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:
5494 LINN LANE
WEST LINN, OR 97068

Assessor's Map No.: 2IE25BD00500
Tax Lot(s): 500
Total Land Area: 29,318 SQ.FT.

Brief Description of Proposal: THE PROPOSED SINGLE FAMILY RESIDONCE WILL BE REPLACING AN EXISTING DWELLING OVER 60 YEARS OLD. THE NEW HOME WILL BE IN THE SAME LOCATION AS THE EXISTING ONE. MINIMAL GRADING WILL BE TAKING PLACE IN THE ERA ZONE. LANDSCAPING WILL CONSIST OF GRASSES, NATIVE PLANTING AND A VARIETY OF FLOWERING AND EVERGREEN TREES.

Applicant Name*: KEVIN JANSSEN
Address:
City State Zip: 614 SE 52ND AVE. PORTLAND, OR 97215
Phone: 541-515-0653
Email: khjanssen@yahoo.com

Owner Name (required): ROBERT EASTON
Address:
City State Zip: 21520 LUPINE CT. WEST LINN, OR 97068
Phone: 503-866-8810
Email: BOBEASTON@COMCAST.NET

Consultant Name: KIM CARTWRIGHT
Address: P.O. BOX 589
City State Zip: AURORA, OR 97002
Phone: 503-678-6028
Email: KIM@SCHOTTANDASSOCIATES.COM

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 permit costs.**
2. The owner/applicant or their representative should attend all public hearings related to the propose land use.
3. A decision may be reversed on appeal. The decision will become effective once the appeal period has expired.
4. Submit this form, application narrative, and all supporting documents as a single PDF through the Submit a Land Use Application 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. Applications with deposits will be billed monthly for time and materials incurred above the initial deposit. The applicant agrees to pay additional billable charges.

2/11/24

March 1, 2024

Kevin Janssen,
614 SE 52nd Ave
Portland OR 97215

Subject: WAP-24-01 Water Resource Area Permit for the replacement of an existing single-family residence at 5494 Linn Lane

Dear Mr. Janssen:

The City accepted your application for review on February 20, 2024, with supplemental materials provided on February 27, 2024. The Planning Department find that this application is **incomplete.** The following items must be addressed and included in a complete revised submittal package uploaded through the application portal.

1. **Narrative.** Please provide a narrative that specifically addresses CDC 48.030(B) & (C).

2. **Building Height.** Please revised the building elevations to include all elevations and the total height of the structure using the methodology of CDC 41.005, and 41.020 if applicable.

3. **Preliminary Stormwater Plan.** Please provide a storm detention and treatment plan and associated narrative per CDC 32.050.F.3.

4. **Construction Management Plan.** Please provide a construction management plan per CDC 32.050.G.

5. **Driveway Details.** Please revise the site plan to provide details regarding the existing and proposed driveway widths and turnaround area, any changes or extension of the existing pipe below the driveway, and any work proposed in the public right of way.

6. **TVF&R Service Provider Permit.** Please provide a complete TVF&R Service Provider Permit, as the one submitted appears incomplete

7. **Overhang above Public Utility Easement.** Please revise the site plan to remove the roof overhang over the public utility easement. For questions about this requirement, please contact Clark Ide in the Engineering department at cide@westlinnoregon.gov or 503-722-3437.

Pursuant to CDC 99.035, the Planning Director may require information in addition to that required by a specific chapter in the Community Development Code or may waive a specific requirement for information or a requirement to address an approval standard.

Pursuant to ORS 227.178 "If an application for a permit, limited land use decision or zone change is incomplete, the governing body or its designee shall notify the applicant in writing of exactly what information is missing within 30 days of receipt of the application and allow the applicant to submit the missing information. The application shall be deemed complete for the purpose of subsection (1) of this section upon receipt by the governing body or its designee of:

(a) All of the missing information;
(b) Some of the missing information and written notice from the applicant that no other information will be provided; or
(c) Written notice from the applicant that none of the missing information will be provided.

You now have 180 days, through **August 28, 2024**, to make the application complete by providing the information outlined above. On the 181st day after first being submitted, the application will be considered void if the applicant has been notified of the missing information and has not submitted the information as requested above or a written notice responding to the above options.

Please contact me at 503-742-6058, or by email at jfloyd@westlinnoregon.gov if you have any questions or comments.

Sincerely,

John Floyd
Senior Planner

Barclay Home Design

12112 S. New Era Road
Oregon City, OR 97045
503-970-4257

John Floyd
Senior Planner
City of West Linn
Re: Proposed residential replacement dwelling
5494 Linn Lane
West Linn, OR 97068

The proposed residence will be replacing an existing dwelling over 60 years old. The new home will be in the same location as the existing one. Minimal grading will be taking place in the ERA zone. Landscaping will consist of grasses, native planting and a variety of flowering and evergreen trees. The proposed drive is at the same location as the existing one.

Written response to approval criteria included.

A stamped approved site plan from Jason Arn (Tualatin Valley Fire & Rescue) is included (Pg. D)

Vicinity map (Pg. C) included on-site plan; Grading Plan also included (Pg. B). The site plan includes:

1. Included
2. Included
3. Included (zoning) No Neighborhood Association
4. Included. Existing dwelling setbacks for the proposed structure.
5. Included. Proposed drive-off street parking n/a.
6. N/A
7. Included all easements.
8. Existing trees and trees to be removed are shown. A landscape professional to be retained to provide a landscape plan.
9. Gas, electrical, sewer and water location to remain the same. 100 yr. floodplain n/a.
10. Site-sensitive areas shown.
11. N/A
12. N/A
13. N/A

Additional: Natural resource assessment provided by Kim Cartwright, Wetland Ecologist G.I.S. analyst

Additional: Stormwater Management Report provided by Deborah Beck, P.E., of White Pelican Consulting, LLC

Cordially,
Michael J. Barclay

NARRATIVE FOR PA-23-20

WATER RESOURCES AREA PERMIT

Located at 5494 Linn Lane

KEVIN JANSSEN and MICHELLE JANSSEN, APPLICANTS

INTRODUCTION

The application for a Water Resources Area Permit requires "full written responses to approval criteria in the identified CDC Chapters", as noted **in Item 3** of "HOW TO SUBMIT AN APPLICATION". The applicable CDC Code Sections, as identified on Pg. 1 of the SUMMARY NOTES of the PRE-APPLICATION CONFERENCE MEETING, are as follows:

- Chapter 11: Residential, R-10;
- Chapter 32: Water Resource Area Protection;
- Chapter 48: Access, Egress, and Circulation;
- Chapter 96: Street Improvement Construction;
- Chapter 99: Procedures for Decision Making: Quasit-Judicial

DISCUSSION

- CHAPTER 11: This property lies within a residential zone, R-10, and because the project is a single-family home replacing an existing single-family home, it is a permitted use per Section 11.030-6. No further discussion is needed.

- CHAPTER 32: See *"NATURAL RESOURCE ASSESSMENT -5494 Linn Lane*" prepared by Kim Cartwright of Schott and Assoc., attached herein by reference.

- CHAPTER 48: The property is located at the north end of Linn Lane, which is a dead-end public street. The new dwelling will use the same point of access onto Linn Lane as does the existing house, but with a slightly wider, paved driveway. Linn Lane is paved but has no curbs or sidewalks. Therefore, the driveway will not have a standard concrete apron but will transition directly into the existing street pavement. We believe we meet all conditions of access, egress and circulation as described in Chapter 48.

- CHAPTER 96: Section 96.010 A.2 states that "*Street improvements for residential construction are required when… Replacement of a single-family home increases the square feet by 50 percent or greater".* However, according to Section 96.020:

  "*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. (Ord. 1739 § 2 (Exh. B), 2022)"

As noted under Chapter 48 above, Linn Lane is a paved, dead-end street with no existing curb or sidewalk. It is less than 1,320 feet in length and is not planned to be extended to the north because of the topography and the existence of a City park. As such it satisfies both conditions 1 and 2 above and should be considered to be candidate for an in-lieu-of waiver for street improvements along the frontage of this parcel.

However, we also believe that, because the Linn Lane neighborhood is a well-established neighborhood, is a short, dead-end street and will probably never be extended or improved with curbs, gutters or sidewalks, *the in-lieu-of option be waived as well*.

SUMMARY

We believe that through the above discussions we have satisfied the approval criteria outlined in Chapters 11, 32, 48 and 96, as required by Pre-Application Conference Summary Notes. As such, we hereby request approval of the Water Resources Area Permit for this site.

Date: 07/08/2024

John Floyd
Senior Planner
City of West Linn

Subj: WAP-24-01 Water Resource Area Permit for the replacement of an existing single-family residence at 5494 Linn Lane, West Linn, OR 97068

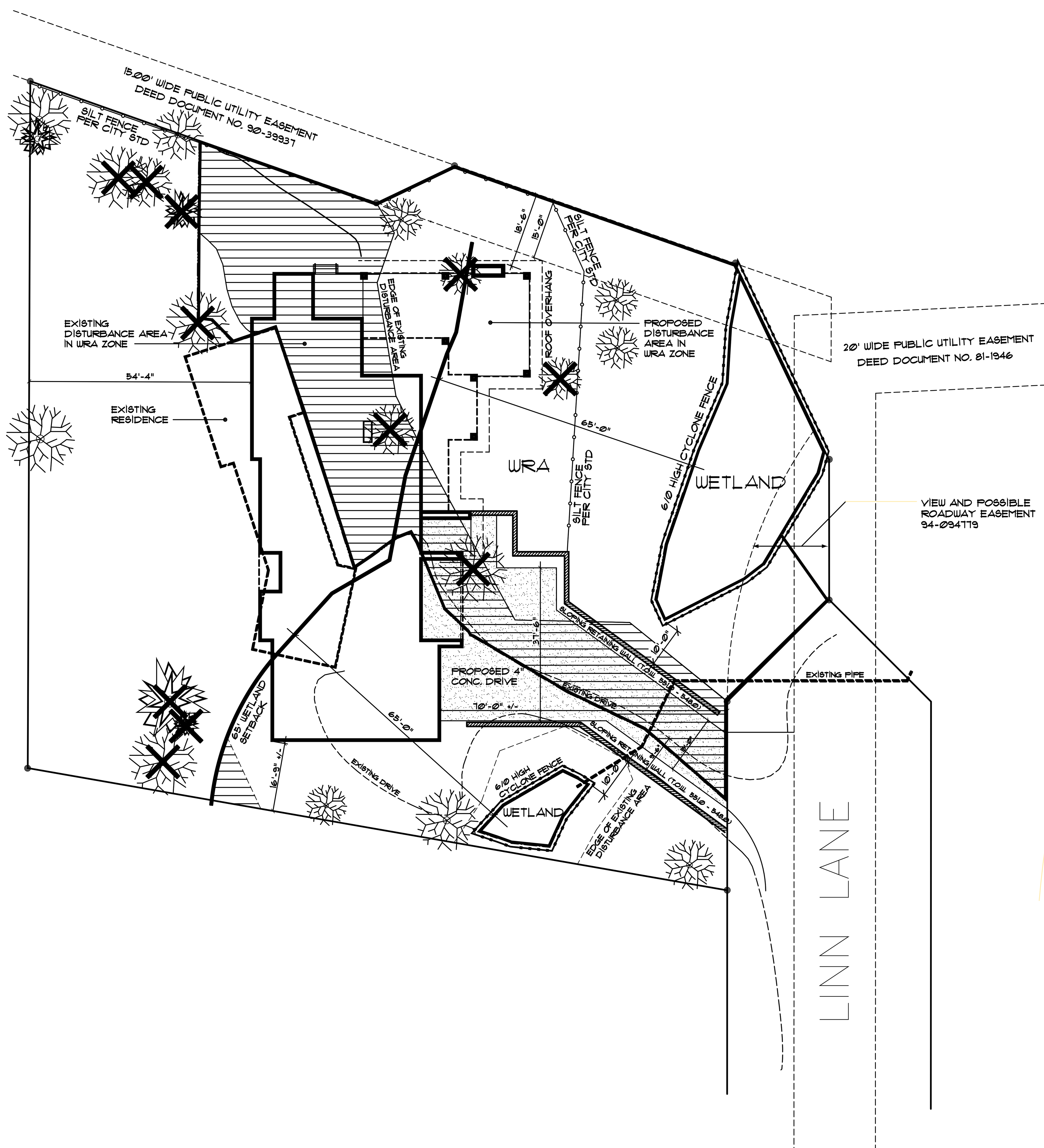
Dear Mr. Floyd,
Please find, below and attached, our responses addressing the seven (7) items listed in your letter of March 1, 2024.

