -- |
| Fine | 0.425 mm to 0.075 mm | No. 40 to No. 200 sieve | 0.425 mm to 0.075 mm | No. 40 to No. 200 sieve |
| Fines (Silt and Clay) | Less than 0.075 mm | Passing No. 200 sieve | Less than 0.075 mm | Passing No. 200 sieve |

## CONSISTENCY FOR COHESIVE SOIL

| CONSISTENCY | SPT N-VALUE (blows per foot) | D&M N-VALUE (blows per foot) | POCKET PENETROMETER (unconfined compressive strength [tsf]) |
|---|---|---|---|
| Very soft | 0 to 2 | 0 to 3 | Less than 0.25 |
| Soft | 2 to 4 | 3 to 6 | 0.25 to 0.5 |
| Medium stiff | 4 to 8 | 6 to 12 | 0.5 to 1.0 |
| Stiff | 8 to 15 | 12 to 25 | 1.0 to 2.0 |
| Very stiff | 15 to 30 | 25 to 65 | 2.0 to 4.0 |
| Hard | Greater than 30 | Greater than 30 | Greater than 4.0 |

## RELATIVE DENSITY FOR GRANULAR SOIL

| RELATIVE DENSITY | SPT N-VALUE (blows per foot) | D&M N-VALUE (blows per foot) |
|---|---|---|
| Very loose | 0 to 4 | 0 to 11 |
| Loose | 4 to 10 | 11 to 26 |
| Medium dense | 10 to 30 | 26 to 74 |
| Dense | 30 to 50 | 74 to 120 |
| Very dense | Greater than 50 | Greater than 120 |

## MOISTURE DESIGNATIONS

| TERM | FIELD IDENTIFICATION |
|---|---|
| Dry | Very low moisture, dry to touch |
| Moist | Damp, color appears darkened, without visible moisture, cohesive soil will clump, sand will bulk |
| Wet | Visible free water, usually saturated |

## ADDITIONAL CONSTITUENTS

| Percent | SILT AND CLAY IN | | Percent | SAND AND GRAVEL IN | | Percent | SECONDARY MATERIAL |
|---|---|---|---|---|---|---|---|
| | Fine-Grained Soil | Coarse-Grained Soil | | Fine-Grained Soil | Coarse-Grained Soil | | Organics and Man-Made Debris |
| < 5 | trace | trace | < 5 | trace | trace | < 4 | trace |
| 5 – 12 | minor | with | 5 – 15 | minor | minor | 4 – 12 | some |
| > 12 | some | silty/clayey | 15 – 30 | with | with | | |
| | | | > 30 | sandy/gravelly | with | | |

# ROCK CLASSIFICATION SYSTEM

| STRENGTH | DESCRIPTION | UNCONFINED COMPRESSIVE STRENGTH (psi) |
|---|---|---|
| Extremely weak (R0) | Easily indented by thumbnail | 35 to 150 |
| Very weak (R1) | Scratched with fingernail, peeled by knife, indented by rock pick | 150 to 725 |
| Weak (R2) | Peeled by knife, indented by rock pick | 725 to 3,500 |
| Medium strong (R3) | Cannot be peeled or scraped with a knife | 3,500 to 7,250 |
| Strong (R4) | Requires more than one blow with a rock hammer to fracture it | 7,250 to 14,500 |
| Very strong (R5) | Requires many blows with a rock hammer to fracture it | 14,500 to 36,250 |
| Extremely strong (R6) | Can only be chipped with a rock hammer | Greater than 36,250 |

| WEATHERING | DESCRIPTION |
|---|---|
| Decomposed | A soil formed in place with original texture of rock destroyed |
| Completely weathered | Rock wholly weathered but rock texture preserved |
| Highly weathered | Rock weakened so that large pieces can be broken by hand |
| Moderately weathered | Rock mass is decomposed locally |
| Slightly weathered | Discoloration along discontinuities |
| Fresh | No visible signs of weathering or discoloring |

| JOINT SPACING | DESCRIPTION |
|---|---|
| Very close | Less than 0.2 foot |
| Close | 0.2 foot to 1 foot |
| Moderately close | 1 foot to 3 feet |
| Wide | 3 feet to 10 feet |
| Very wide | Greater than 10 feet |

| FRACTURING | FRACTURE SPACING |
|---|---|
| Very intensely fractured | Chips, fragments, with scattered short core lengths |
| Intensely fractured | 0.1 foot to 0.3 foot with scattered fragments |
| Moderately fractured | 0.3 foot to 1 foot |
| Slightly fractured | 1 foot to 3 feet |
| Very slightly fractured | Greater than 3 feet |
| Unfractured | No fractures observed |

| HEALING | DESCRIPTION |
|---|---|
| Not healed | Discontinued surface, fractured zone, sheared material, filling is not cemented |
| Partly healed | Less than 50% of fractures or sheared zone bonding |
| Moderately healed | Greater than 50% fractures or sheared zone bonding |
| Totally healed | All fragments are bonded |

| QUALITY | RQD (percent) |
|---|---|
| Very poor | Less than 25 |
| Poor | 25 to 50 |
| Fair | 51 to 75 |
| Good | 76 to 90 |

Rock quality designation (RQD) is a measure of quality of rock core taken from a borehole. The length of core pieces is measured along the center line of the pieces. All pieces of intact rock core equal to or greater than 100 millimeters (4 inches) long are summed and divided by the total length of the core run to obtain RQD value

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# BORING NUMBER: B - 1



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NUMBER** WestL-1-01-1
**PROJECT LOCATION** West Linn, Oregon
**DRILLING CONTRACTOR** Western States Soil Conservation, Inc.
**DATE STARTED** 02/05/2025
**DRILLING METHOD** Mud Rotary and Rock Coring
**TIME STARTED** 4:13 PM
**EQUIPMENT** CME-850, Rig 7
**DATE COMPLETED** 02/07/2025
**BORING DIAMETER** 4.875 inches
**TIME COMPLETED** 5:00 PM
**HAMMER EFFICIENCY** 82.8%
**LOGGED BY** E. Uren

| DEPTH (ft) | USCS | MATERIAL DESCRIPTION AND NOTES | ELEVATION (ft) | SAMPLE TYPE | RECOVERY (in) | SAMPLE ID | % RQD | BLOW COUNTS | MOISTURE CONTENT (%) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Soft, brown sandy SILT, organics, moist (12 inches of topsoil, 4-inch-thick root zone). 1.0 | 430 | | | | | | | |
| | | Medium stiff, brown-orange sandy SILT, moist, low plasticity, sand is fine to medium. | | SPT | 12 | B1.1 | | 2-3-3 (6) | | |
| 5 | ML | Stiff, red-brown-orange with white and black mottles at 5 feet. | 425 | SPT | 18 | B1.2 | | 5-7-6 (13) | | |
| | | Brown-orange-gray, trace gravel, gravel is fractured at 7.5 feet. | | SPT | 18 | B1.3 | | 3-5-9 (14) | | |
| 10 | | Hard, with gravel, gravel is fine and angular (decomposed basalt) at 11 feet. 11.5 | 420 | SPT | 9 | B1.4 | | 18-12-50/1" | | Drill chatter at 9 feet. |
| | | | | SPT | 1 | B1.5 | | 50/1" | | |
| | | Weak to medium strong (R2-R3), brown-gray BASALT, highly to moderately weathered, very instensely to intensely fractured, not healed, moist. 12.0 | | | | | | | | Switched to rock coring at 12 feet. |
| 15 | | Strong (R4), gray BASALT, slightly weathered, intensely to moderately fractured (boulder!). 13.5 | 415 | Core | 48 | BC1.1 | 23 | | | Brown return water from 13.5 to 42 feet. |
| | | Weak to medium strong (R2-R3), brown-gray BASALT, highly to moderately weathered, very instensely to intensely fractured, not healed, moist. | | Core | 30 | BC1.2 | 0 | | | |

**Water Levels**

▽ Unable to observe

▼ -

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# BORING NUMBER: B - 1



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NUMBER** WestL-1-01-1
**PROJECT LOCATION** West Linn, Oregon
**DRILLING CONTRACTOR** Western States Soil Conservation, Inc.
**DATE STARTED** 02/05/2025
**DRILLING METHOD** Mud Rotary and Rock Coring
**TIME STARTED** 4:13 PM
**EQUIPMENT** CME-850, Rig 7
**DATE COMPLETED** 02/07/2025
**BORING DIAMETER** 4.875 inches
**TIME COMPLETED** 5:00 PM
**HAMMER EFFICIENCY** 82.8%
**LOGGED BY** E. Uren

| DEPTH (ft) | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION AND NOTES | ELEVATION (ft) | SAMPLE TYPE | RECOVERY (in) | SAMPLE ID | % RQD | BLOW COUNTS | MOISTURE CONTENT (%) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (continued from previous page) | | | | | | | | |
| 25 | | | | 405 | Core | 30 | BC1.2 | 0 | | | |
| 30 | | | | 400 | Core | 48 | BC1.4 | 0 | | | |
| 35 | | | | 395 | Core | 48 | BC1.5 | 0 | | | |
| | | | | | Core | 46 | BC1.6 | 19 | | | |

**Water Levels**

▽ Unable to observe

▼ -

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# BORING NUMBER: B - 1



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NUMBER** WestL-1-01-1
**PROJECT LOCATION** West Linn, Oregon
**DRILLING CONTRACTOR** Western States Soil Conservation, Inc.
**DATE STARTED** 02/05/2025
**DRILLING METHOD** Mud Rotary and Rock Coring
**TIME STARTED** 4:13 PM
**EQUIPMENT** CME-850, Rig 7
**DATE COMPLETED** 02/07/2025
**BORING DIAMETER** 4.875 inches
**TIME COMPLETED** 5:00 PM
**HAMMER EFFICIENCY** 82.8%
**LOGGED BY** E. Uren

| DEPTH (ft) | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION AND NOTES | ELEVATION (ft) | SAMPLE TYPE | RECOVERY (in) | SAMPLE ID | % RQD | BLOW COUNTS | MOISTURE CONTENT (%) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (continued from previous page) | | | | | | | | |
| | | | 48.8 | | | | | | | | |
| | | | Strong (R4), gray BASALT, slightly weathered, slightly fractured. 50.0 | | | | | | | | |
| | | | Weak to medium strong (R2-R3), brown-gray BASALT, highly to moderately weathered, very instensely to intensely fractured, not healed, moist. 52.0 | | | | | | | | |
| | | | Very weak to weak (R1-R2), brown-gray BASALT, decomposed to moderately weathered, very instensely to intensely fractured, vesicular. | | | | | | | | |
| | | | Weak to medium strong (R2-R3), intensely fractured, vesicular at 57 feet. | | | | | | | | |
| 45 | | | | 385 | Core | 58 | BC1.7 | 26 | | | |
| 50 | | | | 380 | Core | 57 | BC1.8 | 33 | | | |
| 55 | | | | 375 | Core | 36 | BC1.9 | 0 | | | Lost circulation at 54 feet. |
| | | | | | Core | 59 | BC1.10 | 39 | | | |

**Water Levels**

▽ Unable to observe

▼ -

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# BORING NUMBER: B - 1



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NUMBER** WestL-1-01-1
**PROJECT LOCATION** West Linn, Oregon
**DRILLING CONTRACTOR** Western States Soil Conservation, Inc.
**DATE STARTED** 02/05/2025
**DRILLING METHOD** Mud Rotary and Rock Coring
**TIME STARTED** 4:13 PM
**EQUIPMENT** CME-850, Rig 7
**DATE COMPLETED** 02/07/2025
**BORING DIAMETER** 4.875 inches
**TIME COMPLETED** 5:00 PM
**HAMMER EFFICIENCY** 82.8%
**LOGGED BY** E. Uren

| DEPTH (ft) | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION AND NOTES | ELEVATION (ft) | SAMPLE TYPE | RECOVERY (in) | SAMPLE ID | % RQD | BLOW COUNTS | MOISTURE CONTENT (%) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (continued from previous page) | | | | | | | | |
| | | | Extremely weak to weak (R0-R2), decomposed to moderately weathered, very intensely to intensely fractured, less vesicular at 62 feet. | | | | | | | | |
| 65 | | | | 365 | Core | 18 | BC1.11 | 20 | | | |
| | | | | | | | | | | | |
| 70 | | | Extremely weak to medium strong (R0-R3), brown-gray, decomposed to moderately fractured at 69 feet. | 360 | Core | 48 | BC1.12 | 28 | | | Actual end of sample C1.11 at 69 feet. Driller commented he might have over drilled first couple of cores. |
| 75 | | | Extremely weak to weak (R0-R2), brown, very intensely to intensely fractured at 74 feet.<br>CLAY bed (3 inches thick) at 75.5 feet. | 355 | Core | 48 | BC1.13 | 0 | | | |
| | | | CLAY bed (3 inches thick) at 77.7 feet. | | Core | 54 | BC1.14 | 0 | | | |

**Water Levels**

▽ Unable to observe

▼ -

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# BORING NUMBER: B - 1



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NUMBER** WestL-1-01-1
**PROJECT LOCATION** West Linn, Oregon
**DRILLING CONTRACTOR** Western States Soil Conservation, Inc.
**DATE STARTED** 02/05/2025
**DRILLING METHOD** Mud Rotary and Rock Coring
**TIME STARTED** 4:13 PM
**EQUIPMENT** CME-850, Rig 7
**DATE COMPLETED** 02/07/2025
**BORING DIAMETER** 4.875 inches
**TIME COMPLETED** 5:00 PM
**HAMMER EFFICIENCY** 82.8%
**LOGGED BY** E. Uren

| DEPTH (ft) | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION AND NOTES | ELEVATION (ft) | SAMPLE TYPE | RECOVERY (in) | SAMPLE ID | % RQD | BLOW COUNTS | MOISTURE CONTENT (%) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CLAY bed (3 inches thick) at 80.2 feet. | | | | | | | | Clay has parallel staining, native soil structure, and uniform grain size, so likely not a product of grinding rock during coring. |
| 85 | | | Very weak to medium strong (R1-R3), moderately weathered at 84 feet. | 345 | Core | 50 | BC1.15 | 20 | | | |
| 90 | | | Weak to strong (R2-R4), moderately to slightly weathered, very intensely to slightly fractured at 89 feet. | 340 | Core | 60 | BC1.16 | 27 | | | |
| 95 | | | Medium strong to strong (R3-R4), very intensely to slightly fractured at 94 feet. | 335 | Core | 61 | BC1.17 | 36 | | | |
| | | | Strong (R4), gray, intensely to moderately fractured at 99 feet. | | Core | 60 | BC1.18 | 63 | | | |

**Water Levels**

▽ Unable to observe

▼ -

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# BORING NUMBER: B - 1



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NUMBER** WestL-1-01-1
**PROJECT LOCATION** West Linn, Oregon
**DRILLING CONTRACTOR** Western States Soil Conservation, Inc.
**DATE STARTED** 02/05/2025
**DRILLING METHOD** Mud Rotary and Rock Coring
**TIME STARTED** 4:13 PM
**EQUIPMENT** CME-850, Rig 7
**DATE COMPLETED** 02/07/2025
**BORING DIAMETER** 4.875 inches
**TIME COMPLETED** 5:00 PM
**HAMMER EFFICIENCY** 82.8%
**LOGGED BY** E. Uren

| DEPTH (ft) | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION AND NOTES | ELEVATION (ft) | SAMPLE TYPE | RECOVERY (in) | SAMPLE ID | % RQD | BLOW COUNTS | MOISTURE CONTENT (%) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (continued from previous page) | | | | | | | | |
| | | | 104.0 | | | | | | | | |
| 105 | | | Extremely weak to weak (R0-R2), red-brown to gray-brown BASALT, decomposed to moderately weathered, intensely to moderately fractured, vesicular. CLAY layer (paleosol) from 104.4 to 105.4 feet. | 325 | Core | 59 | BC1.19 | 58 | | | |
| | | | 106.5 | | | | | | | | |
| 110 | | | Medium strong (R3), brown-gray BASALT, moderately to slightly weathered, moderately fractured, vesicular. No vesicles at 111 feet. | 320 | Core | 60 | BC1.20 | 70 | | | |
| 115 | | | Medium strong to strong (R3-R4), gray, slightly weathered at 115 feet. | 315 | Core | 60 | BC1.21 | 59 | | | |
| | | | | | Core | 60 | BC1.22 | 38 | | | |

**Water Levels**

▽ Unable to observe

▼ -

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# BORING NUMBER: B - 1



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NUMBER** WestL-1-01-1
**PROJECT LOCATION** West Linn, Oregon
**DRILLING CONTRACTOR** Western States Soil Conservation, Inc.
**DATE STARTED** 02/05/2025
**DRILLING METHOD** Mud Rotary and Rock Coring
**TIME STARTED** 4:13 PM
**EQUIPMENT** CME-850, Rig 7
**DATE COMPLETED** 02/07/2025
**BORING DIAMETER** 4.875 inches
**TIME COMPLETED** 5:00 PM
**HAMMER EFFICIENCY** 82.8%
**LOGGED BY** E. Uren

| DEPTH (ft) | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION AND NOTES | ELEVATION (ft) | SAMPLE TYPE | RECOVERY (in) | SAMPLE ID | % RQD | BLOW COUNTS | MOISTURE CONTENT (%) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (continued from previous page) | | | | | | | | |
| | | | 123.5 | | | | | | | | |
| 125 | | | Weak to medium strong (R2-R3), red to gray BASALT, completely to moderately weathered, intensely fractured, vesicular. 125.0 | 305 | | | | | | | Yellow microfracture where basalt is moist, red, and weathered |
| | | | Medium strong (R3), gray to brown-gray BASALT, moderately weathered, moderately to slightly fractured, vesicular. | | Core | 60 | BC1.23 | 19 | | | |
| 130 | | | CLAY layer (1 inch thick) at 131.2 feet. | 300 | Core | 61 | BC1.24 | 43 | | | |
| | | | Medium strong to strong (R3-R4), large vesicles and vugs, oriented transverse of vesicles at 5 to 20 degrees at 132 feet. | | | | | | | | |
| 135 | | | | 295 | Core | 60 | BC1.25 | 63 | | | |
| | | | 139.0 | | | | | | | | |
| | | | Boring completed at 139 feet. | | | | | | | | |

**Water Levels**

▽ Unable to observe

▼ -

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# BORING NUMBER: B - 2



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NUMBER** WestL-1-01-1
**PROJECT LOCATION** West Linn, Oregon
**DRILLING CONTRACTOR** Western States Soil Conservation, Inc.
**DATE STARTED** 01/31/2025
**DRILLING METHOD** Mud Rotary and Rock Coring
**TIME STARTED** 11:35 AM
**EQUIPMENT** CME-850, Rig 7
**DATE COMPLETED** 12/05/2025
**BORING DIAMETER** 4.875 inches
**TIME COMPLETED** 12:45 PM
**HAMMER EFFICIENCY** 82.8%
**LOGGED BY** E. Uren

| DEPTH (ft) | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION AND NOTES | ELEVATION (ft) | SAMPLE TYPE | RECOVERY (in) | SAMPLE ID | % RQD | BLOW COUNTS | MOISTURE CONTENT (%) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Soft, brown sandy SILT, trace organics, moist (12 inches of topsoil, 6-inch-thick root zone) - **FILL**. 1.0 | 345 | | | | | | | |
| | | | Loose, brown-gray-orange silty GRAVEL with sand, moist, gravel is fine to coarse, sand is fine to coarse - **FILL**. | | SPT | 6 | B2.1 | | 4-4-5 (9) | 41 | |
| 5 | | | Medium dense at 5 feet. | 340 | SPT | 8 | B2.2 | | 9-7-7 (14) | | |
| | | | | | SPT | 3 | B2.3 | | 6-6-6 (12) | | |
| 10 | | | Very loose at 10 feet. | 335 | D&M | 6 | B2.4 | | 4-5-4 (9) | | |
| 15 | | | Medium dense at 15 feet. | 330 | CSS | 13 | B2.5 | | 10-24-22 (46) | 18 | Driller Comment: Lost circulation at 15 feet. Lost 130 gallons from 15 to 20 feet. |
| | | | | | | | | | | | Drill grinding at 19.5 feet. |

**Water Levels**

▽ Unable to observe

▼ -



DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# BORING NUMBER: B - 2



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NUMBER** WestL-1-01-1
**PROJECT LOCATION** West Linn, Oregon
**DRILLING CONTRACTOR** Western States Soil Conservation, Inc.
**DATE STARTED** 01/31/2025
**DRILLING METHOD** Mud Rotary and Rock Coring
**TIME STARTED** 11:35 AM
**EQUIPMENT** CME-850, Rig 7
**DATE COMPLETED** 12/05/2025
**BORING DIAMETER** 4.875 inches
**TIME COMPLETED** 12:45 PM
**HAMMER EFFICIENCY** 82.8%
**LOGGED BY** E. Uren

| DEPTH (ft) | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION AND NOTES | ELEVATION (ft) | SAMPLE TYPE | RECOVERY (in) | SAMPLE ID | % RQD | BLOW COUNTS | MOISTURE CONTENT (%) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Very dense, gray-brown at 20 feet. | | SPT | 0.5 | B2.6 | | 50/3" | | Slow drilling from 20 to 23 feet. Possible nested cobbles and boulders. Driller Comment: Lost circulation at 22 feet. Lost 130 gallons of mud from 20 to 22 feet. Drill chatter at 24 feet. |
| 25 | | | 25.0 Medium dense, brown-gray-orange SAND with silt and gravel, moist, sand is fine to coarse, gravel is fine to coarse - **FILL**. | 320 | SPT | 10 | B2.7 | | 9-12-15 (27) | 24 | |
| | | | 29.0 Medium dense, gray-brown GRAVEL with sand, trace silt, moist, gravel is fine to coarse, sand is fine to coarse - **FILL**. | | | | | | | | |
| 30 | | | 31.0 Hard, brown-orange-gray SILT with sand, moist, low plasticity, sand is fine to coarse (decomposed basalt). | 315 | D&M | 14 | B2.8 | | 27-30-120 (150) | 43 | Native relict soil; looks like interflow volcanic breccia at 31 feet. |
| | ML | | | | | | | | | | |
| 35 | | | 35.0 Hard, orange-brown sandy CLAY, moist, medium plasticity, sand is fine to medium (decomposed basalt). | 310 | SPT | 8 | B2.9 | | 41-50/2" | 55 | Lost 65 gallons of mud from 35 to 40 feet. |
| | CL/CH | | | | | | | | | | |

**Water Levels**

▽ Unable to observe

▼ -

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# BORING NUMBER: B - 2



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NUMBER** WestL-1-01-1
**PROJECT LOCATION** West Linn, Oregon
**DRILLING CONTRACTOR** Western States Soil Conservation, Inc.
**DATE STARTED** 01/31/2025
**DRILLING METHOD** Mud Rotary and Rock Coring
**TIME STARTED** 11:35 AM
**EQUIPMENT** CME-850, Rig 7
**DATE COMPLETED** 12/05/2025
**BORING DIAMETER** 4.875 inches
**TIME COMPLETED** 12:45 PM
**HAMMER EFFICIENCY** 82.8%
**LOGGED BY** E. Uren

| DEPTH (ft) | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION AND NOTES | ELEVATION (ft) | SAMPLE TYPE | RECOVERY (in) | SAMPLE ID | % RQD | BLOW COUNTS | MOISTURE CONTENT (%) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | SP-SC | | Very dense, brown-orange SAND with clay, moist, sand is fine to medium (decomposed basalt). | | SPT | 4 | B2.10 | | 50/4" | | |
| | | | 44.0 | | | | | | | | |
| 45 | | | Medium strong to strong (R3-R4), gray-brown BASALT, moderately to slightly weathered, intensely to moderately fractured, not healed, vesicular, moist. | 300 | SPT | 0 | B2.11 | | 50/1" | | Grinding/drill chatter at 44 feet. |
| | | | | | Core | 23 | BC2.1 | 34 | | | Switched to rock coring at 46 feet. |
| 50 | | | Strong (R4), gray, slightly weathered, moderately fractured at 48 feet. Large vesicles and vugs, oriented transverse of vesicles at 10 to 40 degrees at 50 feet. | 295 | Core | 62 | BC2.2 | 66 | | | |
| 55 | | | Intensely to moderately fractured at 53 feet. | 290 | Core | 60 | BC2.3 | 55 | | | |
| | | | No vesicles at 56.5 feet. High-angle joints healed and not healed from 57 to 61 feet. | | Core | 59 | BC2.4 | 46 | | | |

**Water Levels**

▽ Unable to observe

▼ -

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# BORING NUMBER: B - 2



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NUMBER** WestL-1-01-1
**PROJECT LOCATION** West Linn, Oregon
**DRILLING CONTRACTOR** Western States Soil Conservation, Inc.
**DATE STARTED** 01/31/2025
**DRILLING METHOD** Mud Rotary and Rock Coring
**TIME STARTED** 11:35 AM
**EQUIPMENT** CME-850, Rig 7
**DATE COMPLETED** 12/05/2025
**BORING DIAMETER** 4.875 inches
**TIME COMPLETED** 12:45 PM
**HAMMER EFFICIENCY** 82.8%
**LOGGED BY** E. Uren

| DEPTH (ft) | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION AND NOTES | ELEVATION (ft) | SAMPLE TYPE | RECOVERY (in) | SAMPLE ID | % RQD | BLOW COUNTS | MOISTURE CONTENT (%) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (continued from previous page) | | | | | | | | |
| 65 | | | Vesicular injection with non-vesicular basalt at 75 degrees from 66 to 68 feet. | 280 | Core | 62 | BC2.5 | 33 | | | |
| 70 | | | Moderate to slightly fractured, no vesicles at 68 feet. | 275 | Core | 60 | BC2.6 | 66 | | | |
| 75 | | | Slightly fractured at 73 feet. | 270 | Core | 60 | BC2.7 | 100 | | | |
| | | | Moderately to slightly weathered, moderately to slightly fractured at 78 feet. | | Core | 59 | BC2.8 | 66 | | | |

**Water Levels**

▽ Unable to observe

▼ -

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# BORING NUMBER: B - 2



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NUMBER** WestL-1-01-1
**PROJECT LOCATION** West Linn, Oregon
**DRILLING CONTRACTOR** Western States Soil Conservation, Inc.
**DATE STARTED** 01/31/2025
**DRILLING METHOD** Mud Rotary and Rock Coring
**TIME STARTED** 11:35 AM
**EQUIPMENT** CME-850, Rig 7
**DATE COMPLETED** 12/05/2025
**BORING DIAMETER** 4.875 inches
**TIME COMPLETED** 12:45 PM
**HAMMER EFFICIENCY** 82.8%
**LOGGED BY** E. Uren

| DEPTH (ft) | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION AND NOTES | ELEVATION (ft) | SAMPLE TYPE | RECOVERY (in) | SAMPLE ID | % RQD | BLOW COUNTS | MOISTURE CONTENT (%) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (continued from previous page) | | | | | | | | |
| | | | Intensely fractured at 82 feet. | | | | | | | | |
| | | | 82.5 | | | | | | | | |
| | | | Weak (R2), gray-brown to red-brown BASALT, moderately to slightly weathered, intensely to moderately fractured, vesicular. | | | | | | | | |
| 85 | | | | 260 | Core | 61 | BC2.9 | 52 | | | |
| | | | Gray, moderately to slightly fractured at 88 feet. | | | | | | | | |
| 90 | | | | 255 | Core | 61 | BC2.10 | 80 | | | |
| | | | Medium strong to strong (R3-R4), [other than clay layer], gray-brown, moderately to slightly weathered at 93 feet. | | | | | | | | |
| 95 | | | CLAY layer, low plasticity (0.4-foot thick) at 93.3 feet. | 250 | Core | 60 | BC2.11 | 68 | | | Yellow return water at 96 feet. |
| | | | | | Core | 60 | BC2.12 | 7 | | | Vibrating wire piezometer 2312663 installed at 98 feet. |

**Water Levels**

▽ Unable to observe

▼ -

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# BORING NUMBER: B - 2



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NUMBER** WestL-1-01-1
**PROJECT LOCATION** West Linn, Oregon
**DRILLING CONTRACTOR** Western States Soil Conservation, Inc.
**DATE STARTED** 01/31/2025
**DRILLING METHOD** Mud Rotary and Rock Coring
**TIME STARTED** 11:35 AM
**EQUIPMENT** CME-850, Rig 7
**DATE COMPLETED** 12/05/2025
**BORING DIAMETER** 4.875 inches
**TIME COMPLETED** 12:45 PM
**HAMMER EFFICIENCY** 82.8%
**LOGGED BY** E. Uren

| DEPTH (ft) | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION AND NOTES | ELEVATION (ft) | SAMPLE TYPE | RECOVERY (in) | SAMPLE ID | % RQD | BLOW COUNTS | MOISTURE CONTENT (%) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (continued from previous page) | | | | | | | | |
| | | | Medium strong (R3), brown-gray to yellow-brown, vesicular (weathered bottom of flow) at 103.5 feet. | | | | | | | | |
| 105 | | | 104.7<br>Weak to medium strong (R2-R3), brown-gray BASALT, moderately weathered, intensely to moderately fractured, vesicular with filled in vesicles (clay mineralization). | 240 | Core | 55 | BC2.13 | 50 | | | Yellow return water from 104.5 to 105.5 feet. |
| 110 | | | Medium strong to strong (R3-R4), gray, slightly weathered, moderately fractured, vesicular with open vesicles at 108 feet. | 235 | Core | 60 | BC2.14 | 19 | | | |
| 115 | | | No vesicles at 116 feet. | 230 | Core | 60 | BC2.15 | 53 | | | |
| | | | Medium strong to strong (R3-R4), moderately to slightly weathered, moderately jointed at 118 feet. | | Core | 60 | BC2.16 | 45 | | | |

**Water Levels**

▽ Unable to observe

▼ -

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# BORING NUMBER: B - 2



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NUMBER** WestL-1-01-1
**PROJECT LOCATION** West Linn, Oregon
**DRILLING CONTRACTOR** Western States Soil Conservation, Inc.
**DATE STARTED** 01/31/2025
**DRILLING METHOD** Mud Rotary and Rock Coring
**TIME STARTED** 11:35 AM
**EQUIPMENT** CME-850, Rig 7
**DATE COMPLETED** 12/05/2025
**BORING DIAMETER** 4.875 inches
**TIME COMPLETED** 12:45 PM
**HAMMER EFFICIENCY** 82.8%
**LOGGED BY** E. Uren

| DEPTH (ft) | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION AND NOTES | ELEVATION (ft) | SAMPLE TYPE | RECOVERY (in) | SAMPLE ID | % RQD | BLOW COUNTS | MOISTURE CONTENT (%) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (continued from previous page) | | | | | | | | |
| | | | 123.0 | | | | | | | | |
| | | | Boring completed at 123 feet. | | | | | | | | |

**Water Levels**

▽ Unable to observe

▼ -

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# BORING NUMBER: B - 3



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NUMBER** WestL-1-01-1
**PROJECT LOCATION** West Linn, Oregon
**DRILLING CONTRACTOR** Western States Soil Conservation, Inc.
**DATE STARTED** 01/27/2025
**DRILLING METHOD** Hollow-Stem Auger and Rock Coring
**TIME STARTED** 9:17 AM
**EQUIPMENT** CME-850, Rig 7
**DATE COMPLETED** 01/29/2025
**BORING DIAMETER** 4.875 inches
**TIME COMPLETED** 4:32 PM
**HAMMER EFFICIENCY** 82.8%
**LOGGED BY** E. Uren

| DEPTH (ft) | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION AND NOTES | ELEVATION (ft) | SAMPLE TYPE | RECOVERY (in) | SAMPLE ID | % RQD | BLOW COUNTS | MOISTURE CONTENT (%) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Bark Chips (approximatley 24 inches) - **FILL**. | 315 | | | | | | | |
| | | | 2.0 | | | | | | | | |
| | GM | | Very dense, brown-gray silty GRAVEL with sand, moist, gravel is fine to coarse, sand is fine to coarse (decomposed basalt). | | SPT | 5 | B3.1 | | 50/5" | 21 | |
| | | | 4.0 | | SPT | 1 | B3.2 | | 50/1" | | Switched to rock coring at 4 feet. |
| 5 | | | Very weak to medium strong (R1-R3), brown-gray BASALT, completely to highly weathered, very instensely to intensely fractured, not healed, moist. | 310 | Core | 48 | BC3.1 | 23 | | | |
| | | | Gray at 9 feet. | | | | | | | | |
| 10 | | | | 305 | Core | 24 | BC3.2 | 0 | | | |
| | | | | | Core | 56 | BC3.3 | 0 | | | |
| 15 | | | | 300 | | | | | | | |
| | | | Weak to medium strong (R2-R3), gray-brown, slightly to moderately weathered, very intensely fractured at 16 feet. | | Core | 60 | BC3.4 | 0 | | | Intensity of fracturing due to sub-vertical columnar of joints. |

**Water Levels**

▽ -

▼ -

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# BORING NUMBER: B - 3



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NUMBER** WestL-1-01-1
**PROJECT LOCATION** West Linn, Oregon
**DRILLING CONTRACTOR** Western States Soil Conservation, Inc.
**DATE STARTED** 01/27/2025
**DRILLING METHOD** Hollow-Stem Auger and Rock Coring
**TIME STARTED** 9:17 AM
**EQUIPMENT** CME-850, Rig 7
**DATE COMPLETED** 01/29/2025
**BORING DIAMETER** 4.875 inches
**TIME COMPLETED** 4:32 PM
**HAMMER EFFICIENCY** 82.8%
**LOGGED BY** E. Uren

| DEPTH (ft) | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION AND NOTES | ELEVATION (ft) | SAMPLE TYPE | RECOVERY (in) | SAMPLE ID | % RQD | BLOW COUNTS | MOISTURE CONTENT (%) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (continued from previous page) | | | | | | | | |
| | | | Medium strong (R3) at 22 feet. | | Core | 60 | BC3.5 | 17 | | | |
| 25 | | | | 290 | | | | | | | |
| | | | Very strong (R5), gray, moderately fractured, 5 to 20 degrees, alteration around fractures at 26 feet. | | Core | 59.1 | BC3.6 | 73 | | | UC = 16,150 psi |
| 30 | | | | 285 | | | | | | | |
| | | | Very weak to weak (R1-R2), red-brown-gray-orange, completely to highly weathered, very intensely to intensely, vesicular at 31 feet. | | Core | 50 | BC3.7 | 22 | | | Rock loss at 31 feet due to increased weathering. |
| 35 | | | | 280 | | | | | | | |
| | | | Weak (R2), red-brown, highly weathered, intensely to moderately fractured at 36 feet. | | Core | 59 | BC3.8 | 28 | | | |

**Water Levels**

▽ -

▼ -

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# BORING NUMBER: B - 3



**PROJECT NAME** Operations Center
**PROJECT NUMBER** WestL-1-01-1
**DRILLING CONTRACTOR** Western States Soil Conservation, Inc.
**DRILLING METHOD** Hollow-Stem Auger and Rock Coring
**EQUIPMENT** CME-850, Rig 7
**BORING DIAMETER** 4.875 inches
**HAMMER EFFICIENCY** 82.8%

**CLIENT** City of West Linn
**PROJECT LOCATION** West Linn, Oregon
**DATE STARTED** 01/27/2025
**TIME STARTED** 9:17 AM
**DATE COMPLETED** 01/29/2025
**TIME COMPLETED** 4:32 PM
**LOGGED BY** E. Uren

| DEPTH (ft) | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION AND NOTES | ELEVATION (ft) | SAMPLE TYPE | RECOVERY (in) | SAMPLE ID | % RQD | BLOW COUNTS | MOISTURE CONTENT (%) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (continued from previous page) | | | | | | | | |
| | | | Medium strong (R3), gray, moderately to slightly weathered, moderately to slightly fractured, 15 to 20 degrees, mineralized surfaces, 80 percent clay infill (partially healed), columnar joint, sub-vertical (70 to 80 degrees) at 41 feet. | | Core | 60 | BC3.9 | 72 | | | |
| 45 | | | | 270 | | | | | | | |
| | | | Medium strong to strong (R3-R4), moderately fractured, not healed at 46 feet. | | Core | 60 | BC3.10 | 39 | | | |
| 50 | | | | 265 | | | | | | | |
| | | | No vesicles at 50.5 feet.<br>Slightly weathered, moderately fractured at 51 feet.<br>Columnar joint from 51.9 to 53.8 feet. | | Core | 57 | BC3.11 | 89 | | | |
| 55 | | | | 260 | | | | | | | |
| | | | Moderately jointed at 56 feet. | | Core | 63 | BC3.12 | 27 | | | |

**Water Levels**

▽ -

▼ -

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# BORING NUMBER: B - 3



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NUMBER** WestL-1-01-1
**PROJECT LOCATION** West Linn, Oregon
**DRILLING CONTRACTOR** Western States Soil Conservation, Inc.
**DATE STARTED** 01/27/2025
**DRILLING METHOD** Hollow-Stem Auger and Rock Coring
**TIME STARTED** 9:17 AM
**EQUIPMENT** CME-850, Rig 7
**DATE COMPLETED** 01/29/2025
**BORING DIAMETER** 4.875 inches
**TIME COMPLETED** 4:32 PM
**HAMMER EFFICIENCY** 82.8%
**LOGGED BY** E. Uren

| DEPTH (ft) | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION AND NOTES | ELEVATION (ft) | SAMPLE TYPE | RECOVERY (in) | SAMPLE ID | % RQD | BLOW COUNTS | MOISTURE CONTENT (%) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (continued from previous page) | | | | | | | | |
| | | | 61.0 | | | | | | | | |
| | | | Weak to medium strong (R2-R3), brown to brown-gray BASALT, intensely to slightly weathered, moderately to slightly fractured, vesicular. | | Core | 60 | BC3.13 | 42 | | | |
| 65 | | | | 250 | | | | | | | |
| | | | Medium strong to strong (R3-R4), gray to orange, moderately to slightly weathered, intensely to moderately fractured at 67 feet. Medium strong (R3) at 69 feet. | | Core | 60 | BC3.14 | 18 | | | |
| 70 | | | | 245 | | | | | | | |
| | | | 71.0 | | | | | | | | |
| | | | Weak to medium strong (R2-R3), brown to brown-gray BASALT, highly to moderately weathered, very instensely to intensely fractured, vesicular, jointed (60 to 80 degrees). No vesicles, several joints with mineralized fill, not healed, (60 to 90 degrees), columnar at 73 feet. Gray at 76 feet. | | Core | 60 | BC3.15 | 22 | | | |
| 75 | | | | 240 | | | | | | | |
| | | | | | Core | 60 | BC3.16 | 55 | | | |

**Water Levels**

▽ -

▼ -

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# BORING NUMBER: B - 3



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NUMBER** WestL-1-01-1
**PROJECT LOCATION** West Linn, Oregon
**DRILLING CONTRACTOR** Western States Soil Conservation, Inc.
**DATE STARTED** 01/27/2025
**DRILLING METHOD** Hollow-Stem Auger and Rock Coring
**TIME STARTED** 9:17 AM
**EQUIPMENT** CME-850, Rig 7
**DATE COMPLETED** 01/29/2025
**BORING DIAMETER** 4.875 inches
**TIME COMPLETED** 4:32 PM
**HAMMER EFFICIENCY** 82.8%
**LOGGED BY** E. Uren

| DEPTH (ft) | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION AND NOTES | ELEVATION (ft) | SAMPLE TYPE | RECOVERY (in) | SAMPLE ID | % RQD | BLOW COUNTS | MOISTURE CONTENT (%) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 85 | | | Medium strong (R3), brown BASALT, moderately weathered, very instensely to intensely fractured, vesicular. | 230 | Core | 57 | BC3.17 | 32 | | | |
| | | | 85.5 Extremely weak to very weak (R0-R1), gray to blue-gray and yellow BASALT, decomposed to completely weathered, very intensely fractured, vesicular (where not decomposed). CLAY filling from 86.5 to 87 feet. | | Core | 60 | BC3.18 | 7 | | 50 | |
| 90 | | | Weak (R2), brown-gray, highly to moderately weathered, intensely fractured at 88 feet. Medium strong (R3), gray, moderately to slightly weathered, intensely to moderately fractured at 89 feet. No vesicles at 91 feet. | 225 | | | | | | | |
| | | | | | Core | 60 | BC3.19 | 48 | | | |
| 95 | | | | 220 | | | | | | | |
| | | | | | Core | 36 | BC3.20 | 0 | | | Vibrating wire piezometer 2449284 installed at 97.5 feet. |
| | | | Red-brown, moderately weathered, vesicular at 98.5 feet. | | | | | | | | |

**Water Levels**

▽ -

▼ -



DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# BORING NUMBER: B - 3



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NUMBER** WestL-1-01-1
**PROJECT LOCATION** West Linn, Oregon
**DRILLING CONTRACTOR** Western States Soil Conservation, Inc.
**DATE STARTED** 01/27/2025
**DRILLING METHOD** Hollow-Stem Auger and Rock Coring
**TIME STARTED** 9:17 AM
**EQUIPMENT** CME-850, Rig 7
**DATE COMPLETED** 01/29/2025
**BORING DIAMETER** 4.875 inches
**TIME COMPLETED** 4:32 PM
**HAMMER EFFICIENCY** 82.8%
**LOGGED BY** E. Uren

| DEPTH (ft) | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION AND NOTES | ELEVATION (ft) | SAMPLE TYPE | RECOVERY (in) | SAMPLE ID | % RQD | BLOW COUNTS | MOISTURE CONTENT (%) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Gray-brown, slightly weathered at 100 feet. | | Core | 9 | BC3.21 | 0 | | | |
| | | | 101.0 | | | | | | | | |
| | | | Boring terminated at 101 feet due to drill shake. | | | | | | | | |

DRAFT

**Water Levels**

▽ -

▼ -

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# BORING NUMBER: B - 4



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NUMBER** WestL-1-01-1
**PROJECT LOCATION** West Linn, Oregon
**DRILLING CONTRACTOR** Western States Soil Conservation, Inc.
**DATE STARTED** 01/29/2025
**DRILLING METHOD** Hollow-Stem Auger and Rock Coring
**TIME STARTED** 4:08 PM
**EQUIPMENT** CME-850, Rig 7
**DATE COMPLETED** 01/29/2025
**BORING DIAMETER** 4.25 inches
**TIME COMPLETED** 1:30 PM
**HAMMER EFFICIENCY** 82.8%
**LOGGED BY** E. Uren

| DEPTH (ft) | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION AND NOTES | ELEVATION (ft) | SAMPLE TYPE | RECOVERY (in) | SAMPLE ID | % RQD | BLOW COUNTS | MOISTURE CONTENT (%) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 303.7 | | | | | | | |
| | | | Bark Chips (approximatley 18 inches) - **FILL**. 1.5 | | | | | | | | |
| | SP-SM | | Very dense, brown-gray SAND with silt, moist, sand is fine to medium (decomposed basalt). | | SPT | 7 | B4.1 | | 40-50/1" | | |
| | | | | 300 | SPT | 5 | B4.2 | | 50/5" | | |
| 5 | | | 5.0 | | | | | | | | |
| | | | Weak to strong (R2-R4), gray-brown BASALT, moderately weathered, intensely to moderately fractured, not healed, moist. | | Core | 53 | BC4.1 | 45 | | | Switched to rock coring at 5 feet. |
| | | | | 295 | | | | | | | |
| 10 | | | Strong to very strong (R4-R5), gray, intensely fractured at 10 feet. | | Core | 22 | BC4.2 | 9 | | | Washout at 11 feet. UC = 17,340 psi<br>Washout at 12.5 feet. |
| | | | | 290 | | | | | | | Washout at 14 feet. |
| 15 | | | | | Core | 44 | BC4.3 | 0 | | | |
| | | | | 285 | | | | | | | |

**Water Levels**

▽ -

▼ -



DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# BORING NUMBER: B - 4



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NUMBER** WestL-1-01-1
**PROJECT LOCATION** West Linn, Oregon
**DRILLING CONTRACTOR** Western States Soil Conservation, Inc.
**DATE STARTED** 01/29/2025
**DRILLING METHOD** Hollow-Stem Auger and Rock Coring
**TIME STARTED** 4:08 PM
**EQUIPMENT** CME-850, Rig 7
**DATE COMPLETED** 01/29/2025
**BORING DIAMETER** 4.25 inches
**TIME COMPLETED** 1:30 PM
**HAMMER EFFICIENCY** 82.8%
**LOGGED BY** E. Uren

| DEPTH (ft) | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION AND NOTES | ELEVATION (ft) | SAMPLE TYPE | RECOVERY (in) | SAMPLE ID | % RQD | BLOW COUNTS | MOISTURE CONTENT (%) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (continued from previous page) Red-gray, intensely to moderately fractured, vesicular with yellow mineralization at 20.4 feet. | 280 | Core | 48 | BC4.4 | 23 | | | |
| 25 | | | Medium strong (R3), gray, moderately to slightly weathered, moderately to slightly fractured, vesicular at 25 feet. | 275 | Core | 61 | BC4.5 | 59 | | | |
| 30 | | | Medium strong to strong (R3-R4), moderately fractured, not vesicular at 30 feet. | 270 | Core | 59 | BC4.6 | 88 | | | |
| 35 | | | Slightly weathered, slightly fractured at 35 feet. | 265 | Core | 60 | BC4.7 | 80 | | | |
| | | | Vesicular at 39 feet. | | | | | | | | |

**Water Levels**

▽ -

▼ -

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# BORING NUMBER: B - 4



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NUMBER** WestL-1-01-1
**PROJECT LOCATION** West Linn, Oregon
**DRILLING CONTRACTOR** Western States Soil Conservation, Inc.
**DATE STARTED** 01/29/2025
**DRILLING METHOD** Hollow-Stem Auger and Rock Coring
**TIME STARTED** 4:08 PM
**EQUIPMENT** CME-850, Rig 7
**DATE COMPLETED** 01/29/2025
**BORING DIAMETER** 4.25 inches
**TIME COMPLETED** 1:30 PM
**HAMMER EFFICIENCY** 82.8%
**LOGGED BY** E. Uren

| DEPTH (ft) | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION AND NOTES | ELEVATION (ft) | SAMPLE TYPE | RECOVERY (in) | SAMPLE ID | % RQD | BLOW COUNTS | MOISTURE CONTENT (%) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Medium strong to strong (R3-R4), moderately to slightly weathered, intensely fractured at 40 feet. | 260 | Core | 61 | BC4.8 | 23 | | | |
| 45 | | | Strong (R4), moderately fractured, fewer vesicles at 45 feet. | | Core | 60 | BC4.9 | 37 | | | |
| 50 | | | 50.0 | 255 | | | | | | | |
| | | | Boring completed at 50 feet. | | | | | | | | |

DRAFT

**Water Levels**

▽ -

▼ -

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# BORING NUMBER: B - 5



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NUMBER** WestL-1-01-1
**PROJECT LOCATION** West Linn, Oregon
**DRILLING CONTRACTOR** Western States Soil Conservation, Inc.
**DATE STARTED** 01/29/2025
**DRILLING METHOD** Mud Rotary and Rock Coring
**TIME STARTED** 2:30 PM
**EQUIPMENT** CME-850, Rig 7
**DATE COMPLETED** 01/31/2025
**BORING DIAMETER** 4.25 inches
**TIME COMPLETED** 11:25 AM
**HAMMER EFFICIENCY** 82.8%
**LOGGED BY** E. Uren

| DEPTH (ft) | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION AND NOTES | ELEVATION (ft) | SAMPLE TYPE | RECOVERY (in) | SAMPLE ID | % RQD | BLOW COUNTS | MOISTURE CONTENT (%) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Soft, brown sandy SILT, trace organics, moist (12 inches of topsoil, 6-inch-thick root zone) - **FILL**. 1.0 | 332.5 | | | | | | | |
| | | | Medium dense, brown clayey GRAVEL with sand, moist, gravel is fine to coarse, sand is fine to coarse - **FILL**. | 330 | SPT | 5 | B5.1 | | 6-7-12 (19) | 20 | |
| 5 | | | | | SPT | 12 | B5.2 | | 9-10-7 (17) | | |
| | | | 7.5 | 325 | | | | | | | |
| | | | Medium stiff, brown sandy CLAY with gravel, moist, medium plasticity, sand is fine to coarse, gravel is fine - **FILL**. | | SPT | 9 | B5.3 | | 3-3-3 (6) | 23 | |
| 10 | | | | | CSS | 8 | B5.4 | | 4-4-4 (8) | | |
| | | | | 320 | | | | | | | Driller Comment: Lost circulation at 12.5 feet. Lost 80 gallons of mud. |
| 15 | | | | | SPT | 0 | B5.5 | | 5-1-6 (7) | | Lost 230 gallons of mud at 15 feet. Possible nested cobbles and boulders at 15 feet. |
| | | | | 315 | | | | | | | |
| | | | Hard, gravel is fractured at 18 feet. | | SPT | 1 | B5.6 | | 50/2" | | |