1. Code sections CDC 48.030(B) and (C) deal with driveway standards. Because this permit is for a single-family residence that is less than 150ft. from the adjacent street right-of-way, only (B)1 and (B)3 apply:
   a. Sheet A, Driveway Plan, of the attached plans, shows the distance between the house and the adjacent street right-of-way to be 70ft. (i.e. less than 150ft.).
   b. (B)1 is satisfied by also referring to Sheet A, Driveway Plan of the attached plans, which shows the driveway with a minimum width of 15ft.
   c. (B)3 is satisfied by referring to Sheet B, Driveway Plan, of the attached plans, which shows the slope of the driveway to be 0.015%, well below the maximum allowable grade of 15%.
   d. CDC 48.030(C) does not apply because the proposed dwelling is only 70ft. from the adjacent street right-of-way.
2. Sheets 1 and 2 of the attached Plans have been modified to show building heights on all four (4) elevation drawings in accordance with CDC 41.005. CDC 41.020 does not apply. We are not requesting any height exceptions.
3. A Preliminary Stormwater Plan, prepared by Deborah Beck of White Pelican Engineers in accordance with CDC 92.010 E, is attached as requested.
4. A Construction Management Plan has been provided as requested. See Plot Plan and Erosion Control on Sheet A of the attached plans. The Plot Plan has been modified to reflect erosion control and protection fencing for wetland and material stockpile in accordance with CDC 32.050G.
5. An enlarged plan of the driveway is shown on Sheet A, showing the existing and proposed driveway and turn-around area with dimensions.
   a. In an email received on July 2nd, 2024, Deborah Beck of White Pelican Engineering wrote the following:
   "Hello Mike and Kevin, Good news, the believed location of the stormwater pipe draining the wetland on the south side of the existing driveway does not appear to interfere with the proposed locations of the StormTech chambers. Drainpipe has been added to the drawings and attached are the updated drawings and report for the stormwater design at 5494 Linn Ln."

This message confirms that the location of the pipe under the driveway will not interfere with the proposed Stormwater Plan. Therefore, no changes are necessary to the existing pipe under the driveway.

b. The proposed concrete driveway will blend into Linn Lane with an asphalt transition to match the street's existing surface.

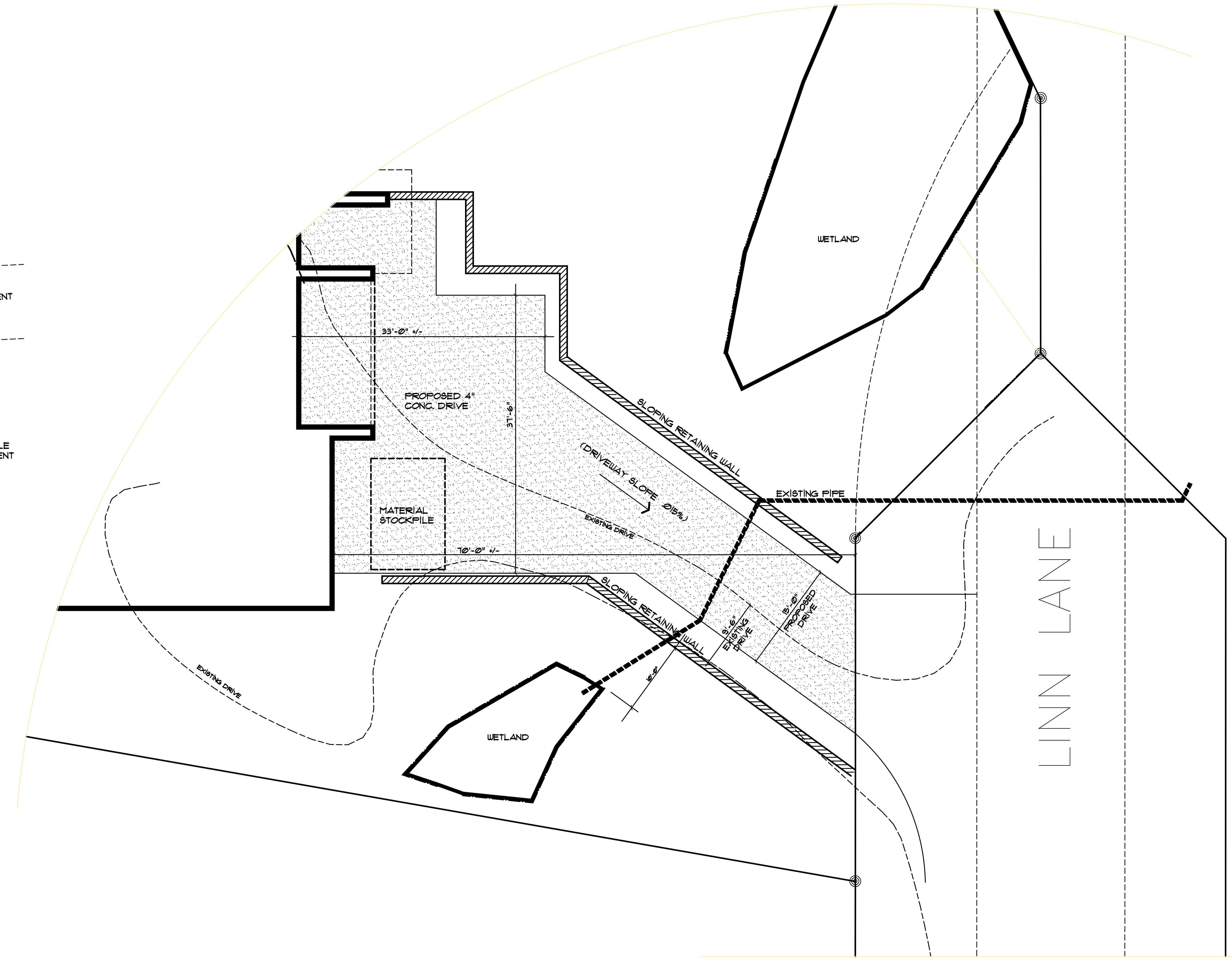
6. TVF&R has reviewed and stamped the Plot Plan, indicating approval. Permit number is 2023-0013.
7. The Plot Plans, Sheets A, B, C and D have been revised by moving the house 3ft. to the south to remove the roof overhang from the Public Utility Easement that runs along the northerly property line.



PLOT PLAN & EROSION CONTROL

T.L. 21E25BD00500
5494 LINN LN.
WEST LINN, OR

SCALE: 1" = 20'



DRIVEWAY PLAN

(EXISTING & PROPOSED)

SCALE: 1" = 10'

DISTURBANCE AREA (PERMANENT / PROPOSED) 2453 SQ. FT.

R-10 ZONE
SETBACKS: FRONT 20'
REAR 20'
SIDE 7.5'

LOT AREA:	29,318 SQ. FT.
ALLOWABLE COVERAGE:	10,261 SQ. FT. (35%)
ACTUAL COVERAGE:	6780 SQ. FT. (23%)
ALLOWABLE FAR:	13,193 SQ. FT. (45%)
ACTUAL FAR:	6385 SQ FT. (22%)

A RESIDENCE FOR: THE JANSSEN FAMILY

APPLICANT : ROBERT EASTON
21520 LUPINE CT.
WEST LINN, OR 97068
(503) 866-8810

2024-06-14

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(503)970-4257
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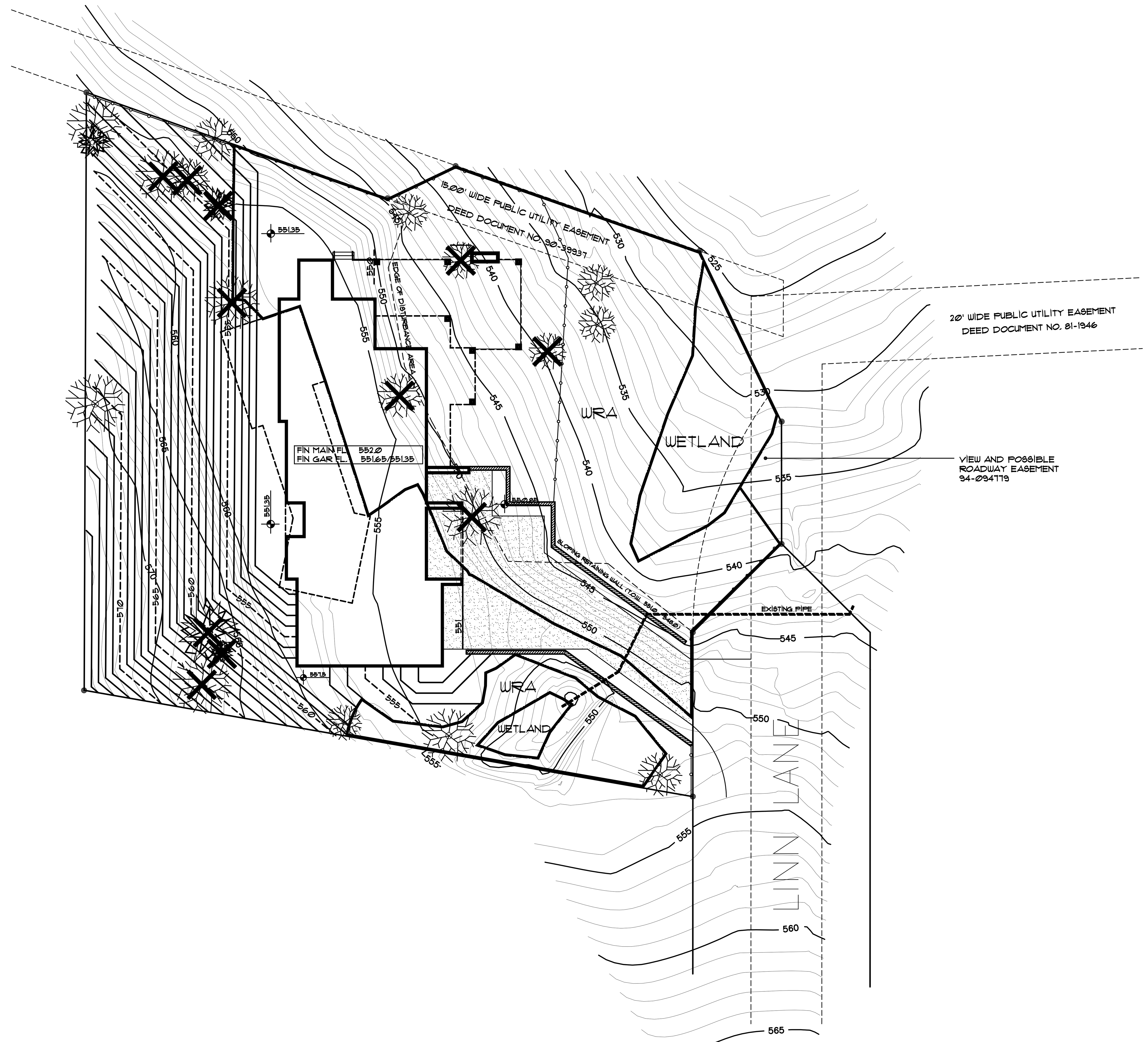
OREGON CITY, OR 97045

A

JANSSEN



GRADING PLAN

SCALE: 1" = 20'

T.L. 21E23BD00500
5494 LINN LN.
WEST LINN, OR

A RESIDENCE FOR: THE JANSSEN FAMILY

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2024-06-14

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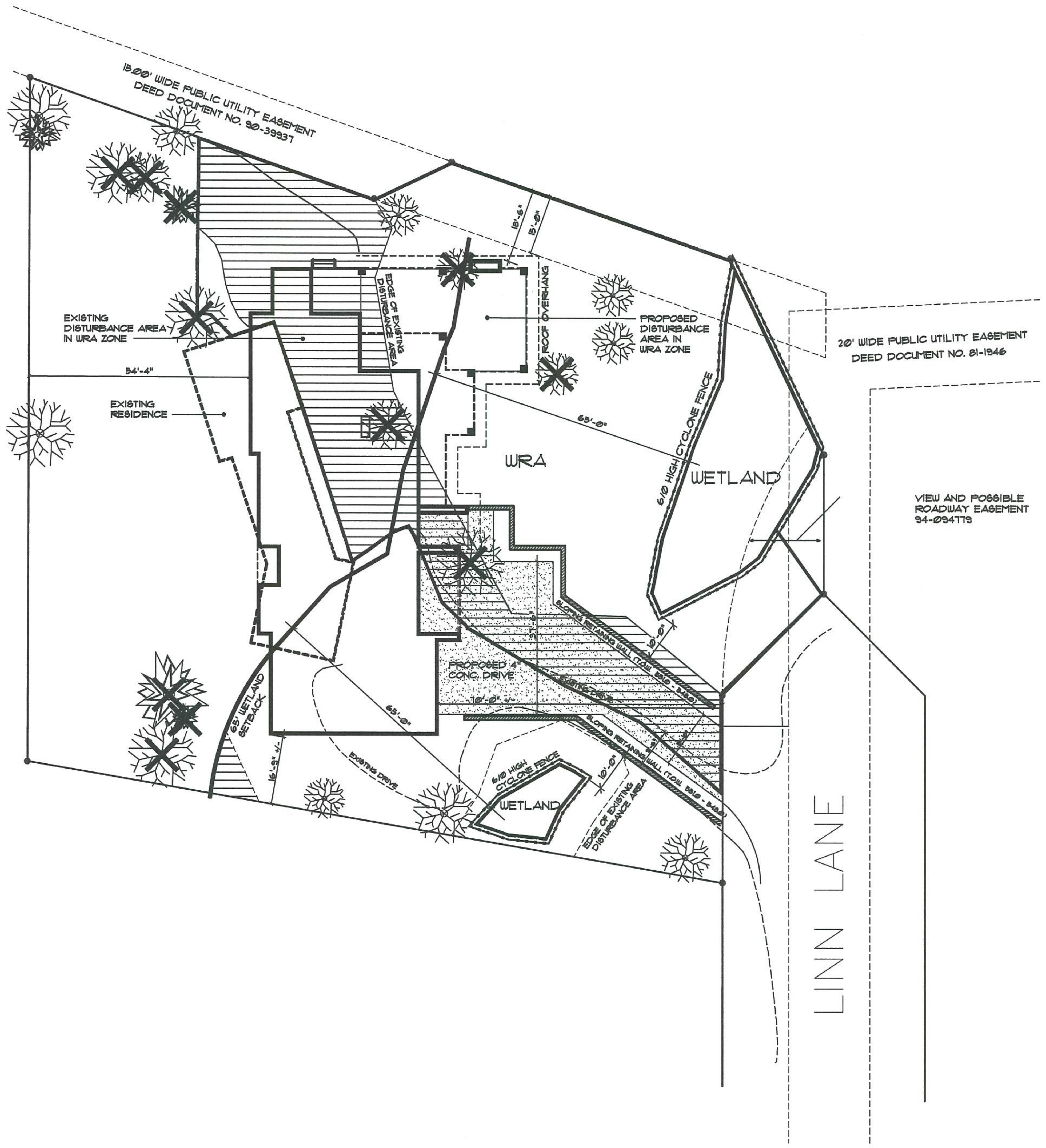
B

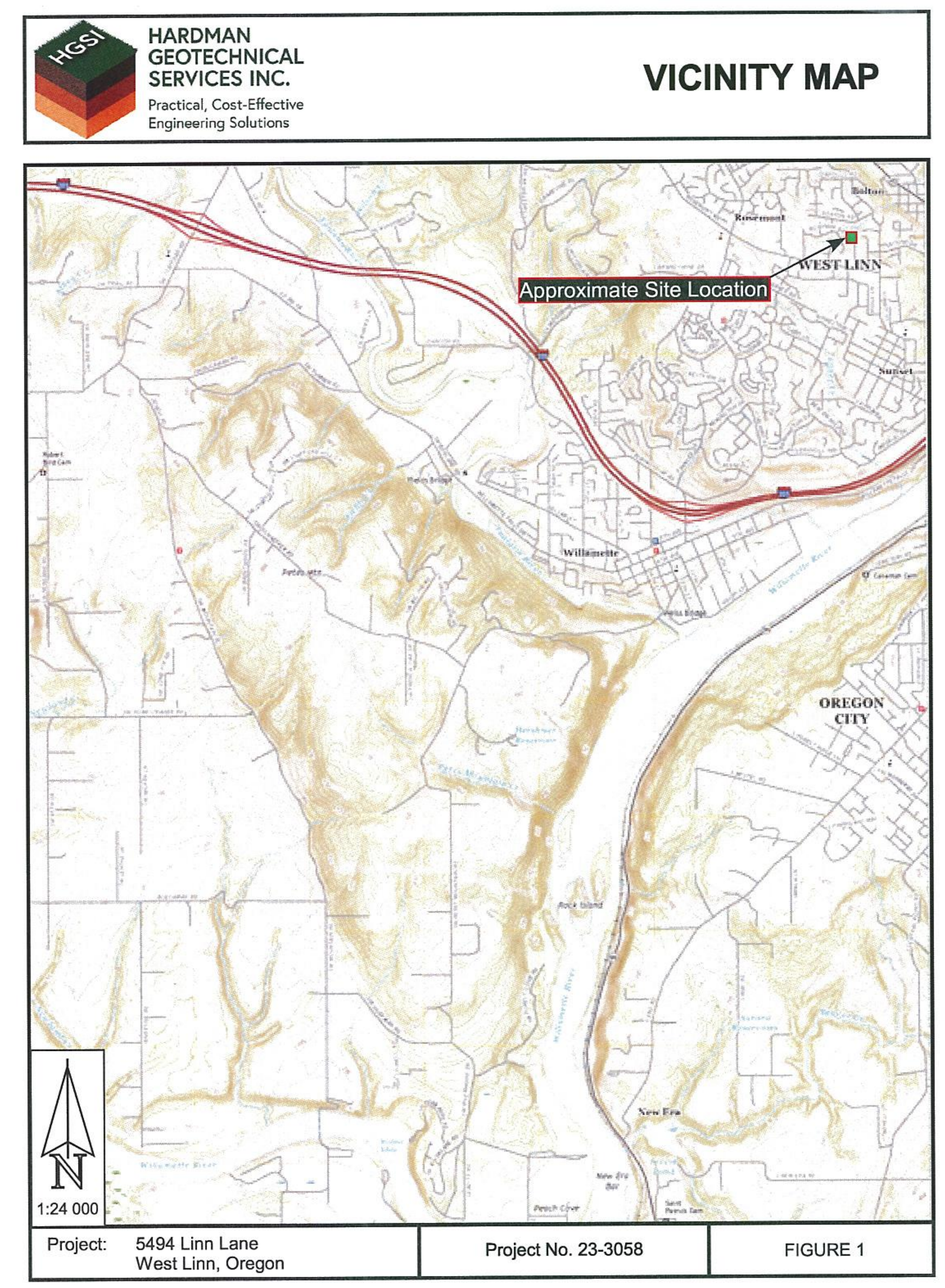
JANSSEN



PLOT PLAN

T.L. 21E25BD00500
5494 LINN LN.
WEST LINN, OR

SCALE: 1" = 20'



VICINITY MAP

A RESIDENCE FOR: THE JANSSEN FAMILY

APPLICANT : ROBERT EASTON
21520 LUPINE CT.
WEST LINN, OR 97068
(503) 866-8810

2024-06-14

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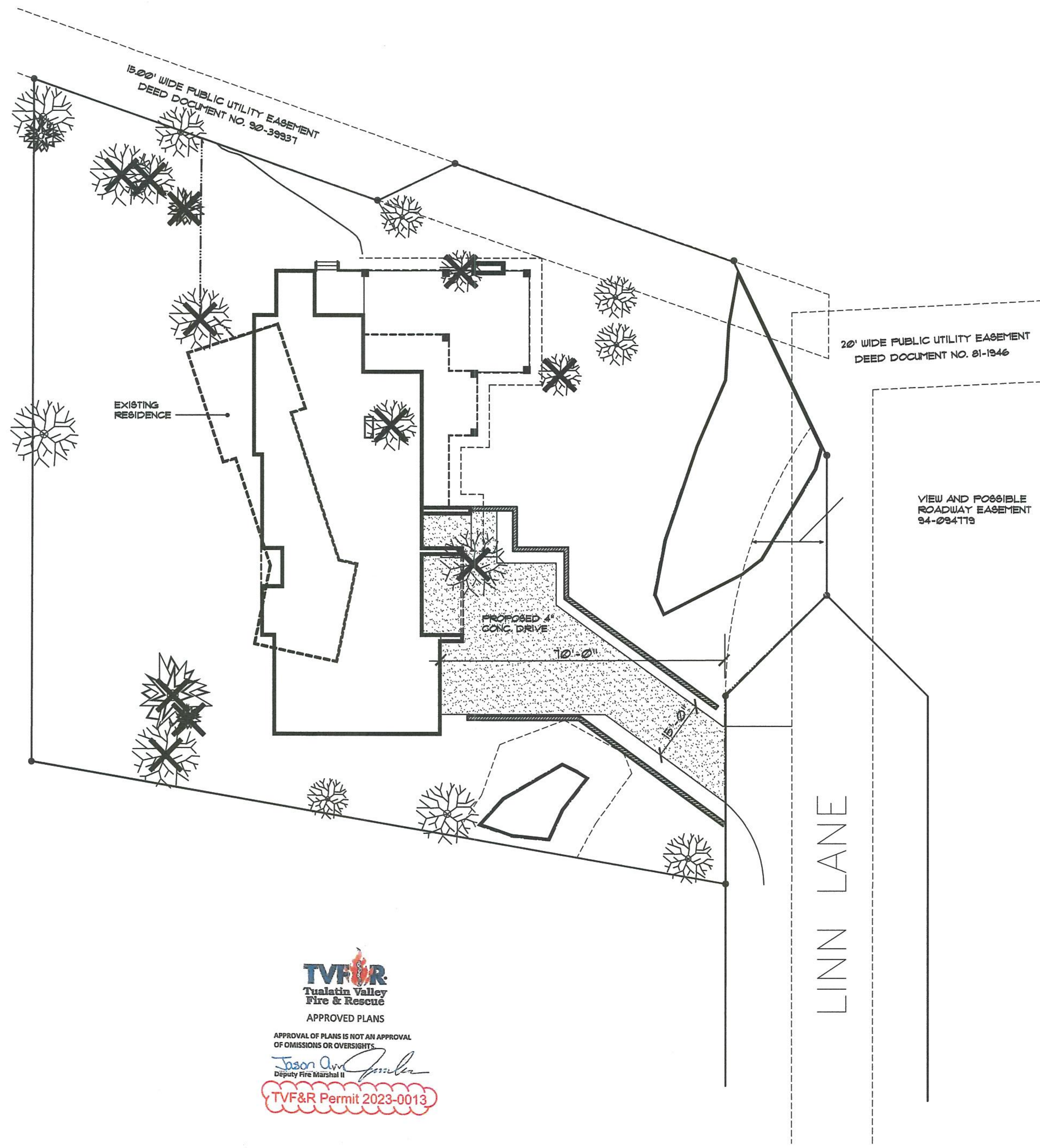
C

JANSSEN



PLOT PLAN W/ FIRE APPROVAL

T.L. 21E25BD00500
5494 LINN LN.
WEST LINN, OR

SCALE: 1" = 20'