**Water Levels**

▽ Unable to observe

▼ -

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# BORING NUMBER: B - 5



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NUMBER** WestL-1-01-1
**PROJECT LOCATION** West Linn, Oregon
**DRILLING CONTRACTOR** Western States Soil Conservation, Inc.
**DATE STARTED** 01/29/2025
**DRILLING METHOD** Mud Rotary and Rock Coring
**TIME STARTED** 2:30 PM
**EQUIPMENT** CME-850, Rig 7
**DATE COMPLETED** 01/31/2025
**BORING DIAMETER** 4.25 inches
**TIME COMPLETED** 11:25 AM
**HAMMER EFFICIENCY** 82.8%
**LOGGED BY** E. Uren

| DEPTH (ft) | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION AND NOTES | ELEVATION (ft) | SAMPLE TYPE | RECOVERY (in) | SAMPLE ID | % RQD | BLOW COUNTS | MOISTURE CONTENT (%) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Medium dense, brown-gray SAND with clay and gravel, moist, sand is fine to coarse, gravel is fine to coarse - **FILL**. | | SPT | 1 | B5.7 | | 12-10-8 (18) | | |
| | | | | 310 | | | | | | | |
| 25 | | | | | D&M | 12 | B5.8 | | 9-9-27 (36) | 27 | |
| | | | 27.0 | | | | | | | | |
| | | | Hard, pink-brown with orange mottled sandy SILT, moist, sand is fine to medium (decomposed basalt). | 305 | | | | | | | |
| 30 | ML | | | | SPT | 18 | B5.9 | | 23-35-47 (82) | 26 | |
| | | | | 300 | | | | | | | |
| 35 | | | 35.0 | | SPT | 6 | B5.10 | | 40-50/3" | | |
| | GC/GP-GC | | Very dense, gray-brown-orange clayey GRAVEL with sand, moist, to GRAVEL with clay and sand, moist, gravel is fine to coarse and fractured, sand is fine to coarse (decomposed basalt). | 295 | | | | | | | |

**Water Levels**

▽ Unable to observe

▼ -

DRAFT

# BORING NUMBER: B - 5



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NUMBER** WestL-1-01-1
**PROJECT LOCATION** West Linn, Oregon
**DRILLING CONTRACTOR** Western States Soil Conservation, Inc.
**DATE STARTED** 01/29/2025
**DRILLING METHOD** Mud Rotary and Rock Coring
**TIME STARTED** 2:30 PM
**EQUIPMENT** CME-850, Rig 7
**DATE COMPLETED** 01/31/2025
**BORING DIAMETER** 4.25 inches
**TIME COMPLETED** 11:25 AM
**HAMMER EFFICIENCY** 82.8%
**LOGGED BY** E. Uren

| DEPTH (ft) | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION AND NOTES | ELEVATION (ft) | SAMPLE TYPE | RECOVERY (in) | SAMPLE ID | % RQD | BLOW COUNTS | MOISTURE CONTENT (%) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (continued from previous page) | | D&M | 5 | B5.11 | | 120/5" (100) | | |
| | GC/GP-GC | | | 290 | | | | | | | |
| 45 | | | 46.0 | | | | | | | | |
| | | | Strong (R4), gray BASALT, slightly weathered, moderately fractured, vesicular, not healed, moist. | | Core | 9 | BC5.1 | 58 | | | Switched to rock coring at 46 feet. |
| | | | Medium strong to strong (R3-R4) at 47 feet. | 285 | | | | | | | UC = 5,860 psi |
| | | | Intensely to moderately fractured at 48 feet. | | Core | 63 | BC5.2 | 68 | | | |
| 50 | | | Moderately fractured at 52 feet. | 280 | | | | | | | |
| | | | Vesicular and vuggy, trunks of vesicles oriented 5 to 20 degrees at 53 feet. | | Core | 40 | BC5.3 | 46 | | | |
| 55 | | | Strong (R4) at 55.3 feet. | | | | | | | | |
| | | | No vesicles at 57 feet. | 275 | Core | 60 | BC5.4 | 95 | | | |

**Water Levels**

▽ Unable to observe

▼ -

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# BORING NUMBER: B - 5



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NUMBER** WestL-1-01-1
**PROJECT LOCATION** West Linn, Oregon
**DRILLING CONTRACTOR** Western States Soil Conservation, Inc.
**DATE STARTED** 01/29/2025
**DRILLING METHOD** Mud Rotary and Rock Coring
**TIME STARTED** 2:30 PM
**EQUIPMENT** CME-850, Rig 7
**DATE COMPLETED** 01/31/2025
**BORING DIAMETER** 4.25 inches
**TIME COMPLETED** 11:25 AM
**HAMMER EFFICIENCY** 82.8%
**LOGGED BY** E. Uren

| DEPTH (ft) | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION AND NOTES | ELEVATION (ft) | SAMPLE TYPE | RECOVERY (in) | SAMPLE ID | % RQD | BLOW COUNTS | MOISTURE CONTENT (%) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Slightly weathered, intensely fractured at 60 feet. | | Core | 20 | BC5.5 | 40 | | | Intense fracturing due to coring through sub-vertical joints (columnar) 60 degrees. |
| | | | Slightly to moderately weathered, moderately fractured at 62 feet. | 270 | Core | 55 | BC5.6 | 33 | | | |
| 65 | | | | | | | | | | | |
| | | | Slightly weathered, intensely to slightly fractured, vesicular at 67 feet. | 265 | Core | 52 | BC5.7 | 38 | | | |
| 70 | | | | | | | | | | | |
| | | | Moderately to slightly weathered, intensely to moderately fractured at 72 feet. | 260 | Core | 62 | BC5.8 | 53 | | | |
| 75 | | | Intensely to moderately weathered, intensely fractured, vesicular with yellow staining at 74.5 feet. Larger vesicles have blue-gray mineral coatings at 75 feet. Gray-blue, slightly weathered, moderately fractured at 77 feet. | 255 | Core | 62 | BC5.9 | 70 | | | |

**Water Levels**

▽ Unable to observe

▼ -

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# BORING NUMBER: B - 5



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NUMBER** WestL-1-01-1
**PROJECT LOCATION** West Linn, Oregon
**DRILLING CONTRACTOR** Western States Soil Conservation, Inc.
**DATE STARTED** 01/29/2025
**DRILLING METHOD** Mud Rotary and Rock Coring
**TIME STARTED** 2:30 PM
**EQUIPMENT** CME-850, Rig 7
**DATE COMPLETED** 01/31/2025
**BORING DIAMETER** 4.25 inches
**TIME COMPLETED** 11:25 AM
**HAMMER EFFICIENCY** 82.8%
**LOGGED BY** E. Uren

| DEPTH (ft) | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION AND NOTES | ELEVATION (ft) | SAMPLE TYPE | RECOVERY (in) | SAMPLE ID | % RQD | BLOW COUNTS | MOISTURE CONTENT (%) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (continued from previous page) | | | | | | | | |
| | | | Last vesicles oriented 10 degrees at 82 feet.<br>No vesicles below 82 feet. | 250 | | | | | | | |
| 85 | | | | | Core | 54 | BC5.10 | 35 | | | |
| | | | Weak to strong (R2-R4), gray-orange-red, completely to slightly weathered at 87 feet. | 245 | | | | | | | |
| 90 | | | | | Core | 36 | BC5.11 | 41 | | | |
| | | | Highly weathered zones from 91 to 92 feet. | | | | | | | | |
| | | | 92.0<br>Extremely weak to very weak (R0-R1), gray-red and yellow-white BASALT, very intensely fractured (relict basalt or weathered sandy interflow). 93.0 | 240 | | | | | | | |
| 95 | | | Medium strong (R3), gray BASALT, moderately to slightly weathered, moderately fractured with columnar joints, vesicular, moist.<br>Highly weathered zone from 93 to 94 feet.<br>Strong (R4), gray, slightly weathered, moderately fractured at 97 feet. | | Core | 60 | BC5.12 | 40 | | | |
| | | | | 235 | | | | | | | |
| | | | | | Core | 62 | BC5.13 | 42 | | | Vibrating wire piezometer 2449541 installed at 98 feet. |

**Water Levels**

▽ Unable to observe

▼ -

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# BORING NUMBER: B - 5



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NUMBER** WestL-1-01-1
**PROJECT LOCATION** West Linn, Oregon
**DRILLING CONTRACTOR** Western States Soil Conservation, Inc.
**DATE STARTED** 01/29/2025
**DRILLING METHOD** Mud Rotary and Rock Coring
**TIME STARTED** 2:30 PM
**EQUIPMENT** CME-850, Rig 7
**DATE COMPLETED** 01/31/2025
**BORING DIAMETER** 4.25 inches
**TIME COMPLETED** 11:25 AM
**HAMMER EFFICIENCY** 82.8%
**LOGGED BY** E. Uren

| DEPTH (ft) | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION AND NOTES | ELEVATION (ft) | SAMPLE TYPE | RECOVERY (in) | SAMPLE ID | % RQD | BLOW COUNTS | MOISTURE CONTENT (%) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (continued from previous page) | | | | | | | | |
| | | | Extremely weak (R0), white-gray-orange, completely to intensely weathered, very intensely fractured at 104 feet. | 230 | Core | 48 | BC5.14 | 17 | | 57 | |
| 105 | | | 106.0 Medium strong to strong (R3-R4), gray BASALT, slightly weathered, moderately to slightly fractured, some vesicles. Vesicles at 107 feet. Fewer vesicles at 109 feet. | 225 | Core | 60 | BC5.15 | 60 | | | |
| 110 | | | CLAY with basalt fragments interflow from 112.3 to 112.6 feet. Medium strong to strong (R3-R4) at 112.6 feet. | 220 | Core | 60 | BC5.16 | 63 | | | |
| 115 | | | 117.0 Boring completed at 117 feet. | | | | | | | | |

**Water Levels**

▽ Unable to observe

▼ -

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# TEST PIT NUMBER: TP-1



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NO.** WestL-1-01-1 **LOGGED BY** E. Uren
**PROJECT LOCATION** West Linn, Oregon
**CONTRACTOR** Dan J. Fischer Excavating, Inc.
**EQUIPMENT** Kobelco SK140SR
**CAVING** Not observed
**DATE COMPLETED** 01/23/2025
**GROUNDWATER** Not observed
**TIME STARTED** 10:59 AM **TIME COMPLETED** 11:15 AM

| DEPTH (ft) | SAMPLE TYPE | SAMPLE ID | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEVATION (ft) | POCKET PEN (tsf) | MOISTURE CONTENT (%) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 367.5 | | | |
| | | | | | Soft, brown sandy SILT, trace organics, moist (6 inches of topsoil). 0.5 | | | | |
| | Grab | TP1.1 | | | Extremely weak to weak (R0-R2), brown-gray BASALT, completely to highly weathered, very close to close jointed, moist. | 365 | | 13 | |
| | | | | | 4.0 | | | | |
| | | | | | Test pit terminated at 4 feet on basalt. | | | | |
| 5 | | | | | | | | | |
| 10 | | | | | | | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# TEST PIT NUMBER: TP-2



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NO.** WestL-1-01-1 **LOGGED BY** E. Uren
**PROJECT LOCATION** West Linn, Oregon
**CONTRACTOR** Dan J. Fischer Excavating, Inc.
**EQUIPMENT** Kobelco SK140SR
**CAVING** Not observed
**DATE COMPLETED** 01/23/2025
**GROUNDWATER** Not observed
**TIME STARTED** 9:56 AM **TIME COMPLETED** 10:23 AM

| DEPTH (ft) | SAMPLE TYPE | SAMPLE ID | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEVATION (ft) | POCKET PEN (tsf) | MOISTURE CONTENT (%) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 350.7 | | | |
| | | | | | Soft, brown sandy SILT, trace organics, moist (6 inches of topsoil, 4-inch-thick root zone). 0.5 | 350 | | | |
| | Grab | TP2.1 | GM | | Medium dense, brown-gray silty GRAVEL with sand and cobbles, moist, gravel is fine to coarse, sand is fine to coarse, cobbles are subangular and approximately 5 to 15% (decomposed basalt). | | | 16 | |
| | | | | | Boulder (subangular and 24 inches in diameter) at 3 feet. 4.0 | | | | |
| 5 | | | | | Very weak to weak (R1-R2), brown-gray BASALT, highly to moderately weathered, close to moderately close jointed, moist. 6.0 | 345 | | | Decomposed pockets. |
| | | | | | Test pit terminated at 6 feet on basalt. | | | | |
| 10 | | | | | | | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# TEST PIT NUMBER: TP-3



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NO.** WestL-1-01-1 **LOGGED BY** E. Uren
**PROJECT LOCATION** West Linn, Oregon
**CONTRACTOR** Dan J. Fischer Excavating, Inc.
**EQUIPMENT** Kobelco SK140SR
**CAVING** Minor from 1 to 3 feet, severe from 4 to 15 feet
**DATE COMPLETED** 01/23/2025
**GROUNDWATER** Not observed
**TIME STARTED** 9:05 AM **TIME COMPLETED** 9:55 AM

| DEPTH (ft) | SAMPLE TYPE | SAMPLE ID | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEVATION (ft) | POCKET PEN (tsf) | MOISTURE CONTENT (%) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 345 | | | |
| | | | | | Soft, brown sandy SILT, trace organics, moist (6 inches of topsoil, 4-inch-thick root zone) - **FILL**. 0.5 | | | | |
| | | | | | Medium dense, brown clayey GRAVEL with sand, cobbles, and boulders, moist, gravel is fine to coasre and fractured, sand is fine to coarse, cobbles are subangular to angular and approximately 5 to 15%, boulders are subangular to angular, 12 to 24 inches in diameter, and approximately 5 to 10% - **FILL**. | | | | |
| | Grab | TP3.1 | | | | | | 17 | |
| 5 | | | | | 5.0 | 340 | | | |
| | | | | | Medium dense, brown GRAVEL with clay, sand, cobbles, and boulders, moist, gravel is fine to coasre and fractured, sand is fine to coarse, cobbles are subangular to angular and approximately 5 to 10%, boulders are subangular to angular, 12 to 24 inches in diameter, and approximately 5 to 15% - **FILL**. | | | | |
| | Grab | TP3.2 | | | | | | | |
| 10 | | | | | | 335 | | | |
| | Grab | TP3.3 | | | | | | 10 | |
| | | | | | Loose to medium dense, moist to wet at 12 feet. | | | | |
| | | | | | Boulder (subrounded and 36 inches in diameter) at 13 feet. | | | | |
| 15 | | | | | | 330 | | | |
| | Grab | TP3.4 | | | Loose at 17 feet. | | | | |
| | | | | | Boulder (subrounded and 18 inches in diameter) at 18 feet. | | | | |
| 20 | | | | | | 325 | | | |
| | Grab | TP3.5 | | | 20.5 | | | | |
| | | | | | Test pit completed at 20.5 feet. | | | | |

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# TEST PIT NUMBER: TP-4



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NO.** WestL-1-01-1 **LOGGED BY** E. Uren
**PROJECT LOCATION** West Linn, Oregon
**CONTRACTOR** Dan J. Fischer Excavating, Inc.
**EQUIPMENT** Kobelco SK140SR
**CAVING** Severe from 0 to 14 feet
**DATE COMPLETED** 01/23/2025
**GROUNDWATER** Not observed
**TIME STARTED** 12:45 PM **TIME COMPLETED** 1:40 PM

| DEPTH (ft) | SAMPLE TYPE | SAMPLE ID | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEVATION (ft) | POCKET PEN (tsf) | MOISTURE CONTENT (%) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 342.3 | | | |
| | | | | | Soft, brown sandy SILT, trace organics, moist (12 inches of topsoil, 6-inch-thick root zone) - **FILL**. 1.0 | | | | |
| | | | | | Medium dense, brown-gray clayey GRAVEL, moist, gravel is fine to coarse (blasted basalt) - **FILL**. | 340 | | | |
| | Grab | TP4.1 | | | Boulders (four; subangular and 36 to 48 inches in diameter) at 4 feet. | | | 8 | |
| 5 | | | | | | 335 | | | |
| | | | | | 9.5 | | | | |
| 10 | Grab | TP4.2 | | | Medium dense, brown clayey GRAVEL with sand and cobbles, moist, gravel is fine to coarse, sand is fine to coarse, cobbles are subangular and approximately 10 to 20% - **FILL**. | 330 | | | |
| | Grab | TP4.3 | | | | | | | |
| 15 | | | | | 17.0 | | | | |
| | | | | | Test pit terminated at 17 feet due to caving. | | | | |
| 20 | | | | | | | | | |

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# TEST PIT NUMBER: TP-5



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NO.** WestL-1-01-1 **LOGGED BY** E. Uren
**PROJECT LOCATION** West Linn, Oregon
**CONTRACTOR** Dan J. Fischer Excavating, Inc.
**EQUIPMENT** Kobelco SK140SR
**CAVING** Minor from 1 foot to 6 feet, severe from 12 to 17 feet
**DATE COMPLETED** 01/23/2025
**GROUNDWATER** Not observed
**TIME STARTED** 11:44 AM **TIME COMPLETED** 12:12 PM

| DEPTH (ft) | SAMPLE TYPE | SAMPLE ID | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEVATION (ft) | POCKET PEN (tsf) | MOISTURE CONTENT (%) | FINES (%) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 336.7 | | | | |
| | | | | | Soft, brown sandy SILT, trace organics, moist (6 inches of topsoil, 6-inch-thick root zone) - **FILL**. 0.5 | | | | | |
| | | | | | Loose, brown silty GRAVEL with sand and cobbles, moist, gravel is fine to coarse and fractured, sand is fine to coarse, cobbles are subangular and approximately 0 to 10% - **FILL**. | 335 | | | | |
| | Grab | TP5.1 | | | | | | 19 | | |
| 5 | | | | | | 330 | | | | |
| | Grab | TP5.2 | | | With boulders, boulders are subangular, 12 to 24 inches in diameter, and approximately 5 to 10% at 7 feet. | | | | | |
| 10 | | | | | 11.0 | | | | | |
| | Grab | TP5.3 | | | Loose, brown clayey GRAVEL with sand and cobbles, wet, medium plasticity, gravel is fine to coarse, sand is fine to coarse, cobbles are subangular and approximately 0 to 10% - **FILL**. | 325 | | 20 | 15 | |
| 15 | | | | | | 320 | | | | |
| | Grab | TP5.4 | | | 18.0 | | | 24 | | |
| | | | | | Medium dense to dense, brown GRAVEL with silt, clay, sand, and cobbles, wet, gravel is fine to coarse, sand is fine to coarse, cobbles are subangular and approximately 0 to 10% - **FILL**. 19.0 | | | | | |
| 20 | | | | | Test pit terminated at 19 feet due to refusal on large boulder. | | | | | |

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# TEST PIT NUMBER: TP-6



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NO.** WestL-1-01-1 **LOGGED BY** E. Uren
**PROJECT LOCATION** West Linn, Oregon
**CONTRACTOR** Dan J. Fischer Excavating, Inc.
**EQUIPMENT** Kobelco SK140SR
**CAVING** Severe from 0 to 15 feet
**DATE COMPLETED** 01/23/2025
**GROUNDWATER** Not observed
**TIME STARTED** 1:51 PM **TIME COMPLETED** 2:20 PM

| DEPTH (ft) | SAMPLE TYPE | SAMPLE ID | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEVATION (ft) | POCKET PEN (tsf) | MOISTURE CONTENT (%) | ATTERBERG LIMITS (LL-PL-PI) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 337 | | | | |
| | | | | | Soft, brown sandy SILT, trace organics, moist (6 inches of topsoil, 6-inch-thick root zone) - **FILL**. | | | | | |
| | | | | | 0.5 | | | | | |
| | | | | | Loose, brown clayey GRAVEL with sand, cobbles, and boulders, moist, medium plasticity, gravel is fine to coarse, sand is fine to coarse, cobbles are subangular and approximately 10 to 20%, boulders are subangular, and 12 to 24 inches in diameter, and approximately 0 to 5% - **FILL**. | 335 | | | | |
| | Grab | TP6.1 | | | | | | | 48-26-22 | |
| 5 | | | | | | 330 | | | | |
| | Grab | TP6.2 | | | | | | 13 | | |
| 10 | | | | | | 325 | | | | |
| | | | | | 15.0 | | | | | |
| 15 | | | | | Test pit terminated at 15 feet due to caving. | | | | | |
| 20 | | | | | | | | | | |

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# TEST PIT NUMBER: TP-7



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NO.** WestL-1-01-1 **LOGGED BY** E. Uren
**PROJECT LOCATION** West Linn, Oregon
**CONTRACTOR** Dan J. Fischer Excavating, Inc.
**EQUIPMENT** Kobelco SK140SR
**CAVING** Not observed
**DATE COMPLETED** 01/23/2025
**GROUNDWATER** Not observed
**TIME STARTED** 2:38 PM **TIME COMPLETED** 3:00 PM

| DEPTH (ft) | SAMPLE TYPE | SAMPLE ID | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEVATION (ft) | POCKET PEN (tsf) | MOISTURE CONTENT (%) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 305.5 | | | |
| | | | | | Bark Chips (6 inches) - **FILL**. 0.5 | 305 | | | |
| | Grab | TP7.1 | | | Medium dense, orange-brown clayey SAND with gravel, moist, sand is fine to coarse, gravel is fine to coarse - **FILL**. 2.5 | | | 36 | |
| | | | | | Extremely weak to very weak (R0-R1), brown-gray-orange BASALT, decomposed to highly weathered, very close to close jointed, moist. 4.0 | | | | |
| | | | | | Test pit terminated at 4 feet on basalt. | | | | |
| 5 | | | | | | | | | |
| 10 | | | | | | | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# TEST PIT NUMBER: TP-8



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NO.** WestL-1-01-1 **LOGGED BY** E. Uren
**PROJECT LOCATION** West Linn, Oregon
**CONTRACTOR** Dan J. Fischer Excavating, Inc.
**EQUIPMENT** Kobelco SK140SR
**CAVING** Not observed
**DATE COMPLETED** 01/24/2025
**GROUNDWATER** Not observed
**TIME STARTED** 8:06 AM **TIME COMPLETED** 8:20 AM

| DEPTH (ft) | SAMPLE TYPE | SAMPLE ID | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEVATION (ft) | POCKET PEN (tsf) | MOISTURE CONTENT (%) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 310 | | | |
| | | | | | Bark Chips (approximately 24 inches) - **FILL**. 2.0 | | | | |
| | Grab | TP8.1 | | | Very weak to weak (R1-R2), gray BASALT, highly to moderately weathered, very close jointed, moist. 2.5 | | | | |
| | | | | | Test pit terminated at 2.5 feet on basalt. | | | | |
| 5 | | | | | | | | | |
| 10 | | | | | | | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# TEST PIT NUMBER: TP-9



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NO.** WestL-1-01-1 **LOGGED BY** E. Uren
**PROJECT LOCATION** West Linn, Oregon
**CONTRACTOR** Dan J. Fischer Excavating, Inc.
**EQUIPMENT** Kobelco SK140SR
**CAVING** Minor from 0 to 4 feet
**DATE COMPLETED** 01/23/2025
**GROUNDWATER** Not observed
**TIME STARTED** 10:25 AM **TIME COMPLETED** 10:58 AM

| DEPTH (ft) | SAMPLE TYPE | SAMPLE ID | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEVATION (ft) | POCKET PEN (tsf) | MOISTURE CONTENT (%) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 350 | | | |
| | | | | | Soft, brown sandy SILT, trace organics, moist (6 inches of topsoil, 4-inch-thick root zone) - **FILL**. 0.5 | | | | |
| | Grab | TP9.1 | | | Loose, gray-brown silty GRAVEL with sand and cobbles, moist, gravel is fine to coarse, sand is fine to coarse, cobbles are subangular and 5 to 15% - **FILL**. | | | | |
| 5 | | | | | 5.5 | 345 | | | |
| | Grab | TP9.2 | | | Extremely weak to weak (R0-R2), brown-gray-orange BASALT, decomposed to highly weathered, very close to close jointed, moist. | | | | Native rock along north wall of test pit at 5.5 feet. |
| | | | | | | | | | Native rock along south wall of test pit at 8.5 feet. |
| 10 | | | | | | 340 | | | |
| | Grab | TP9.3 | | | | 335 | | 14 | |
| 15 | | | | | | | | | Harder digging at 15.5 feet. |
| | | | | | 17.0 | | | | |
| | | | | | Test pit terminated at 17 feet on basalt. | | | | |
| 20 | | | | | | | | | |

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# TEST PIT NUMBER: TP-10



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NO.** WestL-1-01-1 **LOGGED BY** E. Uren
**PROJECT LOCATION** West Linn, Oregon
**CONTRACTOR** Dan J. Fischer Excavating, Inc.
**EQUIPMENT** Kobelco SK140SR
**CAVING** Not observed
**DATE COMPLETED** 01/24/2025
**GROUNDWATER** Not observed
**TIME STARTED** 8:21 AM **TIME COMPLETED** 8:30 AM

| DEPTH (ft) | SAMPLE TYPE | SAMPLE ID | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEVATION (ft) | POCKET PEN (tsf) | MOISTURE CONTENT (%) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 316.5 | | | |
| | | | | | Bark Chips (approximately 12 inches) - **FILL**. 1.0 | | | | |
| | Grab | TP10.1 | | | Very weak to weak (R1-R2), gray-black BASALT, highly to moderately weathered, very close jointed, moist, moist. 1.5 | 315 | | | |
| | | | | | Test pit terminated at 1.5 feet on basalt. | | | | |
| 5 | | | | | | | | | |
| 10 | | | | | | | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# TEST PIT NUMBER: TP-11



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NO.** WestL-1-01-1 **LOGGED BY** E. Uren
**PROJECT LOCATION** West Linn, Oregon
**CONTRACTOR** Dan J. Fischer Excavating, Inc.
**EQUIPMENT** Kobelco SK140SR
**CAVING** Severe from 0 to 7 feet
**DATE COMPLETED** 01/24/2025
**GROUNDWATER** Not observed
**TIME STARTED** 8:31 AM **TIME COMPLETED** 9:17 AM

| DEPTH (ft) | SAMPLE TYPE | SAMPLE ID | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEVATION (ft) | POCKET PEN (tsf) | MOISTURE CONTENT (%) | ATTERBERG LIMITS (LL-PL-PI) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 319.5 | | | | |
| | | | | | Soft, brown sandy SILT, trace organics, moist (12 inches of topsoil, 4-inch-thick root zone) - **FILL**. 1.0 | | | | | |
| | | | | | Loose to medium dense, gray-brown GRAVEL with silt, sand, cobbles, and boulders, moist, gravel is fine to coarse, silt has medium to high plasticity, sand is fine to coarse, cobbles are subangular, fractured, and approximately 20 to 25%, boulders are subangular to angular, 12 to 24 inches in diameter, and 10 to 15% - **FILL**. 3.0 | | | | | |
| | Grab | TP11.1 | | | | | | | 52-36-16 | Native rock along south wall of test pit at 3 feet. |
| 5 | | | | | Extremely weak to very weak (R0-R1), brown-black-orange BASALT, completely to highly weathered, very close to close jointed, moist. | 315 | | | | |
| | Grab | TP-11.2 | | | | | | 31 | | Native rock along north wall of test pit at 7.5 feet. |
| | | | | | Very weak to weak (R1-R2), gray, highly to moderately weathered, very close jointed at 9.5 feet. 10.0 | 310 | | | | |
| 10 | | | | | Test pit terminated at 10 feet on basalt. | | | | | |
| 15 | | | | | | | | | | |
| 20 | | | | | | | | | | |

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# TEST PIT NUMBER: TP-12



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NO.** WestL-1-01-1 **LOGGED BY** E. Uren
**PROJECT LOCATION** West Linn, Oregon
**CONTRACTOR** Dan J. Fischer Excavating, Inc.
**EQUIPMENT** Kobelco SK140SR
**CAVING** Not observed
**DATE COMPLETED** 01/24/2025
**GROUNDWATER** Not observed
**TIME STARTED** 9:19 AM **TIME COMPLETED** 9:31 AM

| DEPTH (ft) | SAMPLE TYPE | SAMPLE ID | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEVATION (ft) | POCKET PEN (tsf) | MOISTURE CONTENT (%) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 306.5 | | | |
| | | | | | Bark Chips (approximately 12 inches) - **FILL**. 1.0 | | | | |
| | Grab | TP12.1 | | | Very weak to weak (R1-R2), gray-black BASALT, highly to moderately weathered, very close jointed, moist. 1.5 | 305 | | | |
| | | | | | Test pit terminated at 1.5 feet on basalt. | | | | |
| 5 | | | | | | | | | |
| 10 | | | | | | | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

DRAFT

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# TEST PIT NUMBER: TP-13



**PROJECT NAME** Operations Center
**CLIENT** City of West Linn
**PROJECT NO.** WestL-1-01-1 **LOGGED BY** E. Uren
**PROJECT LOCATION** West Linn, Oregon
**CONTRACTOR** Dan J. Fischer Excavating, Inc.
**EQUIPMENT** Kobelco SK140SR
**CAVING** Not observed
**DATE COMPLETED** 01/24/2025
**GROUNDWATER** Not observed
**TIME STARTED** 9:34 AM **TIME COMPLETED** 9:55 AM

| DEPTH (ft) | SAMPLE TYPE | SAMPLE ID | USCS | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEVATION (ft) 315 | POCKET PEN (tsf) | MOISTURE CONTENT (%) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Bark Chips (approximately 15 inches) - **FILL**. 1.3 | | | | |
| | Grab | TP13.1 | | | Extremely weak to weak (R0-R2), gray-black BASALT, highly to moderately weathered, very close to close jointed, moist. 3.0 | | | | |
| | | | | | Test pit terminated at 3 feet on basalt. | | | | |
| 5 | | | | | | | | | |
| 10 | | | | | | | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

DRAFT

Shannon & Wilson
SPT Analyzer Results

PDA-S Ver. 2022.35.2 - Printed: 1/9/2025

**Summary of SPT Test Results**

Project: rig 7, Test Date: 12/31/2024

FMX: Maximum Force
VMX: Maximum Velocity
BPM: Blows/Minute
EFV: Maximum Energy
ETR: Energy Transfer Ratio - Rated

| Instr. Length ft | Blows Applied /6" | **N Value** | **N60 Value** | Average FMX kips | Average VMX ft/s | Average BPM bpm | Average EFV ft-lb | Average ETR % |
|---|---|---|---|---|---|---|---|---|
| 57.50 | **8-13-8** | **21** | **28** | 42 | 16.5 | 48.2 | 282 | 80.6 |
| 60.00 | **1-5-9** | **14** | **19** | 45 | 14.9 | 49.2 | 289 | 82.6 |
| 62.50 | **4-7-8** | **15** | **20** | 46 | 15.0 | 50.7 | 298 | 85.3 |
| 67.50 | **15-13-12** | **25** | **34** | 44 | 16.8 | 51.6 | 292 | 83.4 |
| | | **Overall Average Values:** | | 44 | 16.0 | 50.0 | 290 | 82.8 |
| | | **Standard Deviation:** | | 3 | 0.9 | 1.4 | 7 | 1.9 |
| | | **Overall Maximum Value:** | | 61 | 17.2 | 51.7 | 304 | 86.8 |
| | | **Overall Minimum Value:** | | 41 | 14.0 | 48.1 | 277 | 79.2 |

# APPENDIX B

# APPENDIX B
# LABORATORY TESTING

## *GENERAL*

Laboratory testing was conducted on select soil samples to confirm field classifications and determine the index engineering properties and strength characteristics. The laboratory classifications are shown on the exploration logs if those classifications differed from the field classifications. The locations of the tested samples are shown on the exploration logs. Descriptions of the tests are presented below, and results of the testing are presented in this appendix.

## *PARTICLE-SIZE ANALYSIS*

Particle-size analysis was completed on select soil samples in general accordance with ASTM D1140 (P200). This test is a quantitative determination of the percent passing the U.S. Standard No. 200 sieve by dry weight. In addition, particle-size analysis was completed on a select soil sample in general accordance with ASTM D6913. This test is a quantitative determination of the soil particle size distribution expressed as a percentage of dry soil weight.

## *MOISTURE CONTENT*

The natural moisture content of select soil samples was determined in general accordance with ASTM D2216. The natural moisture content is a ratio of the weight of the water to dry soil in a test sample and is expressed as a percentage.

## *ATTERBERG LIMITS TESTING*

Atterberg limits (plastic and liquid limits) testing was performed on select soil samples in general accordance with ASTM D4318. The plastic limit is defined as the moisture content where the soil becomes brittle. The liquid limit is defined as the moisture content where the soil begins to act similar to a liquid. The plasticity index is the difference between the liquid and plastic limits.

## *DIRECT SHEAR*

Direct shear testing was completed on a select soil sample in general accordance with ASTM D3080. The test is performed by deforming a specimen at a controlled strain rate on or near a single shear plane. In general, three or more specimens are tested, each under a different normal load, to determine the Mohr strength envelope.

## *DRY DENSITY TESTING*

Dry density testing was completed on relatively undisturbed soil samples in general accordance with ASTM D2937. The dry density is the dry unit weight of a soil sample in units of pcf.

## *UNCONFINED COMPRESSIVE STRENGTH*

Unconfined compressive strength testing was completed on select rock samples in general accordance with ASTM D7012. The recorded value is reported as the peak compressive strength of the specimen prior to failure.

11917 NE 95th Street
Vancouver, Washington 98682 • Phone: 360-823-2900
8880 SW Nimbus Avenue, Suite A
Portland, Oregon 97008 • Phone: 971-384-1666
www.columbia-west.com

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# MOISTURE CONTENT, PERCENT PASSING NO. 200 SIEVE BY WASHING

| PROJECT | CLIENT | PROJECT NO. | |
|---|---|---|---|
| Operations Center<br>Salamo Road and Greene Street<br>West Linn, Oregon | City of West Linn<br>22500 Salamo Road<br>West Linn, OR 97068 | WestL-1-01-1 | |
| | | ISSUE DATE: 03/06/25 | PAGE: 1 of 2 |
| | | DATE SAMPLED: 01/23/25 - 02/06/25 | SAMPLED BY: E. Uren |

## LABORATORY TEST DATA

TEST PROCEDURE
ASTM D2216 - Method A, ASTM D1140

| LAB ID | CONTAINER MASS (g) | MOIST MASS + CONTAINER (g) | DRY MASS + CONTAINER (g) | AFTER WASH DRY MASS + CONTAINER (g) | FIELD ID | SAMPLE DEPTH (ft) | PERCENT MOISTURE CONTENT | PERCENT PASSING NO. 200 SIEVE |
|---|---|---|---|---|---|---|---|---|
| S25-0305 | 771.52 | 3,692.50 | 3,350.55 | - | TP1.1 | 2 | 13% | - |
| S25-0306 | 849.49 | 3,597.99 | 3,217.31 | - | TP2.1 | 1 | 16% | - |
| S25-0307 | 780.05 | 3,952.42 | 3,499.22 | - | TP3.1 | 3 | 17% | - |
| S25-0308 | 853.22 | 4,186.71 | 3,878.31 | - | TP3.3 | 11 | 10% | - |
| S25-0309 | 776.96 | 3,086.82 | 2,916.80 | - | TP4.1 | 4 | 8% | - |
| S25-0310 | 752.71 | 3,978.70 | 3,474.92 | - | TP5.1 | 3 | 19% | - |
| S25-0311 | 784.19 | 3,493.96 | 3,034.75 | 2,695.74 | TP5.3 | 11 | 20% | 15% |
| S25-0312 | 866.51 | 4,091.88 | 3,477.85 | - | TP5.4 | 18 | 24% | - |
| S25-0314 | 776.40 | 3,631.15 | 3,292.24 | - | TP6.2 | 8 | 13% | - |
| S25-0315 | 867.38 | 3,566.51 | 2,857.86 | - | TP7.1 | 2 | 36% | - |
| S25-0316 | 1,536.73 | 4,829.89 | 4,432.75 | - | TP9.3 | 14.5 | 14% | - |
| S25-0318 | 1,554.19 | 3,459.56 | 3,005.00 | - | TP11.2 | 7.5 | 31% | - |
| S25-0319 | 548.10 | 979.92 | 854.68 | - | B2.1 | 2.5 | 41% | - |
| S25-0320 | 539.89 | 2,638.41 | 2,319.25 | - | B2.5 | 15 | 18% | - |
| S25-0321 | 548.47 | 1,118.21 | 1,006.92 | 961.89 | B2.7 | 25 | 24% | 10% |
| S25-0389 | 87.16 | 236.86 | 192.16 | - | B2.8 | 30 | 43% | - |

NOTES:
Sample weights received for Lab ID: S25-0305, 0306, 0307, 0308, 0309, 0310, 3011, 0312, 0314, 0315, 0316, 0318, 0319, 0320, 0321, 0324, 0325, 0326 and 0395 did not meet the minimum size requirements; entire sample used for analysis.

DATE TESTED: 02/17/25, 02/28/25
TESTED BY: B. Taylor, M. Scherette

This report may not be reproduced except in full without prior written authorization by Columbia West Engineering, Inc.

COLUMBIA WEST ENGINEERING, INC. authorized signature

11917 NE 95th Street
Vancouver, Washington 98682 • Phone: 360-823-2900
8880 SW Nimbus Avenue, Suite A
Portland, Oregon 97008 • Phone: 971-384-1666
www.columbia-west.com

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

# MOISTURE CONTENT, PERCENT PASSING NO. 200 SIEVE BY WASHING

| PROJECT | CLIENT | PROJECT NO. | |
|---|---|---|---|
| Operations Center<br>Salamo Road and Greene Street<br>West Linn, Oregon | City of West Linn<br>22500 Salamo Road<br>West Linn, OR 97068 | WestL-1-01-1 | |
| | | ISSUE DATE: 03/06/25 | PAGE: 2 of 2 |
| | | DATE SAMPLED: 01/23/25 - 02/06/25 | SAMPLED BY: E. Uren |

## LABORATORY TEST DATA

TEST PROCEDURE
ASTM D2216 - Method A, ASTM D1140

| LAB ID | CONTAINER MASS (g) | MOIST MASS + CONTAINER (g) | DRY MASS + CONTAINER (g) | AFTER WASH DRY MASS + CONTAINER (g) | FIELD ID | SAMPLE DEPTH (ft) | PERCENT MOISTURE CONTENT | PERCENT PASSING NO. 200 SIEVE |
|---|---|---|---|---|---|---|---|---|
| S25-0322 | 542.54 | 924.22 | 789.24 | - | B2.9 | 35 | 55% | - |
| S25-0323 | 556.41 | 869.53 | 815.53 | - | B3.1 | 2.5 | 21% | - |
| S25-0392 | 384.26 | 721.64 | 608.69 | - | BC3.18 | 86 | 50% | - |
| S25-0324 | 574.84 | 1,002.15 | 931.57 | - | B5.1 | 2.5 | 20% | - |
| S25-0325 | 537.40 | 978.10 | 896.65 | - | B5.3 | 7.5 | 23% | - |
| S25-0326 | 760.40 | 1,560.87 | 1,389.03 | 1,311.66 | B5.8 | 25 | 27% | 12% |
| S25-0327 | 556.11 | 840.41 | 782.05 | 648.87 | B5.9 | 30 | 26% | 59% |
| S25-0395 | 787.39 | 2,605.01 | 1,946.74 | sieved sample | BC5.14 | 102 | 57% | 20% |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

NOTES:
Sample weights received for Lab ID: S25-0305, 0306, 0307, 0308, 0309, 0310, 3011, 0312, 0314, 0315, 0316, 0318, 0319, 0320, 0321, 0324, 0325, 0326 and 0395 did not meet the minimum size requirements; entire sample used for analysis.

DATE TESTED: 02/17/25, 02/28/25
TESTED BY: B. Taylor, M. Scherette

This report may not be reproduced except in full without prior written authorization by Columbia West Engineering, Inc.

COLUMBIA WEST ENGINEERING, INC. authorized signature

11917 NE 95th Street
Vancouver, Washington 98682 • Phone: 360-823-2900
8880 SW Nimbus Avenue, Suite A
Portland, Oregon 97008 • Phone: 971-384-1666
www.columbia-west.com

Geotechnical ▪ Environmental ▪ Special Inspections
**Columbia West** Engineering, Inc

# DIRECT SHEAR REPORT

| PROJECT | CLIENT | PROJECT NO. | |
|---|---|---|---|
| Operations Center<br>Salamo Road and Greene Street<br>West Linn, Oregon | City of West Linn<br>22500 Salamo Road<br>West Linn, OR 97068 | WestL-1-01-1 | |
| | | ISSUE DATE: 03/06/25 | PAGE: 1 of 1 |
| | | LAB ID: S25-0389 | FIELD ID: B2.8 |
| | | DATE SAMPLED: 01/31/25 | SAMPLED BY: E. Uren |

## MATERIAL DATA

| MATERIAL SAMPLED | MATERIAL SOURCE | USCS SOIL TYPE |
|---|---|---|
| SILT with Sand<br>Dames & Moore sampler | Boring B-2<br>depth = 30 feet | no data provided |

## LABORATORY TEST DATA

LABORATORY EQUIPMENT: Humboldt Automated Direct/Residual Shear Apparatus HM-5760.3F

TEST PROCEDURE: ASTM D3080

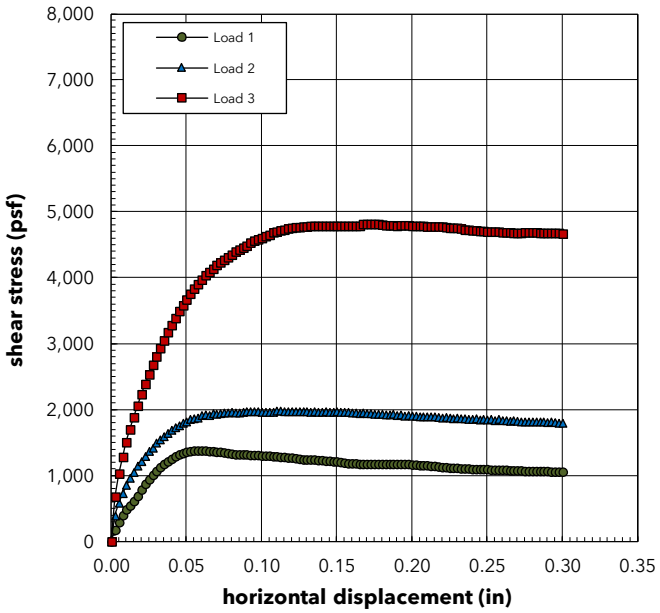
HORIZONTAL DISPLACEMENT RATE: 0.001 in/min

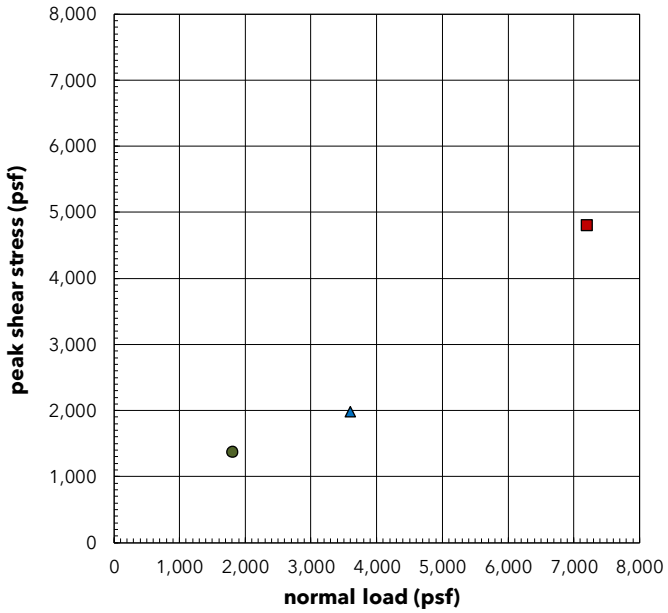
SAMPLE TYPE: relatively undisturbed

MOISTURE CONDITION: inundated

**SAMPLE INFORMATION**

| | PARAMETER | LOAD 1 | LOAD 2 | LOAD 3 |
|---|---|---|---|---|
| initial | initial dry density, pcf | 77.7 | 74.9 | 76.9 |
| | initial moisture content, % | 42.6 | 42.6 | 42.6 |
| final | final dry density, pcf | 80.4 | 79.2 | 81.1 |
| | final moisture content, % | 44.6 | 49.4 | 45.8 |




| load | applied normal load (psf) | shear stess at failure (psf) |
|---|---|---|
| 1 | 1,800 | 1,379 |
| 2 | 3,600 | 1,977 |
| 3 | 7,200 | 4,809 |

| DATE TESTED | TESTED BY |
|---|---|
| 02/24/25 to 03/03/25 | M. Scherette |

This report may not be reproduced except in full without prior written authorization by Columbia West Engineering, Inc.