A RESIDENCE FOR: THE JANSSEN FAMILY

APPLICANT : ROBERT EASTON
21520 LUPINE CT.
WEST LINN, OR 97068
(503) 866-8810

N

2024-06-14

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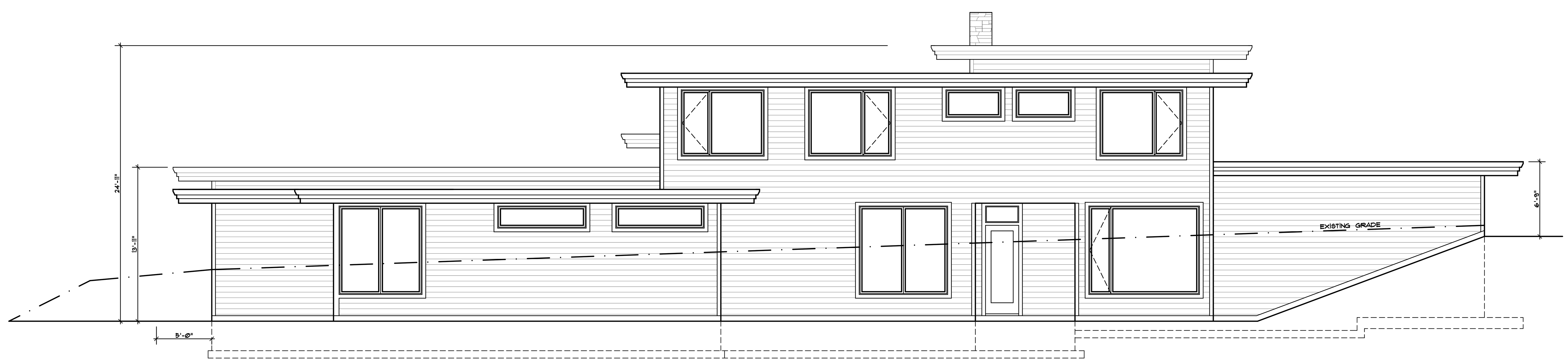
D

JANSSEN

FRONT ELEVATION

SCALE: 3/16" = 1'-0"



REAR ELEVATION

SCALE: 3/16" = 1'-0"

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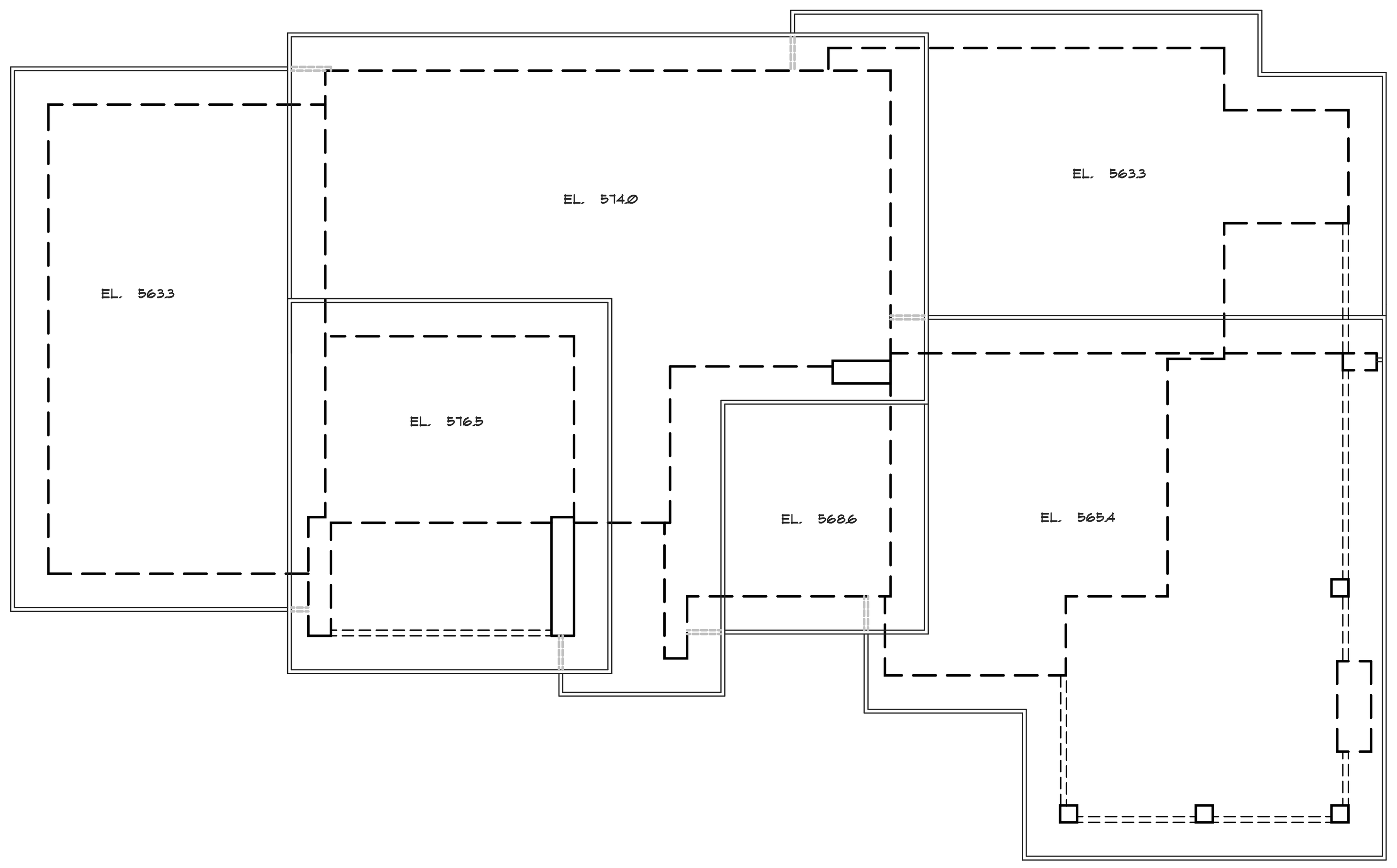
MAIN FLR. 3179 SQ.FT
UPPER FLR. 1227 SQ.FT.

1

2024-03-14

JANSSEN 2

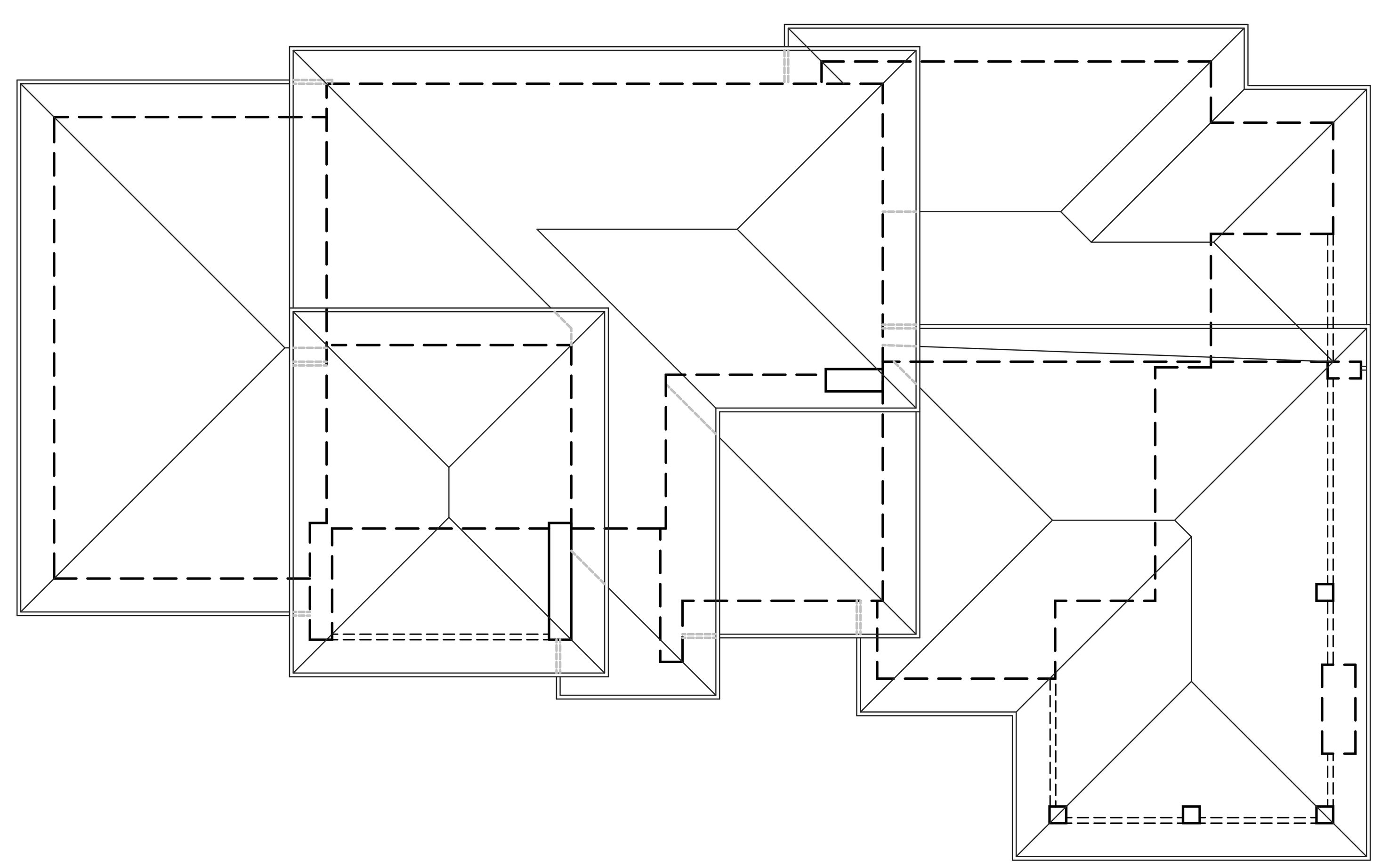


ROOF ELEVATIONS

SCALE: 3/16" = 1'-0"

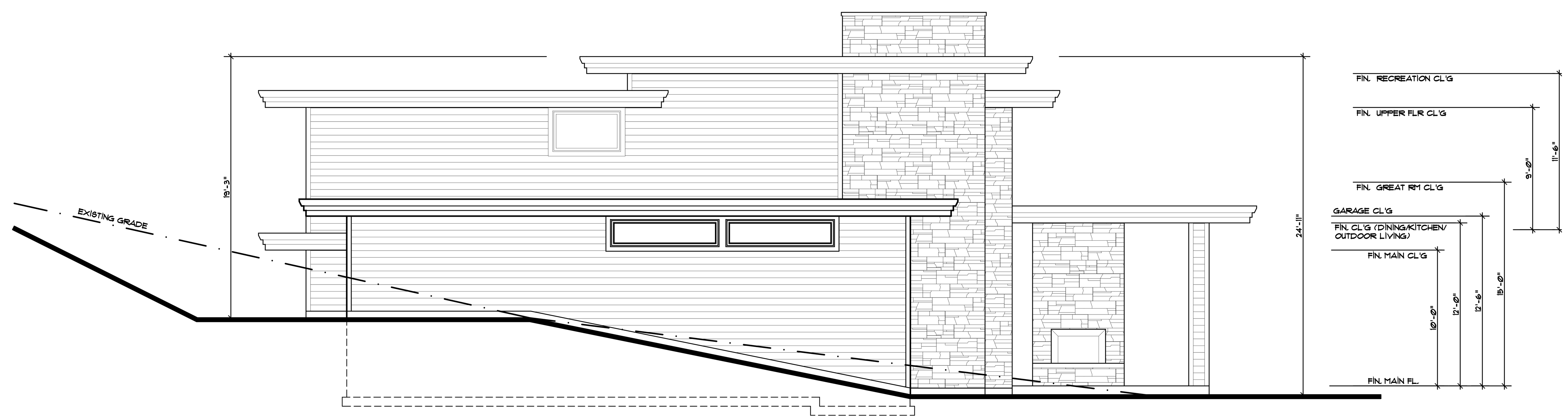
RIGHT SIDE ELEVATION

SCALE: 3/16" = 1'-0"



ROOF PLAN

SCALE: 3/16" = 1'-0"



LEFT SIDE ELEVATION

SCALE: 3/16" = 1'-0"

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MAIN FLR. 3179 SQ.FT

UPPER FLR. 1227 SQ.FT.

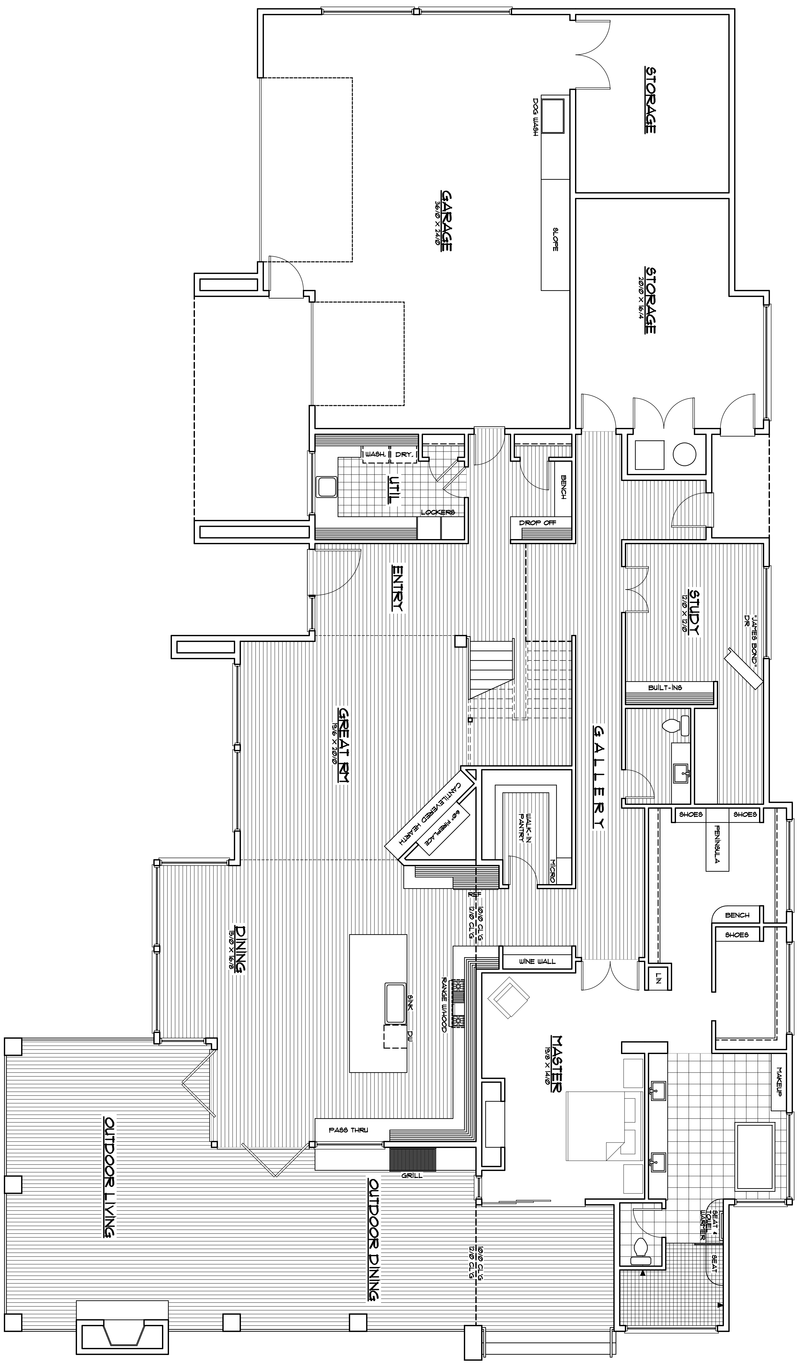
2

2024-04-18

JANSSEN 2

MAIN FLOOR PLAN

SCALE: 3/16" = 1'-0"



JANSSEN 2

MAIN FLR 3179 SQFT
UPPER FLR 1227 SQFT

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Barclay HOME DESIGNS F.A.I.B.D.

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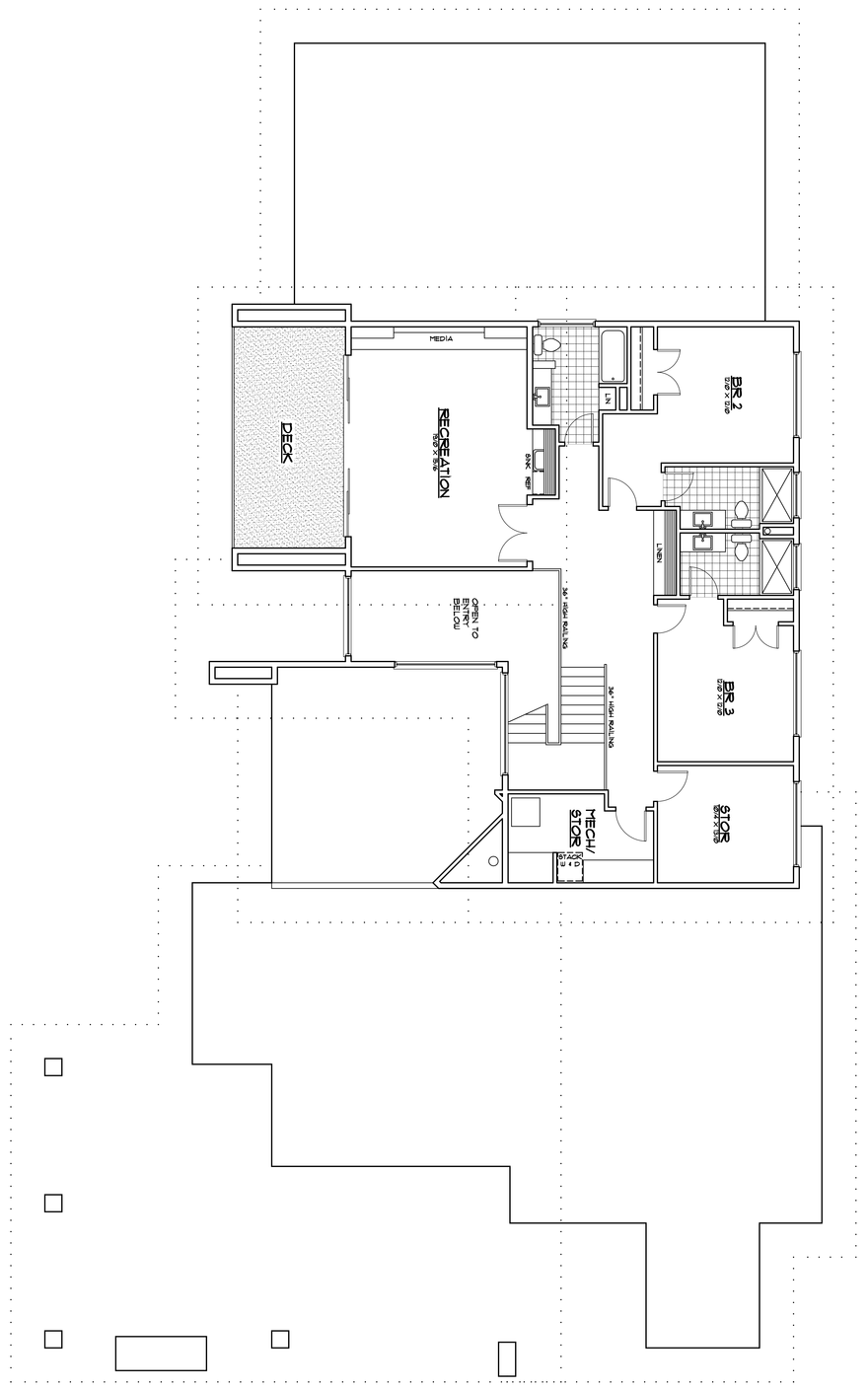
2023-06-12



UPPER FLOOR PLAN

SCALE:
3/16" = 1'-0"

2023-06-12

JANSSEN 2

MAIN FLR 3178 SQFT
UPPER FLR 1221 SQFT.

General Notes and Disclaimers: These drawings have been prepared to meet generally accepted professional standards. However, local variations may require changes. Likewise, building code requirements vary with location and change from time to time. Before starting construction, the builder must review and be responsible for all details and dimensions, and ensure that these plans meet all current requirements in your area. It is also suggested that a local architect and/or engineer be retained to review and make any changes necessary to ensure that plans meet all requirements, and that you check with your local building department to see if a professional stamp is required on drawings filed for permit purposes. All applicable construction shall conform to the latest editions of either "Uniform Building Code" or the "BOCA Basic Building Code," or any other locally required code. Codes govern over drawings. Dimensions govern over scale. Verify all mechanical requirements before framing. Verify topographic and subsurface conditions, and adapt foundation plans accordingly.

Barclay HOME DESIGNS F.A.I.B.D.

12112 S NEW ERA RD
OREGON CITY, OR 97045
(503) 970-4257

SCHOTT & ASSOCIATES
Ecologists & Wetlands Specialists
21018 NE Hwy 99E • P.O. Box 589 • Aurora, OR 97002 • (503) 678-6007 • FAX: (503) 678-6011

NATURAL RESOURCE ASSESSMENT

5494 Linn Lane

T2S, R1E, Section 25BD, Tax Lot 500
West Linn, Oregon

Prepared for

Kevin Janssen
614 SE 52nd Avenue
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Introduction

Schott & Associates (S&A) was contracted to conduct wetland delineation and natural resource assessment for the project site at 5494 Linn Lane, West Linn, Clackamas County, Oregon (T2S, R1E, Section 25BD, Tax Lot 500; Figure 1). This property contains a Water Resource Area (WRA) that is subject to regulation under Chapter 32 of the West Linn Community Development Code (CDC). The purpose of this report is to document existing and proposed conditions with regards to regulated natural resources and meet City approval criteria for the proposed project. The applicant participated in a pre-application meeting with the City on July 20, 2023 (File PA-23-20). An online meeting was held with the applicant, site architect, S&A, and John Floyd, Associate Planner of the City of West Linn, on August 17, 2023, to discuss the project. Additional correspondence has occurred between all parties to develop this proposal. A wetland delineation report has been prepared and was submitted to the Oregon Department of State Lands (DSL) for review on October 11, 2023 (WD#2023-0462). WRA boundaries and encroachments presented in this report are based on boundaries pending DSL approval.

All work on this project has been completed by a qualified natural resource specialist. Onsite assessment and reporting were conducted by Kim Cartwright, a wetland ecologist with over 12 years of experience in conducting natural resource assessments, including wetland and other water delineations, habitat and functional assessments, natural resource permitting, and mitigation site planning and development.

Site Description and Land Use

The project site consisted of the entire 0.70-acre parcel. Residential development, including parking and turnaround areas, were in the northwestern portion of the property, accessed by an asphalt driveway from Linn Lane to the east. The site features steep convergent slopes which form a well-defined, southwest sloping swale in the eastern portion of the site. The existing home is perched on top of the slope on the west side of the property. The driveway crosses the swale and was constructed 5-6 feet above the surrounding grade to match that of the home and parking area. A culvert outlet extends from the ground upslope from the swale, just offsite to the south. A culvert placed at the bottom of the swale on the south side of the driveway conducts any surface flows east, offsite, and into a ditch on the east side of Linn Lane. The ditch flows north and into an offsite drainage in the Sahallie Illahee Park, which borders the property to the north. Onsite vegetation generally consisted of mown turfgrasses with ornamental trees and shrubs around the home. Himalayan blackberry (*Rubus armeniacus*) thickets were present in and around the swale and had been recently mown to facilitate site access for this study. A thicket of red-osier dogwood (*Cornus sericea*) grew along the northeastern site boundary.

Surrounding land use was moderate-density, single-family residential to the east, south, and west, and the forested Sahallie Illahee Park to the north. The property was zoned for single-family residential (West Linn zoning designation R-10).