COLUMBIA WEST ENGINEERING, INC. authorized signature

11917 NE 95th Street
Vancouver, Washington 98682 • Phone: 360-823-2900
8880 SW Nimbus Avenue, Suite A
Portland, Oregon 97008 • Phone: 971-384-1666
www.columbia-west.com

Geotechnical ▪ Environmental ▪ Special Inspections
**Columbia West** Engineering, Inc

# ATTERBERG LIMITS REPORT

| PROJECT | CLIENT | PROJECT NO. | |
|---|---|---|---|
| Operations Center<br>Salamo Road and Greene Street<br>West Linn, Oregon | City of West Linn<br>22500 Salamo Road<br>West Linn, OR 97068 | WestL-1-01-1 | |
| | | ISSUE DATE: 03/06/25 | PAGE: 1 of 1 |
| | | LAB ID: S25-0390 | FIELD ID: BC2.11 |
| | | DATE SAMPLED: 02/03/25 | SAMPLED BY: E. Uren |

## MATERIAL DATA

| MATERIAL SAMPLED | MATERIAL SOURCE | USCS SOIL TYPE |
|---|---|---|
| CLAY | Boring B-2<br>depth = 93.3 feet | no data provided |

## LABORATORY TEST DATA

LABORATORY EQUIPMENT: Liquid Limit Machine, Hand Rolled

TEST PROCEDURE: ASTM D4318 - Method A

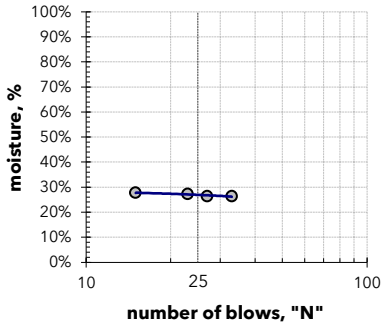
### ATTERBERG LIMITS

| | |
|---|---|
| liquid limit = | 27 |
| plastic limit = | 18 |
| plasticity index = | 9 |

### LIQUID LIMIT DETERMINATION

| | ❶ | ❷ | ❸ | ❹ |
|---|---|---|---|---|
| wet soil + pan weight, g = | 37.34 | 38.13 | 39.74 | 37.50 |
| dry soil + pan weight, g = | 33.92 | 34.55 | 35.73 | 33.87 |
| pan weight, g = | 20.97 | 20.95 | 21.01 | 20.81 |
| N (blows) = | 33 | 27 | 23 | 15 |
| moisture, % = | 26.4 % | 26.3 % | 27.2 % | 27.8 % |

### LIQUID LIMIT



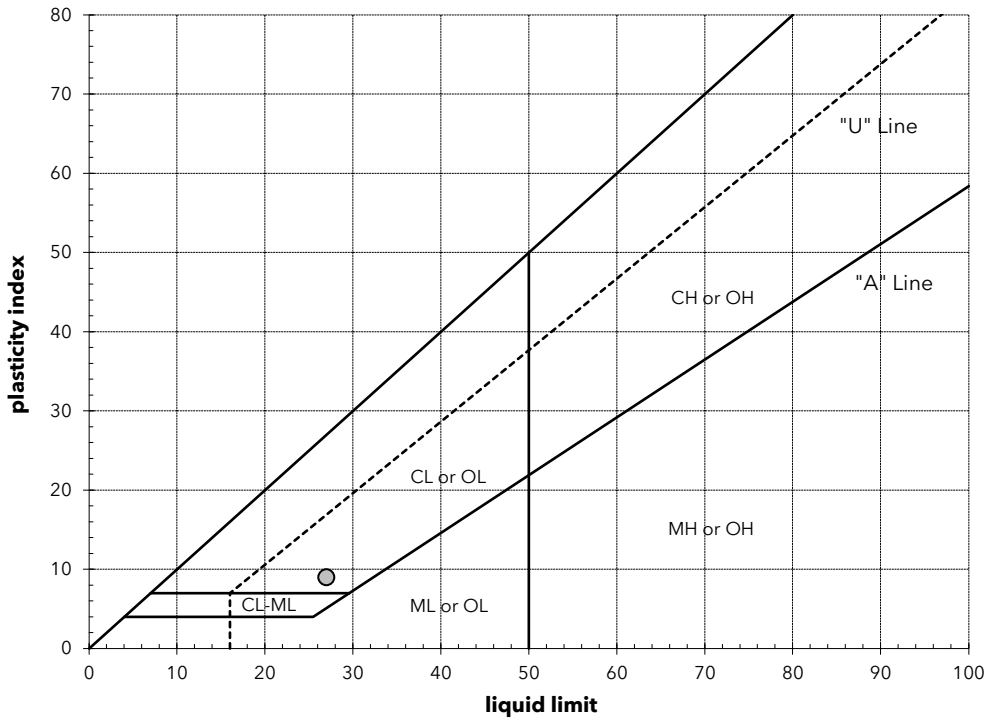

### SHRINKAGE

| | |
|---|---|
| shrinkage limit = | n/a |
| shrinkage ratio = | n/a |

### PLASTIC LIMIT DETERMINATION

| | ❶ | ❷ | ❸ | ❹ |
|---|---|---|---|---|
| wet soil + pan weight, g = | 28.49 | 29.92 | | |
| dry soil + pan weight, g = | 27.33 | 28.50 | | |
| pan weight, g = | 20.97 | 20.91 | | |
| moisture, % = | 18.2 % | 18.7 % | | |

### PLASTICITY CHART




### ADDITIONAL DATA

| | |
|---|---|
| % gravel = | n/a |
| % sand = | n/a |
| % silt and clay = | n/a |
| % silt = | n/a |
| % clay = | n/a |
| moisture content = | n/a |

| DATE TESTED | TESTED BY |
|---|---|
| 02/27/25 | B. Taylor |

This report may not be reproduced except in full without prior written authorization by Columbia West Engineering, Inc.

COLUMBIA WEST ENGINEERING, INC. authorized signature

11917 NE 95th Street
Vancouver, Washington 98682 • Phone: 360-823-2900
8880 SW Nimbus Avenue, Suite A
Portland, Oregon 97008 • Phone: 971-384-1666
www.columbia-west.com

Geotechnical ▪ Environmental ▪ Special Inspections
**Columbia West** Engineering, Inc

# PARTICLE-SIZE ANALYSIS REPORT

| PROJECT | CLIENT | PROJECT NO. | |
|---|---|---|---|
| Operations Center<br>Salamo Road and Greene Street<br>West Linn, Oregon | City of West Linn<br>22500 Salamo Road<br>West Linn, OR 97068 | WestL-1-01-1 | |
| | | ISSUE DATE: 03/06/25 | PAGE: 1 of 1 |
| | | LAB ID: S25-0395 | FIELD ID: BC5.14 |
| | | DATE SAMPLED: 01/30/25 | SAMPLED BY: E. Uren |

## MATERIAL DATA

| MATERIAL SAMPLED | MATERIAL SOURCE | USCS SOIL TYPE |
|---|---|---|
| Clayey GRAVEL with Sand<br>(weathered basalt) | Boring B-5<br>depth = 102 feet | no data provided |
| **SPECIFICATIONS** | | **AASHTO CLASSIFICATION** |
| none | | no data provided |

## LABORATORY TEST DATA

| LABORATORY EQUIPMENT | TEST PROCEDURE |
|---|---|
| Rainhart "Mary Ann" Sifter, moist prep, hand washed, 12" single sieve-set | ASTM D6913, Method A |

### ADDITIONAL DATA

| | | | |
|---|---|---|---|
| initial dry mass (g) = | 1159.35 | | |
| as-received moisture content = | 57% | coefficient of curvature, $C_C$ = | n/a |
| liquid limit = | n/a | coefficient of uniformity, $C_U$ = | n/a |
| plastic limit = | n/a | effective size, $D_{(10)}$ = | n/a |
| plasticity index = | n/a | $D_{(30)}$ = | 0.359 mm |
| fineness modulus = | n/a | $D_{(60)}$ = | 5.950 mm |

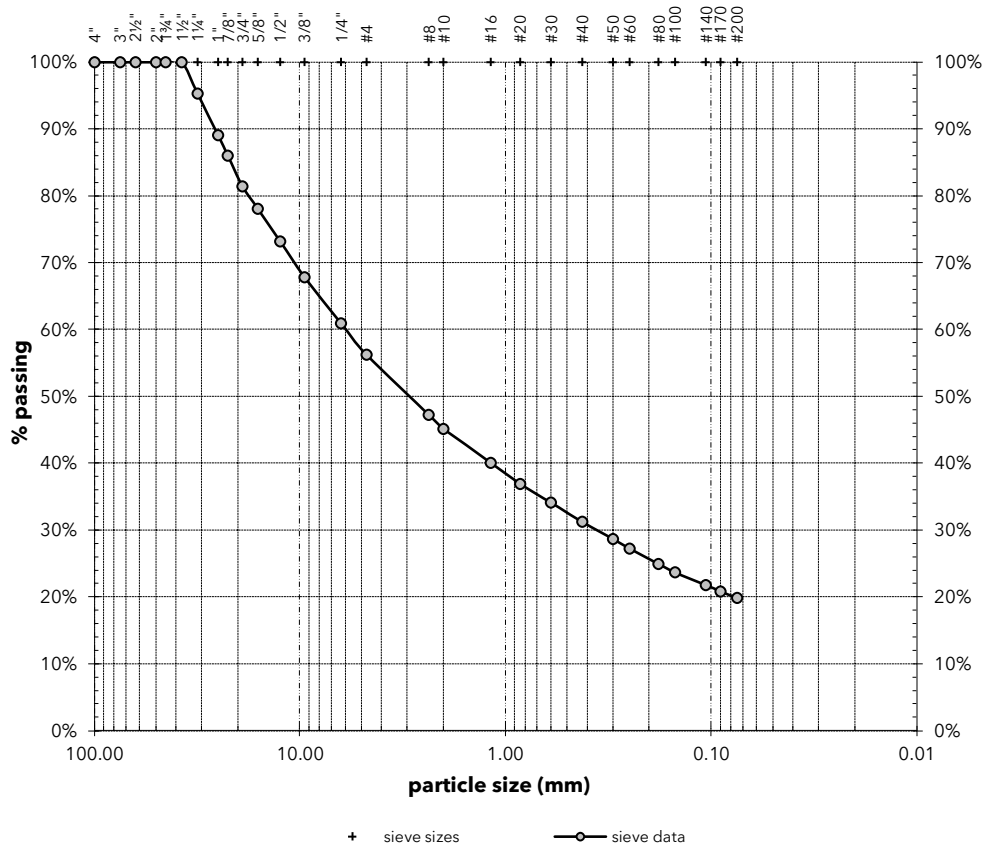
NOTE: Entire sample used for analysis; did not meet minimum size required.

### SIEVE DATA

% gravel = 43.8%
% sand = 36.3%
% silt and clay = 19.9%

| | SIEVE SIZE | | PERCENT PASSING | | | |
|---|---|---|---|---|---|---|
| | | | SIEVE | | SPECS | |
| | US | mm | act. | interp. | max | min |
| GRAVEL | 6.00" | 150.0 | | 100% | | |
| | 4.00" | 100.0 | | 100% | | |
| | 3.00" | 75.0 | | 100% | | |
| | 2.50" | 63.0 | | 100% | | |
| | 2.00" | 50.0 | | 100% | | |
| | 1.75" | 45.0 | | 100% | | |
| | 1.50" | 37.5 | 100% | | | |
| | 1.25" | 31.5 | | 95% | | |
| | 1.00" | 25.0 | 89% | | | |
| | 7/8" | 22.4 | | 86% | | |
| | 3/4" | 19.0 | 81% | | | |
| | 5/8" | 16.0 | | 78% | | |
| | 1/2" | 12.5 | | 73% | | |
| | 3/8" | 9.50 | 68% | | | |
| | 1/4" | 6.30 | | 61% | | |
| | #4 | 4.75 | 56% | | | |
| SAND | #8 | 2.36 | | 47% | | |
| | #10 | 2.00 | 45% | | | |
| | #16 | 1.18 | | 40% | | |
| | #20 | 0.850 | 37% | | | |
| | #30 | 0.600 | | 34% | | |
| | #40 | 0.425 | 31% | | | |
| | #50 | 0.300 | | 29% | | |
| | #60 | 0.250 | 27% | | | |
| | #80 | 0.180 | | 25% | | |
| | #100 | 0.150 | 24% | | | |
| | #140 | 0.106 | | 22% | | |
| | #170 | 0.090 | | 21% | | |
| | #200 | 0.075 | 20% | | | |

### GRAIN SIZE DISTRIBUTION




| DATE TESTED | TESTED BY |
|---|---|
| 02/27/25 | M. Scherette |

This report may not be reproduced except in full without prior written authorization by Columbia West Engineering, Inc.

COLUMBIA WEST ENGINEERING, INC. authorized signature

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

Vancouver, Washington • Phone: 360-823-2900
Portland, Oregon • Phone: 971-384-1666
www.columbia-west.com

March 6, 2025

City of West Linn
22500 Salamo Road
West Linn, OR 97068

**Re: Basalt Core Compressive Strength**
**Operations Center**
**Salamo Road and Greene Street**
**West Linn, Oregon**
**CWE Project: WestL-1-01-1**

Columbia West Engineering, Inc. (Columbia West) is pleased to submit test results for basalt rock cores sampled during the recent subsurface investigation at the above-referenced site. Specimen core ends were saw-cut wet and capped per *ASTM C617* seven days prior to testing. Compression testing was conducted in general accordance with *ASTM D7012*. A seating load of approximately 180 lbf was applied to each specimen. Results for ultimate compressive strength conducted on March 4, 2025, are presented in Table 1.

*Table 1. Compressive strength results.*

| LAB ID | TECH | FIELD ID | CORE SAMPLE DEPTH (ft) | TRIMMED SPECIMEN WEIGHT (lbm) | TRIMMED SPECIMEN LENGTH (in) | AVERAGE SPECIMEN DIAMETER (in) | CROSS-SECTIONAL AREA ($in^2$) | COMPRESSIVE STRENGTH | | FRACTURE TYPE |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MAXIMUM LOAD (lbf) | MAXIMUM PRESSURE (psi) | |
| S25-0391 | MJR | BC3.6 | 27 | 2.170 | 4.97 | 2.38 | 4.45 | 71,876 | 16,150 | cone/shear |
| S25-0393 | MJR | BC4.2 | 11 | 2.021 | 4.76 | 2.37 | 4.41 | 76,488 | 17,340 | cone/shear |
| S25-0394 | MJR | BC5.2 | 47 | 1.744 | 4.82 | 2.35 | 4.34 | 25,427 | 5,860 | cone/shear |

Results apply only to the samples analyzed. Columbia West appreciates the opportunity to provide materials testing services. Please call me at 360-823-2900 if you have any questions or need additional information.

Sincerely,

Jared J. Comastro, CET
Laboratory Manager

11917 NE 95th Street
Vancouver, Washington 98682 • Phone: 360-823-2900
8880 SW Nimbus Avenue, Suite A
Portland, Oregon 97008 • Phone: 971-384-1666
www.columbia-west.com

Geotechnical ▪ Environmental ▪ Special Inspections
**Columbia West** Engineering, Inc

# ATTERBERG LIMITS REPORT

| PROJECT | CLIENT | PROJECT NO. | |
|---|---|---|---|
| Operations Center<br>Salamo Road and Greene Street<br>West Linn, Oregon | City of West Linn<br>22500 Salamo Road<br>West Linn, OR 97068 | WestL-1-01-1 | |
| | | ISSUE DATE: 02/20/25 | PAGE: 1 of 1 |
| | | LAB ID: S25-0313 | FIELD ID: TP6.1 |
| | | DATE SAMPLED: 01/23/25 | SAMPLED BY: E. Uren |

## MATERIAL DATA

| MATERIAL SAMPLED | MATERIAL SOURCE | USCS SOIL TYPE |
|---|---|---|
| Clayey GRAVEL with Sand and Cobbles | Test Pit TP-6<br>depth = 3 feet | no data provided |

## LABORATORY TEST DATA

LABORATORY EQUIPMENT: Liquid Limit Machine, Hand Rolled

TEST PROCEDURE: ASTM D4318 - Method A

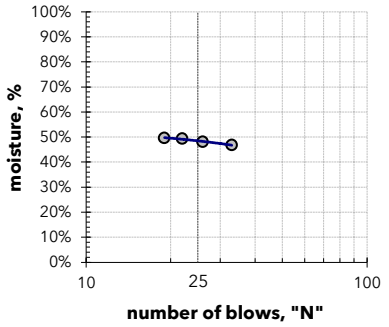
### ATTERBERG LIMITS

| | |
|---|---|
| liquid limit = | 48 |
| plastic limit = | 26 |
| plasticity index = | 22 |

### LIQUID LIMIT DETERMINATION

| | ❶ | ❷ | ❸ | ❹ |
|---|---|---|---|---|
| wet soil + pan weight, g = | 32.65 | 34.23 | 33.06 | 34.61 |
| dry soil + pan weight, g = | 28.93 | 29.92 | 29.08 | 30.03 |
| pan weight, g = | 20.98 | 20.96 | 21.01 | 20.81 |
| N (blows) = | 33 | 26 | 22 | 19 |
| moisture, % = | 46.8 % | 48.1 % | 49.3 % | 49.7 % |

### LIQUID LIMIT



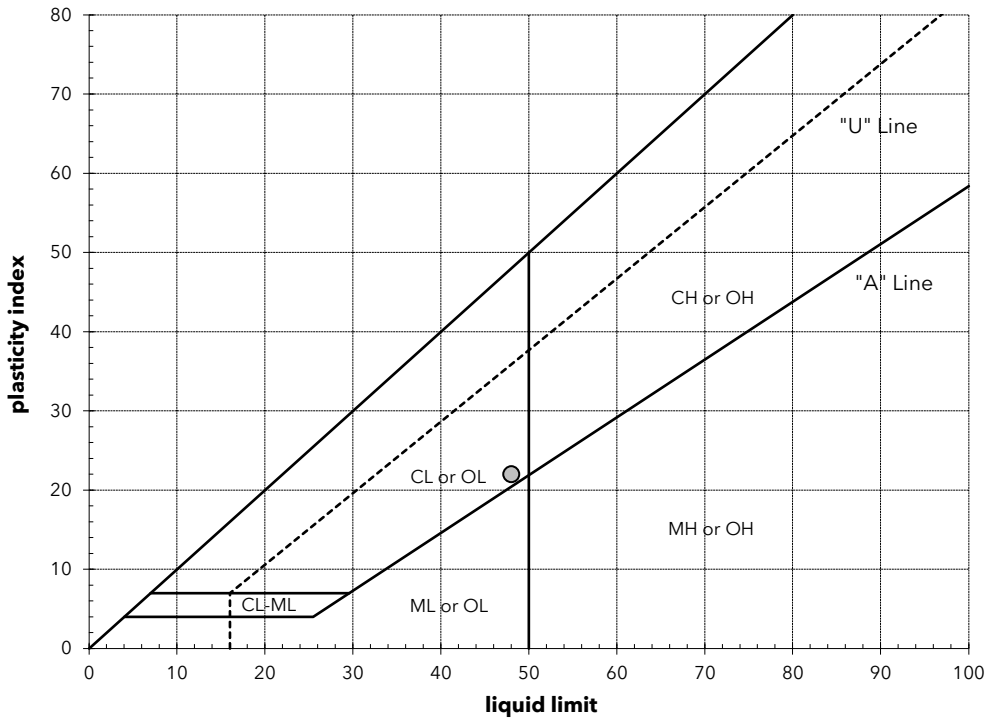

### SHRINKAGE

| | |
|---|---|
| shrinkage limit = | n/a |
| shrinkage ratio = | n/a |

### PLASTIC LIMIT DETERMINATION

| | ❶ | ❷ | ❸ | ❹ |
|---|---|---|---|---|
| wet soil + pan weight, g = | 27.11 | 27.70 | | |
| dry soil + pan weight, g = | 25.83 | 26.30 | | |
| pan weight, g = | 20.98 | 20.91 | | |
| moisture, % = | 26.4 % | 26.0 % | | |

### PLASTICITY CHART




### ADDITIONAL DATA

| | |
|---|---|
| % gravel = | n/a |
| % sand = | n/a |
| % silt and clay = | n/a |
| % silt = | n/a |
| % clay = | n/a |
| moisture content = | n/a |

| DATE TESTED | TESTED BY |
|---|---|
| 02/17/25 | K. Summers |

This report may not be reproduced except in full without prior written authorization by Columbia West Engineering, Inc.

COLUMBIA WEST ENGINEERING, INC. authorized signature

11917 NE 95th Street
Vancouver, Washington 98682 • Phone: 360-823-2900
8880 SW Nimbus Avenue, Suite A
Portland, Oregon 97008 • Phone: 971-384-1666
www.columbia-west.com

Geotechnical ▪ Environmental ▪ Special Inspections
**Columbia West** Engineering, Inc

# ATTERBERG LIMITS REPORT

| PROJECT | CLIENT | PROJECT NO. | |
|---|---|---|---|
| Operations Center<br>Salamo Road and Greene Street<br>West Linn, Oregon | City of West Linn<br>22500 Salamo Road<br>West Linn, OR 97068 | WestL-1-01-1 | |
| | | ISSUE DATE: 02/20/25 | PAGE: 1 of 1 |
| | | LAB ID: S25-0317 | FIELD ID: TP11.1 |
| | | DATE SAMPLED: 01/24/25 | SAMPLED BY: E. Uren |

## MATERIAL DATA

| MATERIAL SAMPLED | MATERIAL SOURCE | USCS SOIL TYPE |
|---|---|---|
| GRAVEL with Silt and Sand and Cobbles | Test Pit TP-11<br>depth = 3 feet | no data provided |

## LABORATORY TEST DATA

LABORATORY EQUIPMENT: Liquid Limit Machine, Hand Rolled

TEST PROCEDURE: ASTM D4318 - Method A

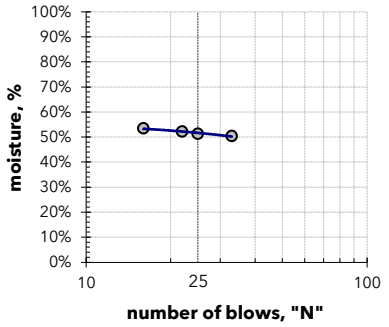
### ATTERBERG LIMITS

| | |
|---|---|
| liquid limit = | 52 |
| plastic limit = | 36 |
| plasticity index = | 16 |

### LIQUID LIMIT DETERMINATION

| | ❶ | ❷ | ❸ | ❹ |
|---|---|---|---|---|
| wet soil + pan weight, g = | 33.54 | 34.33 | 33.49 | 32.98 |
| dry soil + pan weight, g = | 29.15 | 29.62 | 29.19 | 28.65 |
| pan weight, g = | 20.44 | 20.43 | 20.95 | 20.56 |
| N (blows) = | 33 | 25 | 22 | 16 |
| moisture, % = | 50.4 % | 51.3 % | 52.2 % | 53.5 % |

### LIQUID LIMIT



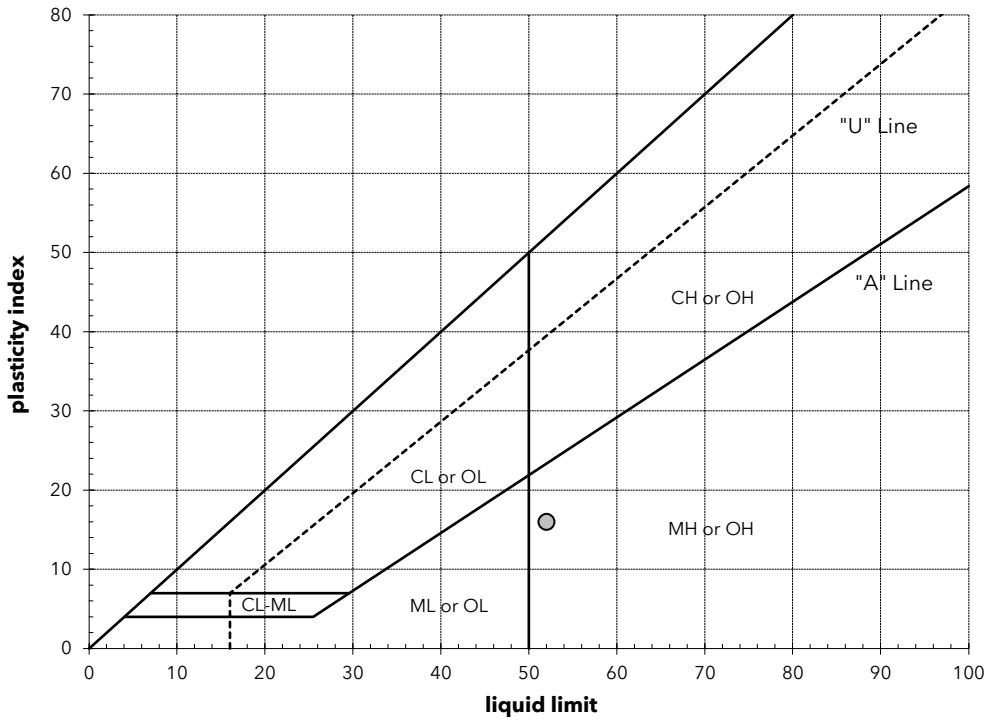

### SHRINKAGE

| | |
|---|---|
| shrinkage limit = | n/a |
| shrinkage ratio = | n/a |

### PLASTIC LIMIT DETERMINATION

| | ❶ | ❷ | ❸ | ❹ |
|---|---|---|---|---|
| wet soil + pan weight, g = | 28.26 | 27.74 | | |
| dry soil + pan weight, g = | 26.31 | 25.94 | | |
| pan weight, g = | 20.93 | 20.98 | | |
| moisture, % = | 36.3 % | 36.3 % | | |

### PLASTICITY CHART




### ADDITIONAL DATA

| | |
|---|---|
| % gravel = | n/a |
| % sand = | n/a |
| % silt and clay = | n/a |
| % silt = | n/a |
| % clay = | n/a |
| moisture content = | n/a |

| DATE TESTED | TESTED BY |
|---|---|
| 02/18/25 | K. Summers |

This report may not be reproduced except in full without prior written authorization by Columbia West Engineering, Inc.

COLUMBIA WEST ENGINEERING, INC. authorized signature

# APPENDIX C

# APPENDIX C
# SEISMIC SURVEY

## INTRODUCTION

This appendix summarizes the results of our seismic survey for the Operations Center project in West Linn, Oregon. The objective of the survey was to determine the shear wave velocity profile of approximately 100 feet of the subsurface soil. Fieldwork for the survey was completed on January 23, 2025.

Detailed discussion of the surface and subsurface conditions at the site is presented in the main report.

## SCOPE OF SERVICES

Our scope of services included the following:

- Completed one linear ReMi array consisting of 12 geophones.
- Generated additional seismic noise as needed via hammer strikes or other active sources.
- Acquired at least twenty-five 30-second-long data records.
- Pre-processed and analyzed the data to extract a dispersion curve.
- Inverted the dispersion curve and iteratively adjusted the interpreted shear wave velocity profile to align theoretical and modeled dispersion curves.
- Prepared this appendix that includes an estimate of the $Vs_{100}$ and a corresponding seismic site class in accordance with ASCE 7-16.

## METHODOLOGY

The seismic survey technique known as ReMi was used to estimate the $Vs_{100}$ for a linear array of geophones deployed at the site. ReMi is a non-invasive surface wave method used to estimate subsurface shear wave velocity profiles using ambient seismic noise to capture surface wave velocities through a linear array of geophones. The technique was developed in 2001 by Dr. John Louie as a method to accurately and efficiently capture the one-dimensional $Vs_{100}$ in a code-compliant manner (Louie 2001). The technique is well suited for areas with pronounced background noise such as urban settings or high-traffic areas. In areas lacking passive noise, active sources such as sledgehammer strikes or pedestrian foot traffic can be used to enhance the seismic signal.

Given the topography and locations of various features at the site (e.g., sloping ground, vegetation, etc.), we were able to deploy an approximately 289-foot-long array in the northwest portion of the site. The array was set generally perpendicular to the nearest arterial road (Salamo Road). The linear array consisted of 12 HG-6 4.5-hertz geophones, with an approximate center-to-center geophone spacing of 26 feet. Approximate GPS coordinates for the first and last geophones are provided in Table C-1, and the approximate array location is shown on Figures C-1 and C-2.

**Table C-1. ReMi Array Coordinates**

| Array | Orientation | Approximate GPS Coordinates | |
|---|---|---|---|
| | | Geophone 1 | Geophone 12 |
| A-1 | W-E | 45.350501, -122.643577 | 45.350306, -122.642430 |

Geophones equipped with spikes were driven into the ground. Each geophone installation was checked for plumb (within +/-5 degrees) and adequate contact with the surrounding soil. The surface wave data were acquired using a ReMiDAQ 4-12 channel seismograph for approximately 90 minutes. Noise sources included 10-pound sledgehammer blows to a plastic strike plate on both ends and at the midpoint of the array, a hydraulic excavator operating within 100 feet of the array, and ambient noise generated by traffic on nearby roads.

Pre- and post-processing was completed using Terēan's proprietary VsSurf ReMi 1dS software, which indicated that the data collected along the array were sufficient in quality to characterize shear wave velocity to a minimum depth of 100 feet BGS. A minimum of 10 individual records were "stacked" and inverted to facilitate dispersion curve selection along the lowest velocity envelope. The dispersion curve was then imported into the VsSurf ReMi 1dS Disper module, which was used to perform forward modeling of the interpreted shear wave velocity profile. The shear wave velocity profile was adjusted based on our understanding of the site geology and subsurface conditions until the theoretical dispersion curve fit the selected dispersion points within an acceptable margin.

## RESULTS

Table C-2 summarizes the interpreted one-dimensional $Vs_{100}$ for the array. The interpreted value should be thought of as an average representation along the length of the array. Figure C-3 shows the interpreted shear wave velocity profile from the ground surface to a depth of 100 feet BGS. Note that the velocity structure shown in Table C-2 and on Figure C-3 represents a non-unique interpretation of the geophysical data and other interpretations are possible; however, the resulting $Vs_{100}$ value is generally considered to be reliable for the purpose of seismic design in accordance with ASCE 7-16.

**Table C-2. Average Shear Wave Velocity in Upper 100 Feet BGS**

| Array | Depth (feet BGS) | Shear Wave Velocity (fps) | $Vs_{100}$ (fps) | ASCE 7-16 Site Class |
|---|---|---|---|---|
| A-1 | 0 – 7 | 727 | 2,053 | C |
| | 7 – 11 | 870 | | |
| | 11 – 27 | 1,112 | | |
| | 27 – 100 | 3,661 | | |

## REFERENCES

ASCE 2016. *Minimum Design Loads and Associated Criteria for Buildings and Other Structures*. ASCE Standard ASCE/SEI 7-16.

Louie, John N. 2001. "Faster, Better: Shear-Wave Velocity to 100 Meters Depth from Refraction Microtremor Arrays." *Bulletin of the Seismological Society of America*, vol. 91, no. 2, 1 April, pp. 347–364, https://doi.org/10.1785/0120000098.

VsSurf ReMi 1dS. Version 2.1.7. Terēan. https://www.terean.com/applications.

DRAFT

LEGEND

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE REMI ARRAY

N

0 20 40 60 80 100 200

NOTES:
1. AERIAL PHOTO SOURCED FROM GOOGLE EARTH.
2. EXPLORATION LOCATIONS ARE APPROXIMATE AND NOT SURVEYED.
3. REFER TO REPORT TEXT FOR EXPLORATION DESCRIPTIONS.

Geotechnical ■ Environmental ■ Special Inspections
Columbia West Engineering, Inc

# OPERATIONS CENTER
# WEST LINN, OREGON
SALAMO ROAD AND GREEN STREET

## ARRAY LOCATION PLAN

PROJECT NO:
WESTL-1-01-1

APRIL 2025

FIGURE
C-1

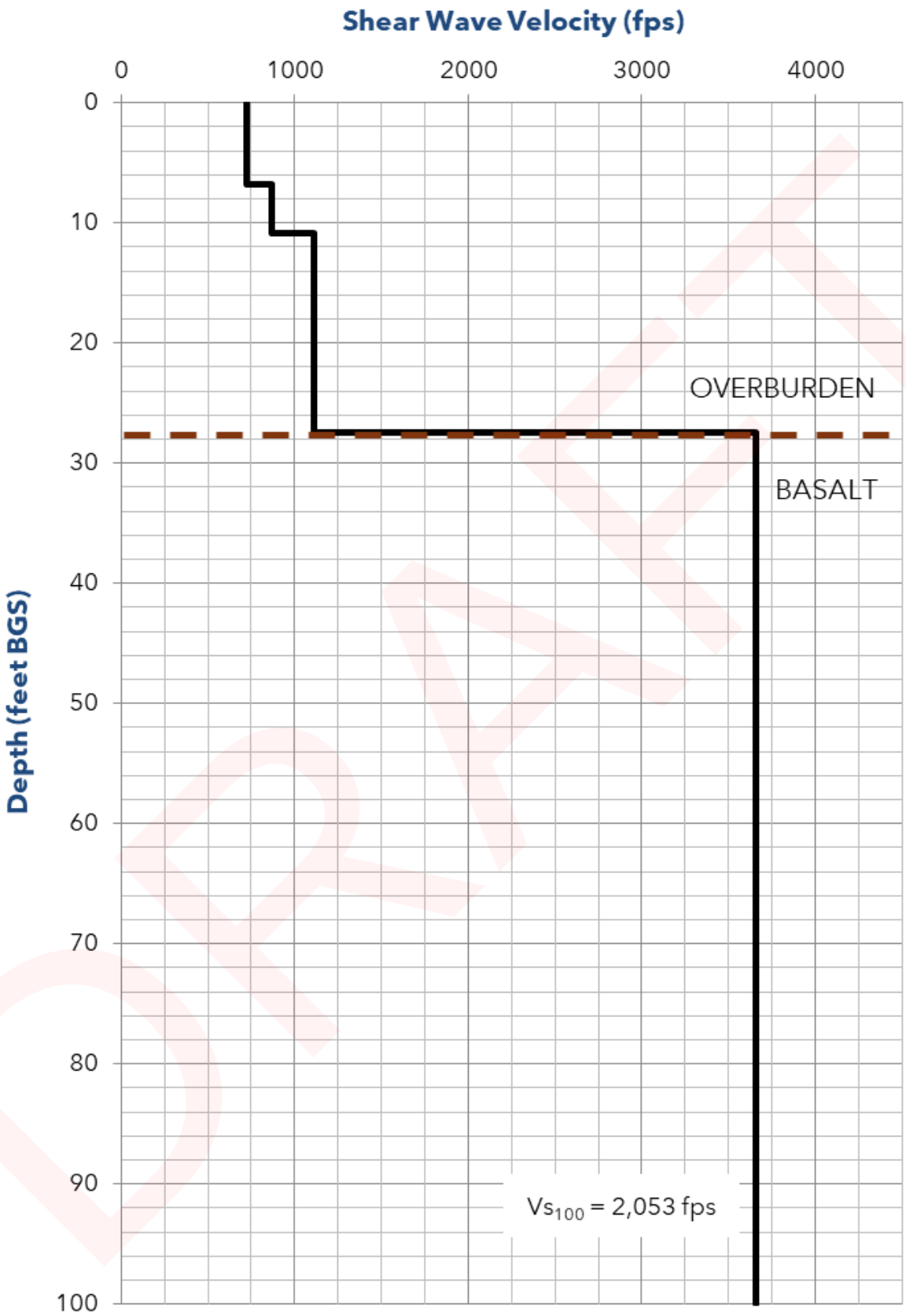
Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

PROJECT NO.: WESTL-1-01-1

APRIL 2025

ARRAY PHOTOGRAPH
OPERATIONS CENTER
WEST LINN, OREGON

FIGURE C-2




DRAFT

| | | | |
|---|---|---|---|
| Geotechnical ▪ Environmental ▪ Special Inspections Columbia West Engineering, Inc | PROJECT NO.: WESTL-1-01-1<br>APRIL 2025 | SHEAR WAVE VELOCITY PROFILE<br>OPERATIONS CENTER<br>WEST LINN, OREGON | FIGURE C-3 |

# APPENDIX D

# APPENDIX D
# SLOPE STABILITY RESULTS

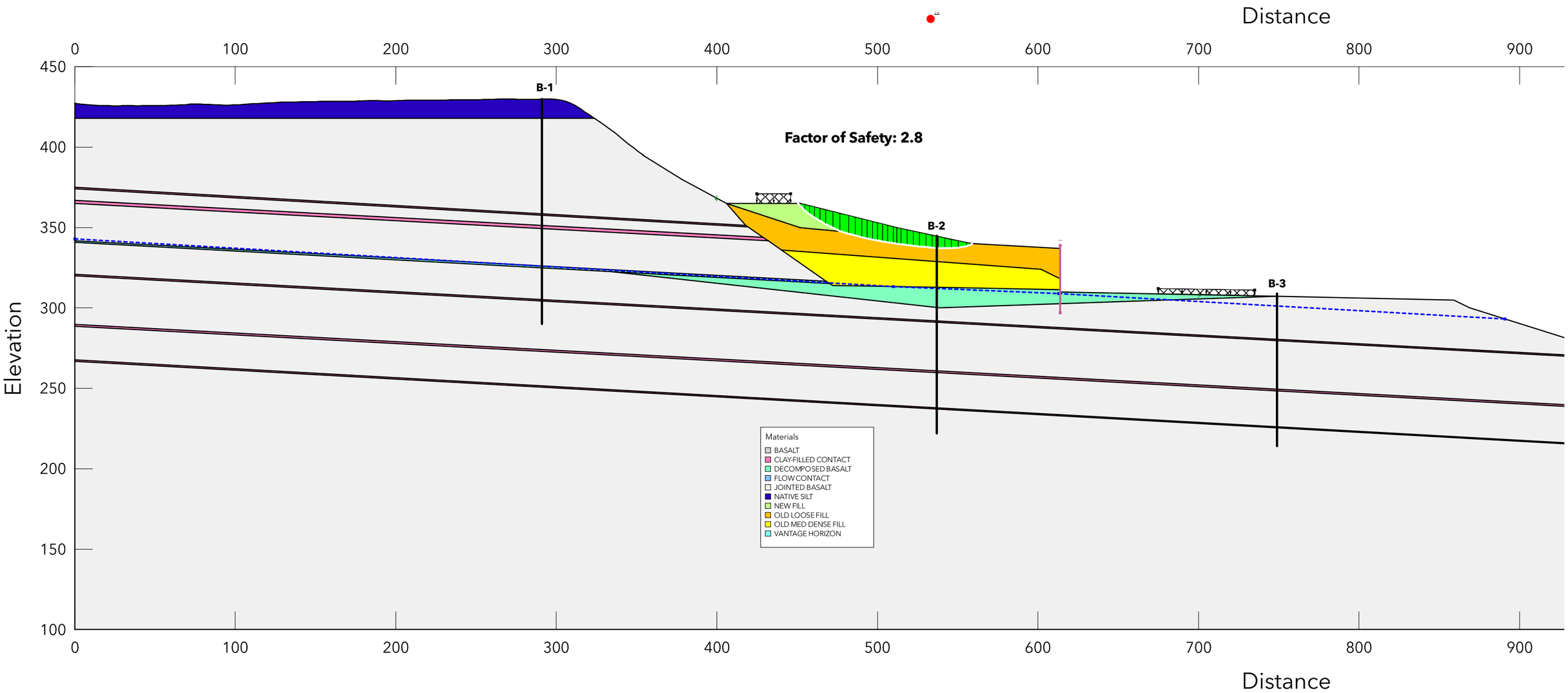
Material properties, model geometry, and critical failure surfaces from the slope stability analysis are presented in this appendix.

DRAFT

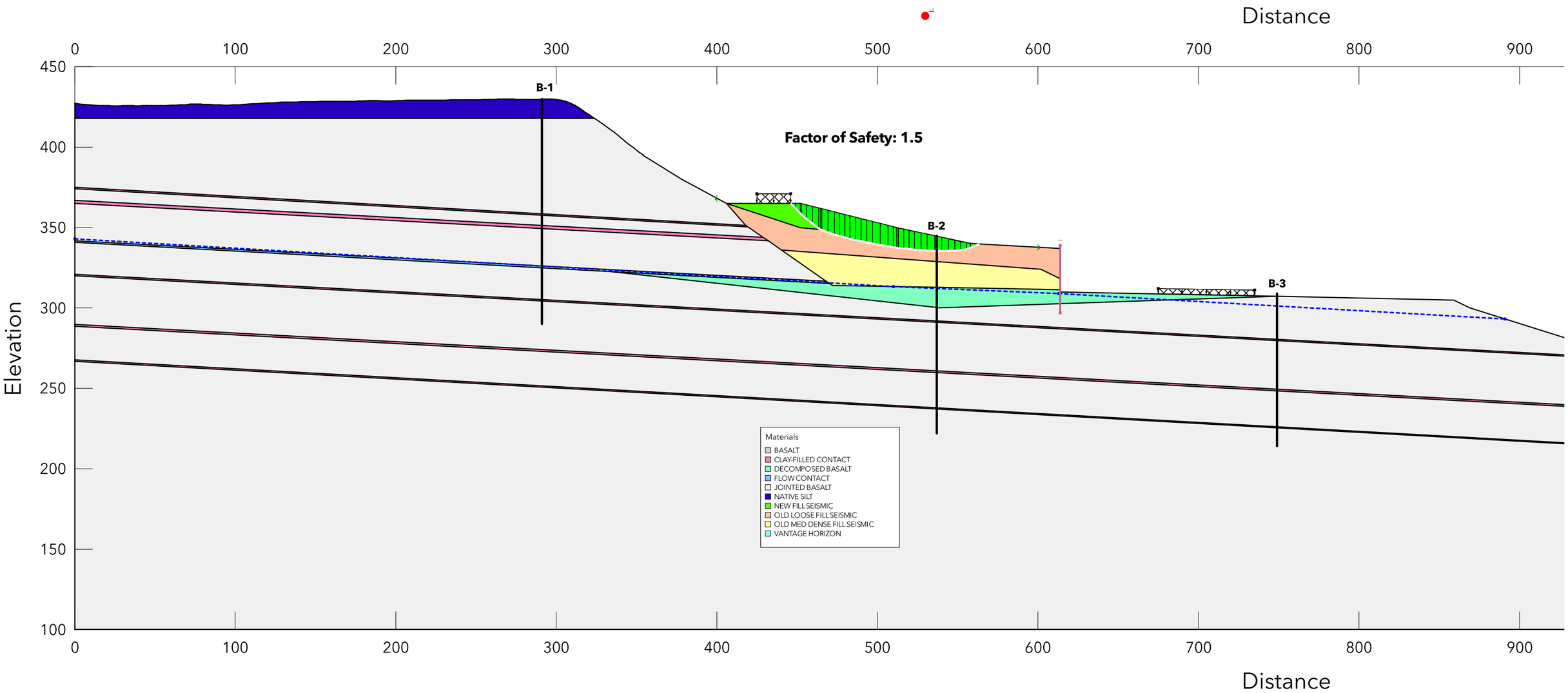
| Color | Name | Slope Stability Material Model | Unit Weight (pcf) | Base Material | Shear/Normal Strength Fn. | Effective Cohesion (psf) | Effective Friction Angle (°) | UCS Intact (psf) | Intact Rock Parameter mi | Geological Strength Index GSI | Disturbance Factor D |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | BASALT | Hoek-Brown | 160 | | | | | 720,000 | 20 | 25 | 0.7 |
| | CLAY-FILLED CONTACT | Mohr-Coulomb | 125 | | | 500 | 28 | | | | |
| | DECOMPOSED BASALT | Mohr-Coulomb | 130 | | | 500 | 32 | | | | |
| | FLOW CONTACT | Shear/Normal Fn. | 150 | | BASALT JOINT CONTACT | | | | | | |
| | JOINTED BASALT | Compound Strength | 160 | BASALT | | | | | | | |
| | NATIVE SILT | Mohr-Coulomb | 118 | | | 100 | 30 | | | | |
| | NEW FILL | Mohr-Coulomb | 125 | | | 25 | 35 | | | | |
| | NEW FILL SEISMIC | Mohr-Coulomb | 125 | | | 100 | 36 | | | | |
| | OLD LOOSE FILL | Mohr-Coulomb | 120 | | | 25 | 30 | | | | |
| | OLD LOOSE FILL SEISMIC | Mohr-Coulomb | 120 | | | 50 | 30 | | | | |
| | OLD MED DENSE FILL | Mohr-Coulomb | 122 | | | 50 | 32 | | | | |
| | OLD MED DENSE FILL SEISMIC | Mohr-Coulomb | 122 | | | 100 | 32 | | | | |
| | VANTAGE HORIZON | Mohr-Coulomb | 120 | | | 0 | 14 | | | | |