Methods

Assessment consisted of a site visit and review of the following existing data and information:

- Clackamas County tax map

- U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI), West Linn 2005 Local Wetland Inventory (LWI), and Metro wetland and stream mapping.
- West Linn Water Resource Area (WRA) Map (Appendix A)
- Oregon Department of Forestry (ODF) and Metro stream mapping
- U.S. Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) gridded Soil Survey Geographic (gSSURGO) database for Clackamas County
- Aerial photographs for the time period between 1994 and 2021, obtained from Google Earth
- Contours derived from the Oregon Department of Geology and Mineral Industries (DOGAMI, 2014) as well as site survey completed by Love Land Surveyors (Appendix C)
- Pre-application meeting conducted with City of West Linn (File PA-23-20), online meeting, and email correspondence with John Floyd

Schott & Associates visited the site on July 10, 2023. Delineation data were collected according to methods described in the *1987 Manual* and the *Regional Supplement to the Corps of Engineers Delineation Manual: Western Mountains, Valleys, and Coast (Version 2.0)*. Five sample plots were established to document the presence and extent of wetland. Data on vegetation, hydrology, and soils was collected at the sample plot, recorded in the field, and later transferred to data forms (Appendix F). Plant indicator status was determined using the 2020 National Wetland Plant List (Corps 2020). Onsite streams, if present, were delineated via the ordinary high-water mark (OHWM) as indicated by top of bank, wrack or scour lines, or change in vegetation communities.

Wetlands and waters were classified according to the USFWS *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979) and the *Guidebook for Hydrogeomorphic (HGM)-based Assessment of Oregon Wetland and Riparian Sites* (DSL 2001).

Vegetation communities within the onsite WRA were assessed in the field. Vegetation was identified by species and percent cover. The wetland determination forms included in Appendix F describe vegetation cover in the WRA. As the property was bordered by a public right-of-way to the east and a public park to the north, these offsite areas were visually inspected to determine the surrounding site conditions. Required width of the Water Resource Area was determined according to Table 32-2 of the CDC, as indicated by Item B*, the width of the WRA extends from the water resource to the top of the slope (30-foot minimum), plus an additional 50 feet.*

Ground level photographs were taken to document site conditions (Appendix E).

Results

According to the NRCS soil survey, Cornelius silt loam, 8-15% slopes, was mapped within all but the northwestern corner of the site; Xerochrepts and Haploxerolls, very steep, were mapped in the northwestern site corner. The Cornelius soil series is moderately well-drained, not subject to flooding or ponding, and is predominantly nonhydric (4% hydric inclusions). Xerochrepts and Haploxerolls are well drained and nonhydric. No water resources are mapped by the NWI, ODF,

or Metro. The West Linn LWI and the West Linn WRA Map show a drainage in the location of the swale. This drainage is identified as a tributary to Barlow Creek by the West Linn WRA map and as a "ditch" by the LWI. The WRA Map does not show a WRA buffer associated with the ditch. It should be noted that these sources are largely remotely sensed and are not verified through ground-truthing in most cases.

No streams were identified within the project site. Streams are generally defined as unvegetated channels with indicators of ordinary high-water mark (OHWM) including top-of-bank, wrack or scour lines, and change in vegetation communities. Instead, a headwater wetland was identified in the bottom of the swale, bisected by the access road, and partially rerouted by the pipe at the south end of the road. The water resource was entirely vegetated with no bed or banks and met wetland criteria. It is possible the wetland swale once featured stream characteristics prior to development and piping. As the swale has been hydrologically disconnected by the roadway and pipe, it was assessed as two separate wetlands.

Water Resource Area (WRA)

Protected Water Features

Two wetlands totaling 0.05 acre were identified onsite. The wetlands extended offsite to north and south, respectively. Wetland, sample plot, and photo point locations are shown in Figure 2.

Wetland 1 (0.006 acre onsite) was located in the bottom of the swale south of the existing driveway and extended offsite upslope to the south. It was fed by a stormwater pipe located offsite to the south (shown in Photo Point 1) and drained northeast into a pipe at the driveway. This pipe directed flows east into a ditch on the east side of Linn Lane, which then drained north into a drainage in the Sahallie Illahee Park (assumed to be the tributary to Barlow Creek). The wetland was bound by steep, near-vertical slopes; the eastern one was reinforced with riprap. It may have historically been a natural channel that was largely piped and ditched during the development of the neighborhood. The wetland was assessed as a headwater slope HGM class and a seasonally flooded palustrine scrub-shrub (PSSC) Cowardin class. It was vegetated primarily by Himalayan blackberry (FAC), which had recently been mown to facilitate access for fieldwork, with some sedge (*Carex* sp; FACW/OBL) and lady fern (*Athyrium cyclosorum*; FAC).

Soil samples met the Corps hydric soil indicator for redox dark surface (F6). Soils were very dark grayish brown (10 YR 3/2) in matrix color with many yellow-red redoximorphic concentrations occurring as soft masses and pore linings. Angular rock fragments were mixed in with the soil. The soil was very moist and water was observed trickling from the stormwater pipe upslope of the wetland despite the drier-than-normal weather conditions. Corps wetland hydrology indicators observed within the wetland included primary indicators of saturation (A3) and oxidized rhizospheres (C3).

Wetland 2 (0.04 acre onsite) was located in the bottom of the broad swale north of the existing driveway. It extended offsite downslope to the north, draining through a culvert and into a drainage in the Sahallie Illahee Park. It was assumed sustained by lateral subsurface flow and groundwater discharge. It was defined by the driveway and Linn Lane embankments to the east and south, and steep (>25%) side slopes to the west.The wetland may have historically been

connected to Wetland 1 prior to development of the site and surrounding neighborhood. The wetland was assessed as a headwater slope HGM class and a seasonally flooded palustrine emergent (PEMC) Cowardin class. It was vegetated primarily by mown turfgrasses such as tall fescue (*Schedonorus arundinaceus*; FAC) and velvetgrass *(Holcus lanatus*; FAC), along with willowherb (*Epilobium ciliatum*; FACW), Canada thistle (*Cirsium arvense*; FAC), coastal hedgenettle (*Stachys chamissonis*; FACW), and Himalayan blackberry. A red osier dogwood thicket (*Cornus sericea*; FACW) was present along the northern boundary of the site.

Soil samples met the Corps hydric soil indicator for redox dark surface. Soils were very dark grayish brown in matrix color with common yellow-red redoximorphic concentrations occurring as soft masses. The soil was moist compared to the very dry, crumbly characteristics of the soil on the swale side slopes, and secondary Corps wetland hydrology indicators were present, including geomorphic position (D2) and FAC-Neutral Test (D5). Soil saturation was present in the lower portion of the wetland offsite within the park.

Wetland Buffer

Slopes adjacent to the wetlands were generally greater than 25% with a distinct top slope as shown in the topographical survey of the property prepared by Love Land Surveying, Inc (Appendix C) and Figure 2. According to Table 32-2 of the CDC, the required width of the Water Resource Area for a wetland within a ravine (Item B*), the width of the WRA extends from the water resource to the top of the slope (30-foot minimum), plus an additional 50 feet. The 50-foot distance may be reduced to 25 feet if a geotechnical study by a licensed engineer or similar accredited professional demonstrates that the slope is stable and not prone to erosion*. The applicant has provided a geotechnical study showing demonstrating slope stability (Appendix D) and the WRA is proposed to extend 25 feet from the break in slope for Wetland 2. For Wetland 1, the top of the steep slope/ravine is within ten or so feet of the wetland boundary, so a WRA width of 65 feet was applied. Total WRA area within the site totals 0.43 acre or 18,624 sq. ft. Together with the 0.05 acre of wetland, WRA covers nearly 70% of the 0.70-acre parcel.

Vegetation within the WRA consisted largely of mown turfgrasses, recently cleared Himalayan blackberry, and some ornamental shrubs and trees around the existing home. Red osier dogwood was present along the northern boundary of the property. The WRA also contains existing impervious developed areas, including the access road and parking/turnaround areas, as well as portions of the home. Overall, the wetland buffer is low-functioning and degraded, providing little protection to the water resource.

Proposed Project

The applicant proposes the replacement of the existing home with a two-story home, including deck, improved parking area/turnaround, and stormwater facility (Site plan shown in Appendix B). It utilizes the exiting development where possible. The access drive will be widened from 9-12 ft. wide to 15 ft. wide. The rationale for widening the road beyond the minimum required 12 ft. is to allow pedestrian access as well as emergency vehicle access as the road is currently approximately 5-6 ft above grade where it crosses the wetland swales. The road will need to be wider than 12 ft. to allow emergency personnel to walk and carry equipment or assist people around the vehicle. The access drive will be supported by retaining walls on either side to

prevent slope failure of the steep embankments. The retaining walls will be placed within 10 feet of the wetland boundaries. A portion of the home and deck will overhang the WRA, supported by vertical columns. The deck will be at a height of 9.5-14 ft. above the surrounding grade, while the roof overhang will be 21-26 ft. above grade. At this height, sunlight and rainfall will be able to penetrate the area enough to support low-light vegetation, such as that which grows beneath a forest canopy. No impacts to the wetlands are proposed.

The applicant requests approval of reduction of the WRA under the Alternative Review Process per Section 32.080 based on the proposed mitigation plan which shall be, at minimum, qualitatively equal, in terms of maintaining the level of functions allowed by the WRA standards of CDC 32.060(D). Currently, the WRA is significantly degraded, vegetated primarily by nonnative turfgrasses and weedy forbs, along with invasive Himalayan blackberry and Canada thistle.

Approval Criteria

32.080 Approval Criteria (Alternate Review Process)
Applications reviewed under the alternate review process shall meet the following approval criteria:

A. The proposed WRA shall be, at minimum, qualitatively equal, in terms of maintaining the level of functions allowed by the WRA standards of CDC 32.060(D).

As described further in this report (Table 1), the existing WRA, while very wide (100-150 feet from the delineated boundary of the water resources in some areas due to the steep grade of adjacent slopes), is low functioning, serving as residential yard dominated by mown nonnative turfgrass ad weedy forbs along with invasive Himalayan blackberry and Canada thistle. It also contains existing development, including an access road and portions of the parking area and home which provide no protective function to the water resources, and may even adversely impact the function of the water resources by contributing untreated stormwater runoff and pollutants. The applicant proposes to reduce the WRA to 65 ft. in width and remove the existing development (access road, parking area, and residence) from it, for a proposed WRA buffer of 0.25-acre. A 65-foot width was chosen as an appropriate width because it corresponds with the base WRA width for a wetland in the City of West Linn. Other local metropolitan Portland districts, including Clean Water Service, City of Happy Valley, and Clackamas County regulate a base wetland buffer width of 50 feet, and while the basis for these different base widths is unknown, the applicant chooses to comply with the minimum City of West Linn standard. The slopes adjacent to the wetland have been demonstrated as stable according to a geotechnical study (Appendix D) and a WRA that extends 25 ft. beyond the top of slope, covering 0.43 acre of the 0.70-acre site (61%), in its current degraded condition, is unnecessary to protect the water resource. The proposed project will result in 2,216 sq. ft. of encroachment into the proposed 65-foot WRA, including the access road widening and roof/deck overhang along the western margin of the WRA. A stormwater facility is proposed to retain and treat stormwater runoff from the development and prevent discharge of untreated runoff into the wetland. The applicant proposes to mitigate for 2,216 sq. ft. of encroachments into the 65-foot WRA via enhancement of 2,216 sq. ft. within the remaining 0.20-acre WRA currently in degraded condition. The applicant also proposes to restore the 806 sq. ft. of roof/deck overhang that encroaches into the 65-foot WRA with native forest understory groundcover plants. The mitigation plan for the WRA will improve

hydrological, water quality, and habitat functions including stream flow moderation, sediment and pollution control, providing organic material sources, and wildlife habitat. Enhancing the WRA will also provide protection of the wetlands from the proposed development. Existing native vegetation along the northern site boundary (red osier dogwood thicket) will be preserved and maintained as is; the remaining WRA will be landscaped and maintained according to Section 32.040 (A). The proposed WRA shall be, at minimum, qualitatively equal in terms of maintaining the level of functions allowed by the WRA standards of CDC 32.060(D) and is anticipated to be superior with the addition of native plantings and appropriate stormwater management and treatment.

B. If a WRA is already significantly degraded (e.g., native forest and ground cover have been removed or the site dominated by invasive plants, debris, or development), the approval authority may allow a reduced WRA in exchange for mitigation, if:

1. The proposed reduction in WRA width, coupled with the proposed mitigation, would result in better performance of functions than the standard WRA without such mitigation. The approval authority shall make this determination based on the applicant's proposed mitigation plan and a comparative analysis of ecological functions under existing and enhanced conditions (see Table 32-4).

As described in this report and demonstrated below in Table 1, the existing WRA is degraded, dominated by non-native and invasive species, including turfgrasses, Himalayan blackberry and Canada thistle. Stormwater runoff from steep slopes and development above is unmitigated. The proposed WRA will be enhanced by of removal of invasive species and planting of native trees, shrubs, and groundcover along the wetland boundaries to significantly improve ecological functions. The proposed WRA will result in higher functions than the larger WRA without mitigation. Additionally, 806 sq. ft. of area beneath the proposed home and deck overhang, while technically considered an encroachment according to Table 32-1 of the CDC, will be restored with native plantings and should provide further benefit to the WRA. The height of the proposed overhang above the surrounding grade will still allow sunlight and rainfall to access the area and thus can be planted with species adapted to lower-light conditions, such as those which grow under a forest canopy. Table 1 below presents existing and enhanced WRA ecological functions per Table 32-4.

Table 1. Ecological Functions Comparison per Table 32-4

Ecological Functions	**WRA existing conditions**	**WRA enhanced conditions**
Stream flow moderation and/or water storage	No dense or woody vegetation or fallen trees are present to slow velocity of stormwater. Both wetlands are moderately sloped toward the tributary to Barlow Creek north of the site, and Wetland 1 is piped into a ditch which routes surface flows directly into the	Planting of native woody vegetation and groundcover will slow stormwater runoff and increase infiltration and sequestration of pollutants, protecting the wetlands and moderating streamflow for the Barlow Creek tributary located

	tributary. Together with the very steep slopes above the wetlands, stormwater is quickly routed through the wetlands and into the tributary below with little opportunity for retention or infiltration.	immediately downslope of the site.
Sediment or pollution control	With steep slopes and only mown turfgrasses and weedy forbs as vegetation cover, the WRA is unable to sequester sediment or pollutants from reaching downstream.	Increased vegetation, including woody species, will increase the WRA's capacity and opportunity to filter nutrients and retain sediments.
Bank stabilization	Low stream flow moderation and/or water storage function (see above) can contribute to bank erosion and channel downcutting downstream.	Increased vegetation cover will moderate velocity of stormwater, increase retention and contribute to downstream bank stabilization.
Large wood recruitment for a fish bearing section of stream	The tributary is not a fish bearing stream, though wood recruitment potential would be improved.	No change.
Organic material sources	The mown turfgrass vegetation cover provides little organic matter for the wetland/drainage system.	Planting diverse native vegetation community including woody species will increase organic material sources throughout the WRA.
Shade (water temperature moderation) and microclimate	The water resource is not currently shaded. The WRA is vegetated by mown turfgrasses	Tree and shrub planting will provide shade sources adjacent to the wetland, cooling surface waters that drain into the tributary below.
Stream flow that sustains in-stream and adjacent habitats	The wetland is seasonally inundated/saturated	Seasonal saturation/inundation will be maintained. No hydrological impacts anticipated.
Other terrestrial habitat	Forested areas within 100-300 feet of the water resource are not contiguous. Areas immediately adjacent to the water resource have only nonnative and invasive herbaceous cover.	Mitigation of the WRA will augment existing forested natural area within 100-300 feet of the water resource (Sahallie Illahee Park).

2. The mitigation project shall include all of the following components as applicable. It may also include other forms of mitigation (mitigation) deemed appropriate by the approval authority.

a. Removal of invasive vegetation.

b. Planting native, non-invasive plants (at minimum, consistent with CDC 32.100) that provide improved filtration of sediment, excess nutrients, and pollutants. The amount of mitigation (mitigation) shall meet or exceed the standards of CDC 32.090(C).

c. Providing permanent improvements to the site hydrology that would improve water resource functions.

d. Substantial improvements to the aquatic and/or terrestrial habitat of the WRA.

The mitigation plan shall consist of removal of invasive species and planting of a diverse assemblage of native trees, shrubs, and groundcover species to improve hydrological and water quality functions including slowing runoff and filtration of sediment, excess nutrients, and pollutants. Terrestrial habitat of the onsite water resources will be improved by providing cover, nesting or burrowing sites, and food availability and type. Proposed total mitigation area, which includes both enhancement of existing degraded WRA and post-construction restoration of disturbed WRA is 3,022 sq. ft. which exceeds the standards of CDC 32.090(C).

C. Identify and discuss site design and methods of development as they relate to WRA functions.

Site design utilized two-story development and incorporated the existing development footprint to maximize the available development footprint while avoiding steep, hazardous slopes to the west and minimizing impacts to the proposed reduced WRA. Impacts to the reduced WRA will include widening of the access driveway from 9-12 ft. wide to 15 ft. wide to allow emergency vehicle as well as pedestrian access (personnel will be able to walk around the vehicle on the roadway which is approximately 5-6 ft above grade where it crosses the wetland swales) and turnaround, retaining walls to support the driveway embankment and prevent slope failure, and the roof and deck overhang. The overhang areas are well above the surrounding grade (the deck will be at a height of 9.5-14 ft. above the surrounding grade, while the roof overhang will be 21-26 ft. above grade) which will allow rain and sunlight to penetrate and support vegetation growth. This area will be restored with native forest understory plantings following construction. The WRA mitigation plan will protect the water resource from the development as well as improve hydrological, water quality, and wildlife habitat functions to both the onsite water resource and the water resource immediately downslope (tributary to Barlow Creek). The existing WRA is degraded, vegetated primarily with mown, nonnative turfgrasses and invasive species.

D. Address the approval criteria of CDC 32.060, with the exception of CDC 32.060(D).

Applicable approval criteria addressed below.

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.

Proposed development avoids impacts to the 65-foot WRA to the extent practicable. The access road widening is regarded as a necessity to allow appropriate emergency vehicle access and turnaround, with the associated retaining walls required to support the steep embankment which is a result of the constraining site topography. The home was placed as far west as site topography allowed (see geotechnical report included as Appendix D). Where the home does encroach into the WRA, its height above the surrounding grade will allow vegetation growth, preventing erosion or sedimentation of areas downslope. The applicant proposes to restore this area (806 sq. ft) with native forest understory groundcover plants that are well-adapted to low-light conditions. A stormwater facility will also be constructed to retain and treat stormwater runoff from the proposed project (currently, no stormwater facility is present) and prevent the discharge of untreated stormwater into the wetland. The applicant proposes mitigation of the WRA at a ratio of 1:1.4 between the wetland boundaries and the proposed project to provide the best protection of the wetland (3,022 sq. ft. of mitigation to 2,216 sq. ft. of impact). The mitigation plan meets the standards of CDC 32.090.

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, mitigation 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.

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.).*
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.*
5. *Access to public storm water detention and/or treatment facilities shall be provided for maintenance purposes. Maintenance driveways shall be constructed to minimum width and use water permeable paving materials. Significant trees, including roots, shall not be disturbed to the degree possible. The encroachment and any tree loss shall be mitigated per CDC 32.090. There shall also be no adverse impacts upon the hydrologic conditions of the site.*

A stormwater management plan will be developed to meet City requirements.

D. WRA width. Except for the exemptions in CDC 32.040, applications that are using the alternate review process of CDC 32.070, or as authorized by the approval authority consistent with the provisions of this chapter, all development is prohibited in the WRA as established in Table 32-2 below:

Applicant is seeking to reduce the buffer width using the alternate review process of CDC 32.070.

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.*

A 9-12-foot-wide access road currently traverses the WRA on an embankment that is 5-6 feet above grade. The applicant proposes to utilize the existing access road but widen it to 15 feet to allow emergency vehicle access, turnaround, and personnel to safely traverse the roadway. Retaining walls will be required to support the steep embankment. Impacts to the water resource will be avoided.

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.*

No fish bearing streams are present onsite and no crossings are proposed. This criterion is not applicable.

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.*

No new utilities shall span the WRA.

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).*

No fill or excavation is proposed within the ordinary high water mark or within the boundaries of the wetlands.

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.*

No fish bearing streams are present onsite and no crossings are proposed.

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.

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.

Mitigation is proposed onsite.

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.

2,216 sq. ft. of permanent impacts to the 65-foot WRA are proposed. The applicant proposes enhancement mitigation of 2,216 sq. ft. of WRA adjacent to the wetland boundaries, as well as 806 sq. ft. of restoration mitigation beneath the encroaching roof/deck overhang for a total of 3,022 sq. ft. of mitigation to protect the water resource and downstream functions.

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.

The applicant and owner are:

Kevin Janssen
614 SE 52nd Avenue
Portland, OR 97215

The applicant will provide contractor/designer and other responsible party contact information as it becomes available.

2. A map showing where the specific adverse impacts will occur and where the mitigation activities will occur.

Appendix B illustrates the proposed impacts to the 65-foot WRA. Figure 3 illustrates the proposed mitigation planting areas.

3. A re-vegetation plan for the area(s) to be mitigated that meets the standards of CDC 32.100.

See the response to CDC 32.100 below.

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.

Mitigation shall occur after all approvals are met and in accordance with planting requirements outlined in 32.100. As per City of West Linn WRA protection requirements, 80% success is required for replanted areas. The mitigation planting site will be monitored and maintained for three years. If, after each year monitoring period, 80% survival has not been met, dead plants will be replaced up to the 80% success required. Monitoring reports shall be provided to document these activities. No work will be conducted in fish bearing streams and the in-stream work window is not applicable.

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)

The applicant can provide any necessary assurance based on coordination with City staff. We would propose that any bonding or surety be deferred based on the results of the ongoing monitoring, maintenance, and reporting requirements.

32.100 RE-VEGETATION PLAN REQUIREMENTS

The mitigation planting plan will meet the mitigation requirements of CDC 32.090 and vegetative mitigation of CDC 32.080 including the following standards.

1. *All trees, shrubs and ground cover to be planted must be native plants selected from the Portland Plant List.*
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. 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.*
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. 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*
5. *Invasive vegetation. Invasive non-native or noxious vegetation must be removed within the mitigation area prior to planting.*
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.*

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.*
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 and18 inches in diameter to retain moisture and discourage weed growth.*
    b. *Irrigation. Water new plantings one inch per week between June 15th to October 15th, for the three years following planting.*
    c. *Weed control. Remove, or control, non-native or noxious vegetation throughout maintenance period.*
    d. *Planting season. Plant bare root trees between December 1st and February 28th, and potted plants between October 15th and April 30th.*
    e. *Wildlife protection. Use plant sleeves or fencing to protect trees and shrubs against wildlife browsing and resulting damage to plants.*

WRA Mitigation Plan

This WRA mitigation plan has been designed to meet the requirements of 32.100(A)1-8 as outlined above and described below. The applicant proposes enhancement mitigation of 2,216 sq. ft the remaining 65-foot WRA along the boundaries of the wetland, in areas currently degraded and not vegetated by native species (red osier dogwood thicket is present along the northern boundary of the onsite WRA). The applicant also proposes to restore the 806 sq. ft. of roof/deck overhang that encroaches into the WRA with native forest understory groundcover plants. The plan is expected to improve functions of the WRA by removing invasive species and establishing a diverse assemblage of native trees and shrubs along the boundaries of the wetland and restoring the disturbed area of WRA beneath the home with native forest understory species. The functions expected to be enhanced include hydrological functions (slowing velocity of stormwater runoff), water quality functions (retention of sediment and nutrients), organic material recruitment, and riparian wildlife habitat quality.

Planting Plan

The planting plan was developed according to 32.100 Revegetation requirements (Table 2). All plants were selected from the Portland Plant List. Plants selected for the planting area adjacent to the wetland boundaries (2,216 sq. ft.) are adapted to sun-part sun and seasonally wet-dry conditions. Plants selected for the planting area under the roof/deck overhang (806 sq. ft.) are groundcovers adapted to full shade, dry-moist conditions. The proposed quantities and sizing are according to the CDC requirements. 15 trees and 96 shrubs/woody groundcover plants will be installed in the WRA adjacent to the wetland boundaries. 30 shrubs and 68 groundcover plants will be installed in the WRA beneath the roof/deck overhang. All bare ground within the mitigation planting areas will be seeded with a native grass mix as shown below. Substitutions or additional plants are allowable, subject to price and availability, provided are included on the native Portland Plant List, meet the stated type, spacing, and total quantities listed in the table below and are suited to sun and moisture conditions. The planting plan is subject to approval by the City.