MATERIAL PROPERTIES USED IN SLOPE STABILITY MODELS

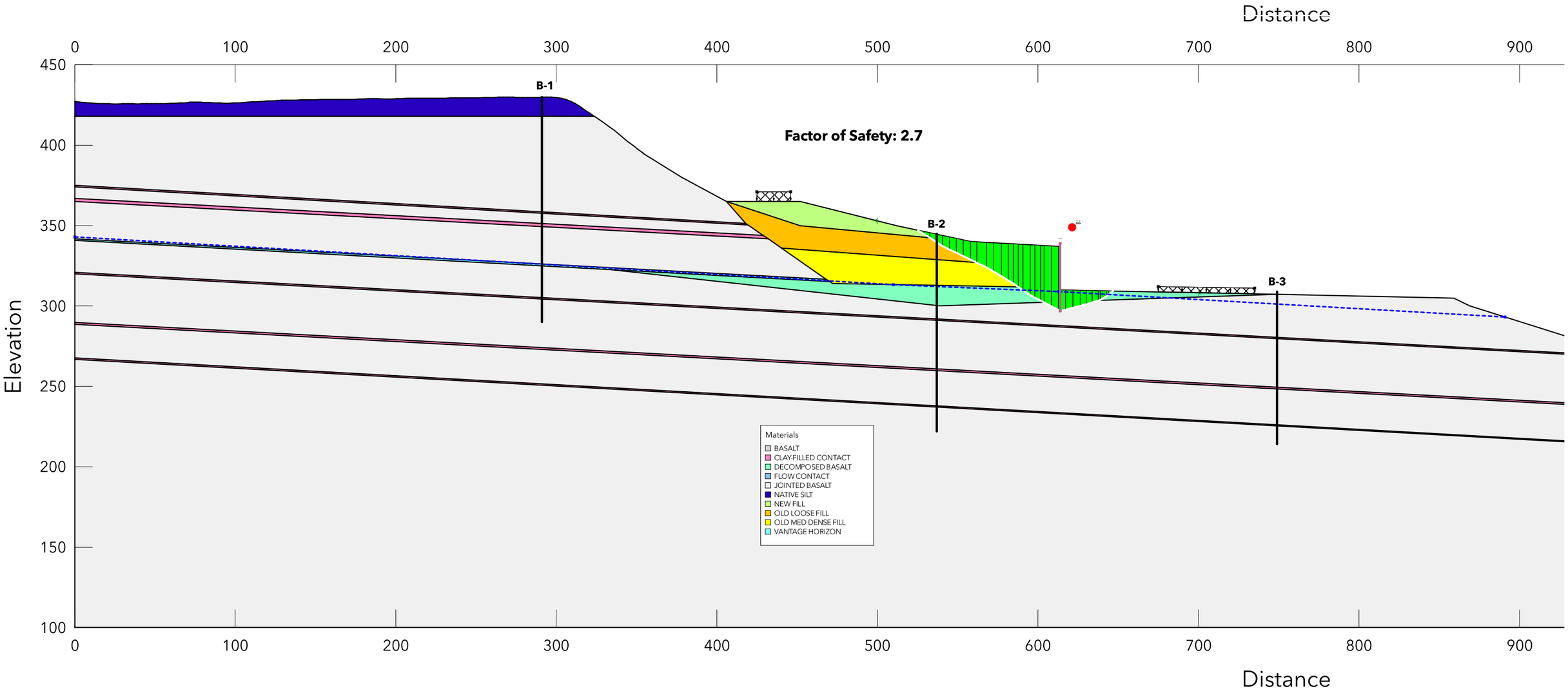
# CROSS-SECTION 1: PROPOSED ROADWAY FILL SLOPE STATIC LOADING



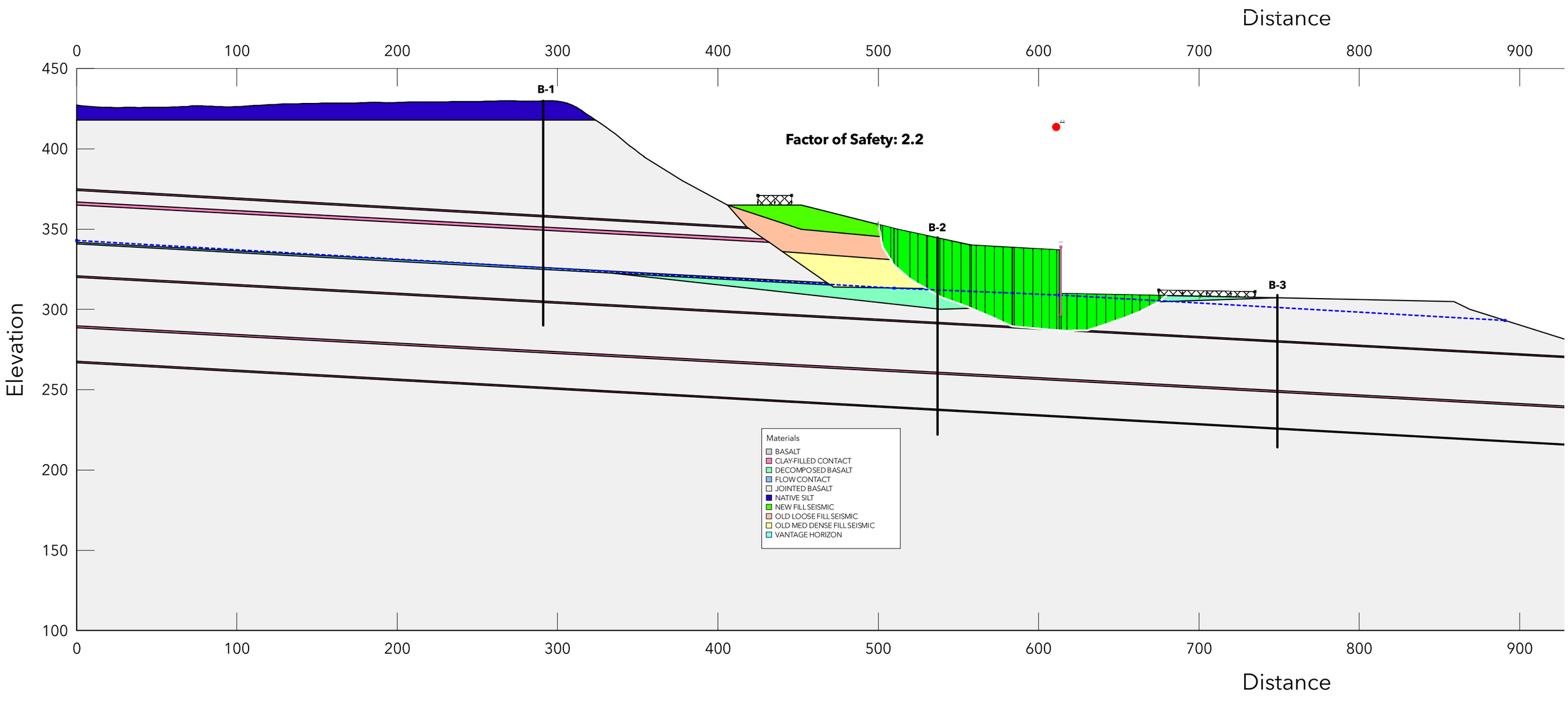
# CROSS-SECTION 1: PROPOSED ROADWAY FILL SLOPE PSEUDOSTATIC LOADING



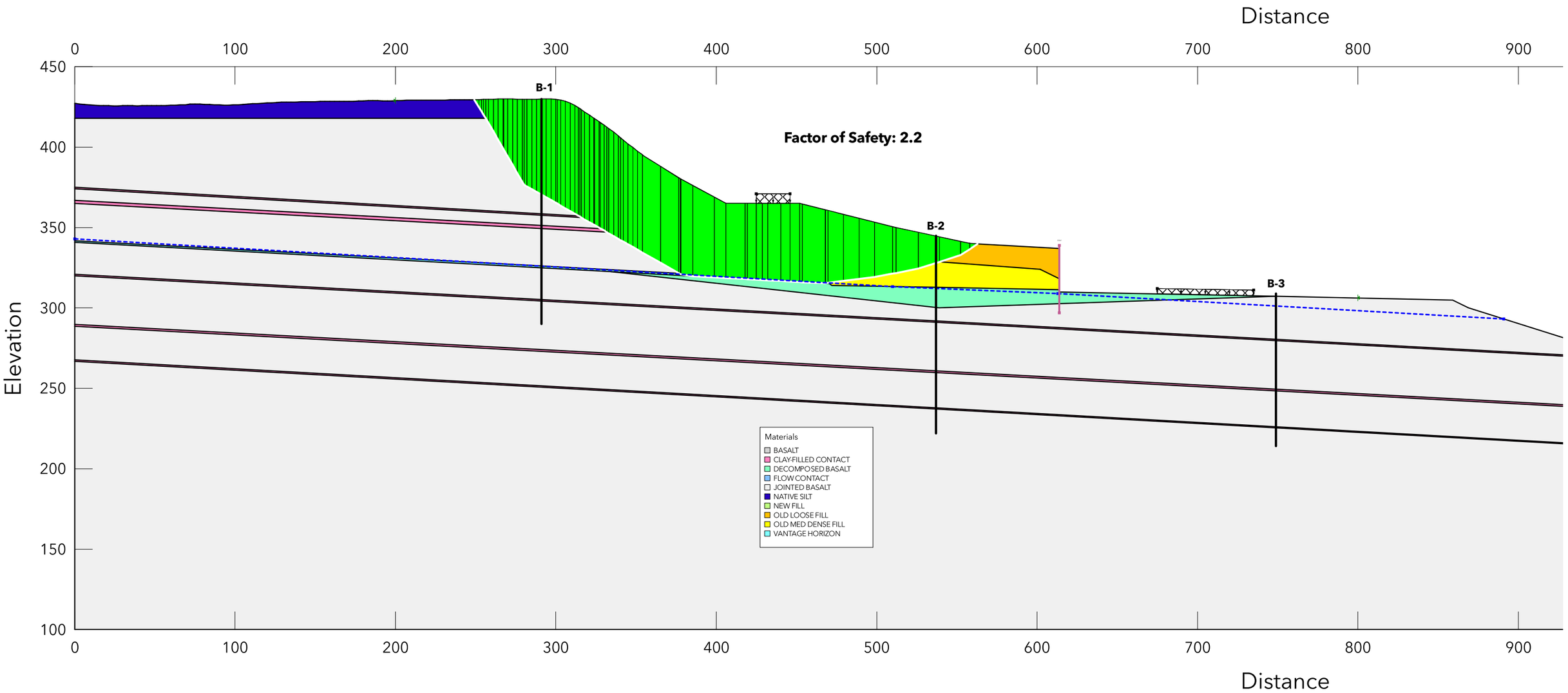
# CROSS-SECTION 1: GLOBAL WALL STABILITY STATIC LOADING



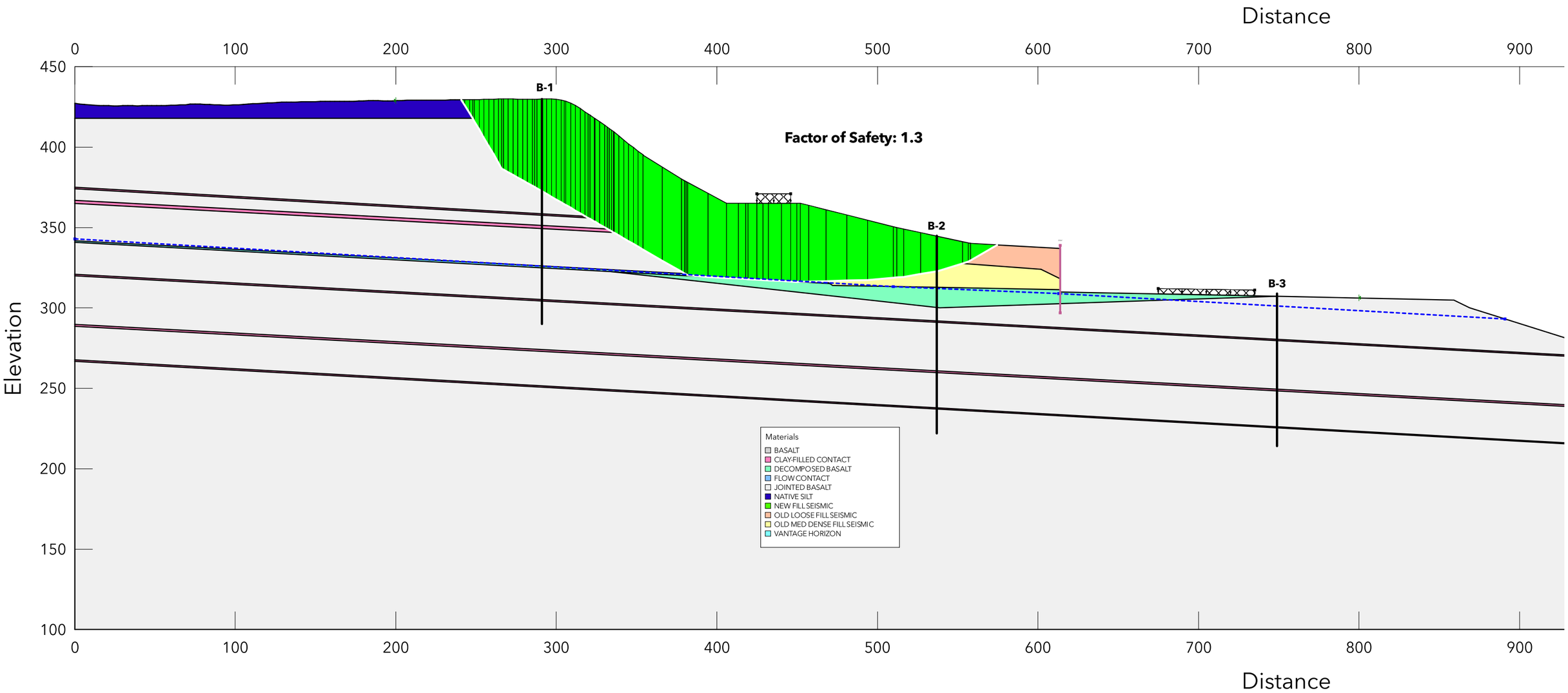
# CROSS-SECTION 1: GLOBAL WALL STABILITY PSEUDOSTATIC LOADING



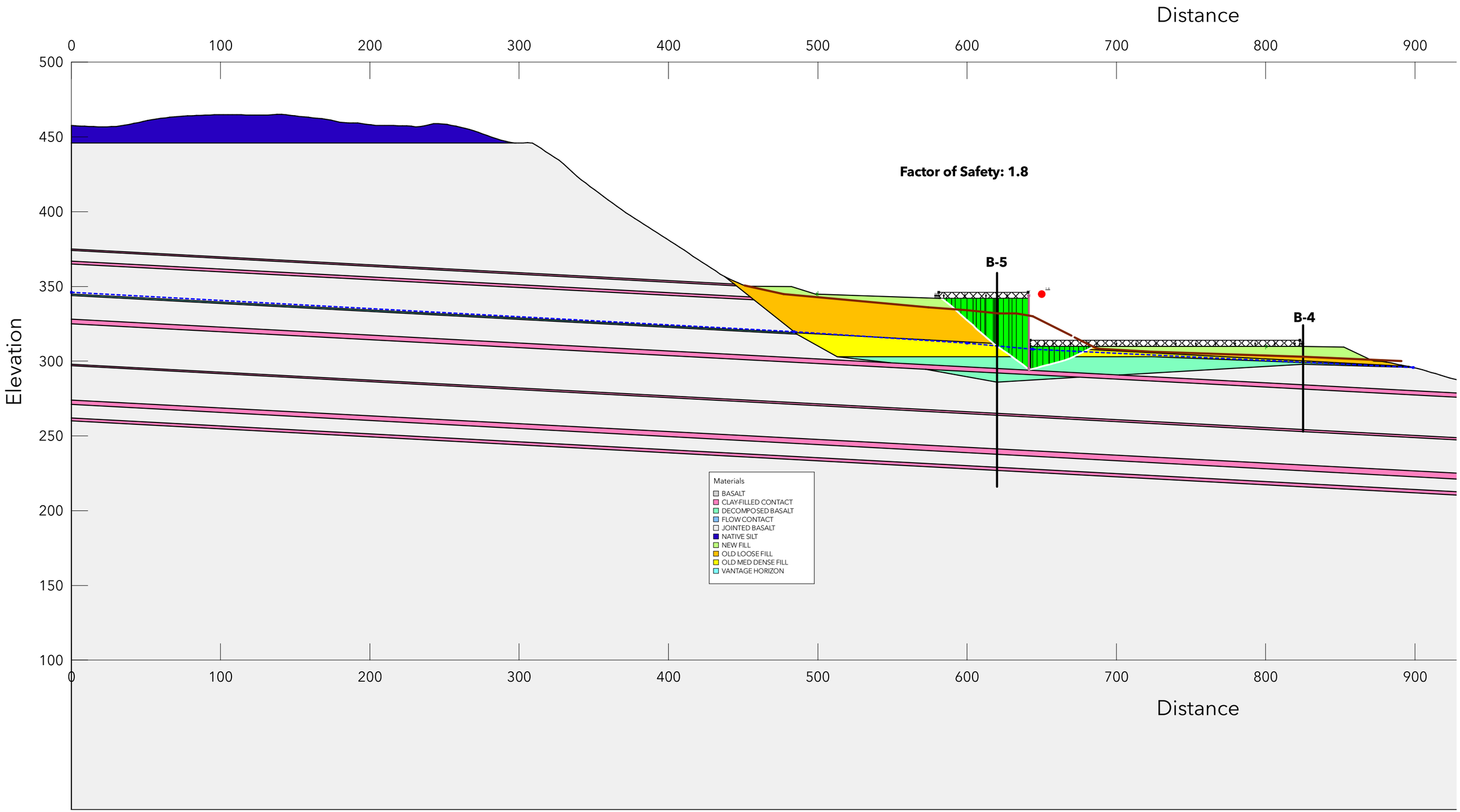
# CROSS-SECTION 1: UPPER SLOPE STATIC LOADING



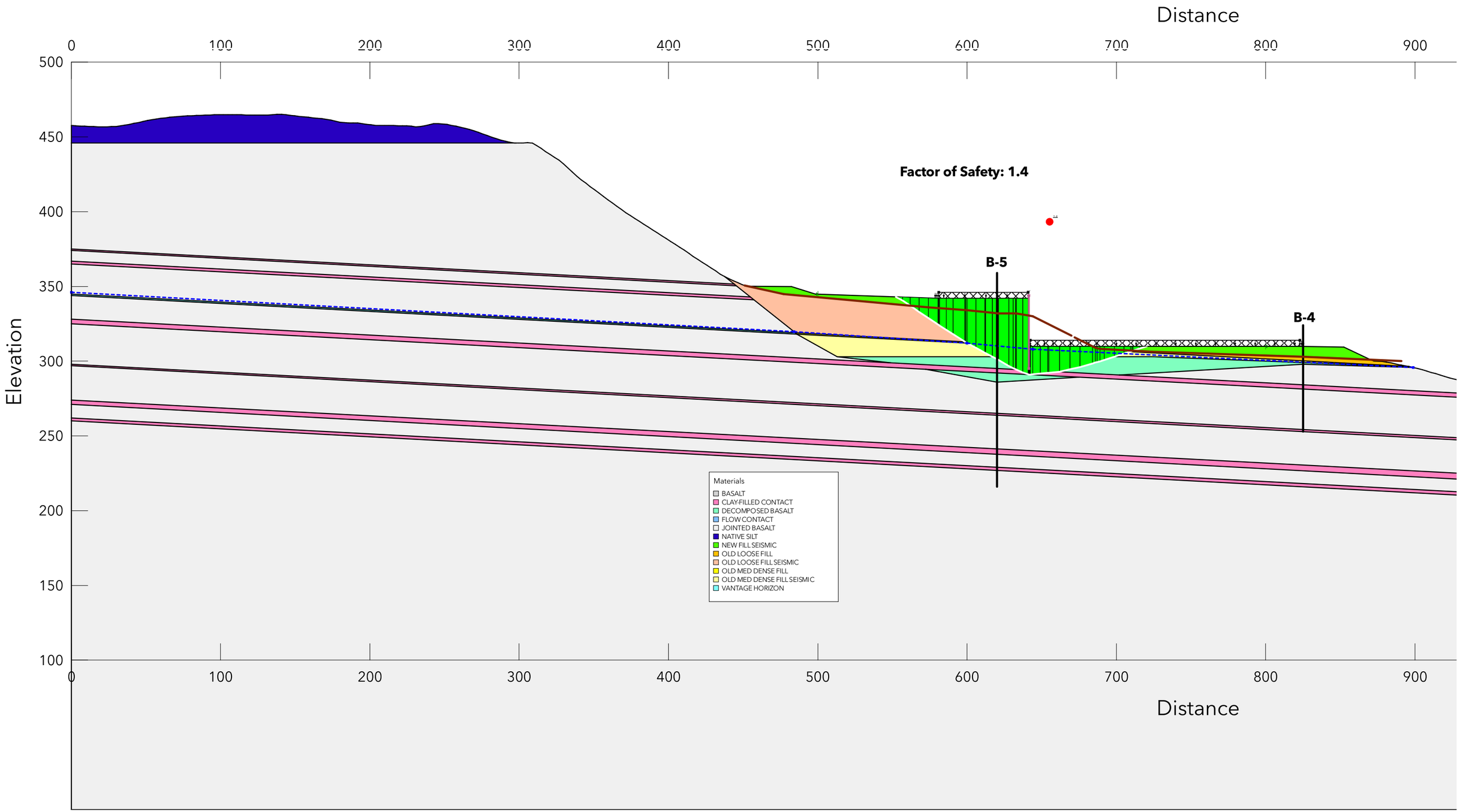
# CROSS-SECTION 1: UPPER SLOPE PSEUDOSTATIC LOADING



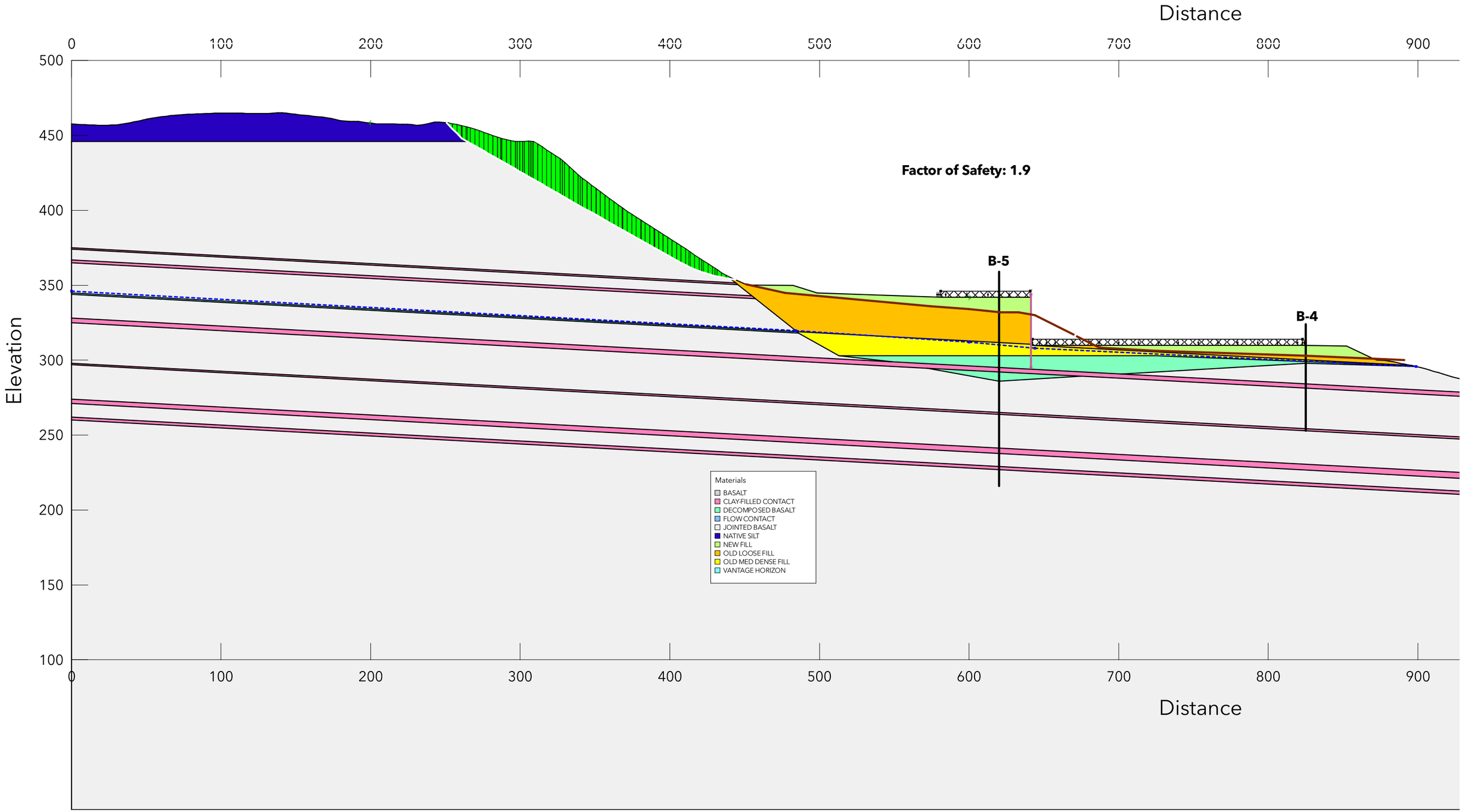
# CROSS-SECTION 2: GLOBAL WALL STABILITY STATIC LOADING



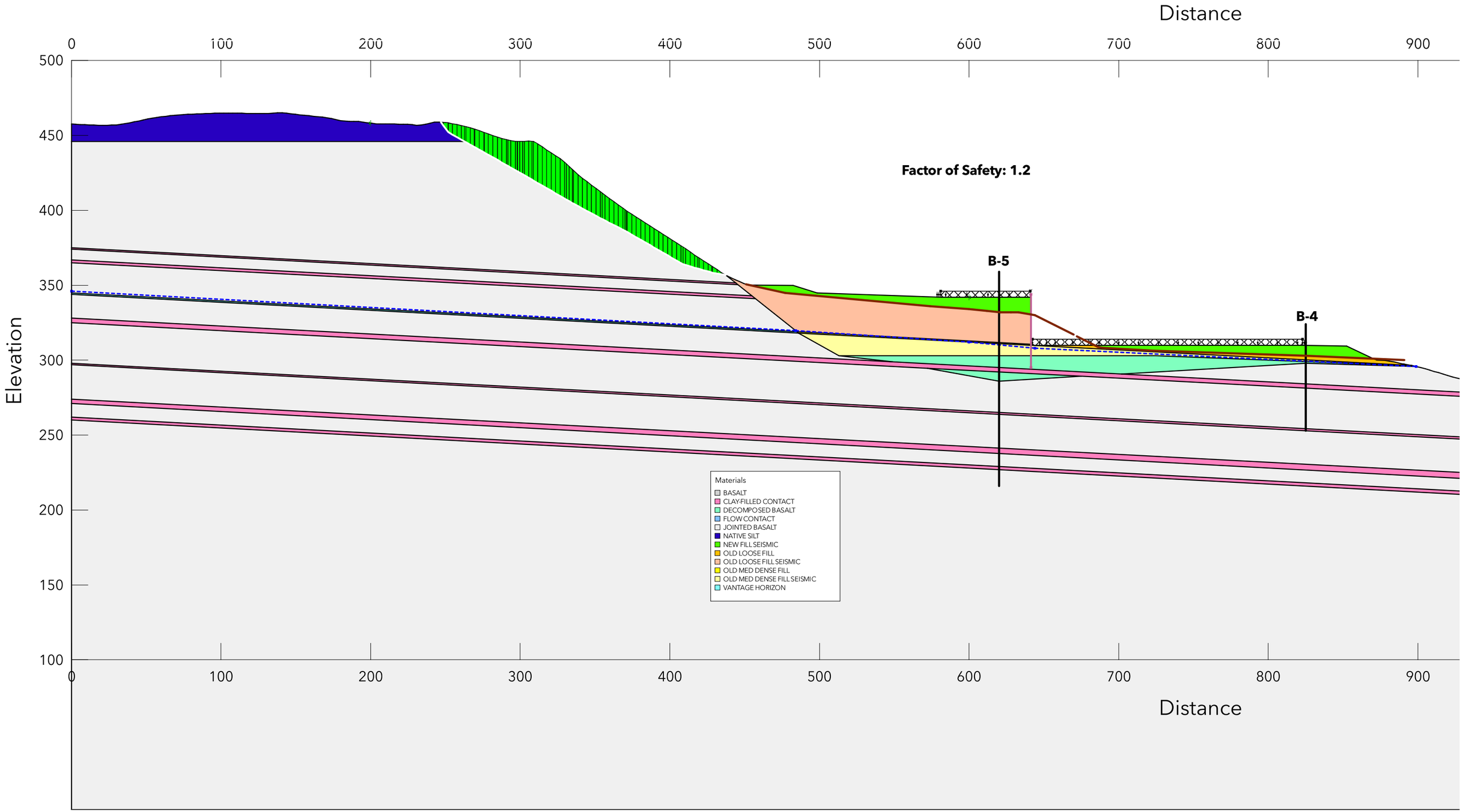
# CROSS-SECTION 2: GLOBAL WALL STABILITY PSEUDOSTATIC LOADING



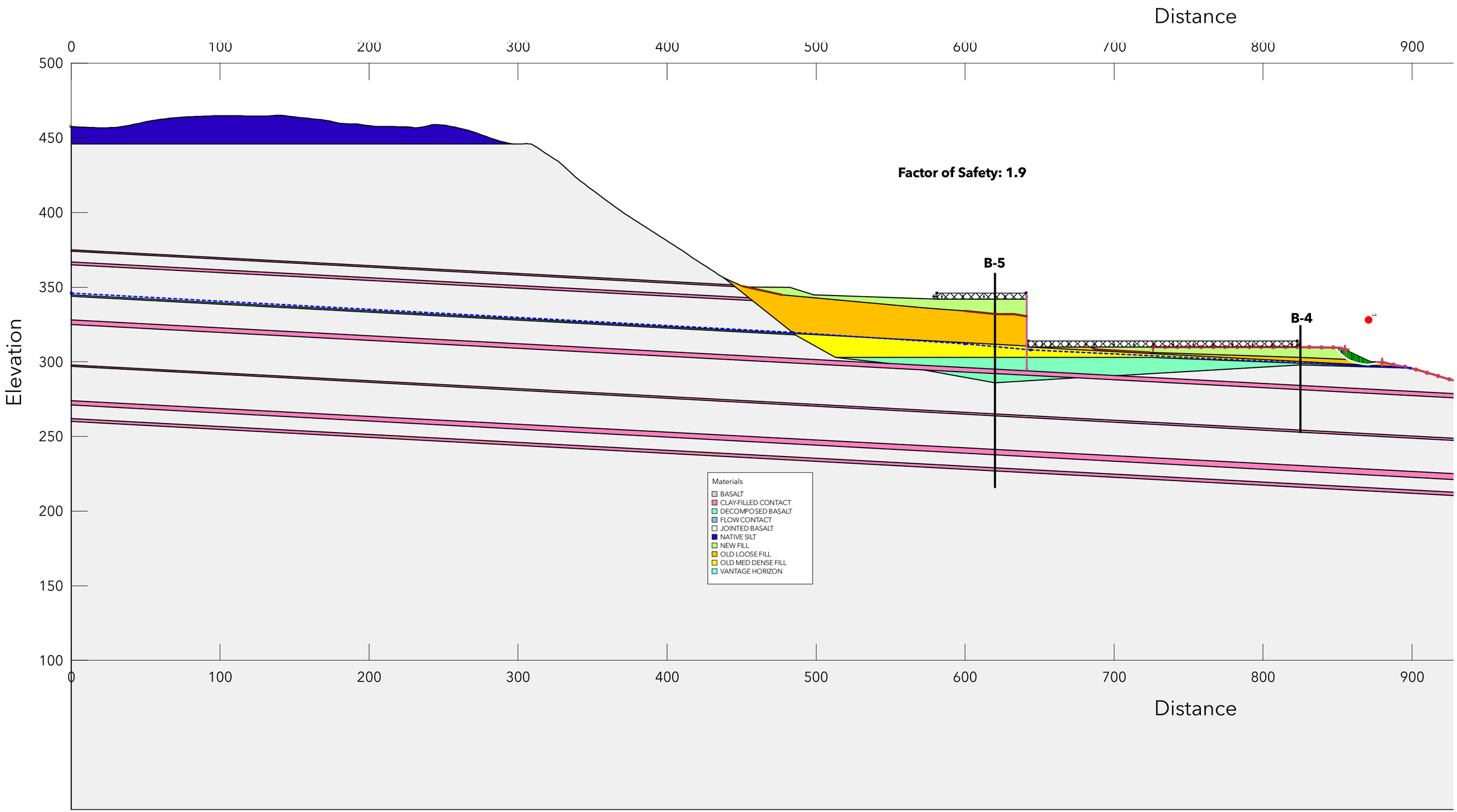
# CROSS-SECTION 2: UPPER SLOPE STATIC LOADING



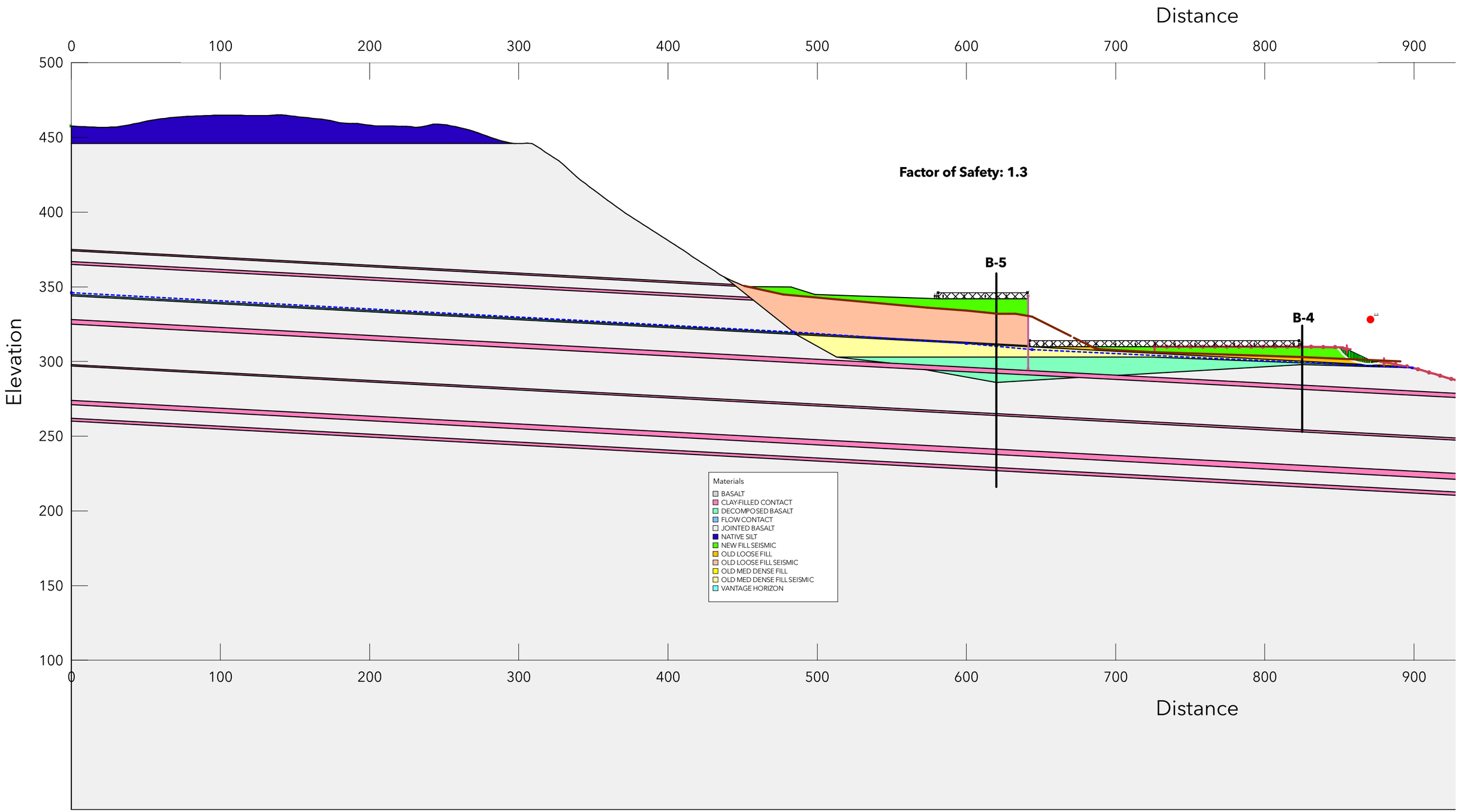
# CROSS-SECTION 2: UPPER SLOPE PSEUDOSTATIC LOADING



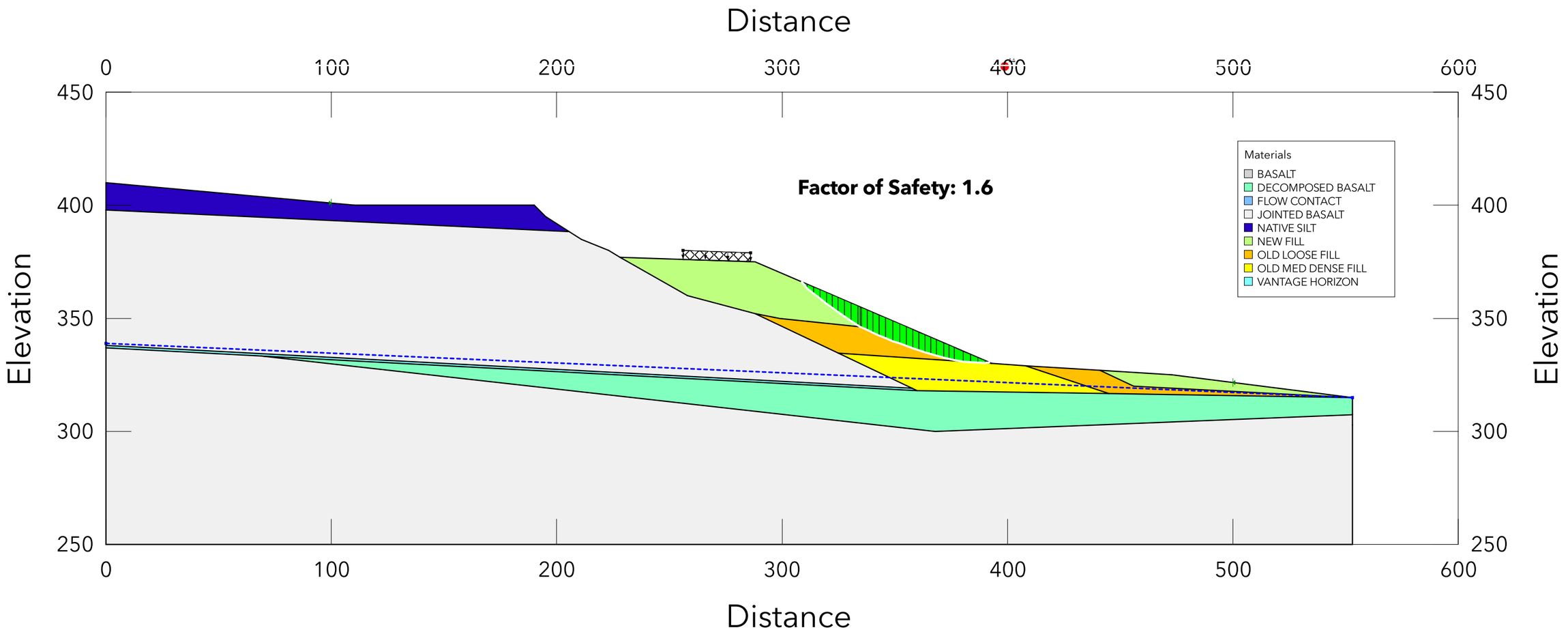
# CROSS-SECTION 2: SLOPE SOUTH OF PROPOSED MAINTENANCE BUILDING STATIC LOADING



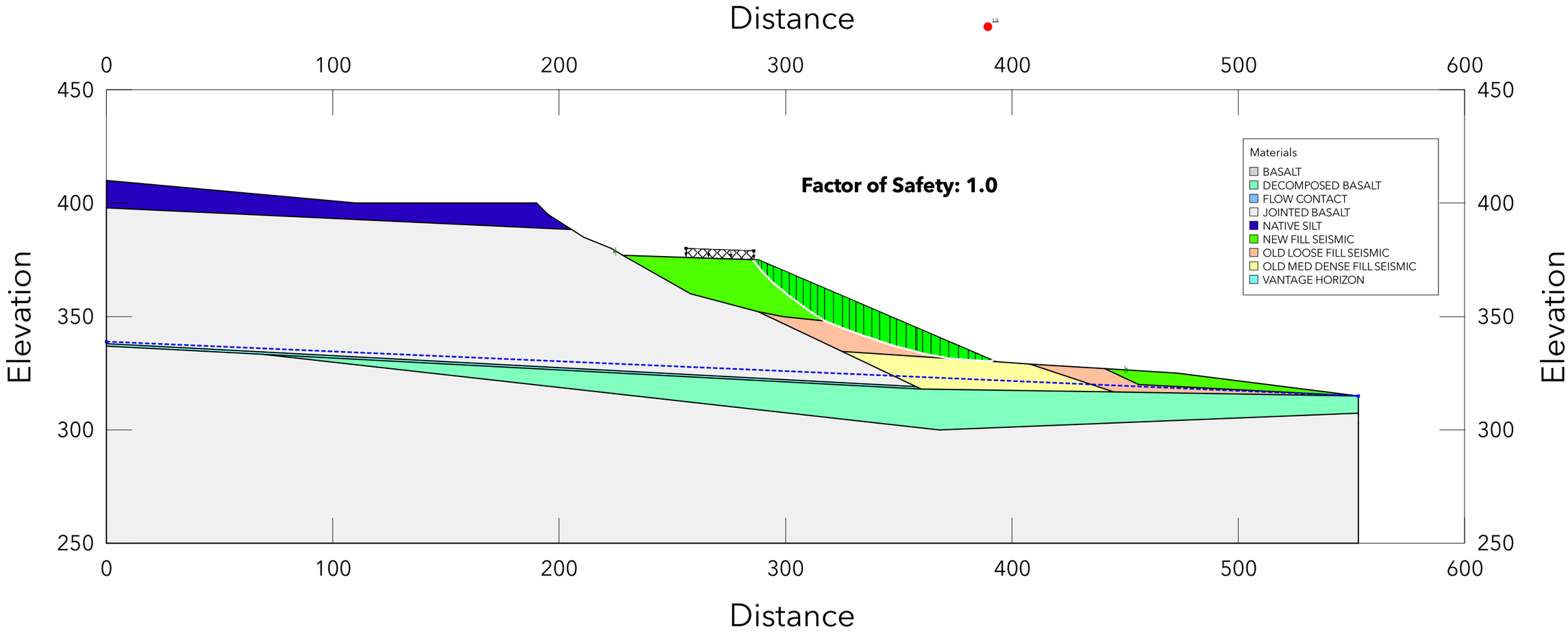
# CROSS-SECTION 2: SLOPE SOUTH OF PROPOSED MAINTENANCE BUILDING PSEUDOSTATIC LOADING



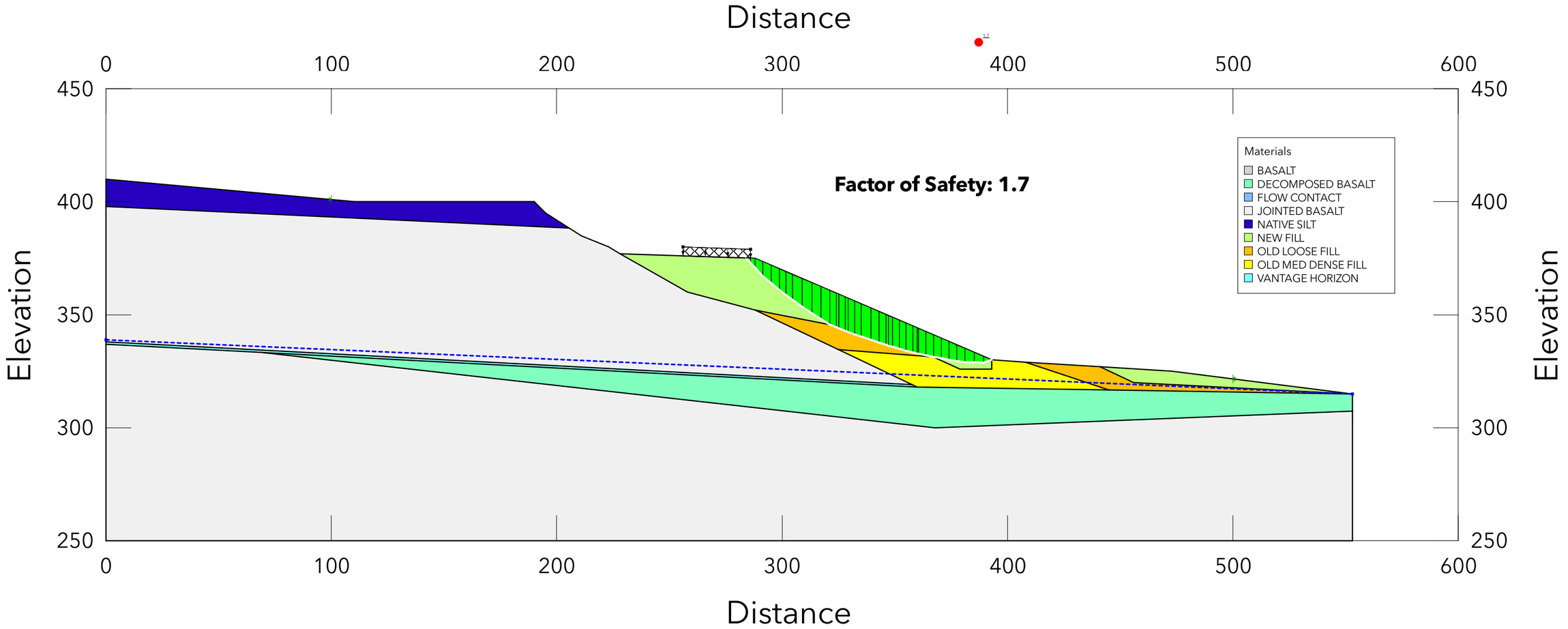
# CROSS-SECTION 3: PROPOSED ROADWAY FILL SLOPE STATIC LOADING



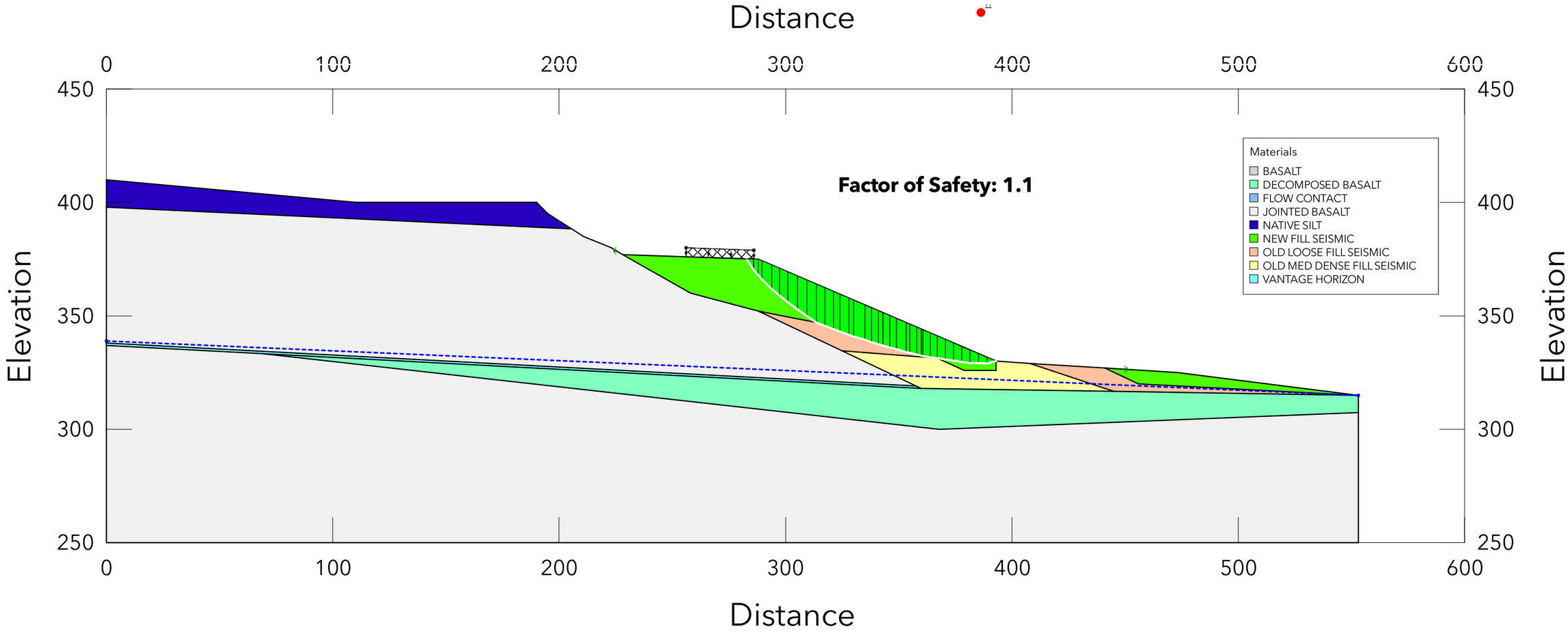
# CROSS-SECTION 3: PROPOSED ROADWAY FILL SLOPE PSEUDOSTATIC LOADING



CROSS-SECTION 3: IMPROVED PROPOSED ROADWAY FILL SLOPE STATIC LOADING



CROSS-SECTION 3: IMPROVED PROPOSED ROADWAY FILL SLOPE PSEUDOSTATIC LOADING



# APPENDIX E

# APPENDIX E
# SITE-SPECIFIC SEISMIC HAZARD EVALUATION

## INTRODUCTION

This appendix summarizes the results of a site-specific seismic hazard evaluation for the proposed Operations Center in West Linn, Oregon. This seismic hazard evaluation was performed in accordance with the requirements of the 2022 SOSSC and ASCE 7-16.

## SITE CONDITIONS

### *REGIONAL GEOLOGY AND SUBSURFACE CONDITIONS*

The regional geology and subsurface conditions at the site are presented in the main report.

### *SEISMIC SETTING*

#### Earthquake Source Zones

Three scenario earthquakes were considered for this study consistent with the local seismic setting. Two of the possible earthquake sources are associated with the CSZ, and the third event is a shallow, local crustal earthquake that could occur in the North American Plate. The three earthquake scenarios are discussed below.

#### Regional Events

The CSZ is the region where the Juan de Fuca Plate is being subducted beneath the North American Plate. This subduction is occurring in the coastal region between Vancouver Island and northern California. Evidence has accumulated suggesting that this subduction zone has generated eight great earthquakes in the last 4,000 years, with the most recent event occurring approximately 300 years ago (Weaver and Shedlock 1991). The fault trace is mapped approximately 50 to 120 km off the Oregon Coast.

Two types of possible subduction zone earthquakes were considered in this study:

1. An interface event earthquake on the seismogenic part of the interface between the Juan de Fuca Plate and the North American Plate on the CSZ. This source is capable of generating earthquakes with a $M_W$ of 9.0+.
2. A deep intraplate earthquake on the seismogenic part of the subducting Juan de Fuca Plate. These events typically occur at depths of between 30 and 60 km. This source is capable of generating an event with a $M_W$ of up to 8.0.

#### Local Events

In addition to a regional subduction earthquake, an earthquake could occur on a local crustal fault. Figure E-1 shows the locations of faults with potential Quaternary movement near the site (USGS 2025b). Figure E-2 shows the interpreted locations of historical seismic events with an $M_W$ of 3 or larger (PNSN 2025). Table E-1 provides information on local faults within a 20-km radius of the site. The faults within 15 km of the site have a slip rates less than 2 mm/yr; therefore, the site is not considered a “near-fault site” according to Section 11.4 of ASCE 7-16.

**Table E-1. Nearest Mapped Crustal Faults[2]**

| Source | Closest Mapped Distance[1] (km) | Mapped Length (km) | Slip Rate (mm/yr) |
|---|---|---|---|
| Bolton fault | 2.8 | 9 | Less than 0.2 |
| Canby-Molalla fault | 4.0 | 50 | Less than 0.2 |
| Oatfield fault | 6.2 | 29 | Less than 0.2 |
| Portland Hills fault | 7.4 | 49 | Less than 0.2 |
| Damascus-Tickle Creek fault zone | 9.9 | 10 and 16 | Less than 0.2 |
| East Bank fault | 18.1 | 29 | Less than 0.2 |
| Beaverton fault zone | 19.2 | 15 | Less than 0.2 |

1. Rounded to nearest 0.5 km
2. As reported by USGS (2025b)

## DESIGN EARTHQUAKE

Based on deaggregation of spectral acceleration at two spectral periods using the USGS Earthquake Hazards Toolbox (USGS 2025a), the seismic hazard at the site is dominated by the CSZ interface source at both periods. A summary of the seismic hazard contributions is presented in Table E-2.

**Table E-2. Seismic Hazard Deaggregation**

| Source | Percent Contribution to Overall Hazard[1] | |
|---|---|---|
| | PGA | T = 0.5 seconds[2] |
| CSZ – interface | 48 | 56 |
| CSZ – intraslab | 15 | 8 |
| Local faults | 21 | 22 |
| Gridded seismicity | 16 | 14 |

1. Individual contributions rounded to the nearest percent; therefore, the sum may be greater than 100.
2. Where T is the structural period.

The "mean" earthquakes associated with the CSZ interface and local fault sources were $M_w$ of 9.0 with a rupture distance of 102 km and $M_w$ of 6.6 with a rupture distance of 7.2 km. The mean earthquake scenario associated with local faults is generally representative of a Portland Hills fault rupture. These two mean earthquake scenarios were largely insensitive to the structural period used in the deaggregation.

## SEISMIC DESIGN

### *SITE CLASS*

Based on the shear wave velocity measurements acquired from the ReMi analysis described in Appendix C, the proposed structures founded on existing fill should be designed according to

Site Class C per Chapter 20 of ASCE 7-16. The shear wave velocity profile and $V_{s100}$ calculations are summarized in Table E-3. For structures founded directly on basalt, Site Class B is appropriate for seismic design.

**Table E-3. Seismic Site Class Determination for Array A-1**

| Array | Depth[1] (feet BGS) | Thickness (feet) | Shear Wave Velocity[1] (fps) | Thickness/Shear Wave Velocity (second) |
|---|---|---|---|---|
| A-1 | 0 – 7 | 7 | 727 | 0.009629 |
| | 7 – 11 | 4 | 870 | 0.004598 |
| | 11 – 27 | 16 | 1,112 | 0.014388 |
| | 27 – 100 | 73 | 3,661 | 0.019940 |
| **Sum** | | 100 | NA | 0.048555 |
| **Average Shear Wave Velocity in the Upper 100 Feet BGS, $V_{S100}$ (fps)** | | 2,053 | | |
| **ASCE 7-16 Site Class** | | C | | |

1. Values rounded to nearest whole number for sake of reporting

## *SEISMIC DESIGN PARAMETERS*

Based on the subsurface conditions encountered at the site, it is our opinion that amplification factors prescribed in ASCE 7-16 for Site Class C are appropriate for design of structures founded on or within the fill buttress and Site Class B is appropriate for structures founded on basalt; therefore, a site-response analysis is not required. The parameters in Table E-4 can be used for seismic design of the proposed structures that are considered Site Class C and Table E-5 can be used for structures that are considered Site Class B.

**Table E-4. Recommend ASCE 7-16 Site Class C Seismic Design Parameters[1]**

| Parameter | Site Class C | |
|---|---|---|
| | Short Period ($T_s$) | 1-Second Period ($T_1$) |
| MCE spectral response acceleration, S | $S_s$ = 0.835 g | $S_1$ = 0.376 g |
| Site coefficient, F | $F_a$ = 1.2 | $F_v$ = 1.5 |
| Adjusted spectral response acceleration, $S_M$ | $S_{MS}$ = 1.003 | $S_{M1}$ = 0.565 |
| Design spectral response acceleration, $S_D$ | $S_{DS}$ = 0.668 | $S_{D1}$ = 0.376 |
| PGA | 0. 376 g | |
| $PGA_M$ | 0.452 g | |

1. Parameters obtained using the ASCE 7 hazard tool

**Table E-5. Recommend ASCE 7-16 Site Class B Seismic Design Parameters[1]**

| Parameter | Site Class B | |
|---|---|---|
| | **Short Period ($T_s$)** | **1-Second Period ($T_1$)** |
| MCE spectral response acceleration, S | $S_s$ = 0.836 g | $S_1$ = 0.377 g |
| Site coefficient, F | $F_a$ = 0.9 | $F_v$ = 0.8 |
| Adjusted spectral response acceleration, $S_M$ | $S_{MS}$ = 0.752 | $S_{M1}$ = 0.301 |
| Design spectral response acceleration, $S_D$ | $S_{DS}$ = 0.501 | $S_{D1}$ = 0.201 |
| PGA | 0. 376 g | |
| $PGA_M$ | 0.339 g | |

1. Parameters obtained using the ASCE 7 hazard tool

## SEISMIC-INDUCED HAZARDS

### *LIQUEFACTION AND CYCLIC STRAIN SOFTENING*

Liquefaction is caused by a rapid increase in pore water pressure that reduces the effective stress between soil particles. It is most commonly triggered by dynamic loading associated with earthquake shaking and can dramatically reduce the shear strength and stiffness of the soil until excess pore pressures can dissipate. In general, loose, saturated sandy soil with low silt and clay content is the most susceptible to liquefaction.

Conversely, fine-grained, plastic soil may be susceptible to a phenomenon known as cyclic softening, which is characterized by a decrease in strength and stiffness that is gradual relative to liquefaction. Soft or sensitive silt and clay subjected to strong shaking are generally most susceptible to significant cyclic softening.

The VWPs installed to depths between 97.5 and 98 feet BGS indicate that the depth to static groundwater is greater than 75 feet BGS and the mapped depth to groundwater at the site is greater than 100 feet BGS (Snyder 2009). Given the depth to the water table and the relatively shallow basalt encountered in our explorations, liquefaction and/or cyclic strain softening are not design considerations for this project.

### *LATERAL SPREADING*

Lateral spreading is a liquefaction-related seismic hazard and occurs on gently sloping or flat sites underlain by liquefiable sediment adjacent to an open face, such as a riverbank. Liquefied soil adjacent to an open face can flow toward the open face, resulting in lateral ground displacement. The site is gently to moderately sloped, but liquefaction and/or cyclic strain softening are not likely; therefore, lateral spreading is not an important design consideration for this project.

### *FAULT SURFACE RUPTURE*

Active faults are not mapped directly beneath the site. The nearest fault, the Bolton fault, is approximately 2.4 km away; therefore, it is our opinion that the risk of fault surface rupture at the site is low.

## *GROUND MOTION AMPLIFICATION*

Soil capable of significantly amplifying ground motions beyond the levels determined using code-based site coefficients was not encountered during the field explorations. The main report provides a detailed description of the subsurface conditions encountered. We conclude that the level of amplification implicit in the code-based site class recommendation is appropriate for the project.

## *LANDSLIDE*

Earthquake-induced landsliding generally occurs on steeper slopes comprised of relatively weak soil and rock deposits. As discussed in the main report, the site is located within a zone of mapped landslide deposits, in an area considered to have "high" susceptibility to shallow landslides (DOGAMI 2025).

We considered the impact of an earthquake on the stability of the on-site slopes by completing a pseudo-static slope stability analysis. Details of that analysis are provided in the main report. Results of the pseudo-static slope stability analysis indicate that all but one of the slopes at the site that we analyzed have factors of safety of greater than 1.1 when subjected to a pseudo-static load equal to one-half of the $PGA_M$ value presented in Table E-4. Slopes are typically considered to be generally stable (deformation less than 2 inches) when the calculated factor of safety is greater than 1.1 under pseudo-static loading (ODOT 2024).

The only slope in our analysis that did not have a factor of safety of 1.1 under pseudo-static loading was a marginally stable (factor of safety equal to 1.0) fill slope considered in cross section 3. The fill slope will support a portion of the proposed access road near Salamo Road. Based on the topography in the vicinity of the cross section and results of our analysis, slope displacement under seismic loading is unlikely to involve a considerable volume of soil or impact any existing or proposed structures; however, it is possible that under seismic loading the slope could displace enough to adversely impact trafficability of the access road. We performed supplementary analysis considering an "improved" fill slope condition and found that the pseudo-static factor of safety could be increased to 1.1 by replacing some of the exiting fill at the bottom of the proposed slope with new fill and constructing a shear key. Additional details regarding the slope stability analysis are presented in the main report and a conceptual representation of the improved slope is shown in the slope stability output presented in Appendix D.

## *SEISMIC SETTLEMENT*

Vertical settlements due to earthquakes typically occur during and after ground shaking. Settlement of loose, dry sandy soil, known as seismic compression, is the most common source of ground surface settlement during shaking. Settlement of saturated soil, known as reconsolidation, typically occurs after the shaking stops. In general, the sum of these types of settlement comprises the total free-field seismic settlement.

Seismic compression is most prevalent in relatively deep deposits of dry, clean sand. Liquefied granular soil or cyclically softened, fine-grained soil is most susceptible to reconsolidation settlement. Typically, reconsolidation settlement of cyclically softened soil is less than for liquefied soil because matrix effects tend to reduce volumetric strain.

There are no thick deposits of loose, cohesionless soil beneath the site and the risk of liquefaction and/or cyclic softening at the site is low. We estimate a total seismic settlement, primarily seismic compression of non-plastic soil, of 1 inch and a differential settlement of 0.5 inch of over a span of 50 feet. This settlement is in addition to the static settlement estimate provided in the main report.

### *LURCHING*

Lurching is a phenomenon generally associated with very high levels of ground shaking, which causes localized failures and distortion of the soil. The anticipated ground accelerations are below the threshold required to induce lurching of the site soil.

### *SUBSIDENCE/UPLIFT*

Subduction zone earthquakes can cause vertical tectonic movements. The movements reflect coseismic strain release accumulation associated with interplate coupling in the subduction zone. Based on our review of the literature, the locked zone of the CSZ is located in excess of 60 miles from the site. Consequently, we do not anticipate that subsidence or uplift is a significant design concern.

### *TSUNAMI AND SEICHE*

The site located more than 60 miles away from the Oregon coast and is not located near any standing bodies of water; therefore, tsunami and seiche inundation are not design considerations for this project.

## REFERENCES

ASCE 2016. *Minimum Design Loads and Associated Criteria for Buildings and Other Structures.* ASCE Standard ASCE/SEI 7-16.

ASCE 2025. ASCE 7 Hazard Tool. https://ascehazardtool.org/. Accessed January 2025.

DOGAMI 2025. Statewide Landslide Information Layer for Oregon (SLIDO). https://gis.dogami.oregon.gov/maps/slido/. Accessed February 2025.

ODOT 2024. *Geotechnical Design Manual,* Oregon Department of Transportation, Delivery & Operations Division, Engineering & Technical Services Branch, May 2024.

Oregon Building Codes Division 2022. *2022 Oregon Structural Specialty Code*.

PNSN 2025. Pacific Northwest Seismic Network. https://www.pnsn.org/earthquakes/recent. Accessed January 2025.

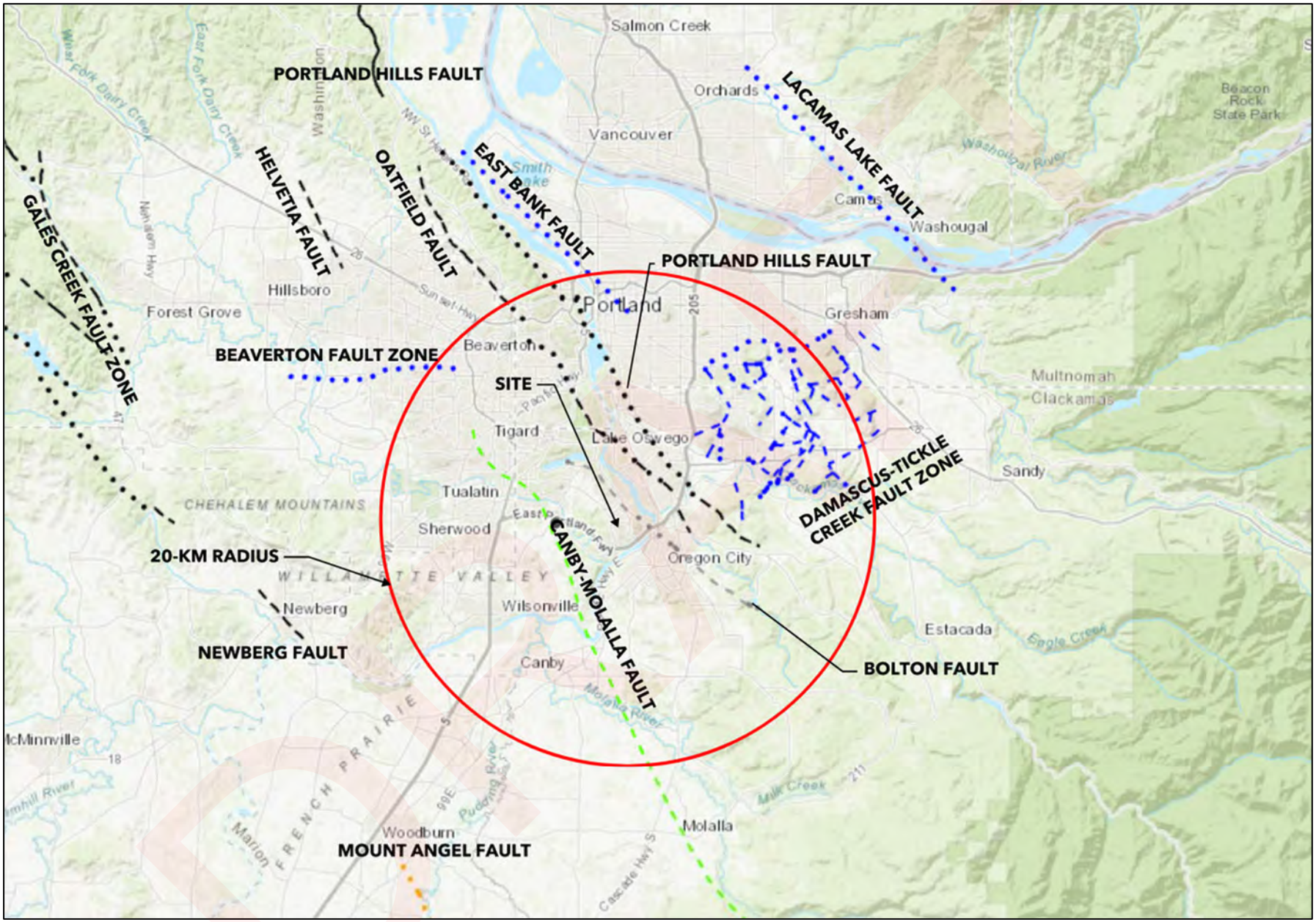
Snyder, D.T. 2008. *Estimated Depth to Ground Water and Configuration of the Water Table in the Portland, Oregon Area.* Prepared in cooperation with the City of Portland, the City of Gresham, Clackamas County's Water Environment Services, and Multnomah County. U.S. Geological Survey, Scientific Investigations Report 2008-5059.

USGS 2025a. Earthquake Hazards Program, Unified Hazard Tool. https://earthquake.usgs.gov/hazards/interactive/. Accessed January 2025.

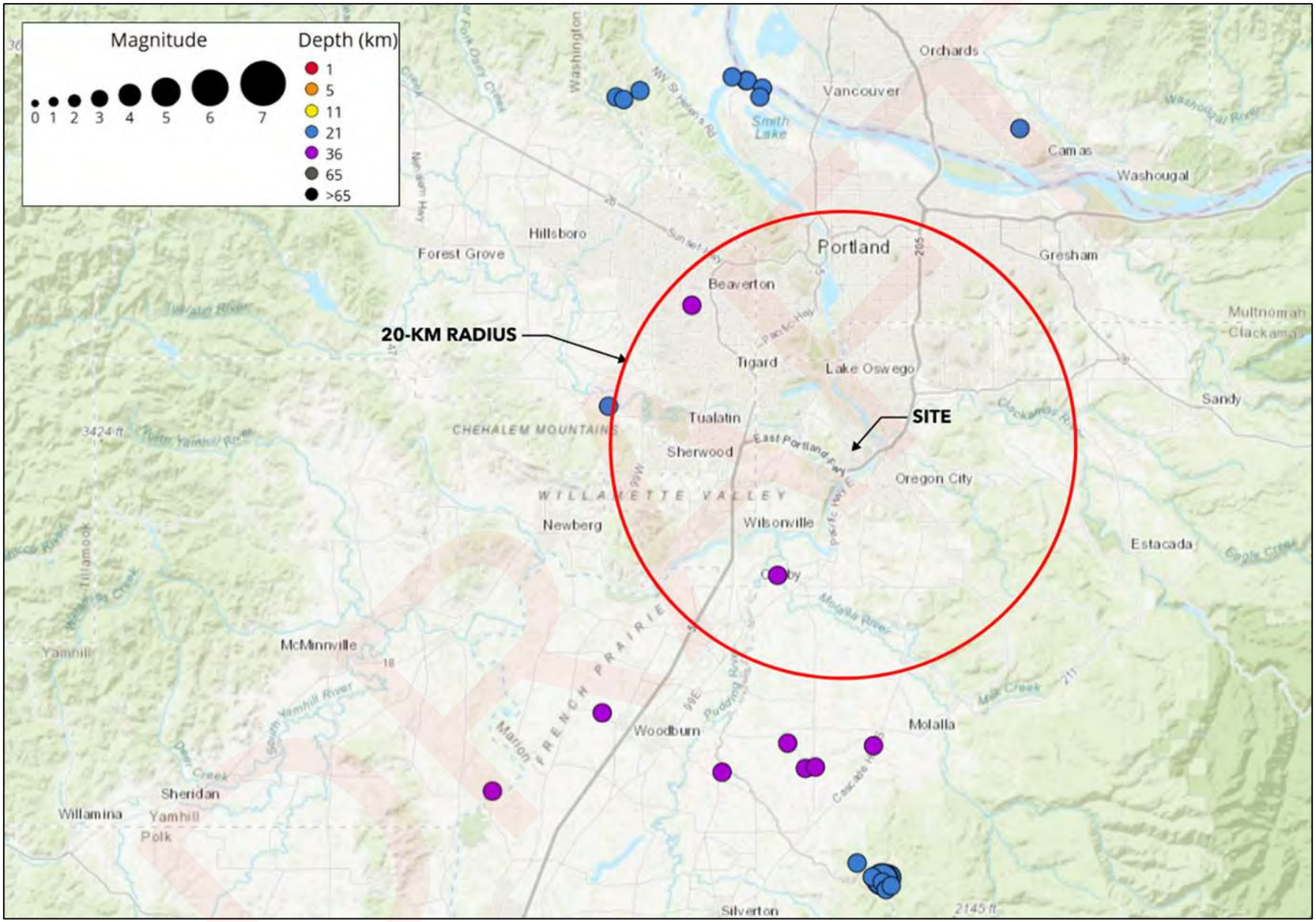
USGS 2025b. Quaternary Fault and Fold Database for the United States. https://www.usgs.gov/natural-hazards/earthquake-hazards/faults. Accessed January 2025.

Weaver, C.S., and K.M. Shedlock 1991. Program for earthquake hazards assessment in the Pacific Northwest: U.S. Geological Survey Circular 1067, 29 pgs.

DRAFT




| | | | |
|---|---|---|---|
| Geotechnical ▪ Environmental ▪ Special Inspections<br>Columbia West Engineering, Inc | PROJECT NO.: WESTL-1-01-1<br>APRIL 2025 | QUARTERNARY FAULT MAP<br>OPERATIONS CENTER<br>WEST LINN, OREGON | FIGURE<br>E-1 |




| | | | |
|---|---|---|---|
| Geotechnical ▪ Environmental ▪ Special Inspections<br>Columbia West Engineering, Inc | PROJECT NO.:<br>WESTL-1-01-1<br><br>APRIL 2025 | HISTORICAL SEISMICITY MAP<br>OPERATIONS CENTER<br>WEST LINN, OREGON | FIGURE<br>E-2 |

# APPENDIX F

# APPENDIX F
# PHOTO LOG

Photographs taken during our field explorations are presented in this appendix.

DRAFT

**Boring B-1 – runs 1 through 4 from 12 to 28 feet BGS**

**Boring B-1– runs 4 through 6 from 28 to 39 feet BGS**

**Boring B-1 – runs 6 through 8 from 39 to 48 feet BGS**

**Boring B-1 – runs 8 through 10 from 48 to 59 feet BGS**

**Boring B-1 – runs 10 through 12 from 59 to 74 feet BGS**

**Boring B-1– runs 13 through 15 from 74 to 84 feet BGS**

**Boring B-1– runs 15 and 16 from 84 to 94 feet BGS**

**Boring B-1 – runs 17 and 18 from 94 to 102 feet BGS**

**Boring B-1– runs 18 through 20 from 102 to 111 feet BGS**

**Boring B-1– runs 20 and 21 from 111 to 119 feet BGS**

**Boring B-1– runs 22 and 23 from 119 to 128.5 feet BGS**

**Boring B-1 – runs 23 through 25 from 128.5 to 135.5 feet BGS**

**Boring B-2 – runs 1 through 3 from 46 to 54 feet BGS**

**Boring B-2 – runs 3 and 4 from 54 to 63 feet BGS**

**Boring B-2 – runs 5 and 6 from 63 to 71 feet BGS**

**Boring B-2 – runs 6 through 8 from 71 to 80 feet BGS**

**Boring B-2 – runs 8 and 9 from 80 to 88 feet BGS**

**Boring B-2 – runs 10 and 11 from 88 to 96 feet BGS**

**Boring B-2 – runs 11 through 13 from 96 to 104.3 feet BGS**

**Boring B-2 – runs 13 through 15 from 104.3 to 113.5 feet BGS**

**Boring B-2 – runs 15 and 16 from 113.5 to 121 feet BGS**

**Boring B-2 – run 16 from 121 to 123 feet BGS**

**Boring B-3 – runs 1 through 3 from 5 to 16 feet BGS**

**Boring B-3 – runs 3 through 5 from 16 to 22.5 feet BGS**

**Boring B-3 – runs 5 and 6 from 22.5 to 30.8 feet BGS**

**Boring B-3 – runs 6 through 8 from 30.3 to 40.3 feet BGS**

**Boring B-3 – runs 8 through10 from 40.3 to 48.8 feet BGS**

**Boring B-3 – runs 10 through 12 from 48.8 to 57.3 feet BGS**

**Boring B-3 – runs 12 and 13 from 57.3 to 65.6 feet BGS**

**Boring B-3 – runs 13 through 15 from 65.6 to 73.6 feet BGS**

**Boring B-3 – runs 15 through 17 from 73.6 to 82.3 feet BGS**

**Boring B-3 – runs 17 and 18 from 82.3 to 90.8 feet BGS**

**Boring B-3 – runs 18 through 20 from 90.8 to 100 feet BGS**

DRAFT

**Boring B-4 – runs 1 through 3 from 5 to 19 feet BGS**

**Boring B-4 – runs 3 through 5 from 19 to 27.5 feet BGS**

**Boring B-4 – runs 5 and 6 from 27.5 to 35 feet BGS**

**Boring B-4 – runs 7 and 8 from 35 to 43.8 feet BGS**

**Boring B-4 – run 8 from 43.8 to 50 feet BGS**

DRAFT

**Boring B-5 – runs 1 through 3 from 46 to 53 feet BGS**

**Boring B-5 – runs 3 and 4 from 53 to 59.3 feet BGS**

**Boring B-5 – runs 4 through 7 from 59.3 to 69 feet BGS**

**Boring B-5 – runs 7 and 8 from 69 to 77 feet BGS**

**Boring B-5 – runs 9 and 10 from 77 to 86.5 feet BGS**

**Boring B-5 – runs 10 through 12 from 86.5 to 97 feet BGS**

**Boring B-5 – runs 13 and 14 from 97 to 105 feet BGS**

**Boring B-5 – runs 14 through 16 from 105 to 113.5 feet BGS**

**Boring B-5 – run 16 from 113.5 to 117 feet BGS**

DRAFT

**Test pit TP-1**

**Test pit TP-2**

**Test pit TP-3**

**Test pit TP-5**

**Test pit TP-8**

**Test pit TP-9**

**Test pit TP-10**

**Test pit TP-11**

**Middle portion of site, looking east**

**Middle portion of site, looking north**

**Middle portion of site, looking west**

**North boundary of site, looking northeast**

**North boundary of site, looking northwest**

**North boundary of site, looking south**

DRAFT

# APPENDIX G

# APPENDIX G
# BACKGROUND INFORMATION

Site plans, exploration logs, and laboratory testing results from prior geotechnical studies at the site and in the site vicinity are presented in this appendix.

DRAFT

GEODESIGN INC

# SLOPE STABILITY EVALUATION

Oregon Solar Highway – West Linn Project Site

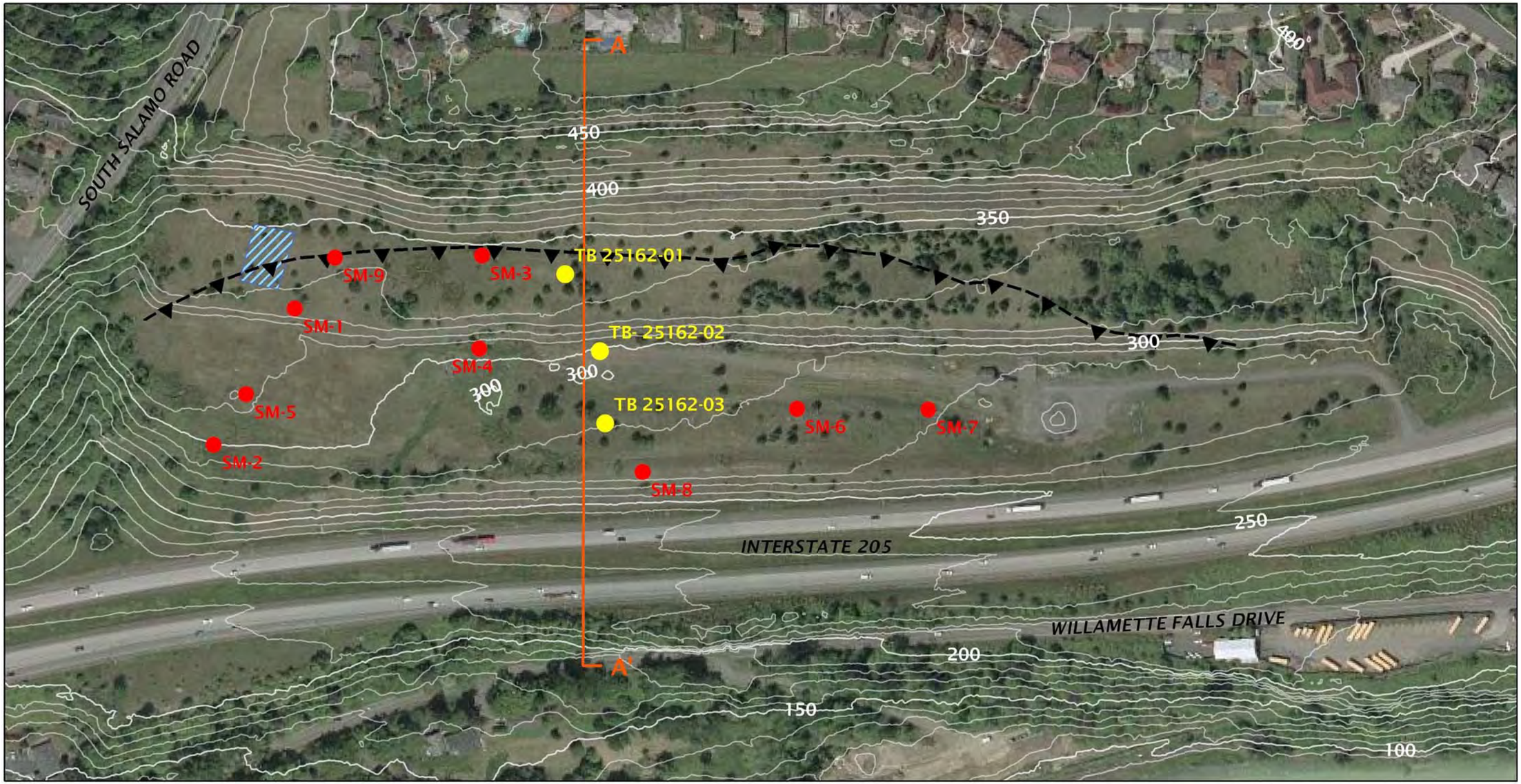
West Linn, Oregon

For

Oregon Department of Transportation

February 4, 2010

GeoDesign Project: ODOT-51-01




**EXPLANATION**

- PROJECT BORINGS
- CH2M BORINGS
- LANDSLIDE HEADSCARP
- WILLAMETTE RESERVOIR
- A A' CROSS SECTION

N

400 200 0 400

SCALE IN FEET

LIDAR DATA OBTAINED FROM PUGET SOUND LIDAR CONSORTIUM
ORTHOPHOTOGRAPH OBTAINED FROM USGS TERRASERVER

**SITE PLAN**

OREGON SOLAR HIGHWAY – WEST LINN PROJECT
WEST LINN, OR

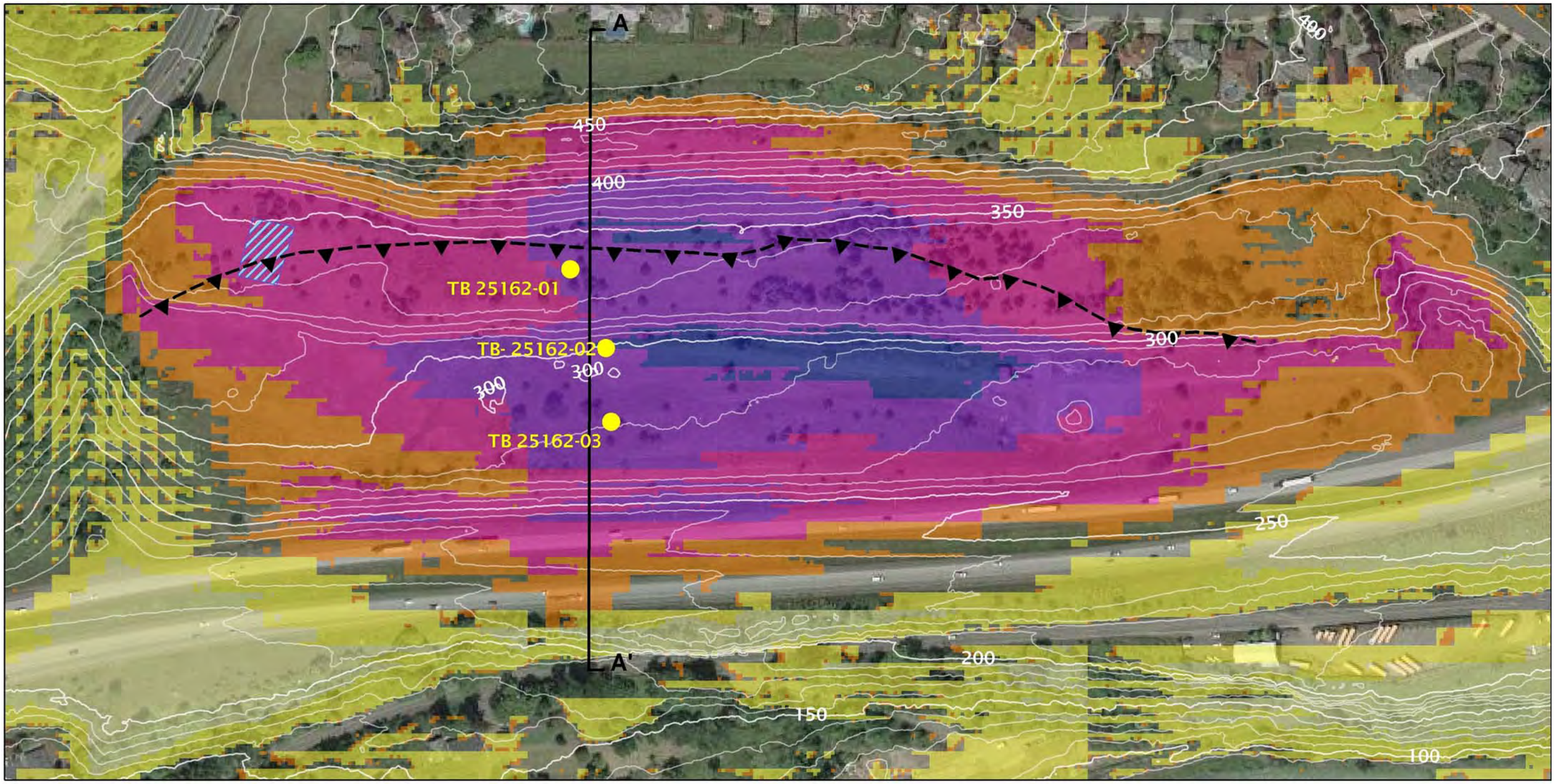
**FIGURE 2**

ODOT-51-01

FEBRUARY 2010

GEODESIGN INC
1201 SE Tech Center Drive - Suite 160
Vancouver WA 98683
Off 360.693.8416 Fax 360.693.8426

ODOT-51-01-F2,4 Print Date: 2/4/10




**EXPLANATION**

- PROJECT BORINGS
- LANDSLIDE HEADSCARP
- WILLAMETTE RESERVOIR
- A A' CROSS SECTION

ELEVATION CHANGE (FEET)

- +60 TO +30
- +30 TO +10
- -10 TO -30
- -30 TO -60
- -60 TO -90
- -90 TO -112

N

400 200 0 400

SCALE IN FEET

LIDAR DATA OBTAINED FROM PUGET SOUND LIDAR CONSORTIUM
ORTHOPHOTOGRAPH OBTAINED FROM USGS TERRASERVER

# GROUND SURFACE ELEVATION DIFFERENCE

OREGON SOLAR HIGHWAY – WEST LINN PROJECT
WEST LINN, OR

FIGURE 4

ODOT-51-01

FEBRUARY 2010

GEODESIGN INC
1201 SE Tech Center Drive - Suite 160
Vancouver WA 98683
Off 360.693.8416 Fax 360.693.8426

ODOT-51-01-F2,4 Print Date: 2/4/10

# APPENDIX A

## APPENDIX A

## FIELD EXPLORATIONS

### *GENERAL*

We explored the subsurface conditions at the site by drilling and coring three geotechnical borings (TB 25162-01 through TB 25162-03) between August 26 and September 1, 2009. Western States Soil Conservation Service, Inc. drilled and cored the borings using mud-rotary and HQ coring techniques. The approximate locations of the explorations were determined in the field using a hand-held GPS and are shown on Figure 2.

Members of our engineering geology staff observed the explorations. Soil and rock sampling procedures used in our boring explorations are summarized in the following section. Classifications and sampling intervals are presented on the exploration logs included in this appendix and followed the procedures presented in ODOT Soil and Rock Classification Manual (ODOT, 1987).

### *SOIL AND ROCK SAMPLING*

Soil and rock samples were obtained from borings TB 25162-01 through TB 25162-03 using the following methods.

During mud rotary drilling, SPTs were performed in general conformance with ASTM D 1586 in soil and decomposed rock. The sampler was driven with a 140-pound hammer free-falling 30 inches. The number of blows required to drive the sampler 1 foot, or as otherwise indicated, into the soils is shown adjacent to the sample symbols on the exploration log. Disturbed samples were obtained from the split barrel for subsequent classification and index testing.

HQ rock coring was performed in borings TB 25162-01 through TB 25162-03 in general accordance with ASTM D 2113 to recover intact samples of rock. Core samples were photographed, preserved, and transported in general accordance with ASTM D 5079.

### *SOIL AND ROCK CLASSIFICATION*

The soil and rock samples were classified in accordance with the ODOT Soil and Rock Classification Manual (ODOT, 1987). The exploration logs indicate the depths at which the soil or rock characteristics change, although the change actually could be gradual. Classifications and sampling intervals are presented on the exploration logs included in this appendix.

### *CORE PHOTOGRAPHS*

We photographed each core box used for archiving the rock core collected in borings TB 25162-01 through TB 25162-03. These core photographs are presented on Figures A-1 through A-9 included in this appendix.

# DRILL LOG

OREGON DEPARTMENT OF TRANSPORTATION



Hole No. **TB-25162-01**

| | | |
|---|---|---|
| Project **Oregon Solar Highway - West Linn Project** | Purpose **Slope Stability** | E.A. No. |
| Highway **I-205** | County **Clackamas** | Key No. |
| Hole Location Northing: **621,117.02** Easting: **7,651,841.35** | | Start Card No. |
| Equipment **mud-rotary** | Driller **Western States Soil Conservation** | Bridge No. |
| Project Geologist **Palmer/Woodcock/Heidgerken** | Recorder **Woodcock** | Ground Elev. **345.63 ft** |
| Start Date **August 27, 2009** End Date **August 31, 2009** | Total Depth **82.50 ft** | Tube Height |

**Test Type**
"A" - Auger Core
"X" - Auger
"C" - Core, Barrel Type
"N" - Standard Penetration
"U" - Undisturbed Sample
"T" - Test Pit

**Rock Abbreviations**

| Discontinuity | Shape | Surface Roughness |
|---|---|---|
| J - Joint | Pl - Planar | P - Polished |
| F - Fault | C - Curved | Sl - Slickensided |
| B - Bedding | U - Undulating | Sm - Smooth |
| Fo - Foliation | St - Stepped | R - Rough |
| S - Shear | Ir - Irregular | VR - Very Rough |

**Typical Drilling Abbreviations**

| Drilling Methods | Drilling Remarks |
|---|---|
| WL - Wire Line | LW - Lost Water |
| HS - Hollow Stem Auger | WR - Water Return |
| DF - Drill Fluid | WC - Water Color |
| SA - Solid Auger | DP - Down Pressure |
| CA - Casing Advancer | DR - Drill Rate |
| HA - Hand Auger | DA - Drill Action |

**Lab Acronyms**
CON - Consolidation Test
DS - Direct Shear
P200 - P200 Test
HYD - Hydrometer Gradation
SIEVE - Sieve Gradation
DD - Dry Density
ATT - Atterberg Limits Test

| Depth (ft) | Test Type, No. | Percent Recovery | Soil / Rock: Driving Resistance / Discontinuity Data Or RQD% | Percent Natural Moisture | Material Description (SOIL: Soil Name, USCS, Color, Plasticity, Moisture, Consistency/Relative Density, Texture, Cementation, Structure, Origin. ROCK: Rock Name, Color, Weathering, Hardness, Discontinuity Spacing, Joint Filling, Core Recovery, Formation Name.) | Unit Description | Graphic Log | Drilling Methods, Size and Remarks / Water Level/ Date | Backfill/ Instrumentation |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | **0.00 - 49.50 Sandy GRAVEL with Silt, Clay, Cobbles, and Boulders; Lenses of Silty SAND with Gravel to Sandy SILT with Gravel; ML, SM, GP, GM, GW; (Fill)** | | Advance auger. Occasional drill chatter from 0 to 7.0 feet (possible cobbles and boulders). | |
| 5 | N1 | 94 | 19-31-40 | 21 | N- 1 (5.00-6.50) Silty SAND with gravel; SM; Brown with orange mottles; Low plasticity; Moist; Very dense. Fill | | | Increased drill chatter from 7.0 to 10.0 feet. | |
| 10 | N2 | 50 | 5-7-6 | 25 | N- 2 (10.00-11.50) Sandy GRAVEL with silt and clay; GP/GM; Brown-gray with orange mottled; Moist; Medium dense; Angular to subangular; Lens of red-brown clay with sand. Fill | | | | |
| 15 | N3 | 0 | 50/3" | | N- 3 (15.00-15.30) No recovery | | | Possible cobbles and boulders at 15.0 feet. | |
| 20 | | | | | | | | | |

| Depth (ft) | Test Type, No. | Percent Recovery | Soil / Rock: Driving Resistance / Discontinuity Data Or RQD% | Percent Natural Moisture | Material Description | Unit Description | Graphic Log | Drilling Methods, Size and Remarks / Water Level/ Date | Backfill/ Instrumentation |
|---|---|---|---|---|---|---|---|---|---|
| 20 | N4 | 72 | 16-7-6 | 37 | N- 4 (20.00-21.50) Sandy GRAVEL with silt and clay; GP/GM; Brown-gray; Medium plasticity; Moist; Medium dense; Angular to subangular; Lenses of red-brown sandy clay. Fill | | | | |
| 25 | N5 | 94 | 7-9-9 | 29 | N- 5 (25.00-26.50) Sandy SILT; ML; Gray-brown with orange and red-brown mottles; Low plasticity; Moist; Lenses of silty sand and some gravel to red-brown clay. Very stiff. Fill | | | | |
| 30 | N6 | 72 | 12-31-45 | 17 | N- 6 (30.00-31.50) Silty SAND with gravel, trace clay; SM; Gray-brown with orange mottles; Low plasticity; Moist; Very dense. Fill | | | | |
| 35 | N7 | 72 | 12-25-21 | 19 | N- 7 (35.00-36.50) Sandy GRAVEL with silt; GP/GM; Gray with orange mottles; Moist; Dense, Angular to subangular. Fill | | | | |
| 40 | N8 | 100 | 44-50/4" | 33 | N- 8 (40.00-40.80) Silty SAND with gravel; SM; Gray-brown with orange mottles; Low plasticity; Moist; Very dense. Fill | | | | |
| 45 | N9 | 100 | 50/3" | 27 | N- 9 (45.00-45.20) Sandy GRAVEL with silt; GP/GM; Gray with orange mottles; Moist; Very dense, Angular to subangular. Fill | | | | |
| 50 | N10 | 0 | 50/0" | | N- 10 (49.50-50.00) No recovery | **49.50 - 82.50** | | Drilled to 50.0 feet, then | |

| Depth (ft) | Test Type, No. | Percent Recovery | Soil / Rock: Driving Resistance / Discontinuity Data Or RQD% | Percent Natural Moisture | Material Description (SOIL: Soil Name, USCS, Color, Plasticity, Moisture, Consistency/Relative Density, Texture, Cementation, Structure, Origin. ROCK: Rock Name, Color, Weathering, Hardness, Discontinuity Spacing, Joint Filling, Core Recovery, Formation Name.) | Unit Description | Graphic Log | Drilling Methods, Size and Remarks / Water Level/ Date | Backfill/ Instrumentation |
|---|---|---|---|---|---|---|---|---|---|
| 50 | C1 | 95 | RQD = 25 | | C- 1 (50.00-53.00) BASALT; Gray; Fresh to slightly weathered; Medium hard (R-3); Jointed 10° to 20°, 80º; Moderately close to close spacing; Iron oxide staining on joints; some vesicles. Columbia River Basalt | **BASALT (Columbia River Basalt)** | | switched to rock coring. | |
| | C2 | 103 | RQD = 60 | | C- 2 (53.00-58.00) BASALT; Gray; Fresh to slightly weathered; Medium hard (R-3); Jointed 10° to 20°, 80° to 90º;Close spacing; Iron oxide staining on joints; Some vesicles. Columbia River Basalt | | | | |
| 55 | | | | | | | | | |
| | C3 | 100 | RQD = 92 | | C- 3 (58.00-63.00) BASALT; Gray; Fresh; Hard (R-4); Jointed 10° to 20°, 50º; Moderately close spacing; Some vesicles. Columbia River Basalt | | | | |
| 60 | | | | | | | | | |
| | C4 | 100 | RQD = 94 | | C- 4 (63.00-68.00) BASALT; Gray; Fresh; Hard (R-4); Jointed 10° to 20°; Moderately close to close spacing; Some vesicles. Columbia River Basalt | | | | |
| 65 | | | | | | | | | |
| | C5 | 100 | RQD = 36 | | C- 5 (68.00-73.00) BASALT; Gray; Fresh; Hard (R-4); Jointed 10°, 70º; Moderately close to close spacing; Some vesicles. Columbia River Basalt | | | | |
| 70 | | | | | (69.50) BASALT; Gray-brown; Slightly weathered, Medium hard (R-3); Very close to close spacing, Iron oxide joint staining; Some vesicles. Columbia River Basalt | | | | |
| | | | | | (71.00) BASALT; Red-brown; Moderately Weathered; Medium hard (R-3); Very close to close spacing; Jointed 10°; Yellow zeolite/clay joint infilling; Some vesicles. Columbia River Basalt | | | | |
| | C6 | 100 | RQD = 33 | | C- 6 (73.00-78.00) BASALT; Red-brown to gray-brown; Moderately weathered; Medium hard (R-3); Jointed 10° to 20°, 70º to 80°; Very close to close spacing; Yellow-orange zeolite/clay joint infilling; Some to highly vesicular. Columbia River Basalt | | | | |
| 75 | | | | | | | | | |
| | C7 | 100 | RQD = 19 | | C- 7 (78.00-82.50) BASALT; Gray; Slightly weathered; Medium hard (R-3); Jointed 10° to 30°, 90º; Very close spacing; Yellow patchy zeolite/clay joint infilling; Iron oxide joint staining; Some vesicles. Columbia River Basalt | | | | |
| 80 | | | | | | | | | |

| Depth (ft) | Test Type, No. | Percent Recovery | Soil / Rock: Driving Resistance / Discontinuity Data Or RQD% | Percent Natural Moisture | Material Description<br>SOIL: Soil Name, USCS, Color, Plasticity, Moisture, Consistency/Relative Density, Texture, Cementation, Structure, Origin.<br>ROCK: Rock Name, Color, Weathering, Hardness, Discontinuity Spacing, Joint Filling, Core Recovery, Formation Name. | Unit Description | Graphic Log | Drilling Methods, Size and Remarks / Water Level/ Date | Backfill/ Instrumentation |
|---|---|---|---|---|---|---|---|---|---|
| 80 | | | | | | | | | |
| | | | | | | | | BOH @ 82.5 feet. | |
| 85 | | | | | | | | | |
| 90 | | | | | | | | | |
| 95 | | | | | | | | | |
| 100 | | | | | | | | | |
| 105 | | | | | | | | | |
| 110 | | | | | | | | | |

# DRILL LOG

OREGON DEPARTMENT OF TRANSPORTATION



Hole No. **TB-25162-02**

| | | |
|---|---|---|
| Project **Oregon Solar Highway - West Linn Project** | Purpose **Slope Stability** | E.A. No. |
| Highway **I-205** | County **Clackamas** | Key No. |
| Hole Location Northing: **620,989.32** | Easting: **7,651,908.05** | Start Card No. |
| Equipment **mud-rotary** | Driller **Western States Soil Conservation** | Bridge No. |
| Project Geologist **Palmer/Woodcock/Heidgerken** | Recorder **Woodcock** | Ground Elev. **299.08 ft** |
| Start Date **August 31, 2009** End Date **September 1, 2009** | Total Depth **87.00 ft** | Tube Height |

**Test Type**
"A" - Auger Core
"X" - Auger
"C" - Core, Barrel Type
"N" - Standard Penetration
"U" - Undisturbed Sample
"T" - Test Pit

**Rock Abbreviations**

| Discontinuity | Shape | Surface Roughness |
|---|---|---|
| J - Joint | Pl - Planar | P - Polished |
| F - Fault | C - Curved | Sl - Slickensided |
| B - Bedding | U - Undulating | Sm - Smooth |
| Fo - Foliation | St - Stepped | R - Rough |
| S - Shear | Ir - Irregular | VR - Very Rough |

**Typical Drilling Abbreviations**

| Drilling Methods | Drilling Remarks |
|---|---|
| WL - Wire Line | LW - Lost Water |
| HS - Hollow Stem Auger | WR - Water Return |
| DF - Drill Fluid | WC - Water Color |
| SA - Solid Auger | DP - Down Pressure |
| CA - Casing Advancer | DR - Drill Rate |
| HA - Hand Auger | DA - Drill Action |

**Lab Acronyms**
CON - Consolidation Test
DS - Direct Shear
P200 - P200 Test
HYD - Hydrometer Gradation
SIEVE - Sieve Gradation
DD - Dry Density
ATT - Atterberg Limits Test

| Depth (ft) | Test Type, No. | Percent Recovery | Soil / Rock: Driving Resistance / Discontinuity Data Or RQD% | Percent Natural Moisture | Material Description | Unit Description | Graphic Log | Drilling Methods, Size and Remarks / Water Level/ Date | Backfill/ Instrumentation |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | **0.00 - 10.50 Silty SAND; SM; (Fill)** | | Advance auger. | |
| 5 | N1 | 100 | 48-50/4" | 35 | N- 1 (5.00-5.80) Silty SAND with lenses of Sand SILT; SM; Gray with orange and dark brown mottles; Low plasticity; Moist; Blocky texture; Moderately indurated. Fill | | | | |
| | | | | | | | | Very hard drilling at 9.0 feet. | |
| 10 | N2 | | 50/1" | | N- 2 (10.00-10.10) As in N-1 | | | | |
| | N3 | 87 | 50/1" | | N- 3 (10.50-10.60) Sandy GRAVEL, trace silt; GP; Gray; Moist; Angular to subangular. Columbia River Basalt | **10.50 - 87.00 BASALT (Columbia River Basalt)** | | Switched to rock coring at 10.5 feet. | |
| | C1 | | RQD = 60 | | C- 1 (10.60-12.00) BASALT; Gray; Fresh; Hard (R-4); Jointed 10° to 30°; Close spacing; Some vesicles. Columbia River Basalt | | | | |
| | C2 | 92 | RQD = 79 | | C- 2 (12.00-17.00) BASALT; Gray; Fresh; Hard (R-4); Jointed 10°, 30°, and 70° to 80°; Moderately close spacing; some vesicles. Columbia River Basalt | | | | |
| 15 | | | | | | | | | |
| | C3 | 88 | RQD = 60 | | C- 3 (17.00-22.00) BASALT; Gray; Fresh; Hard (R-4); Jointed 60° to 70°; Close spacing; Patchy yellow zeolite/clay joint infilling; Some vesicles. Columbia River Basalt | | | | |
| 20 | | | | | | | | | |

ODOT DRILL LOG ODOT--51-01-TB25162-01_03.GPJ ODOT_MAN.GDT 11/20/09

| Depth (ft) | Test Type, No. | Percent Recovery | Soil / Rock: Driving Resistance / Discontinuity Data Or RQD% | Percent Natural Moisture | Material Description (SOIL: Soil Name, USCS, Color, Plasticity, Moisture, Consistency/Relative Density, Texture, Cementation, Structure, Origin. ROCK: Rock Name, Color, Weathering, Hardness, Discontinuity Spacing, Joint Filling, Core Recovery, Formation Name.) | Unit Description | Graphic Log | Drilling Methods, Size and Remarks / Water Level/ Date | Backfill/ Instrumentation |
|---|---|---|---|---|---|---|---|---|---|
| 20 | C4 | 100 | RQD = 84 | | C- 4 (22.00-27.00) BASALT; Gray; Fresh; Hard (R-4); Jointed 10° to 30º, 50º; Moderately close to close spacing; Dark gray clayey silt joint infilling; Some vesicles. Columbia River Basalt | | | | |
| 25 | C5 | 100 | RQD = 58 | | C- 5 (27.00-32.00) BASALT; Gray; Fresh; Hard (R-4); Jointed 10° to 30º; Close to moderately close spacing; Light gray silt joint infilling; Some vesicles. Columbia River Basalt | | | | |
| 30 | C6 | 100 | | | (30.00) BASALT, Red-brown; Moderately weathered, Soft to medium hard (R-2 to R-3); Jointed 10° to 30°; Close to very close spacing; Highly vesicular. C- 6 (32.00-37.00) BASALT; Red-brown; Slightly weathered; Medium hard (R-3); Jointed 10º, 40° to 55º, 90º; Close to very close spacing; Patchy yellow zeolite/clay joint infilling; Highly vesicular. Columbia River Basalt | | | | |
| 35 | C7 | 100 | RQD = 67 | | (36.00) BASALT; Red-brown to brown-gray; Slightly weathered; Medium hard (R-3); Jointed 10° to 90º; Orange clayey silt joint infilling; Highly vesicular. C- 7 (37.00-42.00) BASALT; Gray to gray-brown; Slightly weathered; Medium hard to hard (R-3 to R-4); Jointed 10° to 20°, 60° to 70º; Moderately close to close spacing; Patchy joint infilling with orange clayey sand and yellow zeolite/clay; Some vesicles. Columbia River Basalt | | | | |
| 40 | C8 | 100 | RQD = 52 | | C- 8 (42.00-47.00) BASALT; Gray; Slightly weathered; Hard (R-4); Jointed 20° to 30º, 60º to 90º; Close to very close spacing; Patchy infilling with orange-brown sandy clay; Some vesicles. Columbia River Basalt | | | | |
| 45 | C9 | 100 | RQD = 38 | | C- 9 (47.00-52.00) BASALT; Gray to red-brown; Slightly weathered; Medium hard (R-3); Jointed 10º to 30°, 60º to 80º; Close to very close spacing; Patchy brown sandy clay and yellow zeolite/clay oint infilling; Highly vesicular. Columbia River Basalt | | | | |
| 50 | | | | | | | | | |

| Depth (ft) | Test Type, No. | Percent Recovery | Soil / Rock: Driving Resistance / Discontinuity Data Or RQD% | Percent Natural Moisture | Material Description (SOIL: Soil Name, USCS, Color, Plasticity, Moisture, Consistency/Relative Density, Texture, Cementation, Structure, Origin. ROCK: Rock Name, Color, Weathering, Hardness, Discontinuity Spacing, Joint Filling, Core Recovery, Formation Name.) | Unit Description | Graphic Log | Drilling Methods, Size and Remarks / Water Level/ Date | Backfill/ Instrumentation |
|---|---|---|---|---|---|---|---|---|---|
| 50 | | | | | | | | | |
| | C10 | 100 | RQD = 85 | | C- 10 (52.00-57.00) BASALT; Gray; Fresh to slightly weathered; Hard (R-4); Jointed 10° to 30°, 70° to 80°; Close spacing; Joint infilling with yellow-brown clay; Highly vesicular. Columbia River Basalt | | | | |
| 55 | | | | | | | | | |
| | C11 | 100 | RQD = 92 | | C- 11 (57.00-62.00) BASALT; Gray; Fresh to slightly weathered; Hard (R-4); Jointed 10° to 50º, 80° to 90°; Close to moderately close spacing; Patchy joint infilling with orange-brown clay with sand; Highly vesicular. Columbia River Basalt | | | | |
| 60 | | | | | | | | | |
| | C12 | 100 | RQD = 72 | | C- 12 (62.00-67.00) BASALT; Gray; Fresh to slightly weathered; Hard (R-4); Jointed 10º to 40º, 70º to 80°; Close to very close spacing; Patchy orange clayey sand and yellow zeolite/clay joint infilling; Some to highly vesicular. Columbia River Basalt | | | | |
| 65 | | | | | | | | | |
| | C13 | 100 | RQD = 86 | | C- 13 (67.00-72.00) BASALT; Gray; Fresh to slightly weathered; Hard (R-4); Jointed 10°, 80º; Close spacing; Some vesicles. Columbia River Basalt | | | | |
| 70 | | | | | | | | | |
| | C14 | 100 | RQD = 55 | | C- 14 (72.00-77.00) BASALT; Gray; Fresh to slightly weathered; Hard (R-4); Jointed 10º to 30º, 80° to 90º; Moderately close to close spacing; Some vesicles. Columbia River Basalt | | | | |
| 75 | | | | | | | | | |
| | C15 | 100 | RQD = 88 | | C- 15 (77.00-82.00) BASALT; Gray; Fresh; Hard (R-4); Jointed 20º, 50º, 70° to 90º; Moderately close to close spacing; Patchy yellow zeolite joint coating; Some vesicles. Columbia River Basalt | | | | |
| 80 | | | | | | | | | |

| Depth (ft) | Test Type, No. | Percent Recovery | Soil / Rock: Driving Resistance / Discontinuity Data Or RQD% | Percent Natural Moisture | Material Description | Unit Description | Graphic Log | Drilling Methods, Size and Remarks / Water Level/ Date | Backfill/ Instrumentation |
|---|---|---|---|---|---|---|---|---|---|
| 80 | | | | | SOIL: Soil Name, USCS, Color, Plasticity, Moisture, Consistency/Relative Density, Texture, Cementation, Structure, Origin.<br>ROCK: Rock Name, Color, Weathering, Hardness, Discontinuity Spacing, Joint Filling, Core Recovery, Formation Name. | | | | |
| | C16 | 100 | RQD = 60 | | C- 16 (82.00-87.00) BASALT; Gray; Fresh to slightly weathered; Hard (R-4); Jointed 10° to 20°, 60° to 80°; Moderately close to very close spacing; Patchy orange clayey sand infilling and yellow zeolite joint coating; Highly vesicular. Columbia River Basalt | | | | |
| 85 | | | | | | | | | |
| | | | | | | | | BOH @ 87.0 feet. | |
| 90 | | | | | | | | | |
| 95 | | | | | | | | | |
| 100 | | | | | | | | | |
| 105 | | | | | | | | | |
| 110 | | | | | | | | | |

# DRILL LOG

OREGON DEPARTMENT OF TRANSPORTATION



Hole No. **TB-25162-03**

| | | |
|---|---|---|
| Project **Oregon Solar Highway - West Linn Project** | Purpose **Slope Stability** | E.A. No. |
| Highway **I-205** | County **Clackamas** | Key No. |
| Hole Location Northing: **620,831.85** Easting: **7,651,918.56** | | Start Card No. |
| Equipment **HSA/mud-rotary** | Driller **Western States Soil Conservation** | Bridge No. |
| Project Geologist **Palmer/Woodcock/Heidgerken** | Recorder **Heiderken/Woodcock** | Ground Elev. **290.97 ft** |
| Start Date **August 26, 2009** End Date **August 27, 2009** | Total Depth **72.00 ft** | Tube Height |

**Test Type**
"A" - Auger Core
"X" - Auger
"C" - Core, Barrel Type
"N" - Standard Penetration
"U" - Undisturbed Sample
"T" - Test Pit

**Rock Abbreviations**

| Discontinuity | Shape | Surface Roughness |
|---|---|---|
| J - Joint | Pl - Planar | P - Polished |
| F - Fault | C - Curved | Sl - Slickensided |
| B - Bedding | U - Undulating | Sm - Smooth |
| Fo - Foliation | St - Stepped | R - Rough |
| S - Shear | Ir - Irregular | VR - Very Rough |

**Typical Drilling Abbreviations**

| Drilling Methods | Drilling Remarks |
|---|---|
| WL - Wire Line | LW - Lost Water |
| HS - Hollow Stem Auger | WR - Water Return |
| DF - Drill Fluid | WC - Water Color |
| SA - Solid Auger | DP - Down Pressure |
| CA - Casing Advancer | DR - Drill Rate |
| HA - Hand Auger | DA - Drill Action |

**Lab Acronyms**
CON - Consolidation Test
DS - Direct Shear
P200 - P200 Test
HYD - Hydrometer Gradation
SIEVE - Sieve Gradation
DD - Dry Density
ATT - Atterberg Limits Test

| Depth (ft) | Test Type, No. | Percent Recovery | Soil / Rock: Driving Resistance / Discontinuity Data Or RQD% | Percent Natural Moisture | Material Description (SOIL: Soil Name, USCS, Color, Plasticity, Moisture, Consistency/Relative Density, Texture, Cementation, Structure, Origin. ROCK: Rock Name, Color, Weathering, Hardness, Discontinuity Spacing, Joint Filling, Core Recovery, Formation Name.) | Unit Description | Graphic Log | Drilling Methods, Size and Remarks / Water Level/ Date | Backfill/ Instrumentation |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | **0.00 - 39.50 Silty, clayey GRAVEL to Sandy GRAVEL with cobbles and boulders; GM, GC, GW; (Fill)** | | Hard, slow drilling with minor silty gravel in cuttings at surface. | |
| 5 | N1 | 61 | 10-10-10 | 15 | N- 1 (5.00-6.50) Clayey GRAVEL with silt, sand, and cobbles; GC; Brown-gray; Nonplastic to low plasticity; Moist; Medium dense; Angular to subangular. Fill | | | Switched to mud-rotary drilling (4½ TriCone) at 5.0 feet. | |
| | N2 | 44 | 3-3-3 | 22 | N- 2 (7.50-9.00) Sandy GRAVEL with silt and clay to GRAVEL with sand, silt, and clay; GW/GM; Brown; Nonplastic; Moist to wet; Loose. Fill | | | Rapid drill rate from 7.5 to 12.5 feet. | |
| 10 | | | | | | | | | |
| | N3 | 72 | 4-4-9 | 18 | N- 3 (12.50-14.00) Sandy GRAVEL with silt and clay to GRAVEL with sand, silt, and clay; GW; Brown; Nonplastic; Moist to wet; Medium dense. Fill | | | | |
| 15 | | | | | | | | Driller comments: cobbles and boulders at 15.0 feet. Losing mud at approximately 20 gallons. | |
| | N4 | 6 | 5-6-4 | | N- 4 (17.50-19.00) Sandy GRAVEL with clay to Silty GRAVEL with clay; GC/GM; Brown; Nonplastic; Moist to wet; Loose to medium dense. Fill | | | Rapid drill rate from 17.5 to 22.5 feet. | |
| 20 | | | | | | | | | |

| Depth (ft) | Test Type, No. | Percent Recovery | Soil / Rock: Driving Resistance / Discontinuity Data Or RQD% | Percent Natural Moisture | Material Description (SOIL: Soil Name, USCS, Color, Plasticity, Moisture, Consistency/Relative Density, Texture, Cementation, Structure, Origin. ROCK: Rock Name, Color, Weathering, Hardness, Discontinuity Spacing, Joint Filling, Core Recovery, Formation Name.) | Unit Description | Graphic Log | Drilling Methods, Size and Remarks / Water Level/ Date | Backfill/ Instrumentation |
|---|---|---|---|---|---|---|---|---|
| 20 | | | | | | | | |
| | N5 | 39 | 7-5-10 | 18 | N- 5 (22.50-24.00) Sandy GRAVEL with silt, clay, cobbles, and boulders; GW; Brown-gray; Nonplastic; Moist to wet; Medium dense; Angular to subangular. Fill | | | |
| 25 | | | | | | | | |
| | N6 | 17 | 7-5-3 | 22 | N- 6 (27.50-29.00) Sandy GRAVEL with silt, clay, cobbles, and boulders; GW; Brown-gray; Nonplastic; Moist to wet; Loose; Angular to subangular. Fill | | | Driller comments: still losing mud to 27.5 feet. Fairly rapid drill rate from 27.5 to 32.5 feet. |
| 30 | | | | | | | | |
| | N7 | 39 | 7-5-10 | 24 | N- 7 (32.50-34.00) Silty GRAVEL with sand, cobbles, and boulders; GM; Gray-brown; Nonplastic; Moist to wet; Medium dense; Angular to subangular. Fill | | | |
| 35 | | | | | | | | Losing mud circulation and drill chatter scattered at 36.0 feet. |
| | N8 | 44 | 45-29-15 | 18 | N- 8 (37.50-39.00) GRAVEL with sand, silt, cobbles, and boulders, trace clay; GM/GW; Gray; Nonplastic; Moist to wet; Dense; Angular to subangular. Fill | | | |
| | C1 | 100 | RQD = 48 | | C- 1 (39.50-42.00) BASALT; Gray; Fresh; Hard (R-4); Jointed 30° to 40º, 75º; Close spacing; Iron oxide joint staining; Some vesicles. Columbia River Basalt | **39.50 - 72.00 BASALT (Columbia River Basalt)** | | Switched to rock coring at 39.5 feet. |
| 40 | C2 | 100 | RQD = 90 | | C- 2 (42.00-47.00) BASALT; Gray; Fresh; Hard (R-4); Jointed 10° to 20º, 80°; Close to moderately close spacing; Some vesicles. Columbia River Basalt | | | |
| 45 | C3 | 100 | RQD = 34 | | C- 3 (47.00-52.00) BASALT; Gray; Fresh; Hard (R-4); Jointed 0° to 10º, 40° to 50º; Close to very close spacing; Iron oxide joint staining; Some vesicles. Columbia River Basalt | | | |
| 50 | | | | | | | | |

| Depth (ft) | Test Type, No. | Percent Recovery | Soil / Rock: Driving Resistance / Discontinuity Data Or RQD% | Percent Natural Moisture | Material Description (SOIL: Soil Name, USCS, Color, Plasticity, Moisture, Consistency/Relative Density, Texture, Cementation, Structure, Origin. ROCK: Rock Name, Color, Weathering, Hardness, Discontinuity Spacing, Joint Filling, Core Recovery, Formation Name.) | Unit Description | Graphic Log | Drilling Methods, Size and Remarks / Water Level/ Date | Backfill/ Instrumentation |
|---|---|---|---|---|---|---|---|---|---|
| 50 | | | | | (50.00) BASALT, Brown-gray, slightly weathered; Hard (R-4); Iron oxide joint staining; Some vesicles. | | | | |
| | C4 | 100 | RQD = 45 | | C- 4 (52.00-57.00) BASALT; Red-brown; Moderately weathered; Medium hard (R-3); Jointed 20°, 60°; Close to very close spacing; Yellow-brown zeolite/clay joint infilling; Highly vesicular. Columbia River Basalt | | | | |
| 55 | | | | | | | | | |
| | C5 | 100 | RQD = 51 | | C- 5 (57.00-62.00) BASALT; Red-brown; Moderately weathered; Medium hard (R-3); Jointed 0° to 10°, 30° to 40°, 60° to 80°; Close spacing; Yellow-brown zeolite/clay joint infilling; Highly vesicular. Columbia River Basalt. | | | | |
| 60 | | | | | (59.70) BASALT; Gray; Fresh to slightly weathered; Hard (R-4); Jointed 10° to 30°; Moderately close to close spacing; Highly vesicular. | | | | |
| | C6 | 100 | RQD = 52 | | C- 6 (62.00-67.00) BASALT; Gray; Fresh to slightly weathered; Hard (R-4); Jointed 10° to 20°, 60° to 70°; Close spacing; Some to highly vesicular. Columbia River Basalt | | | | |
| 65 | | | | | (64.00) BASALT; Brown-gray; Moderately weathered; Medium hard (R-3); Jointed 10° to 80°; Close to very close spacing; Yellow zeolite/clay joint infilling; Highly vesicular. | | | | |
| | | | | | (65.80) BASALT; Gray; Fresh to moderately weathered; Hard (R-4); Jointed 60° to 80°; Moderately close spacing; Iron staining on joints; Some vesicles. | | | | |
| | C7 | 100 | RQD = 76 | | C- 7 (67.00-72.00) BASALT; Gray; Fresh to slightly weathered; Hard (R-4); Jointed 40° to 55º, 75° to 80º; Close spacing; Patchy infilling with yellow-brown zeolite/clay. Columbia River Basalt | | | | |
| 70 | | | | | | | | | |
| | | | | | | | | BOH @ 72.0 feet. | |
| 75 | | | | | | | | | |
| 80 | | | | | | | | | |

| | | | |
|---|---|---|---|
| GEODESIGN INC<br>1201 SE Tech Center Drive - Suite 160<br>Vancouver WA 98683<br>Off 360.693.8416 Fax 360.693.8426 | ODOT-51-01 | **CORE PHOTOGRAPHS, TB25162-01 BOXES 1 AND 2** | |
| | FEBRUARY 2010 | OREGON SOLAR HIGHWAY – WEST LINN PROJECT<br>WEST LINN, OR | **FIGURE A-1** |

GEODESIGN INC
1201 SE Tech Center Drive - Suite 160
Vancouver WA 98683
Off 360.693.8416 Fax 360.693.8426

| | | |
|---|---|---|
| ODOT-51-01 | **CORE PHOTOGRAPHS, TB25162-01 BOXES 3 AND 4** | |
| FEBRUARY 2010 | OREGON SOLAR HIGHWAY – WEST LINN PROJECT<br>WEST LINN, OR | **FIGURE A-2** |

| | | | |
|---|---|---|---|
| GEODESIGN INC<br>1201 SE Tech Center Drive - Suite 160<br>Vancouver WA 98683<br>Off 360.693.8416 Fax 360.693.8426 | ODOT-51-01 | **CORE PHOTOGRAPHS, TB25162-02 BOXES 1 AND 2** | |
| | FEBRUARY 2010 | OREGON SOLAR HIGHWAY – WEST LINN PROJECT<br>WEST LINN, OR | **FIGURE A-3** |

GEODESIGN INC
1201 SE Tech Center Drive - Suite 160
Vancouver WA 98683
Off 360.693.8416 Fax 360.693.8426

| | | |
|---|---|---|
| ODOT-51-01 | **CORE PHOTOGRAPHS, TB25162-02 BOXES 3 AND 4** | |
| FEBRUARY 2010 | OREGON SOLAR HIGHWAY – WEST LINN PROJECT<br>WEST LINN, OR | **FIGURE A-4** |

GEODESIGN INC
1201 SE Tech Center Drive - Suite 160
Vancouver WA 98683
Off 360.693.8416 Fax 360.693.8426

| | | |
|---|---|---|
| ODOT-51-01 | **CORE PHOTOGRAPHS, TB25162-02 BOXES 5 AND 6** | |
| FEBRUARY 2010 | OREGON SOLAR HIGHWAY – WEST LINN PROJECT<br>WEST LINN, OR | **FIGURE A-5** |

| | | | |
|---|---|---|---|
| GEODESIGN INC<br>1201 SE Tech Center Drive - Suite 160<br>Vancouver WA 98683<br>Off 360.693.8416 Fax 360.693.8426 | ODOT-51-01 | **CORE PHOTOGRAPHS, TB25162-02 BOXES 7 AND 8** | |
| | FEBRUARY 2010 | OREGON SOLAR HIGHWAY – WEST LINN PROJECT<br>WEST LINN, OR | **FIGURE A-6** |

| | | | |
|---|---|---|---|
| GEODESIGN INC<br>1201 SE Tech Center Drive - Suite 160<br>Vancouver WA 98683<br>Off 360.693.8416 Fax 360.693.8426 | ODOT-51-01 | **CORE PHOTOGRAPHS, TB25162-02 BOX 9** | |
| | FEBRUARY 2010 | OREGON SOLAR HIGHWAY – WEST LINN PROJECT<br>WEST LINN, OR | **FIGURE A-7** |

| | | | |
|---|---|---|---|
| GEODESIGN INC<br>1201 SE Tech Center Drive - Suite 160<br>Vancouver WA 98683<br>Off 360.693.8416 Fax 360.693.8426 | ODOT-51-01 | **CORE PHOTOGRAPHS, TB25162-03 BOXES 1 AND 2** | |
| | FEBRUARY 2010 | OREGON SOLAR HIGHWAY – WEST LINN PROJECT<br>WEST LINN, OR | **FIGURE A-8** |

| | | | |
|---|---|---|---|
| GEODESIGN INC<br>1201 SE Tech Center Drive - Suite 160<br>Vancouver WA 98683<br>Off 360.693.8416 Fax 360.693.8426 | ODOT-51-01 | **CORE PHOTOGRAPHS, TB25162-01 BOXES 3 AND 4** | |
| | FEBRUARY 2010 | OREGON SOLAR HIGHWAY – WEST LINN PROJECT<br>WEST LINN, OR | **FIGURE A-9** |

# APPENDIX B

## APPENDIX B

## LABORATORY TESTING

We visually examined soil samples obtained from the explorations to confirm field classifications. We also performed the following testing on samples obtained from the borings.

### *MOISTURE CONTENT*

We tested the natural moisture content of 16 soil samples in general accordance with ASTM D 2216. The natural moisture content is a ratio of the weight of the water to soil in a test sample and is expressed as a percentage. The moisture content values are presented on the exploration logs included in Appendix A and summarized in this appendix.

### *GRAIN-SIZE TESTING*

Grain-size testing was completed on three samples that consisted of percent fines determinations in general accordance with guidelines presented in ASTM C 136 and ASTM D 1140. The results of the percent fines testing are included in this appendix.

### *ROCK STRENGTH TESTING*

Unconfined uniaxial compressive strength tests were conducted by ACS Testing, Inc. of Tigard, Oregon, on core samples from borings TB 25162-01, TB 25162-02, and TB 25162-03. The tests were performed in general accordance with ASTM D 2938, and the results of the unconfined uniaxial compressive strength tests are presented in this appendix.

| SAMPLE INFORMATION | | | MOISTURE CONTENT (PERCENT) | DRY DENSITY (PCF) | SIEVE | | | ATTERBERG LIMITS | | |
|---|---|---|---|---|---|---|---|---|---|---|
| EXPLORATION NUMBER | SAMPLE DEPTH (FEET) | ELEVATION (FEET) | | | GRAVEL (PERCENT) | SAND (PERCENT) | P200 (PERCENT) | LIQUID LIMIT (PERCENT) | PLASTIC LIMIT (PERCENT) | PLASTICITY INDEX (PERCENT) |
| TB-25162-1 | 5.0 | | 21 | | | | 29 | | | |
| TB-25162-1 | 10.0 | | 25 | | | | | | | |
| TB-25162-1 | 20.0 | | 37 | | | | | | | |
| TB-25162-1 | 25.0 | | 29 | | | | | | | |
| TB-25162-1 | 30.0 | | 17 | | | | 17 | | | |
| TB-25162-1 | 35.0 | | 19 | | | | | | | |
| TB-25162-1 | 40.0 | | 33 | | | | | | | |
| TB-25162-1 | 45.0 | | 27 | | | | | | | |
| TB-25162-2 | 5.0 | | 35 | | | | | | | |
| TB-25162-3 | 5.0 | | 15 | | | | | | | |
| TB-25162-3 | 7.5 | | 22 | | | | | | | |
| TB-25162-3 | 12.5 | | 18 | | | | 9 | | | |
| TB-25162-3 | 22.5 | | 18 | | | | | | | |
| TB-25162-3 | 27.5 | | 22 | | | | | | | |
| TB-25162-3 | 32.5 | | 24 | | | | | | | |
| TB-25162-3 | 37.5 | | 18 | | | | | | | |

LAB SUMMARY ODOT-51-01-LAB.GPJ GEODESIGN.GDT PRINT DATE: 2/4/10:KT

GEODESIGN INC
1201 SE Tech Center Drive - Suite 160
Vancouver WA 98683
Off 360.693.8416 Fax 360.693.8426

ODOT-51-01

FEBRUARY 2010

**SUMMARY OF LABORATORY DATA**

OREGON SOLAR HIGHWAY - WEST LINN PROJECT
WEST LINN, OR

**FIGURE B-1**

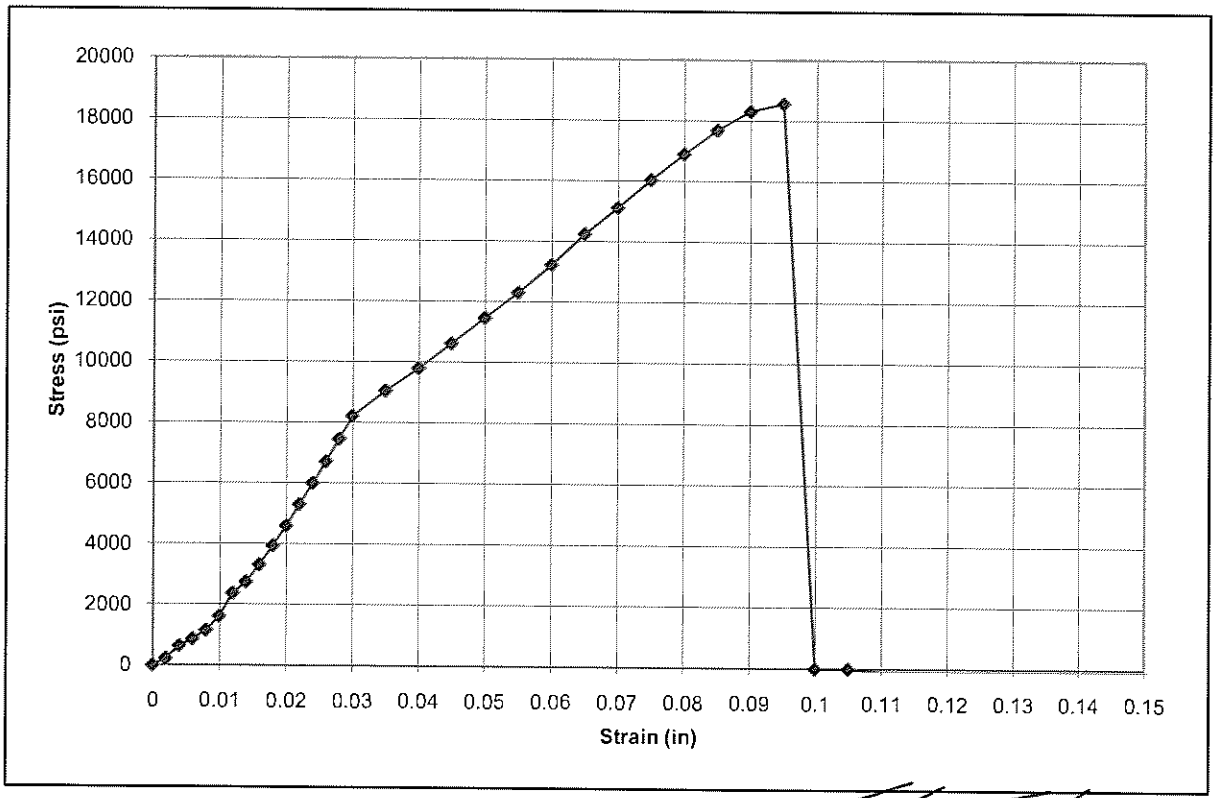
ACS Testing, Inc
7409 SW Tech Center Dr Ste 145
Tigard, OR 97223
PH: 503-443-3799 F: 503-620-2748

**Geo Design**
**15575 SW Sequoia Parkway#100**
**Portland OR 97224**

| | | | |
|---|---|---|---|
| **PROJECT:** | Lab Services | **JOB NO:** | 09-2307 |
| **LOCATION:** | Oregon Solar Hwy | **WORK ORDER NO:** | ODOT-51-01 |
| **MATERIAL:** | Rock Cores | **LAB NO:** | 4745-3 |
| **SAMPLE SOURCE:** | 66.8-67.7 TB 25162-01 | **DATE SAMPLED:** | 09/16/09 |
| **SAMPLE PREP:** | | | |

**UNCONFINED COMPRESSION STRENGTH OF Rock Cores**
**APPLICABLE PORTIONS OF (ASTM D2938)**

| | | | |
|---|---|---|---|
| DIAMETER: | 2.39 in | MAXIMUM STRESS: | 18,563 psi |
| HEIGHT: | 5.97 in | AT STRAIN: | 1.59% |
| STRAIN RATE: | .006 inches/min. | | |
| DRY DENSITY: | 112.1 lb/cu.ft | | |
| MOISTURE: | 2.5% | | |




REVIEWED BY

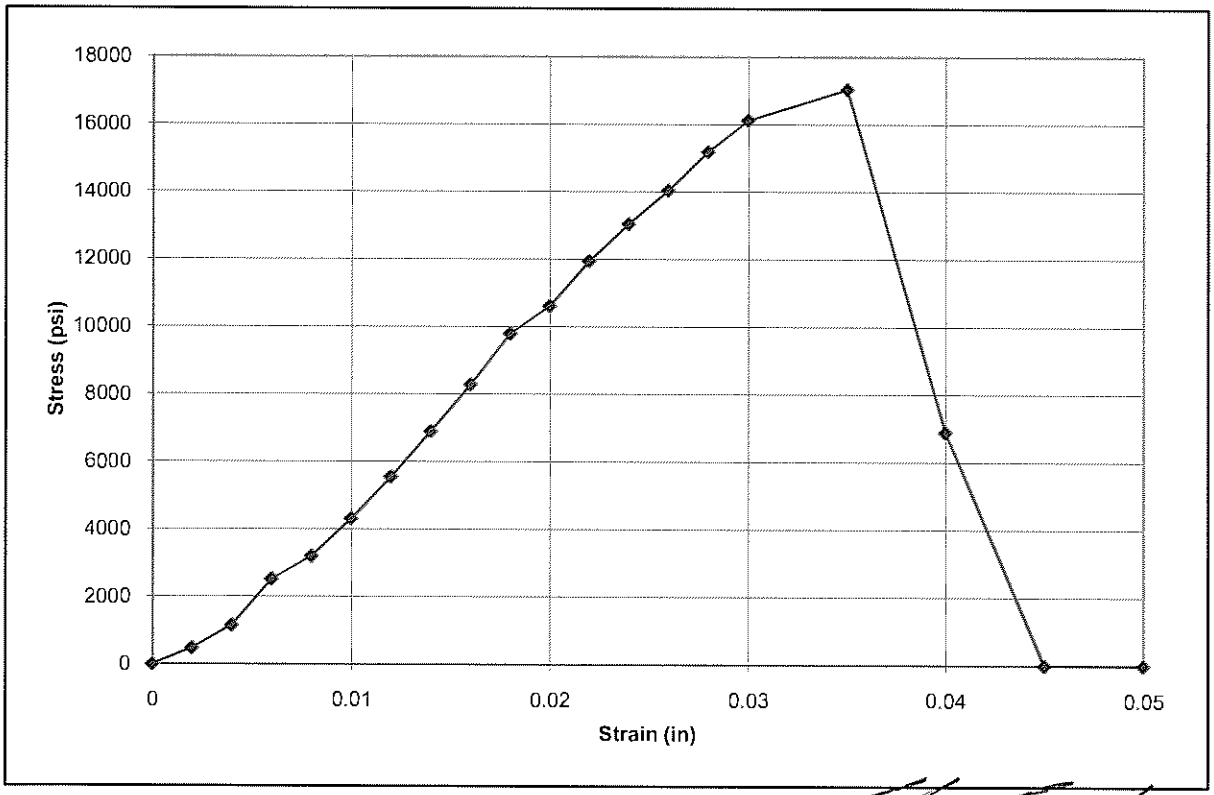
ACS Testing, Inc
7409 SW Tech Center Dr Ste 145
Tigard, OR 97223
PH: 503-443-3799 F: 503-620-2748

**Geo Design**
**15575 SW Sequoia Parkway#100**
**Portland OR 97224**

| | | | |
|---|---|---|---|
| **PROJECT:** | Lab Services | **JOB NO:** | 09-2307 |
| **LOCATION:** | Oregon Solar Hwy | **WORK ORDER NO:** | ODOT-51-01 |
| **MATERIAL:** | Rock Cores | **LAB NO:** | 4745-2 |
| **SAMPLE SOURCE:** | 45.1-45.7 TB 25162-03 | **DATE SAMPLED:** | 09/16/09 |
| **SAMPLE PREP:** | | | |

**UNCONFINED COMPRESSION STRENGTH OF Rock Cores**
**APPLICABLE PORTIONS OF (ASTM D2938)**

| | | | |
|---|---|---|---|
| DIAMETER: | 2.39 in | MAXIMUM STRESS: | 17,040 psi |
| HEIGHT: | 5.98 in | AT STRAIN: | 0.59% |
| STRAIN RATE: | .006 inches/min. | | |
| DRY DENSITY: | 38.1 lb/cu.ft | | |
| MOISTURE: | 2.9% | | |




REVIEWED BY

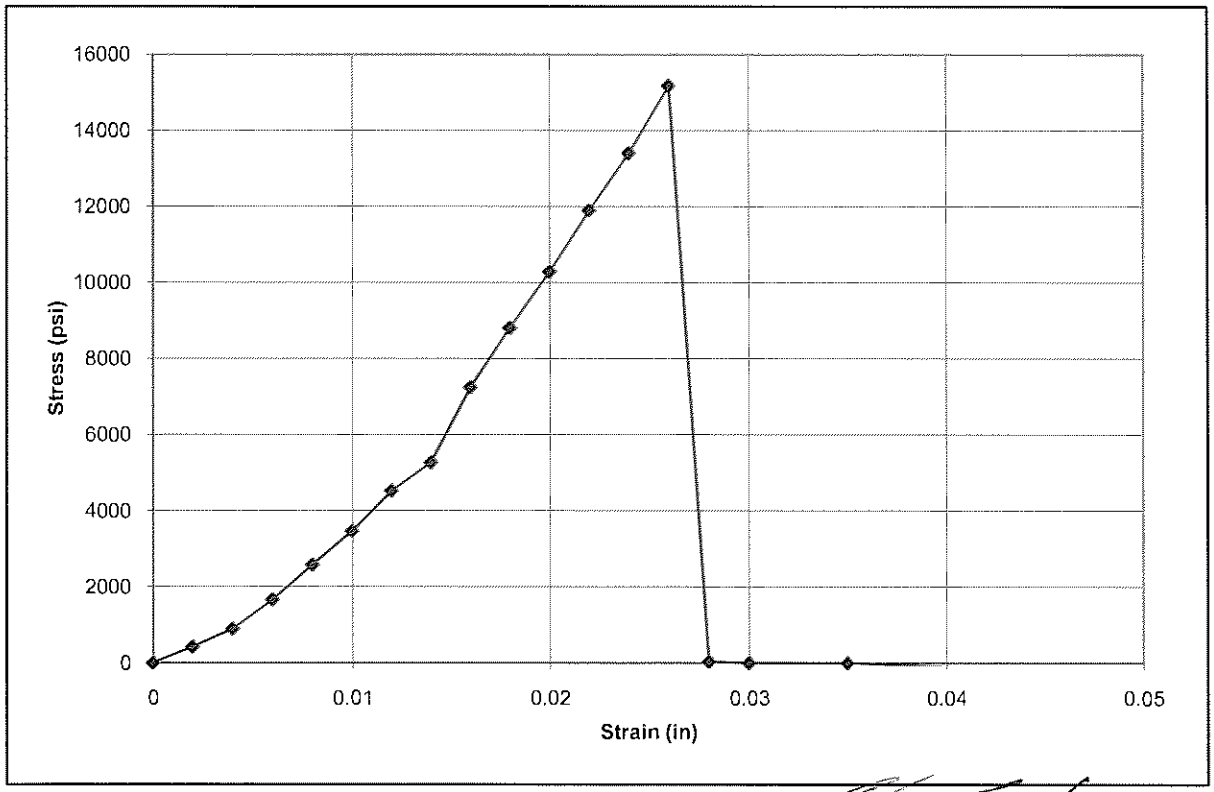
ACS Testing, Inc
7409 SW Tech Center Dr Ste 145
Tigard, OR 97223
PH: 503-443-3799 F: 503-620-2748

**Geo Design**
**15575 SW Sequoia Parkway#100**
**Portland OR 97224**

| | | | |
|---|---|---|---|
| **PROJECT:** | Lab Services | **JOB NO:** | 09-2307 |
| **LOCATION:** | Oregon Solar Hwy | **WORK ORDER NO:** | ODOT-51-01 |
| **MATERIAL:** | Rock Cores | **LAB NO:** | 4745-1 |
| **SAMPLE SOURCE:** | 17.0-17.7 TB 25162-02 | **DATE SAMPLED:** | 09/16/09 |
| **SAMPLE PREP:** | | | |

**UNCONFINED COMPRESSION STRENGTH OF Rock Cores**
**APPLICABLE PORTIONS OF (ASTM D2938)**

| | | | |
|---|---|---|---|
| DIAMETER: | 2.39 in | MAXIMUM STRESS: | 15,180 psi |
| HEIGHT: | 5.96 in | AT STRAIN: | 0.44% |
| STRAIN RATE: | .006 inches/min. | | |
| DRY DENSITY: | 63.8 lb/cu.ft | | |
| MOISTURE: | 2.9% | | |




REVIEWED BY

*DRAFT*

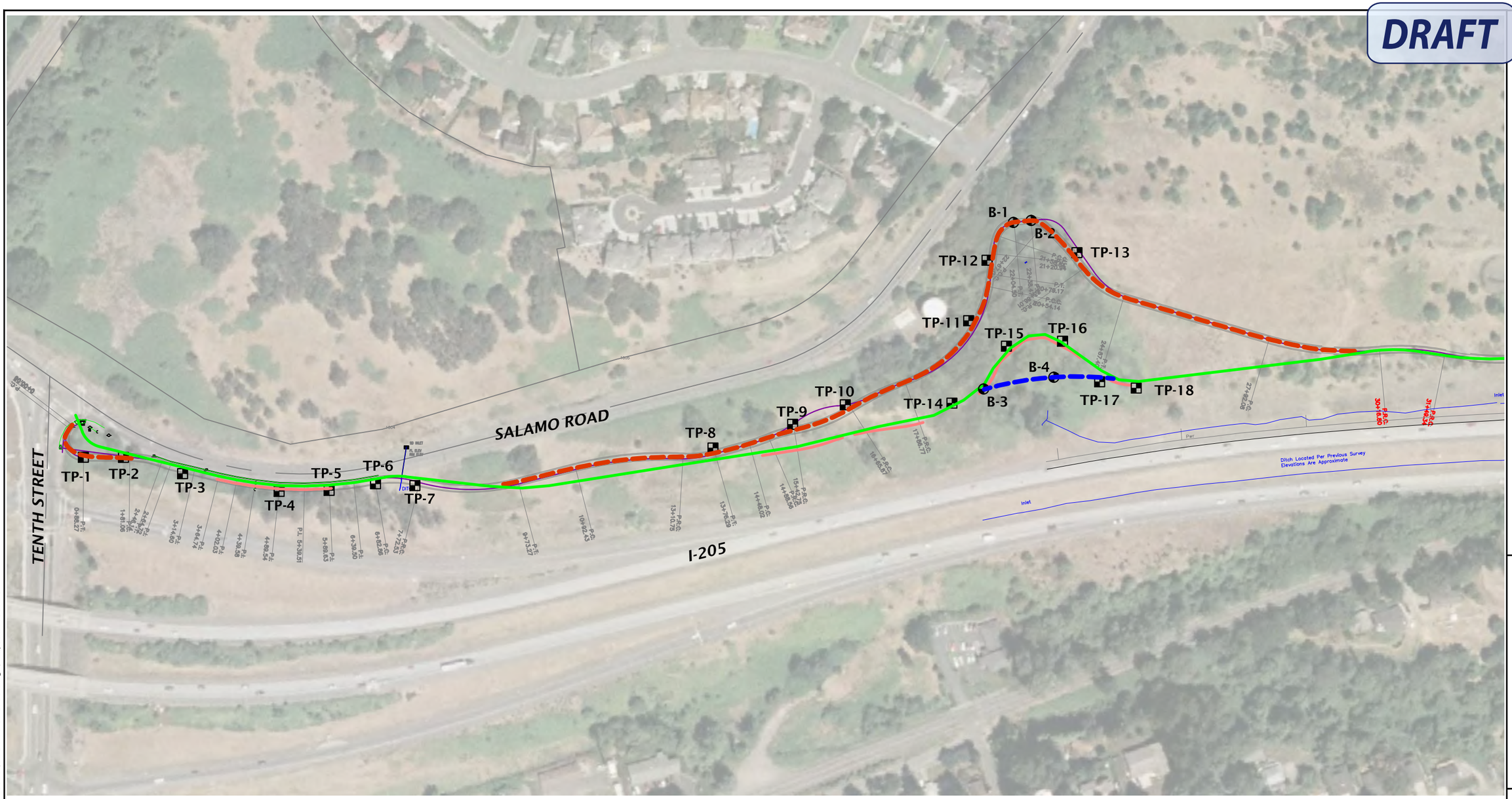
**REPORT OF GEOTECHNICAL ENGINEERING SERVICES**

West Linn Trail Bike/Pedestrian Path
West Linn, Oregon

For
Otak, Inc.
March 7, 2013

GeoDesign Project: ODOT-71-01

DRAFT




**LEGEND:**

| | |
|---|---|
| B-1 | BORING |
| TP-1 | TEST PIT |
| | PROPOSED TRAIL ALIGNMENT |
| | PREVIOUS PROPOSED TRAIL ALIGNMENT 1 |
| | PREVIOUS PROPOSED TRAIL ALIGNMENT 2 |
| | PROPOSED RETAINING WALL LOCATION |

N

0 200 400

(SCALE IN FEET)

SITE PLAN BASED ON DRAWING PROVIDED BY
OTAK, NOVEMBER 26, 2012

# EXPLORATION LOCATIONS

FIGURE 3

WEST LINN TRAIL BIKE/PEDESTRIAN PATH
WEST LINN, OR

ODOT-71-01

MARCH 2013

GEODESIGN INC
15575 SW Sequoia Parkway - Suite 100
Portland OR 97224
Off 503.968.8787 Fax 503.968.3068

Printed By: aday | Print Date: 3/7/2013 2:12:03 PM
File Name: C:\Users\aday\appdata\local\temp\AcPublish_3520\ODOT-71-01-SP03.dwg | Layout: FIGURE 3

# APPENDIX

## FIELD EXPLORATIONS

### *GENERAL*

We explored subsurface conditions along the trail alignment by advancing four borings (B-1 through B-4) to depths ranging between approximately 15 and 32 feet BGS, excavating 18 test pits (TP-1 through TP-18) to depths ranging between 2.5 and 12 feet BGS, and by shallow hand excavations with a shovel. Figure 3 shows the approximate exploration locations. Drilling and test pit excavation services were provided by Western States Drilling on May 26 and 27, 2011 and October 8, 2012 as well as by Dan J. Fischer Excavating, Inc. on January 15, 2013. The drilling was completed using a track-mounted drill rig using mud rotary methods. The test pits were completed using a Hitachi 135 equipped with a rock-toothed bucket and a Kamatsu PC60 trackhoe. The explorations were observed by a member of our geologic staff. Hand excavations were performed by a member of geologic staff. We obtained representative samples of the various soils encountered in the explorations for geotechnical laboratory testing. Classifications and sampling depths are presented on the exploration logs included in this appendix.

Exploration locations were chosen based on the preliminary site plans provided to our office by Otak, Inc. The locations of the explorations were determined in the field by pacing from site features. This information should be considered accurate to the degree implied by the methods used.

### *SOIL SAMPLING*

A member of our geologic staff observed the explorations. We obtained representative samples of the various soils encountered in the explorations for geotechnical laboratory testing. Samples were obtained from the borings using 1½-inch-inside diameter, split-spoon sampler (SPT sampler) and/or Shelby tubes. The split-spoon sampling was conducted in general accordance with ASTM D 1586. The 1½-inch-inside diameter, split-spoon samplers were driven into the soil with a 140-pound hammer free-falling 30 inches. The samplers were driven a total distance of 18 inches. The number of blows required to drive the sampler the final 12 inches is recorded on the exploration logs, unless otherwise noted. Representative grab samples of the soil from the test pit explorations were obtained from the walls and/or base of the test pits using the trackhoe bucket.

### *SOIL CLASSIFICATION*

The soil samples were classified in accordance with the "Exploration Key" (Table A-1) and "Soil Classification System" (Table A-2), which are included in this appendix. The exploration logs indicate the depths at which the soils or their characteristics change, although the change could be gradual. A horizontal line between soil types indicates an observed (visual or drill action) change. If the change occurred between sample locations and was not observed or obvious, the depth was interpreted and the change is indicated using a dashed line. Classifications and sampling intervals are presented on the exploration logs included in this appendix.

## LABORATORY TESTING

### *CLASSIFICATION*

The soil samples were classified in the laboratory to confirm field classifications. The laboratory classifications are included on the exploration logs if those classifications differed from the field classifications.

### *MOISTURE CONTENT*

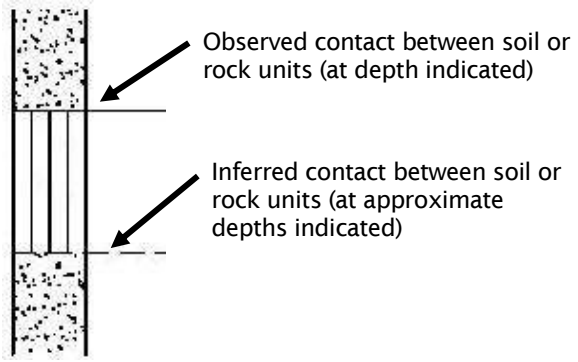
We determined the natural moisture content of selected soil samples in general accordance with ASTM D 2216. The natural moisture content is a ratio of the weight of the water to soil in a test sample and is expressed as a percentage. The test results are presented on the exploration logs included in this appendix.

### *GRAIN-SIZE TESTING*

We completed grain-size testing on a select soil sample in order to determine the fines content (percent passing the U.S. Standard No. 200 Sieve) in general accordance with ASTM D 1140. The fines content test results are presented on the appropriate exploration log.

| SYMBOL | SAMPLING DESCRIPTION |
|---|---|
| | Location of sample obtained in general accordance with ASTM D 1586 Standard Penetration Test with recovery |
| | Location of sample obtained using thin-wall Shelby tube or Geoprobe® sampler in general accordance with ASTM D 1587 with recovery |
| | Location of sample obtained using Dames & Moore sampler and 300-pound hammer or pushed with recovery |
| | Location of sample obtained using Dames & Moore and 140-pound hammer or pushed with recovery |
| | Location of sample obtained using 3-inch-O.D. California split-spoon sampler and 140-pound hammer |
| | Location of grab sample |
| | Rock coring interval |
| | Water level during drilling |
| | Water level taken on date shown |

Graphic Log of Soil and Rock Types




**GEOTECHNICAL TESTING EXPLANATIONS**

| | | | |
|---|---|---|---|
| ATT | Atterberg Limits | PP | Pocket Penetrometer |
| CBR | California Bearing Ratio | P200 | Percent Passing U.S. Standard No. 200 Sieve |
| CON | Consolidation | | |
| DD | Dry Density | RES | Resilient Modulus |
| DS | Direct Shear | SIEV | Sieve Gradation |
| HYD | Hydrometer Gradation | TOR | Torvane |
| MC | Moisture Content | UC | Unconfined Compressive Strength |
| MD | Moisture-Density Relationship | VS | Vane Shear |
| OC | Organic Content | kPa | Kilopascal |
| P | Pushed Sample | | |

**ENVIRONMENTAL TESTING EXPLANATIONS**

| | | | |
|---|---|---|---|
| CA | Sample Submitted for Chemical Analysis | ND | Not Detected |
| P | Pushed Sample | NS | No Visible Sheen |
| PID | Photoionization Detector Headspace Analysis | SS | Slight Sheen |
| | | MS | Moderate Sheen |
| ppm | Parts per Million | HS | Heavy Sheen |

GeoDesign Inc
15575 SW Sequoia Parkway - Suite 100
Portland OR 97224
Off 503.968.8787 Fax 503.968.3068

**EXPLORATION KEY**

**TABLE A-1**

## RELATIVE DENSITY - COARSE-GRAINED SOILS

| Relative Density | Standard Penetration Resistance | Dames & Moore Sampler (140-pound hammer) | Dames & Moore Sampler (300-pound hammer) |
|---|---|---|---|
| Very Loose | 0 – 4 | 0 - 11 | 0 - 4 |
| Loose | 4 – 10 | 11 - 26 | 4 - 10 |
| Medium Dense | 10 – 30 | 26 - 74 | 10 - 30 |
| Dense | 30 – 50 | 74 - 120 | 30 - 47 |
| Very Dense | More than 50 | More than 120 | More than 47 |

## CONSISTENCY - FINE-GRAINED SOILS

| Consistency | Standard Penetration Resistance | Dames & Moore Sampler (140-pound hammer) | Dames & Moore Sampler (300-pound hammer) | Unconfined Compressive Strength (tsf) |
|---|---|---|---|---|
| Very Soft | Less than 2 | Less than 3 | Less than 2 | Less than 0.25 |
| Soft | 2 - 4 | 3 – 6 | 2 - 5 | 0.25 - 0.50 |
| Medium Stiff | 4 - 8 | 6 – 12 | 5 - 9 | 0.50 - 1.0 |
| Stiff | 8 - 15 | 12 – 25 | 9 - 19 | 1.0 - 2.0 |
| Very Stiff | 15 - 30 | 25 – 65 | 19 – 31 | 2.0 - 4.0 |
| Hard | More than 30 | More than 65 | More than 31 | More than 4.0 |

| PRIMARY SOIL DIVISIONS | | | GROUP SYMBOL | GROUP NAME |
|---|---|---|---|---|
| COARSE-GRAINED SOILS (more than 50% retained on No. 200 sieve) | GRAVEL (more than 50% of coarse fraction retained on No. 4 sieve) | CLEAN GRAVELS (< 5% fines) | GW or GP | GRAVEL |
| | | GRAVEL WITH FINES (≥ 5% and ≤ 12% fines) | GW-GM or GP-GM | GRAVEL with silt |
| | | | GW-GC or GP-GC | GRAVEL with clay |
| | | GRAVELS WITH FINES (> 12% fines) | GM | silty GRAVEL |
| | | | GC | clayey GRAVEL |
| | | | GC-GM | silty, clayey GRAVEL |
| | SAND (50% or more of coarse fraction passing No. 4 sieve) | CLEAN SANDS (<5% fines) | SW or SP | SAND |
| | | SANDS WITH FINES (≥ 5% and ≤ 12% fines) | SW-SM or SP-SM | SAND with silt |
| | | | SW-SC or SP-SC | SAND with clay |
| | | SANDS WITH FINES (> 12% fines) | SM | silty SAND |
| | | | SC | clayey SAND |
| | | | SC-SM | silty, clayey SAND |
| FINE-GRAINED SOILS (50% or more passing No. 200 sieve) | SILT AND CLAY | Liquid limit less than 50 | ML | SILT |
| | | | CL | CLAY |
| | | | CL-ML | silty CLAY |
| | | | OL | ORGANIC SILT or ORGANIC CLAY |
| | | Liquid limit 50 or greater | MH | SILT |
| | | | CH | CLAY |
| | | | OH | ORGANIC SILT or ORGANIC CLAY |
| HIGHLY ORGANIC SOILS | | | PT | PEAT |

## MOISTURE CLASSIFICATION

| Term | Field Test |
|---|---|
| dry | very low moisture, dry to touch |
| moist | damp, without visible moisture |
| wet | visible free water, usually saturated |

## ADDITIONAL CONSTITUENTS

**Secondary granular components or other materials such as organics, man-made debris, etc.**

| Percent | Silt and Clay In: Fine-Grained Soils | Silt and Clay In: Coarse-Grained Soils | Percent | Sand and Gravel In: Fine-Grained Soils | Sand and Gravel In: Coarse-Grained Soils |
|---|---|---|---|---|---|
| < 5 | trace | trace | < 5 | trace | trace |
| 5 – 12 | minor | with | 5 – 15 | minor | minor |
| > 12 | some | silty/clayey | 15 – 30 | with | with |
| | | | > 30 | sandy/gravelly | Indicate % |

GEODESIGN INC
15575 SW Sequoia Parkway - Suite 100
Portland OR 97224
Off 503.968.8787 Fax 503.968.3068

**SOIL CLASSIFICATION SYSTEM**

**TABLE A-2**

DRAFT

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEVATION DEPTH | TESTING | SAMPLE | ▲ BLOW COUNT ● MOISTURE CONTENT % ▯▯ RQD% ▨ CORE REC% | INSTALLATION AND COMMENTS |
|---|---|---|---|---|---|---|---|
| 0.0 | | Medium dense, gray, silty GRAVEL with sand (GM); moist, angular (colluvium). | | | | | |
| 2.5 | | | | | | 15 ▲ ● | |
| 5.0 | | Very stiff, orange mottled brown, silty SAND (SM), minor gravel; moist, gravel is fine (colluvium). | 4.5 | P200 | | 24 ▲ ● | P200 = 30% |
| 7.5 | | Very dense, red-brown, fine to coarse SAND with silt (SM); moist, angular (weathered bedrock). | 7.0 | | | 42-42-50/4" ▲ | |
| 10.0 | | Very dense, brown, silty GRAVEL with sand (GM); wet, angular, sand is fine to coarse (weathered bedrock). | 9.5 | | | 40-50/4" ▲ | |
| 12.5 | | | | | | | |
| 15.0 | | | | | | 83 ▲ | |
| 17.5 | | | | | | | |
| 20.0 | | | | | | | |

0 50 100

DRILLED BY: Western States Soil Conservation, Inc. LOGGED BY: CR COMPLETED: 05/26/11

BORING METHOD: mud rotary (see report text) BORING BIT DIAMETER: 3 7/8-inch

BORING LOG ODOT-71-01-B1_4-TP1_18.GPJ GEODESIGN.GDT PRINT DATE: 3/7/13:KT:AMD:KT

GEODESIGN INC
15575 SW Sequoia Parkway - Suite 100
Portland OR 97224
Off 503.968.8787 Fax 503.968.3068

ODOT-71-01

**BORING B-1**

MARCH 2013

WEST LINN TRAIL BIKE/PEDESTRIAN PATH
WEST LINN, OR

**FIGURE A-1**

DRAFT

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEVATION DEPTH | TESTING | SAMPLE | ▲ BLOW COUNT ● MOISTURE CONTENT % RQD% CORE REC% | INSTALLATION AND COMMENTS |
|---|---|---|---|---|---|---|---|
| 20.0 | | grades with sand at 20.0 feet | | | | 50/3" | |
| 22.5 | | | | | | | |
| | | Very dense, gray GRAVEL (GP), minor sand; moist, slightly weathered, sand is fine to coarse. | 24.0 | | | | |
| 25.0 | | | | | | 6-50/3" | |
| 27.5 | | | | | | | |
| 30.0 | | | | | | 50/3" | |
| | | Exploration terminated due to practical refusal on bedrock at a depth of 32.1 feet. | 32.1 | | | 50/1" | Drilling refusal at 32.0 feet Surface elevation was not measured at the time of exploration. |
| 32.5 | | | | | | | |
| 35.0 | | | | | | | |
| 37.5 | | | | | | | |
| 40.0 | | | | | | | |

0 50 100

DRILLED BY: Western States Soil Conservation, Inc. LOGGED BY: CR COMPLETED: 05/26/11

BORING METHOD: mud rotary (see report text) BORING BIT DIAMETER: 3 7/8-inch

BORING LOG ODOT-71-01-B1_4-TP1_18.GPJ GEODESIGN.GDT PRINT DATE: 3/7/13:KT:AMD:KT

GEODESIGN INC
15575 SW Sequoia Parkway - Suite 100
Portland OR 97224
Off 503.968.8787 Fax 503.968.3068

ODOT-71-01

MARCH 2013

**BORING B-1**
(continued)

WEST LINN TRAIL BIKE/PEDESTRIAN PATH
WEST LINN, OR

**FIGURE A-1**

DRAFT

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEVATION DEPTH | TESTING | SAMPLE | ▲ BLOW COUNT ● MOISTURE CONTENT % RQD% CORE REC% | INSTALLATION AND COMMENTS |
|---|---|---|---|---|---|---|---|
| 0.0 | | Loose to medium dense, silty GRAVEL (GM), some sand; moist (colluvium). | | | | | |
| | | large boulder at 2.0 feet | | | | | |
| 2.5 | | | | | | 50/1" | |
| 5.0 | | Very dense, yellow-brown, silty GRAVEL with sand (GM); moist, angular, sand is fine to coarse (weathered bedrock). | 5.0 | | | 52 | |
| 7.5 | | | | | | 50/5" | |
| 10.0 | | grades with less silt at 10.0 feet | | | | 5-/3" | |
| 12.5 | | | | | | | |
| 15.0 | | | | | | 50/4" | |
| 17.5 | | | | | | | |
| 20.0 | | | | | | | |

0 50 100

DRILLED BY: Western States Soil Conservation, Inc. LOGGED BY: CR COMPLETED: 05/27/11

BORING METHOD: mud rotary (see report text) BORING BIT DIAMETER: 3 7/8-inch

GEODESIGN INC
15575 SW Sequoia Parkway - Suite 100
Portland OR 97224
Off 503.968.8787 Fax 503.968.3068

ODOT-71-01

MARCH 2013

**BORING B-2**

WEST LINN TRAIL BIKE/PEDESTRIAN PATH
WEST LINN, OR

**FIGURE A-2**

BORING LOG ODOT-71-01-B1_4-TP1_18.GPJ GEODESIGN.GDT PRINT DATE: 3/7/13:KT:AMD:KT

DRAFT

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEVATION DEPTH | TESTING | SAMPLE | ▲ BLOW COUNT ● MOISTURE CONTENT % RQD% CORE REC% 0 50 100 | INSTALLATION AND COMMENTS |
|---|---|---|---|---|---|---|---|
| 20.0 | | (continued from previous page) | | | | | |
| 22.5 | | | | | | | |
| 25.0 | | | | | | 50/5" | |
| 27.5 | | | | | | | |
| 30.0 | | | | | | 50/5" | |
| | | Exploration terminated due to practical refusal on bedrock at a depth of 30.5 feet. | 30.5 | | | 50/5" | Surface elevation was not measured at the time of exploration. |
| 32.5 | | | | | | | |
| 35.0 | | | | | | | |
| 37.5 | | | | | | | |
| 40.0 | | | | | | 0 50 100 | |

DRILLED BY: Western States Soil Conservation, Inc. LOGGED BY: CR COMPLETED: 05/27/11

BORING METHOD: mud rotary (see report text) BORING BIT DIAMETER: 3 7/8-inch

GEODESIGN INC
15575 SW Sequoia Parkway - Suite 100
Portland OR 97224
Off 503.968.8787 Fax 503.968.3068

ODOT-71-01

MARCH 2013

**BORING B-2**
(continued)

WEST LINN TRAIL BIKE/PEDESTRIAN PATH
WEST LINN, OR

**FIGURE A-2**

BORING LOG ODOT-71-01-B1_4-TP1_18.GPJ GEODESIGN.GDT PRINT DATE: 3/7/13:KT:AMD:KT

DRAFT

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEVATION DEPTH | TESTING | SAMPLE | ▲ BLOW COUNT ● MOISTURE CONTENT % RQD% CORE REC% | INSTALLATION AND COMMENTS |
|---|---|---|---|---|---|---|---|
| 0.0 | | Very stiff, brown SILT with sand (ML), minor clay, trace organics (rootlets); moist (colluvium). | | | | | |
| 2.5 | | | | | | 17 | |
| 5.0 | | Very dense, brown-gray, silty GRAVEL (GM), some clay, minor sand; moist (decomposed bedrock). | 5.0 | | | 66 | |
| 7.5 | | Very dense, gray-brown GRAVEL with sand and silt (GP-GM), minor clay; moist (weathered bedrock). | 7.5 | | | 50/5" | |
| 10.0 | | | | | | 50/4" | |
| 12.5 | | | | | | | |
| 15.0 | | Exploration completed at a depth of 15.1 feet. | 15.1 | | | 50/1" | Surface elevation was not measured at the time of exploration. |
| 17.5 | | | | | | | |
| 20.0 | | | | | | | |

0 50 100

DRILLED BY: Western States Soil Conservation, Inc. LOGGED BY: JGH COMPLETED: 10/08/12

BORING METHOD: mud rotary (see report text) BORING BIT DIAMETER:

GEODESIGN INC
15575 SW Sequoia Parkway - Suite 100
Portland OR 97224
Off 503.968.8787 Fax 503.968.3068

ODOT-71-01

**BORING B-3**

MARCH 2013

WEST LINN TRAIL BIKE/PEDESTRIAN PATH
WEST LINN, OR

**FIGURE A-3**

BORING LOG ODOT-71-01-B1_4-TP1_18.GPJ GEODESIGN.GDT PRINT DATE: 3/7/13:KT:AMD:KT

DRAFT

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEVATION DEPTH | TESTING | SAMPLE | ▲ BLOW COUNT ● MOISTURE CONTENT % RQD% CORE REC% | INSTALLATION AND COMMENTS |
|---|---|---|---|---|---|---|---|
| 0.0 | | Stiff, gray-dark brown SILT with gravel and cobbles (ML), minor sand and clay, trace organics (rootlets); moist (decomposed bedrock, 2- to 3 1/2-inch-thick root zone). | | | | | |
| 2.5 | | | | | | 11 | |
| 5.0 | | grades to very stiff at 5.0 feet | | | | 15 | |
| 7.5 | | Very dense, gray GRAVELwith silt (GP-GM), minor sand, trace clay; moist (weathered bedrock). | 7.0 | | | 50/2" | |
| 10.0 | | | | | | 50/2" | |
| 12.5 | | | | | | | |
| 15.0 | | Exploration completed at a depth of 15.1 feet. | 15.1 | | | 50/1" | Surface elevation was not measured at the time of exploration. |
| 17.5 | | | | | | | |
| 20.0 | | | | | | | |

0 50 100

DRILLED BY: Western States Soil Conservation, Inc. LOGGED BY: JGH COMPLETED: 10/08/12

BORING METHOD: mud rotary (see report text) BORING BIT DIAMETER:

GEODESIGN INC
15575 SW Sequoia Parkway - Suite 100
Portland OR 97224
Off 503.968.8787 Fax 503.968.3068

ODOT-71-01

**BORING B-4**

MARCH 2013

WEST LINN TRAIL BIKE/PEDESTRIAN PATH
WEST LINN, OR

**FIGURE A-4**

BORING LOG ODOT-71-01-B1_4-TP1_18.GPJ GEODESIGN.GDT PRINT DATE: 3/7/13:KT:AMD:KT

DRAFT

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEVATION DEPTH | TESTING | SAMPLE | MOISTURE CONTENT % (0 50 100) | COMMENTS |
|---|---|---|---|---|---|---|---|
| 0.0 | | Medium stiff to stiff, brown SILT with sand (ML), minor clay; moist (2-inch-thick root zone). | | | | | |
| 2.5 | | | | | | | |
| | | Very dense, brown, silty GRAVEL and COBBLES (GM); moist, subangular/fractured (weathered bedrock). | 3.0 | | | | No groundwater seepage observed to the depth explored.<br>No caving observed to the depth explored. |
| | | Exploration terminated due to refusal on bedrock at a depth of 4.5 feet. | 4.5 | | | | Surface elevation was not measured at the time of exploration. |
| 5.0 | | | | | | | |
| 7.5 | | | | | | | |
| 10.0 | | | | | | | |
| 12.5 | | | | | | | |
| 15.0 | | | | | | | |

EXCAVATED BY: Western States Soil Conservation, Inc. LOGGED BY: CLR COMPLETED: 05/26/11

EXCAVATION METHOD: trackhoe (see report text)

GEODESIGN INC
15575 SW Sequoia Parkway - Suite 100
Portland OR 97224
Off 503.968.8787 Fax 503.968.3068

ODOT-71-01

MARCH 2013

**TEST PIT TP-8**

WEST LINN TRAIL BIKE/PEDESTRIAN PATH
WEST LINN, OR

**FIGURE A-12**

TEST PIT LOG - 1 PER PAGE ODOT-71-01-B1_4-TP1_18.GPJ GEODESIGN.GDT PRINT DATE: 3/7/13:KT:AMD:KT

DRAFT

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEVATION DEPTH | TESTING | SAMPLE | ● MOISTURE CONTENT % (0 50 100) | COMMENTS |
|---|---|---|---|---|---|---|---|
| 0.0 | | Very dense, brown, silty GRAVEL and COBBLES (GM); moist, subangular to fractured (1- to 2-inch-thick root zone, weathered bedrock). | | | | | |
| 2.5 | | Exploration terminated due to refusal on bedrock at a depth of 3.0 feet. | 3.0 | | | | No groundwater seepage observed to the depth explored.<br>No caving observed to the depth explored.<br><br>Surface elevation was not measured at the time of exploration. |
| 5.0 | | | | | | | |
| 7.5 | | | | | | | |
| 10.0 | | | | | | | |
| 12.5 | | | | | | | |
| 15.0 | | | | | | | |

EXCAVATED BY: Western States Soil Conservation, Inc. LOGGED BY: CLR COMPLETED: 05/26/11

EXCAVATION METHOD: trackhoe (see report text)

TEST PIT LOG - 1 PER PAGE ODOT-71-01-B1_4-TP1_18.GPJ GEODESIGN.GDT PRINT DATE: 3/7/13:KT:AMD:KT

GEODESIGN INC
15575 SW Sequoia Parkway - Suite 100
Portland OR 97224
Off 503.968.8787 Fax 503.968.3068

ODOT-71-01

**TEST PIT TP-9**

MARCH 2013

WEST LINN TRAIL BIKE/PEDESTRIAN PATH
WEST LINN, OR

**FIGURE A-13**

DRAFT

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEVATION DEPTH | TESTING | SAMPLE | ● MOISTURE CONTENT % (0 50 100) | COMMENTS |
|---|---|---|---|---|---|---|---|
| 0.0 | | Very dense, brown, silty GRAVEL and COBBLES (GM); moist, subangular/fractured (1- to 2--inch-thick root zone, colluvium/weathered bedrock). | | | | | |
| 2.5 | | | | | | | |
| 5.0 | | Exploration terminated due to refusal on bedrock at a depth of 5.0 feet. | 5.0 | | | | No groundwater seepage observed to the depth explored.<br>No caving observed to the depth explored.<br><br>Surface elevation was not measured at the time of exploration. |
| 7.5 | | | | | | | |
| 10.0 | | | | | | | |
| 12.5 | | | | | | | |
| 15.0 | | | | | | | |

EXCAVATED BY: Western States Soil Conservation, Inc. LOGGED BY: CLR COMPLETED: 05/26/11

EXCAVATION METHOD: trackhoe (see report text)

GEODESIGN INC
15575 SW Sequoia Parkway - Suite 100
Portland OR 97224
Off 503.968.8787 Fax 503.968.3068

ODOT-71-01

MARCH 2013

**TEST PIT TP-10**

WEST LINN TRAIL BIKE/PEDESTRIAN PATH
WEST LINN, OR

**FIGURE A-14**

TEST PIT LOG - 1 PER PAGE ODOT-71-01-B1_4-TP1_18.GPJ GEODESIGN.GDT PRINT DATE: 3/7/13:KT:AMD:KT

DRAFT

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEVATION DEPTH | TESTING | SAMPLE | ● MOISTURE CONTENT % (0 50 100) | COMMENTS |
|---|---|---|---|---|---|---|---|
| 0.0 | | Stiff, brown, gravelly SILT with sand (ML), trace clay; moist (<6-inch-thick topsoil and root zone, colluvium). | | | | | Minor caving observed from 1.0 to 3.0 feet. |
| 2.5 | | | | | | | |
| | | Very dense, brown, silty GRAVEL and COBBLES (GM); moist, subangular/fractured (weathered bedrock). | 3.0 | | | | No groundwater seepage observed to the depth explored. |
| | | Exploration terminated due to refusal on bedrock at a depth of 4.0 feet. | 4.0 | | | | Surface elevation was not measured at the time of exploration. |
| 5.0 | | | | | | | |
| 7.5 | | | | | | | |
| 10.0 | | | | | | | |
| 12.5 | | | | | | | |
| 15.0 | | | | | | | |

EXCAVATED BY: Western States Soil Conservation, Inc. LOGGED BY: CLR COMPLETED: 05/26/11

EXCAVATION METHOD: trackhoe (see report text)

GEODESIGN INC
15575 SW Sequoia Parkway - Suite 100
Portland OR 97224
Off 503.968.8787 Fax 503.968.3068

ODOT-71-01

MARCH 2013

**TEST PIT TP-11**

WEST LINN TRAIL BIKE/PEDESTRIAN PATH
WEST LINN, OR

**FIGURE A-15**

TEST PIT LOG - 1 PER PAGE ODOT-71-01-B1_4-TP1_18.GPJ GEODESIGN.GDT PRINT DATE: 3/7/13:KT:AMD:KT

DRAFT

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEVATION DEPTH | TESTING | SAMPLE | MOISTURE CONTENT % (0 50 100) | COMMENTS |
|---|---|---|---|---|---|---|---|
| 0.0 | | Stiff, brown, gravelly SILT with sand (ML), trace roots; moist (topsoil to 12 inches, 4-inch-thick root zone, colluvium). | | | | | |
| | | without roots at 2.0 feet | | | | | |
| 2.5 | | | | | | | |
| | | Dense to very dense, red-brown to brown, silty GRAVEL (GM); moist, subangular to subrounded (weathered bedrock). | 3.5 | | | | |
| 5.0 | | | | | | | No groundwater seepage observed to the depth explored.<br>No caving observed to the depth explored.<br><br>Surface elevation was not measured at the time of exploration. |
| | | Exploration terminated due to refusal on bedrock at a depth of 6.0 feet. | 6.0 | | | | |
| 7.5 | | | | | | | |
| 10.0 | | | | | | | |
| 12.5 | | | | | | | |
| 15.0 | | | | | | | |

EXCAVATED BY: Western States Soil Conservation, Inc. LOGGED BY: CMC COMPLETED: 05/27/11

EXCAVATION METHOD: trackhoe (see report text)

GEODESIGN INC
15575 SW Sequoia Parkway - Suite 100
Portland OR 97224
Off 503.968.8787 Fax 503.968.3068

ODOT-71-01

MARCH 2013

**TEST PIT TP-12**

WEST LINN TRAIL BIKE/PEDESTRIAN PATH
WEST LINN, OR

**FIGURE A-16**

TEST PIT LOG - 1 PER PAGE ODOT-71-01-B1_4-TP1_18.GPJ GEODESIGN.GDT PRINT DATE: 3/7/13:KT:AMD:KT

DRAFT

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEVATION DEPTH | TESTING | SAMPLE | ● MOISTURE CONTENT % (0 50 100) | COMMENTS |
|---|---|---|---|---|---|---|---|
| 0.0 | | Medium dense to dense, brown, fine to coarse, silty GRAVEL with sand (GM); moist, subangular (topsoil to 6 inches, 4-inch-thick root zone) - **FILL**. | | | | | |
| 2.5 | | | | | ☒ | ● | |
| | | Stiff to very stiff, brown SILT with gravel (ML); moist, blocky (colluvium). | 3.0 | PP | | | PP = >4.5 tsf |
| 5.0 | | | | | ☒ | | |
| 7.5 | | becomes with red-brown veining; weakly indurated at 9.0 feet | | | | | |
| 10.0 | | Dense to very dense, red-brown to gray-brown, silty GRAVEL (GM), minor sand; moist, coarse and subangular (weathered bedrock). | 10.0 | | ☒ | | No groundwater seepage observed to the depth explored.<br>No caving observed to the depth explored. |
| | | Exploration terminated due to refusal on bedrock at a depth of 11.5 feet. | 11.5 | | | | Surface elevation was not measured at the time of exploration. |
| 12.5 | | | | | | | |
| 15.0 | | | | | | | |

EXCAVATED BY: Western States Soil Conservation, Inc. LOGGED BY: CMC COMPLETED: 05/27/11

EXCAVATION METHOD: trackhoe (see report text)

GEODESIGN INC
15575 SW Sequoia Parkway - Suite 100
Portland OR 97224
Off 503.968.8787 Fax 503.968.3068

ODOT-71-01

MARCH 2013

**TEST PIT TP-13**

WEST LINN TRAIL BIKE/PEDESTRIAN PATH
WEST LINN, OR

**FIGURE A-17**

TEST PIT LOG - 1 PER PAGE ODOT-71-01-B1_4-TP1_18.GPJ GEODESIGN.GDT PRINT DATE: 3/7/13:KT:AMD:KT

DRAFT

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEVATION DEPTH | TESTING | SAMPLE | ● MOISTURE CONTENT % (0 50 100) | COMMENTS |
|---|---|---|---|---|---|---|---|
| 0.0 | | Medium stiff, orange-brown, silty GRAVEL with cobbles (GM), minor sand, trace organics (roots); moist, organics are up to 3/4-inch diameter(colluvium, 2- to 3 3/4-inch-thick root zone). | | | | | |
| 2.5 | | Medium dense to dense, gray-orange, silty GRAVEL with boulders and cobbles (GM), some clay, trace organics (rootlets); moist (weathered basalt), | 2.5 | | | | No groundwater seepage observed to the depth explored.<br>No caving observed to the depth explored.<br><br>Surface elevation was not measured at the time of exploration. |
| 4.0 | | Exploration terminated due to refusal at a depth of 4.0 feet. | 4.0 | | | | |
| 5.0 | | | | | | | |
| 7.5 | | | | | | | |
| 10.0 | | | | | | | |
| 12.5 | | | | | | | |
| 15.0 | | | | | | | |

EXCAVATED BY: Dan J. Fischer Excavating, Inc. LOGGED BY: JGH COMPLETED: 01/15/13

EXCAVATION METHOD: trackhoe (see report text)

GEODESIGN INC
15575 SW Sequoia Parkway - Suite 100
Portland OR 97224
Off 503.968.8787 Fax 503.968.3068

ODOT-71-01

MARCH 2013

**TEST PIT TP-14**

WEST LINN TRAIL BIKE/PEDESTRIAN PATH
WEST LINN, OR

**FIGURE A-18**

TEST PIT LOG - 1 PER PAGE ODOT-71-01-B1_4-TP1_18.GPJ GEODESIGN.GDT PRINT DATE: 3/7/13:KT:AMD:KT

DRAFT

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEVATION DEPTH | TESTING | SAMPLE | MOISTURE CONTENT % (0 50 100) | COMMENTS |
|---|---|---|---|---|---|---|---|
| 0.0 | | Medium stiff, brown SILT (ML), some clay, minor organics (roots); moist, organics are up to 2-inch diameter (topsoil, 3-inch-thick root zone). | | | | | Minor caving observed to the depth explored. |
| | | Medium stiff, orange-brown SILT with cobbles (ML), minor clay, trace organics (roots); moist, organics are up to 1-inch diameter (colluvium). | 1.0 | | | | |
| 2.5 | | | | | | | |
| | | Medium dense to dense, gray-orange GRAVEL with silt and cobbles (GP-GM), minor clay, trace organics (rootlets); moist (weathered bedrock). | 3.0 | | | ● | |
| 5.0 | | | | | | | |
| 7.5 | | | | | | | No groundwater seepage observed to the depth explored. |
| | | Exploration terminated due to refusal at a depth of 9.0 feet. | 9.0 | | | | Surface elevation was not measured at the time of exploration. |
| 10.0 | | | | | | | |
| 12.5 | | | | | | | |
| 15.0 | | | | | | | |

EXCAVATED BY: Dan J. Fischer Excavating, Inc. LOGGED BY: JGH COMPLETED: 01/15/13

EXCAVATION METHOD: trackhoe (see report text)

GEODESIGN INC
15575 SW Sequoia Parkway - Suite 100
Portland OR 97224
Off 503.968.8787 Fax 503.968.3068

ODOT-71-01

MARCH 2013

**TEST PIT TP-15**

WEST LINN TRAIL BIKE/PEDESTRIAN PATH
WEST LINN, OR

**FIGURE A-19**

TEST PIT LOG - 1 PER PAGE ODOT-71-01-B1_4-TP1_18.GPJ GEODESIGN.GDT PRINT DATE: 3/7/13:KT:AMD:KT

DRAFT

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEVATION DEPTH | TESTING | SAMPLE | ● MOISTURE CONTENT % (0 50 100) | COMMENTS |
|---|---|---|---|---|---|---|---|
| 0.0 | | Medium stiff, gray SILT (ML), minor gravel and organics (roots), some clay; moist, organics are up to 1-inch diameter (topsoil, 2 1/2- to 3 1/2-inch-thick root zone). | 0.8 | | ⊠ | | |
| | | Medium stiff, orange-brown SILT with cobbles (ML), minor clay and sand; moist (colluvium). | | | ⊠ | | |
| 2.5 | | Medium dense to dense, gray-orange GRAVEL with silt and cobbles (GP-GM), minor clay; moist (weathered bedrock). | 2.5 | | ⊠ | | No groundwater seepage observed to the depth explored.<br>No caving observed to the depth explored.<br><br>Surface elevation was not measured at the time of exploration. |
| | | Exploration terminated due to refusal at a depth of 4.0 feet. | 4.0 | | | | |
| 5.0 | | | | | | | |
| 7.5 | | | | | | | |
| 10.0 | | | | | | | |
| 12.5 | | | | | | | |
| 15.0 | | | | | | | |

EXCAVATED BY: Dan J. Fischer Excavating, Inc. LOGGED BY: JGH COMPLETED: 01/15/13

EXCAVATION METHOD: trackhoe (see report text)

GEODESIGN INC
15575 SW Sequoia Parkway - Suite 100
Portland OR 97224
Off 503.968.8787 Fax 503.968.3068

ODOT-71-01

MARCH 2013

**TEST PIT TP-16**

WEST LINN TRAIL BIKE/PEDESTRIAN PATH
WEST LINN, OR

**FIGURE A-20**

TEST PIT LOG - 1 PER PAGE ODOT-71-01-B1_4-TP1_18.GPJ GEODESIGN.GDT PRINT DATE: 3/7/13:KT:AMD:KT

DRAFT

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEVATION DEPTH | TESTING | SAMPLE | MOISTURE CONTENT % (0 50 100) | COMMENTS |
|---|---|---|---|---|---|---|---|
| 0.0 | | Medium stiff, brown SILT with gravel to cobbles (ML), some clay, trace organics (roots); moist, organics are up to 1-inch diameter (topsoil, 2-inch-thick root zone). | | | | | Minor caving observed 0.0 to 7.0 feet. |
| 2.5 | | | | | | | |
| | | Medium dense, orange-brown GRAVEL with cobbles to boulders and silt (GP-GM), minor sand, trace clay and organics (roots); moist, organics are up to 1/4-inch diameter. | 3.0 | | | | |
| 5.0 | | Medium stiff, orange brown, clayey GRAVEL with cobbles (GC), minor sand, trace silt; moist (colluvium). | 5.0 | | | | |
| | | Medium dense to dense, gray-orange GRAVEL with cobbles (GP), trace silt and clay; moist (weathered bedrock). | 7.0 | | | | No groundwater seepage observed to the depth explored. |
| 7.5 | | | | | | | |
| | | Exploration terminated due to refusal at a depth of 9.0 feet. | 9.0 | | | | Surface elevation was not measured at the time of exploration. |
| 10.0 | | | | | | | |
| 12.5 | | | | | | | |
| 15.0 | | | | | | | |

EXCAVATED BY: Dan J. Fischer Excavating, Inc. LOGGED BY: JGH COMPLETED: 01/15/13

EXCAVATION METHOD: trackhoe (see report text)

GeoDesign Inc
15575 SW Sequoia Parkway - Suite 100
Portland OR 97224
Off 503.968.8787 Fax 503.968.3068

ODOT-71-01

MARCH 2013

**TEST PIT TP-17**

WEST LINN TRAIL BIKE/PEDESTRIAN PATH
WEST LINN, OR

**FIGURE A-21**

TEST PIT LOG - 1 PER PAGE ODOT-71-01-B1_4-TP1_18.GPJ GEODESIGN.GDT PRINT DATE: 3/7/13:KT:AMD:KT

DRAFT

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION | ELEVATION DEPTH | TESTING | SAMPLE | ● MOISTURE CONTENT % (0 50 100) | COMMENTS |
|---|---|---|---|---|---|---|---|
| 0.0 | | Medium stiff, brown SILT with gravel to cobbles (ML), some clay, trace organics (roots); moist, organics are up to 3/4-inch diameter (colluvium). | | | | | Minor caving observed to the depth explored. |
| | | Medium dense to dense, orange-gray, clayey GRAVEL with cobbles (GC), minor sand, trace silt; moist (weathered bedrock). | 1.2 | | | | |
| 2.5 | | | | | | ● | |
| 5.0 | | with boulders at 5.0 feet | | | | | |
| 7.5 | | | | | | | |
| 10.0 | | | | | | | No groundwater seepage observed to the depth explored.<br><br>Surface elevation was not measured at the time of exploration. |
| | | Exploration terminated due to refusal at a depth of 11.0 feet. | 11.0 | | | | |
| 12.5 | | | | | | | |
| 15.0 | | | | | | | |

EXCAVATED BY: Dan J. Fischer Excavating, Inc. LOGGED BY: JGH COMPLETED: 01/15/13

EXCAVATION METHOD: trackhoe (see report text)

TEST PIT LOG - 1 PER PAGE ODOT-71-01-B1_4-TP1_18.GPJ GEODESIGN.GDT PRINT DATE: 3/7/13:KT:AMD:KT

GEODESIGN INC
15575 SW Sequoia Parkway - Suite 100
Portland OR 97224
Off 503.968.8787 Fax 503.968.3068

ODOT-71-01

**TEST PIT TP-18**

MARCH 2013

WEST LINN TRAIL BIKE/PEDESTRIAN PATH
WEST LINN, OR

**FIGURE A-22**

DRAFT

| SAMPLE INFORMATION | | | MOISTURE CONTENT (PERCENT) | DRY DENSITY (PCF) | SIEVE | | | ATTERBERG LIMITS | | |
|---|---|---|---|---|---|---|---|---|---|---|
| EXPLORATION NUMBER | SAMPLE DEPTH (FEET) | ELEVATION (FEET) | | | GRAVEL (PERCENT) | SAND (PERCENT) | P200 (PERCENT) | LIQUID LIMIT (PERCENT) | PLASTIC LIMIT (PERCENT) | PLASTICITY INDEX (PERCENT) |
| B-1 | 2.5 | | 30 | | | | | | | |
| B-1 | 5.0 | | 73 | | | | 30 | | | |
| B-2 | 5.0 | | 33 | | | | | | | |
| TP-1 | 3.0 | | 28 | | | | | | | |
| TP-2 | 3.0 | | 30 | | | | | | | |
| TP-3 | 2.0 | | 20 | | | | | | | |
| TP-4 | 2.0 | | 10 | | | | | | | |
| TP-7 | 2.5 | | 9 | | | | | | | |
| TP-8 | 1.0 | | 27 | | | | | | | |
| TP-11 | 2.0 | | 19 | | | | | | | |
| TP-12 | 3.0 | | 34 | | | | | | | |
| TP-13 | 2.0 | | 22 | | | | | | | |
| TP-14 | 1.0 | | 25 | | | | | | | |
| TP-15 | 4.0 | | 13 | | | | | | | |
| TP-17 | 2.0 | | 29 | | | | | | | |
| TP-18 | 3.0 | | 26 | | | | | | | |

LAB SUMMARY ODOT-71-01-B1_4-TP1_18.GPJ GEODESIGN.GDT PRINT DATE: 3/7/13:KT

GEODESIGN INC
15575 SW Sequoia Parkway - Suite 100
Portland OR 97224
Off 503.968.8787 Fax 503.968.3068

ODOT-71-01

MARCH 2013

**SUMMARY OF LABORATORY DATA**

WEST LINN TRAIL BIKE/PEDESTRIAN PATH
WEST LINN, OR

**FIGURE A-23**

CORNELL, HOWLAND, HAYES & MERRYFIELD
ENGINEERS AND PLANNERS

1600 WESTERN AVENUE • CORVALLIS, OREGON 97330
TELEPHONE: AREA CODE 503/752-4271
OTHER OFFICES IN: SEATTLE • BOISE • PORTLAND

10 November 1969

Project No. P5572.0

City of West Linn
West Linn, Oregon 97068

Attention: Mr. Richard W. Dippner, City Administrator

Gentlemen: Willamette Reservoir and FAI-205 Landslide

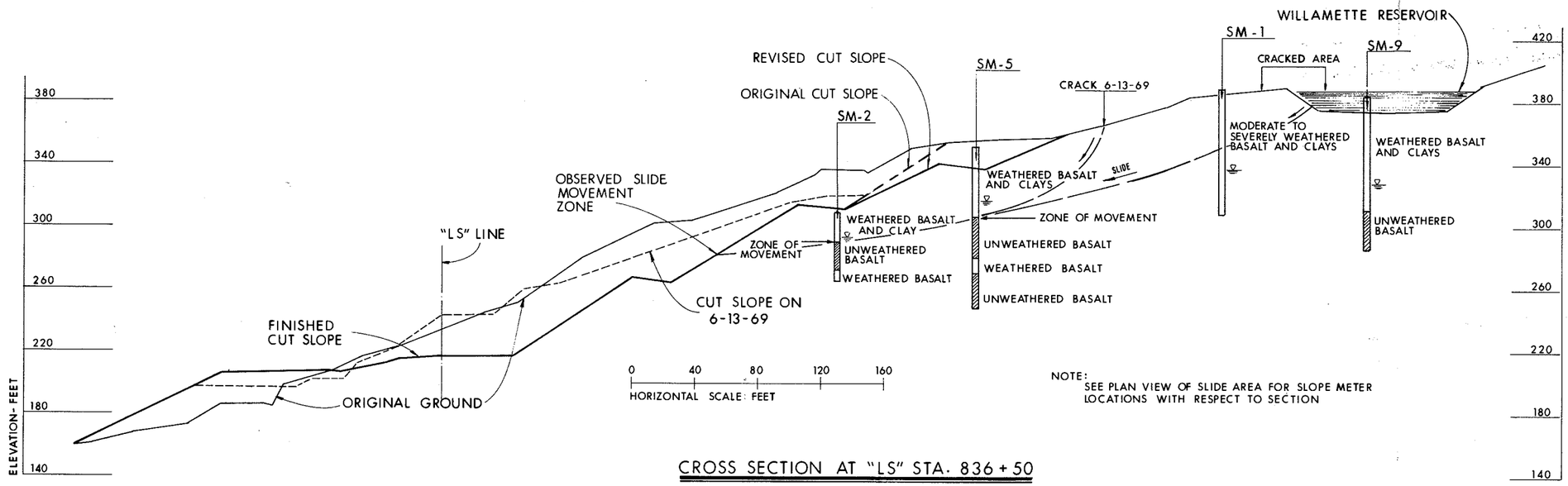
This letter presents our investigation of the condition of the Willamette Reservoir. The landslide associated with the construction of FAI-205 disrupted the reservoir and the distribution pipelines, as well as damaged several houses and other property located above the work area. This investigation was authorized in September, 1969, to examine the condition of the reservoir and to recommend its repair or abandonment. Conclusions and recommendations are presented at the end of this letter.

## INTRODUCTION

Willamette Reservoir is located on the hills above the Cities of West Linn and Willamette, with a water surface elevation of 387. FAI-205 is under construction below the reservoir at about elevation 220, in a side hill excavation with designed slopes of 1 on 1.5 and three benches in the cut slope. On the evening of 10 June 1969, an Oregon State Highway Department (OSHD) inspector discovered cracks in the street and ground in the vicinity of the reservoir.

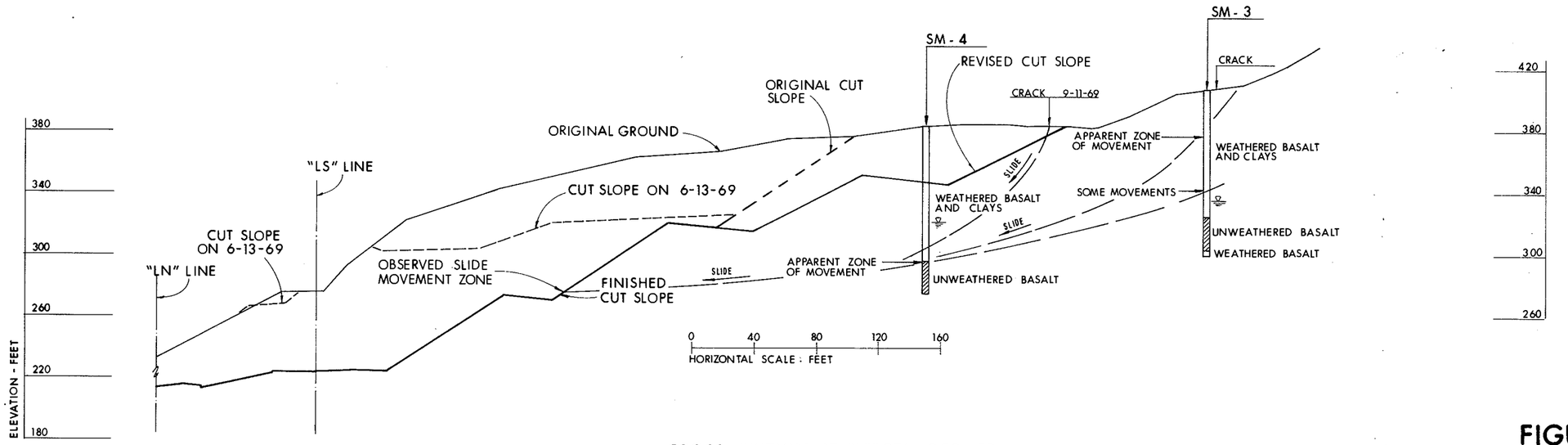
On 12 June 1969, the inflow and outflow pipes of the reservoir were closed, and the water level in the reservoir dropped 0.75-feet in 2-hours. The reservoir leakage at this time was 320-gallons per minue (gpm). The reservoir inflow and outflow pipes were then opened, but the water surface continued to drop and the reservoir could not be filled. One of the reservoir joints was observed to open 0.01-feet (1/8-inch) in a 24-hour period. On 14 June, 1969, the reservoir was drained and has been out of service since. Construction of a water main to bypass the reservoir area was authorized by the OSHD, and completed one month later on 14 July 1969. The same day the bypass main was placed in service, the 8-inch main serving the City of Willamette was pulled apart by slide movements just below the reservoir.

The condition of the reservoir prior to the June landslide activity is known to be good. In March 1969, the City water superintendent commented that the reservoir leakage had recently increased because of FAI-205 construction blasting.




NOTE:
SEE PLAN VIEW OF SLIDE AREA FOR SLOPE METER LOCATIONS WITH RESPECT TO SECTION

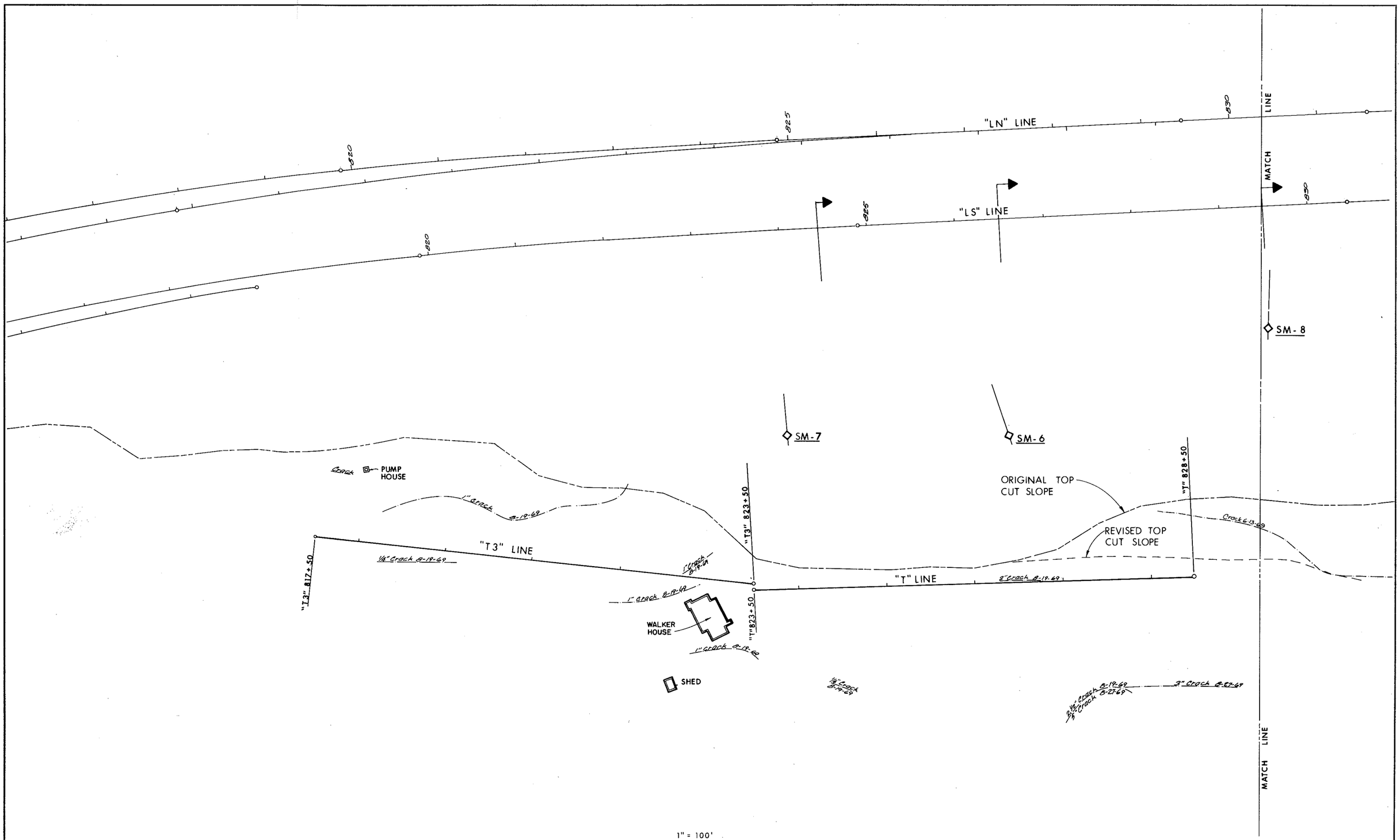
CROSS SECTION AT "LS" STA. 836+50




CROSS SECTION AT "LS" STA. 832+50

# FIGURE 3
CITY OF WEST LINN, OREGON
## FAI-205 LANDSLIDE STUDIES
## CROSS SECTIONS

CORNELL, HOWLAND, HAYES & MERRYFIELD
SEATTLE CORVALLIS BOISE PORTLAND
CH2M




1" = 100'

FIGURE 1

"LN" LINE

"LS" LINE

830

835

840

MATCH LINE

SM-8

SM-2

SM-5

SM-4

SM-1

SM-3

SM-9

ORIGINAL TOP CUT SLOPE

REVISED TOP CUT SLOPE

"T" LINE

"T" 828+50

Crack 6-13-69

½" Crack 9-10-69

¾" Crack 9-11-69

¼" Crack 9-25-69

Crack 6-13-69

3" Crack 8-27-69

2" Crack 9-24-69

Cracked Area 6-13-69

¾" Crack 9-24-69

½" Crack 9-24-69

Crack

PUMP HOUSE

WILLAMETTE WATER RESERVOIR

N

1" = 100'

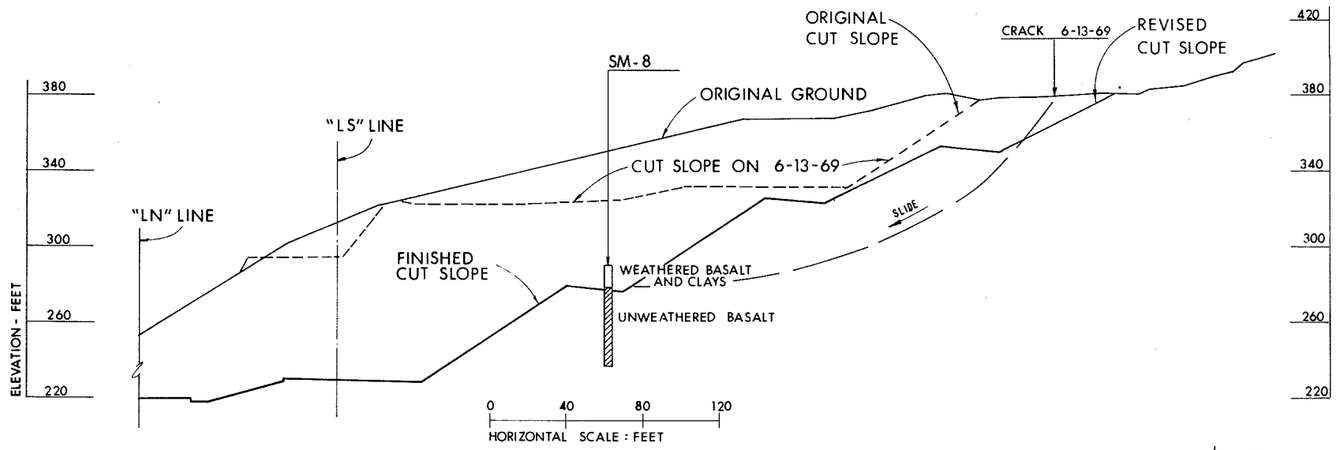
# FIGURE 1

CITY OF WEST LINN, OREGON

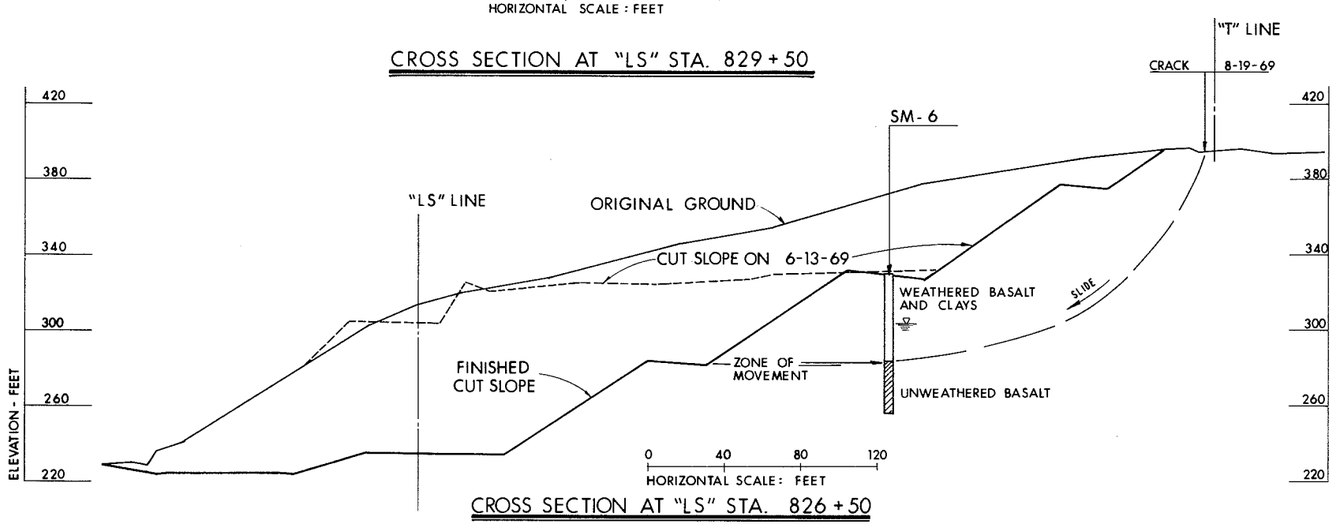
## FAI-205 LANDSLIDE STUDIES GENERAL PLAN

CORNELL, HOWLAND, HAYES & MERRYFIELD
SEATTLE CORVALLIS BOISE PORTLAND

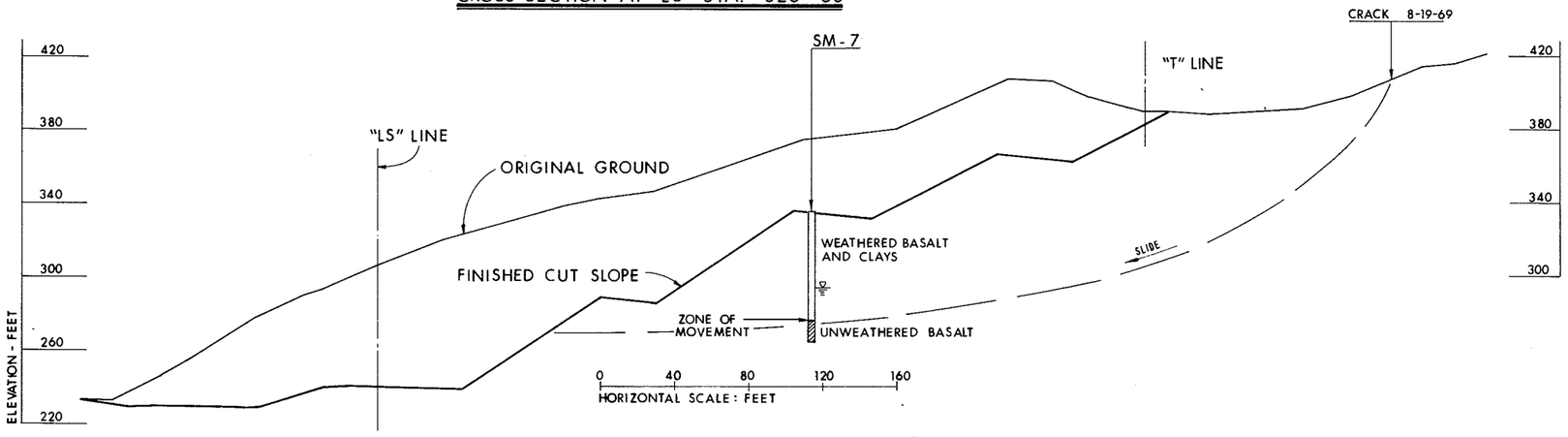
CH2M




CROSS SECTION AT "LS" STA. 829+50




CROSS SECTION AT "LS" STA. 826+50




CROSS SECTION AT "LS" STA. 824+00

# FIGURE 2
CITY OF WEST LINN, OREGON

## FAI-205 LANDSLIDE STUDIES
## CROSS SECTIONS

CORNELL, HOWLAND, HAYES & MERRYFIELD
SEATTLE CORVALLIS BOISE PORTLAND
CH2M

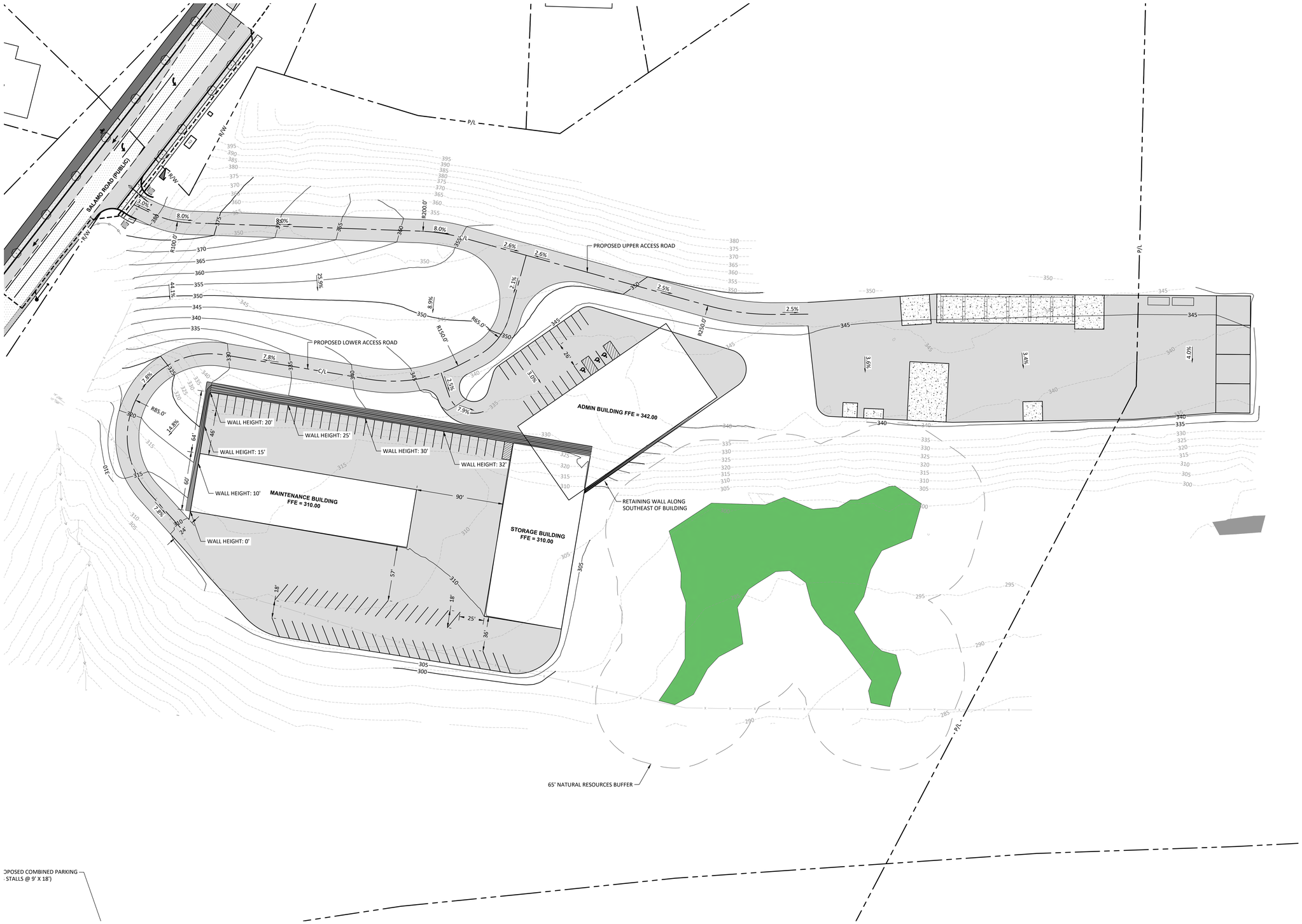
# APPENDIX H

# APPENDIX H
# SCHEMATIC SITE PLANS

Relevant schematic site plans are presented in this appendix.

DRAFT

FILE PATH: C:\Revit_Local\23028_West Linn Public Works_tjorgensenZEPNR.rvt




**LEGEND:**

- ASPHALT PAVEMENT
- CONCRETE PAVEMENT
- GENERAL LANDSCAPING
- WETLAND AREA
- STORM LINE
- SAN — SANITARY LINE
- W — WATER LINE
- 65' NATURAL RESOURCES BUFFER

NOT FOR CONSTRUCTION

# WEST LINN PUBLIC WORKS FACILITY

**Job Number:** 23028

**WEST LINN, OR**

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

THESE DRAWINGS ARE THE ORIGINAL UNPUBLISHED WORK OF THE ARCHITECT AND MAY NOT BE DUPLICATED OR USED WITHOUT THE WRITTEN CONSENT OF THE ARCHITECT.

OPOSED COMBINED PARKING
STALLS @ 9' X 18')

## PLAN VIEW

SCALE: 1" = 40'

0 20 40 80

SCALE: 1" = 40'

| | |
|---|---|
| SCHEMATIC DESIGN | 12.13.2024 |
| ISSUE | DATE |

**Drawing:**

**SITE, UTILITY & GRADING PLAN**

**Sheet No:**

**C1.0**

FILE PATH: Autodesk Docs://23028_West Linn Public Works/23028_West Linn Public Works_24.rvt

Scott Edwards Architecture
2525 E Burnside St. 503.226.3617
Portland, OR 97214 seallp.com

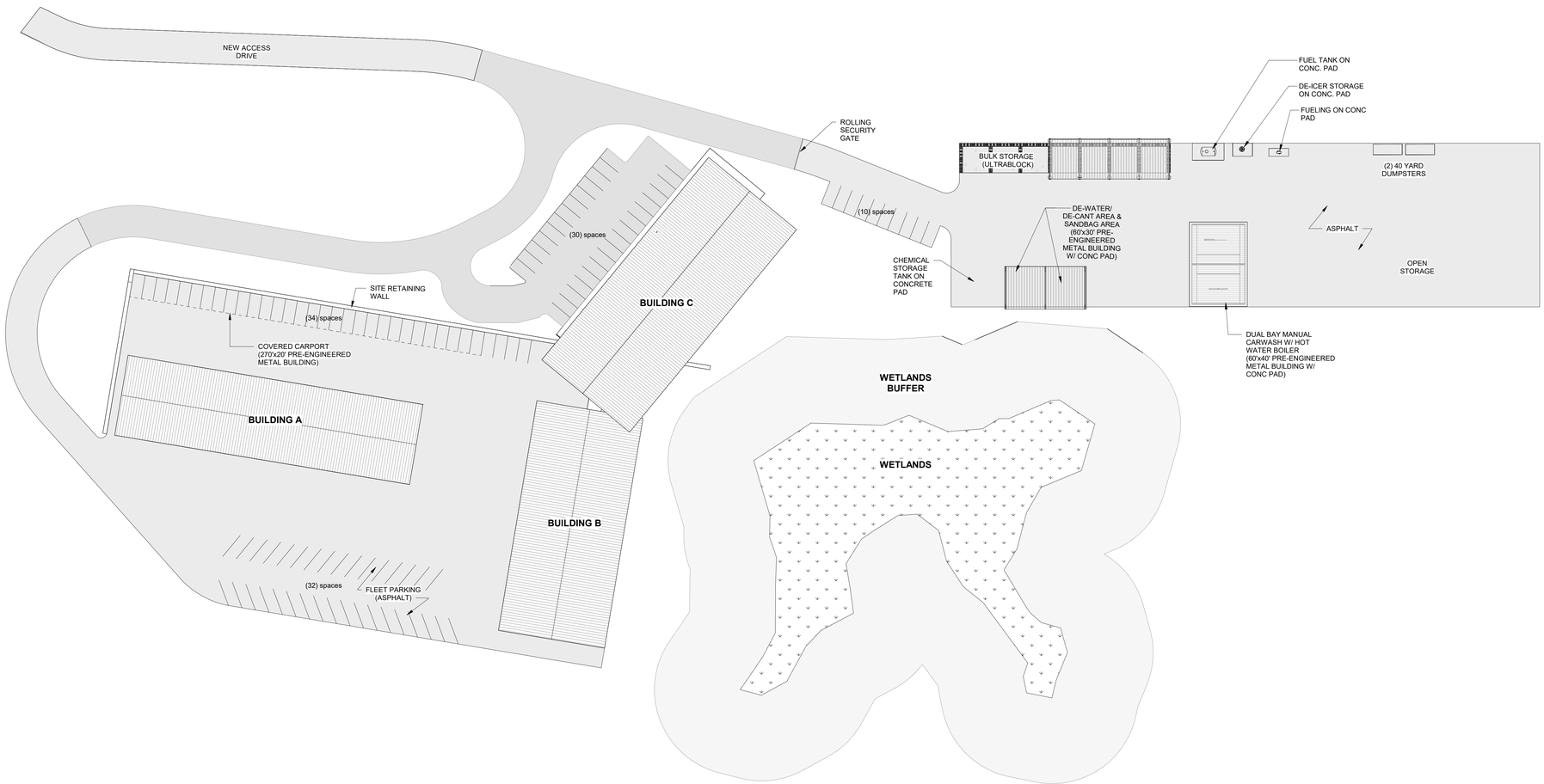
NOT FOR CONSTRUCTION

# WEST LINN PUBLIC WORKS FACILITY

**Job Number:** 23028

**WEST LINN, OR**

City of West Linn




1 **SITE PLAN**
1" = 40'-0"

THESE DRAWINGS ARE THE ORIGINAL UNPUBLISHED WORK OF THE ARCHITECT AND MAY NOT BE DUPLICATED OR USED WITHOUT THE WRITTEN CONSENT OF THE ARCHITECT.

| | |
|---|---|
| 100% SCHEMATIC DESIGN SET ISSUE | 02.14.2025 DATE |

**Drawing:**

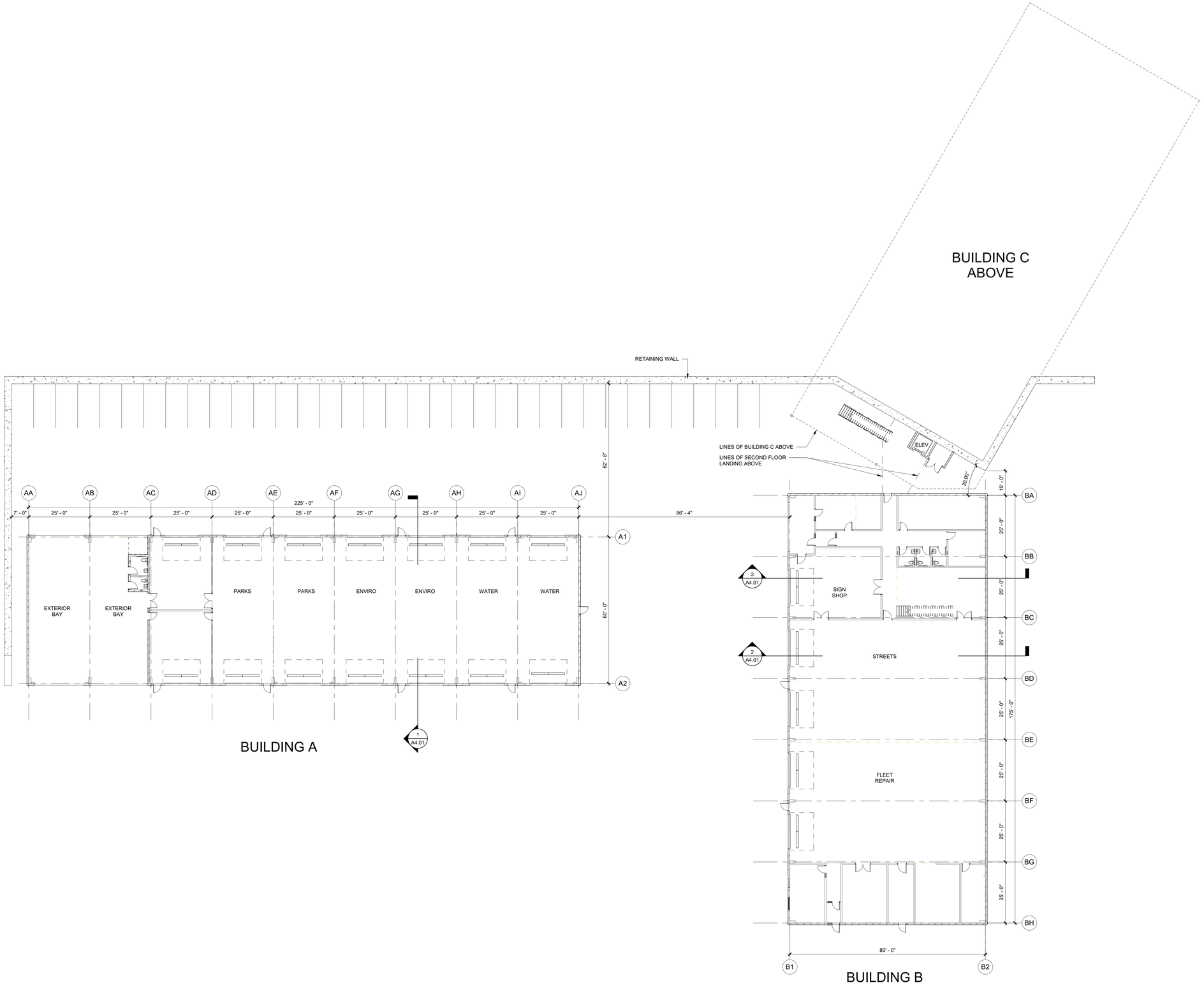
## SITE PLAN

NORTH

**Sheet No:**

# A1.01

FILE PATH: Autodesk Docs://23028_West Linn Public Works/23028_West Linn Public Works_24.rvt




## GENERAL SHEET NOTES

A. PROVIDE FIRE EXTINGUISHERS AND FIRE EXTINGUISHER CABINETS AS SHOWN / SPECIFIED. COORDINATE FINAL LOCATIONS WITH FIRE MARSHALL.
B. ALL INTERIOR WALLS TO BE TYPE X-X, UNLESS NOTED OTHERWISE.

## KEYNOTES 07-02

Scott Edwards Architecture
2525 E Burnside St. 503.226.3617
Portland, OR 97214 seallp.com

NOT FOR CONSTRUCTION

# WEST LINN PUBLIC WORKS FACILITY

**Job Number:** 23028

**WEST LINN, OR**

City of West Linn

**100% SCHEMATIC DESIGN SET ISSUE** 02.14.2025 DATE

**Drawing:**

## OVERALL FLOOR PLANS

**Sheet No:**

# A2.10

THESE DRAWINGS ARE THE ORIGINAL UNPUBLISHED WORK OF THE ARCHITECT AND MAY NOT BE DUPLICATED OR USED WITHOUT THE WRITTEN CONSENT OF THE ARCHITECT.

## 1 OVERALL FLOOR PLANS

1/16" = 1'-0"

FILE PATH: Autodesk Docs://23028_West Linn Public Works/23028_West Linn Public Works_24.rvt




**1** **BUILDING A - FIRST FLOOR PLAN**
1/8" = 1'-0"

THESE DRAWINGS ARE THE ORIGINAL UNPUBLISHED WORK OF THE ARCHITECT AND MAY NOT BE DUPLICATED OR USED WITHOUT THE WRITTEN CONSENT OF THE ARCHITECT.

## GENERAL SHEET NOTES

A. PROVIDE FIRE EXTINGUISHERS AND FIRE EXTINGUISHER CABINETS AS SHOWN / SPECIFIED. COORDINATE FINAL LOCATIONS WITH FIRE MARSHALL.
B. ALL INTERIOR WALLS TO BE TYPE X-X, UNLESS NOTED OTHERWISE.

## KEYNOTES 07-02

Scott Edwards Architecture
2525 E Burnside St. 503.226.3617
Portland, OR 97214 seallp.com

NOT FOR CONSTRUCTION

# WEST LINN PUBLIC WORKS FACILITY

**Job Number:** 23028

**WEST LINN, OR**

City of West Linn

| | |
|---|---|
| 100% SCHEMATIC DESIGN SET ISSUE | 02.14.2025 DATE |

**Drawing:**

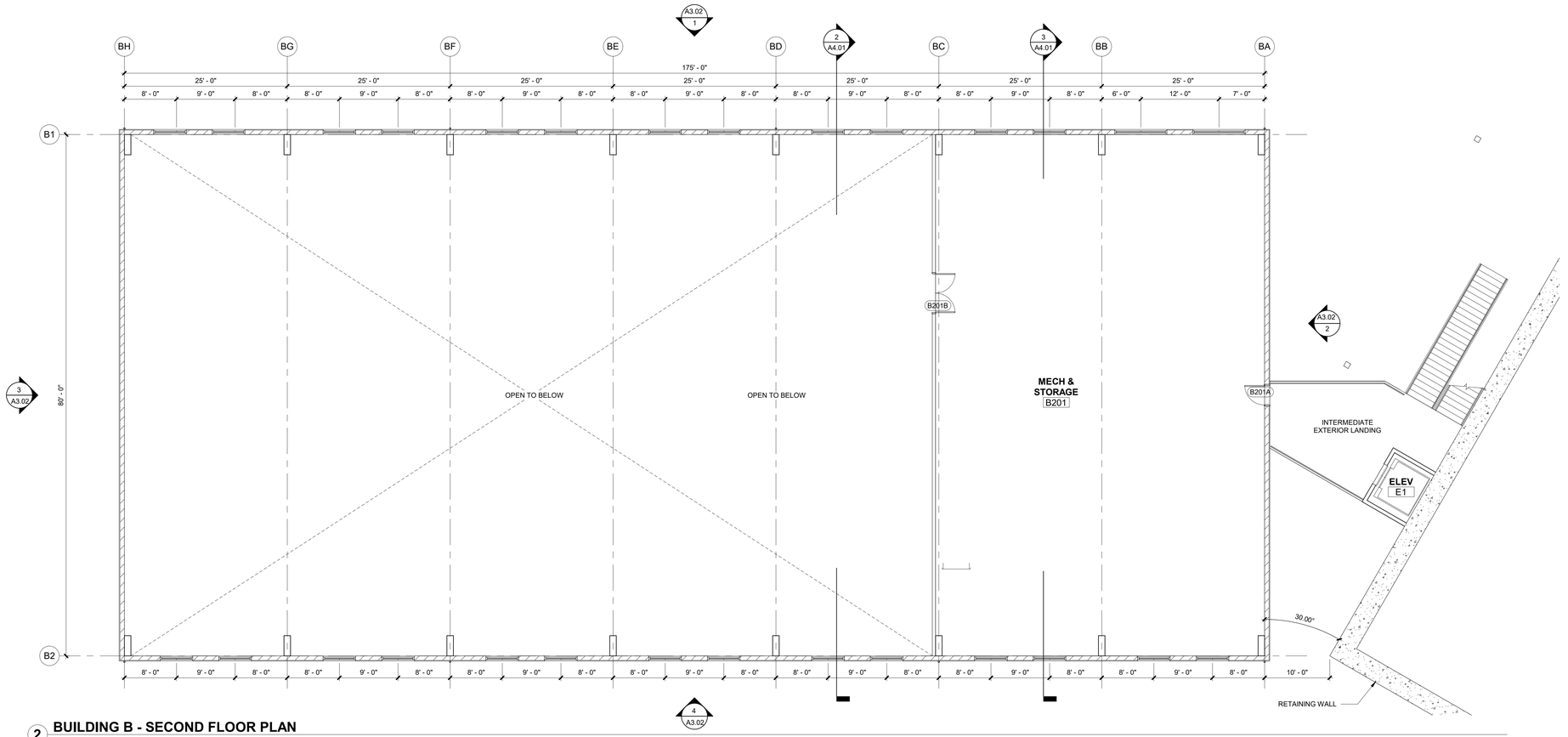
## BUILDING A - FIRST FLOOR PLAN

NORTH

**Sheet No:**

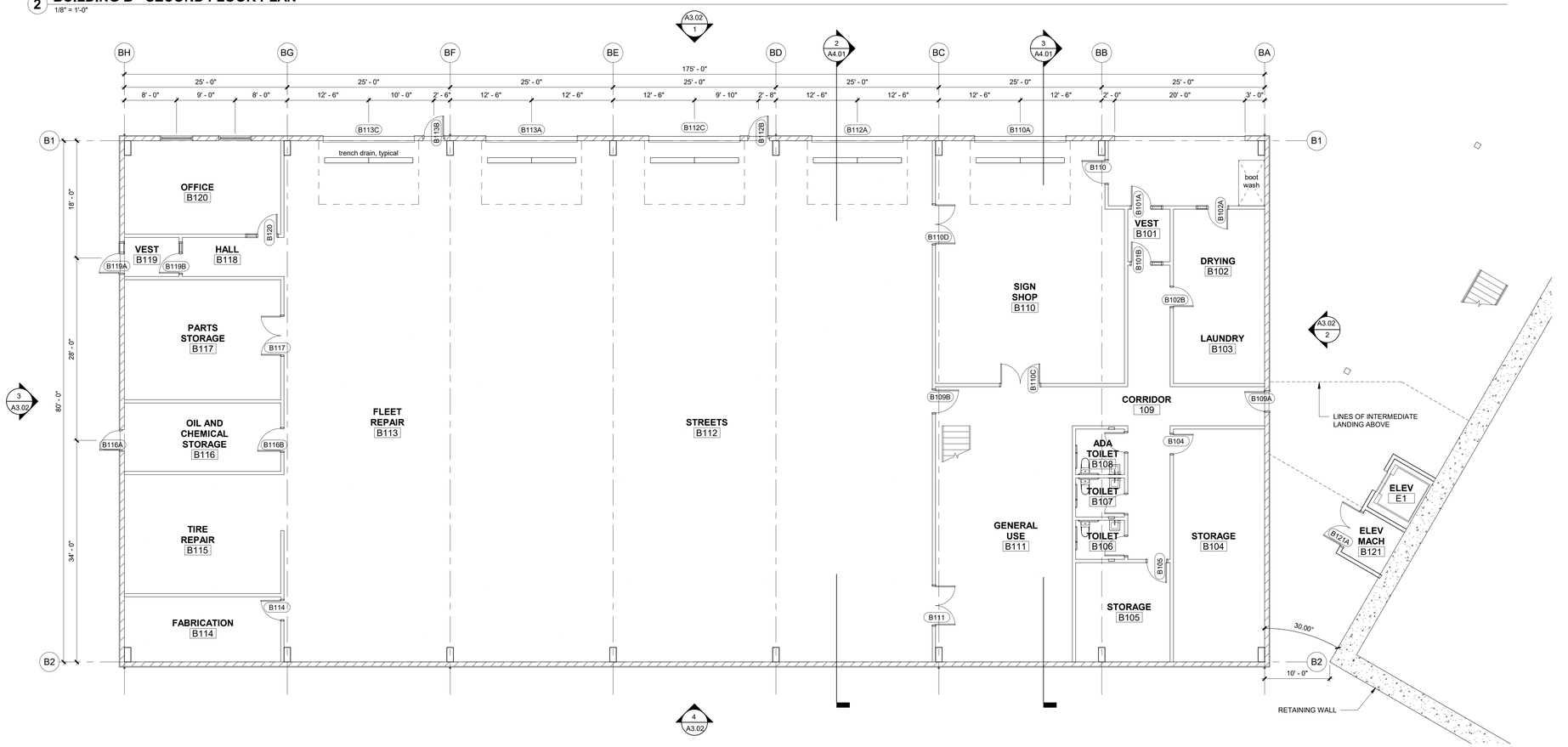
# A2.11

FILE PATH: Autodesk Docs://23028_West Linn Public Works/23028_West Linn Public Works_24.rvt




## 2 BUILDING B - SECOND FLOOR PLAN

1/8" = 1'-0"




## 1 BUILDING B - FIRST FLOOR PLAN

1/8" = 1'-0"

THESE DRAWINGS ARE THE ORIGINAL UNPUBLISHED WORK OF THE ARCHITECT AND MAY NOT BE DUPLICATED OR USED WITHOUT THE WRITTEN CONSENT OF THE ARCHITECT.

## GENERAL SHEET NOTES

A. PROVIDE FIRE EXTINGUISHERS AND FIRE EXTINGUISHER CABINETS AS SHOWN / SPECIFIED. COORDINATE FINAL LOCATIONS WITH FIRE MARSHALL.
B. ALL INTERIOR WALLS TO BE TYPE X-X, UNLESS NOTED OTHERWISE.

## KEYNOTES 07-02

Scott Edwards Architecture
2525 E Burnside St. 503.226.3617
Portland, OR 97214 seallp.com

NOT FOR CONSTRUCTION

# WEST LINN PUBLIC WORKS FACILITY

**Job Number:** 23028

**WEST LINN, OR**

City of West Linn

| | |
|---|---|
| 100% SCHEMATIC DESIGN SET ISSUE | 02.14.2025 DATE |

**Drawing:**

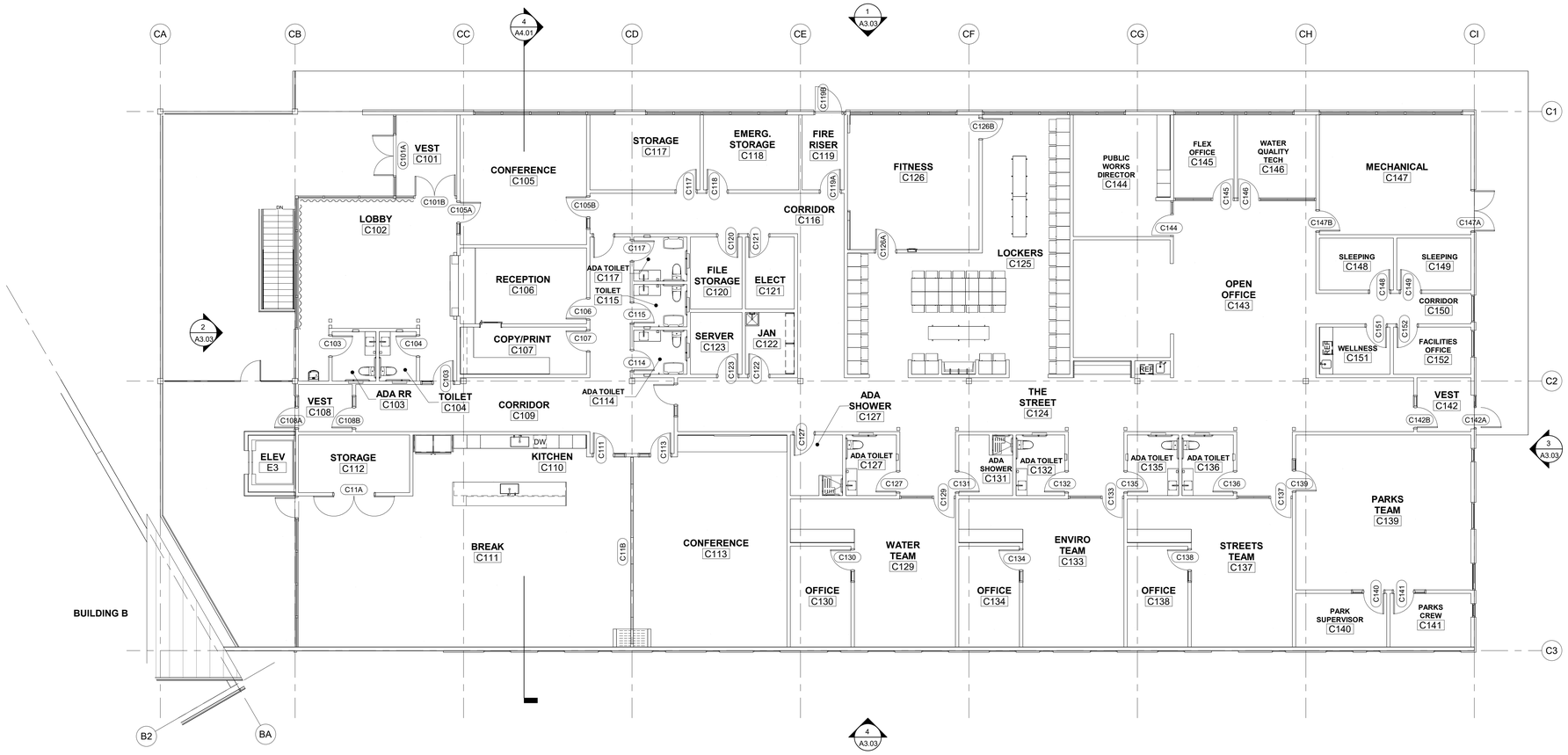
## BUILDING B - FIRST & SECOND FLOOR PLANS

NORTH

**Sheet No:**

# A2.12

FILE PATH: Autodesk Docs://23028_West Linn Public Works/23028_West Linn Public Works_24.rvt




## 1 BUILDING C - FIRST FLOOR PLAN

1/8" = 1'-0"

### GENERAL SHEET NOTES

A. PROVIDE FIRE EXTINGUISHERS AND FIRE EXTINGUISHER CABINETS AS SHOWN / SPECIFIED. COORDINATE FINAL LOCATIONS WITH FIRE MARSHALL.
B. ALL INTERIOR WALLS TO BE TYPE X-X, UNLESS NOTED OTHERWISE.

### KEYNOTES 07-02

Scott Edwards Architecture
2525 E Burnside St. 503.226.3617
Portland, OR 97214 seallp.com

NOT FOR CONSTRUCTION

# WEST LINN PUBLIC WORKS FACILITY

**Job Number:** 23028

WEST LINN, OR

City of West Linn

100% SCHEMATIC DESIGN SET ISSUE 02.14.2025 DATE

Drawing:

**BUILDING C - FIRST FLOOR PLAN**

Sheet No:

**A2.13**

THESE DRAWINGS ARE THE ORIGINAL UNPUBLISHED WORK OF THE ARCHITECT AND MAY NOT BE DUPLICATED OR USED WITHOUT THE WRITTEN CONSENT OF THE ARCHITECT.

# APPENDIX I

# APPENDIX I
# REPORT LIMITATIONS AND IMPORTANT INFORMATION

## Report Purpose, Use, and Standard of Care

This report has been prepared in accordance with standard fundamental principles and practices of geotechnical engineering and/or environmental consulting, and in a manner consistent with the level of care and skill typical of currently practicing local engineers and consultants. This report has been prepared to meet the specific needs of specific individuals for the indicated site. It may not be adequate for use by other consultants, contractors, or engineers, or if change in project ownership has occurred. It should not be used for any other reason than its stated purpose without prior consultation with Columbia West Engineering, Inc. (Columbia West). It is a unique report and not applicable for any other site or project. If site conditions are altered, or if modifications to the project description or proposed plans are made after the date of this report, it may not be valid. Columbia West cannot accept responsibility for use of this report by other individuals for unauthorized purposes, or if problems occur resulting from changes in site conditions for which Columbia West was not aware or informed.

## Report Conclusions and Preliminary Nature

This geotechnical or environmental report should be considered preliminary and summary in nature. The recommendations contained herein have been established by engineering interpretations of subsurface soils based upon conditions observed during site exploration. The exploration and associated laboratory analysis of collected representative samples identifies soil conditions at specific discreet locations. It is assumed that these conditions are indicative of actual conditions throughout the subject property. However, soil conditions may differ between tested locations at different seasonal times of the year, either by natural causes or human activity. Distinction between soil types may be more abrupt or gradual than indicated on the soil logs. This report is not intended to stand alone without understanding of concomitant instructions, correspondence, communication, or potential supplemental reports that may have been provided to the client.

Because this report is based upon observations obtained at the time of exploration, its adequacy may be compromised with time. This is particularly relevant in the case of natural disasters, earthquakes, floods, or other significant events. Report conclusions or interpretations may also be subject to revision if significant development or other manmade impacts occur within or in proximity to the subject property. Groundwater conditions, if presented in this report, reflect observed conditions at the time of investigation. These conditions may change annually, seasonally or as a result of adjacent development.

## Additional Investigation and Construction Observation

Columbia West should be consulted prior to construction to assess whether additional investigation above and beyond that presented in this report is necessary. Even slight variations in soil or site conditions may produce impacts to the performance of structural facilities if not adequately addressed. This underscores the importance of diligent construction observation and testing to verify soil conditions do not differ materially or significantly from the interpreted conditions utilized for preparation of this report.

Therefore, this report contains several recommendations for field observation and testing by Columbia West personnel during construction activities. Actual subsurface conditions are more readily observed and discerned during the earthwork phase of construction when soils are exposed. Columbia West cannot accept responsibility for deviations from recommendations described in this report or future performance of structural facilities if another consultant is retained during the construction phase or Columbia West is not engaged to provide construction observation to the full extent recommended.

## Collected Samples

Uncontaminated samples of soil or rock collected in connection with this report will be retained for thirty days. Retention of such samples beyond thirty days will occur only at client's request and in return for payment of storage charges incurred. All contaminated or environmentally impacted materials or samples are the sole property of the client. Client maintains responsibility for proper disposal.

## Report Contents

This geotechnical or environmental report should not be copied or duplicated unless in full, and even then only under prior written consent by Columbia West, as indicated in further detail in the following text section entitled Report Ownership. The recommendations, interpretations, and suggestions presented in this report are only understandable in context of reference to the whole report. Under no circumstances should the soil boring or test pit excavation logs, monitor well logs, or laboratory analytical reports be separated from the remainder of the report. The logs or reports should not be redrawn or summarized by other entities for inclusion in architectural or civil drawings, or other relevant applications.

## Report Limitations for Contractors

Geotechnical or environmental reports, unless otherwise specifically noted, are not prepared for the purpose of developing cost estimates or bids by contractors. The extent of exploration or investigation conducted as part of this report is usually less than that necessary for contractor's needs. Contractors should be advised of these report limitations, particularly as they relate to development of cost estimates. Contractors may gain valuable information from this report, but should rely upon their own interpretations as to how subsurface conditions may affect cost, feasibility, accessibility and other components of the project work. If believed necessary or relevant, contractors should conduct additional exploratory investigation to obtain satisfactory data for the purposes of developing adequate cost estimates. Clients or developers cannot insulate themselves from attendant liability by disclaiming accuracy for subsurface ground conditions without advising contractors appropriately and providing the best information possible to limit potential for cost overruns, construction problems, or misunderstandings.

## Report Ownership

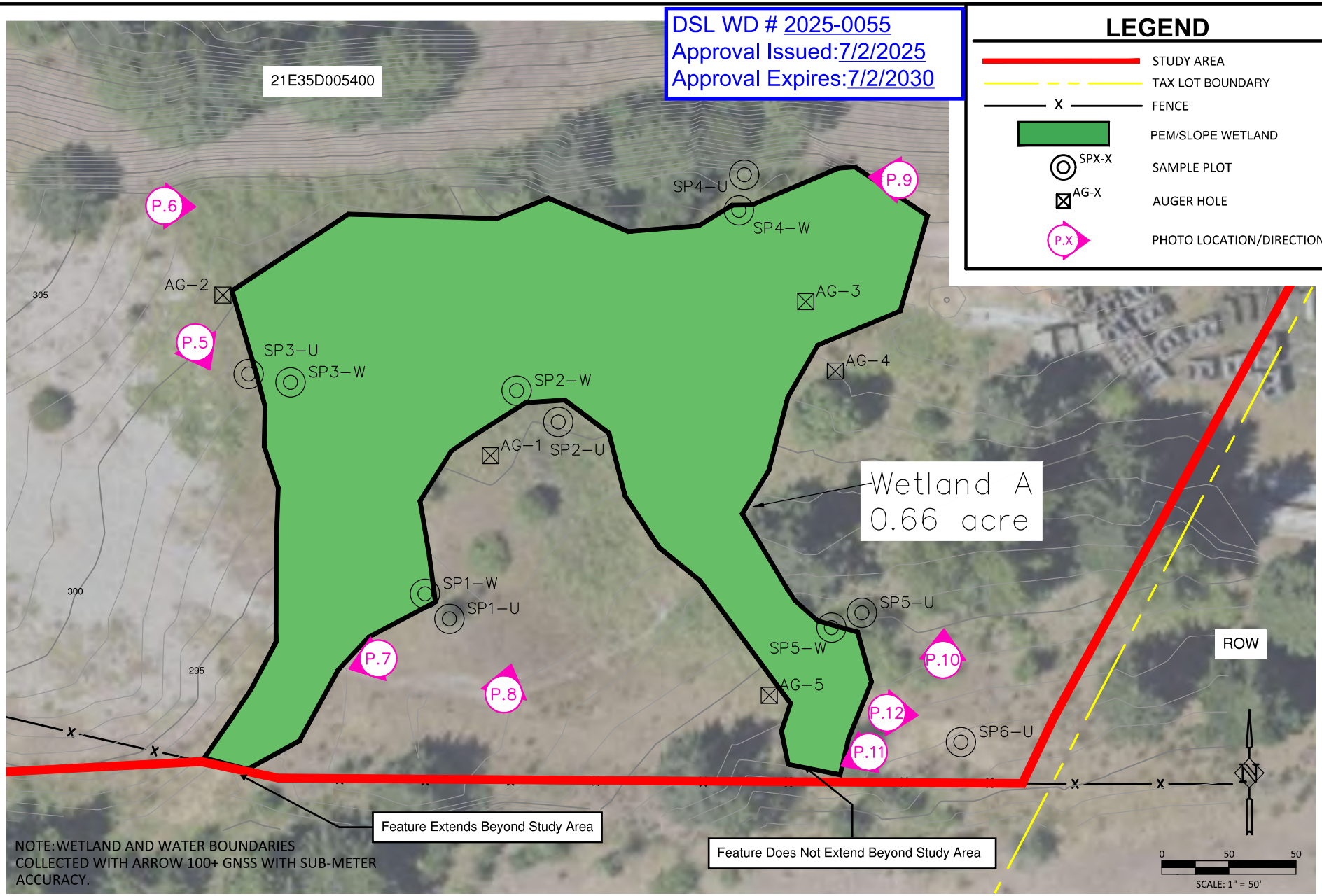
Columbia West retains the ownership and copyright property rights to this entire report and its contents, which may include, but may not be limited to, figures, text, logs, electronic media, drawings, laboratory reports, and appendices. This report was prepared solely for the client, and other relevant approved users or parties, and its distribution must be contingent upon prior express written consent by Columbia West. Furthermore, client or approved users may not use, lend, sell, copy, or distribute this document without express written consent by Columbia West.

Client does not own nor have rights to electronic media files that constitute this report, and under no circumstances should said electronic files be distributed or copied. Electronic media is susceptible to unauthorized manipulation or modification, and may not be reliable.

## Consultant Responsibility

Geotechnical and environmental engineering and consulting is much less exact than other scientific or engineering disciplines, and relies heavily upon experience, judgment, interpretation, and opinion often based upon media (soils) that are variable, anisotropic, and non-homogenous. This often results in unrealistic expectations, unwarranted claims, and uninformed disputes against a geotechnical or environmental consultant. To reduce potential for these problems and assist relevant parties in better understanding of risk, liability, and responsibility, geotechnical and environmental reports often provide definitive statements or clauses defining and outlining consultant responsibility. The client is encouraged to read these statements carefully and request additional information from Columbia West if necessary.

DRAFT




Note: GNSS located using Eos Arrow 100 Plus to sub-meter accuracy by HHPR

| SHEET NO. | | | | DESIGNED: |
|---|---|---|---|---|
| 2 | | | | HHPR |
| | | | | DRAWN: HHPR |
| | | | | CHECKED: HHPR |
| JOB NO. | DATE | NO. | DESCRIPTION | DATE: |
| CWL-11 | R E V I S I O N S | | | 1/24/25 |


Harper Houf Peterson Righellis Inc.
ENGINEERS♦PLANNERS
LANDSCAPE ARCHITECTS♦SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171


Figure 6: Wetland Delineation Exhibit

# West Linn Public Works Facility

West Linn, Oregon