Table 2. Planting Palette for WRA Mitigation Area (3,022 sq.ft.)

Species	Type	Minimum Size	Spacing	Quantity
WRA Adjacent to Wetland Boundaries (2,216 sq. ft.)				
Oregon ash *Fraxinus latifolia*	Tree	0.5" diam or 1 gal.	12'OC	6
Cascara *Rhamnus purschiana*	Tree	0.5" diam or 1 gal.	12'OC	9
Snowberry *Symphoricarpus albus*	Shrub	1 gal.	4-5'OC	24
Redosier dogwood *Cornus sericea*	Shrub	1 gal.	4-5'OC	24
Red flowering currant *Ribes sanguineum*	Shrub	1 gal.	4-5'OC	24
Kinnikinnick *Arctostaphylos uva-ursi*	Woody Ground cover	1 gal.	Clusters 10' OC	24
*Sunmark Seeds native EC mix or equivalent	Ground cover	1 lb/1,000 sq. ft.		2.4 lbs
WRA Beneath Roof/Deck Overhang (806 sq. ft.)				
Salal *Gaultheria shallon*	Shrub	1 gal.	4-5'OC	15
Western swordfern *Polystichum munitum*	Ground cover	1 gal.	4-5'OC	15
Fringecup *Tellima grandiflora*	Ground cover	4"	2-3'OC	34
Inside-out flower *Vancouveria hexandra*	Ground cover	4"	2-3'OC	34
*Sunmark Seeds native EC mix or equivalent	Ground cover	1 lb/1,000 sq. ft.		0.8 lb

*Seed mix includes California brome (*Bromus carinatus*), blue wildrye (*Elymus glaucus*), spike bentgrass (*Agrostis exerata*), native red fescue (*Festuca rubra rubra),* tufted hairgrass (*Deschampsia cespitosa)*

Schedule and Maintenance Requirements

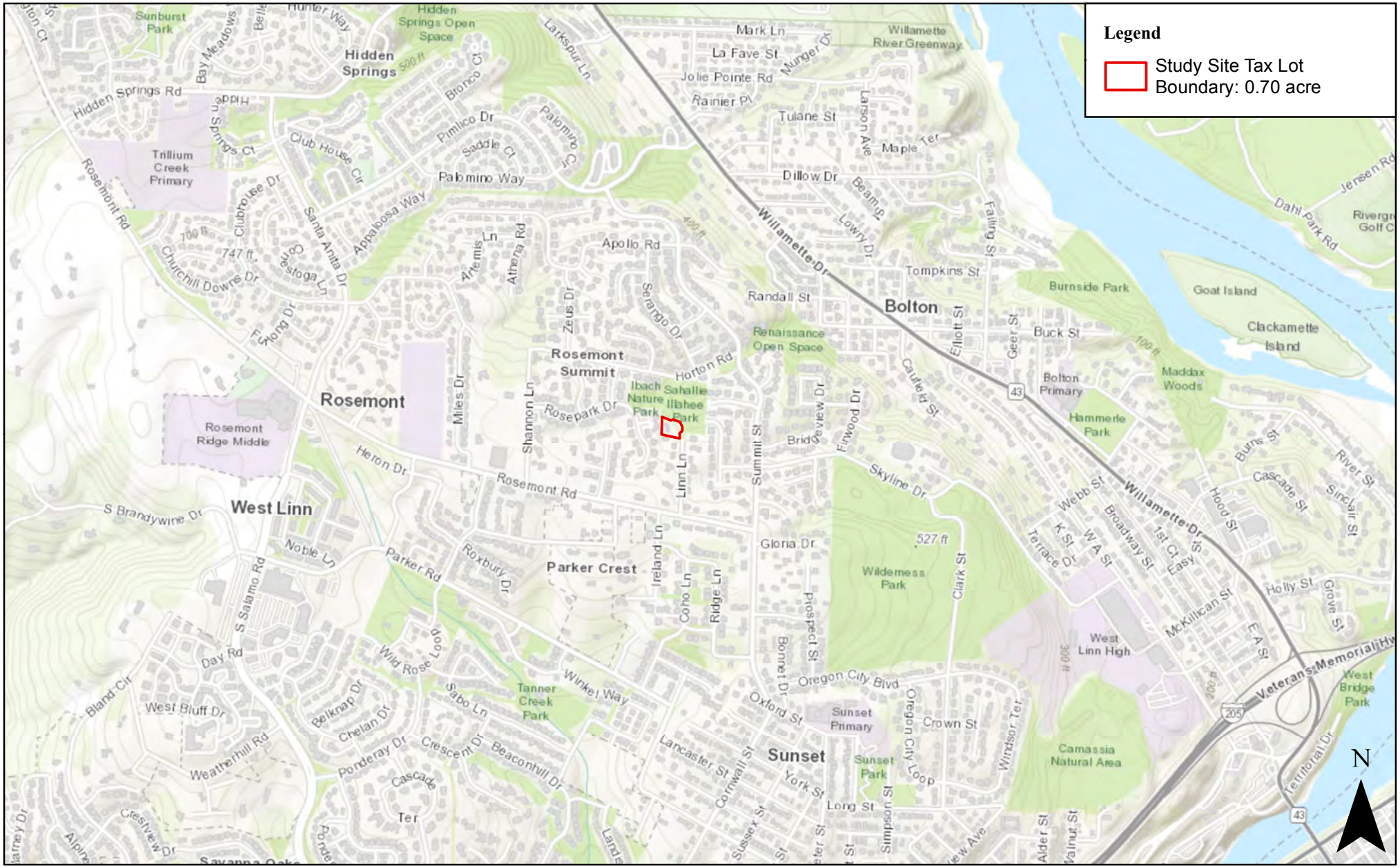
Bare root trees shall be planted between December 1st and February 28th, and potted plants shall be planted between October 15th and April 30th, following construction of the project.

Monitoring of the mitigation site is the ongoing responsibility of the property owner. Plants that die must be replaced in kind. In accordance with City requirements 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.

To enhance survival of tree replacement and plantings, in accordance with Section 32.100 the following practices are required:

- Mulch new plantings a minimum of three inches in depth and 18 inches in diameter to retain moisture and discourage weed growth.
- Irrigation for new plantings shall be provided in the amount of one inch per week between June 15th to October 15th, for the three years following planting.
- Non-native or noxious vegetation shall be removed or controlled throughout maintenance period.
- Use plant sleeves or fencing to protect trees and shrubs against wildlife browsing and resulting damage to plants.
- Resources for plant substitutions are as follows:
    - Native plants from the Portland Plant List https://www.portland.gov/bps/documents/portland-plant-list/download
    - Portland Plant List Native Plants Condensed https://backyardhabitats.org/wp-content/uploads/2021/01/Condensed-Portland-Plant-List-Plants-by-Condition.pdf
    - Gardening with Oregon Native Plants West of the Cascades https://extension.oregonstate.edu/catalog/pub/ec-1577-gardening-oregon-native-plants-west-cascades

FIGURE 1: LOCATION MAP



Date: 10/5/2023

Data Source: ESRI, 2023; Clackamas County GIS Dept., 2023

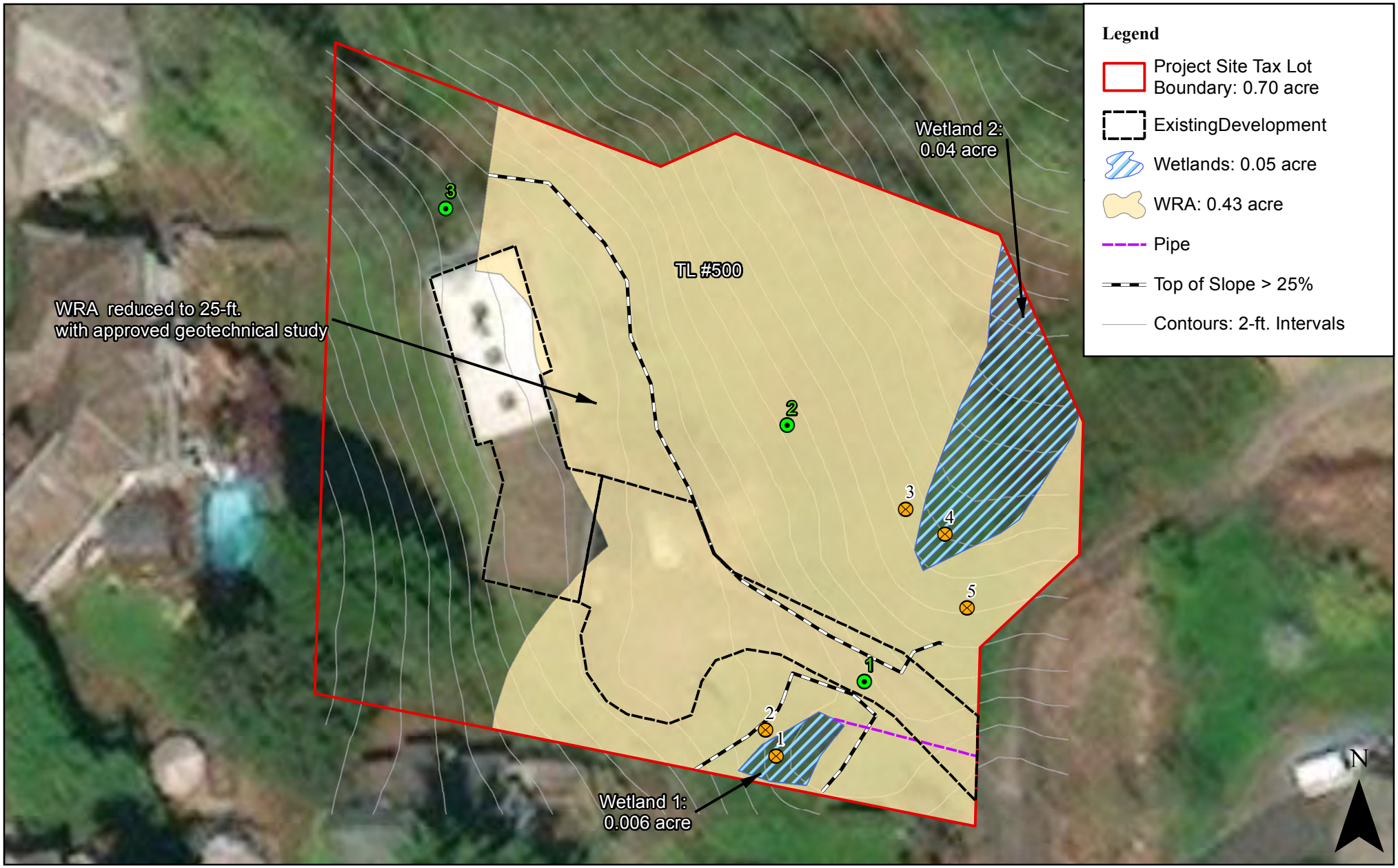
Figure 1. Location Map

SCHOTT & ASSOCIATES, Inc.

Linn Lane Project Site: S&A #3079

0 500 1,000 2,000 Feet

FIGURE 2: EXISTING CONDITIONS



Date: 11/8/2023

Data Source: ESRI, 2023; Clackamas County GIS Dept., 2023; DOGAMI, 2014

Figure 2: Exisiting Conditions

SCHOTT & ASSOCIATES, Inc.

Linn Lane Project Site: S&A #3079

0 20 40 80 Feet

FIGURE 3: PROPOSED WRA AND MITIGATION PLANTING AREAS

Date: 11/9/2023

Data Source: ESRI, 2023; Clackamas County GIS Dept., 2023

Figure 3. Proposed WRA and Mitigation Planting Areas

Linn Lane Project Site: S&A #3079

SCHOTT & ASSOCIATES, Inc.

0 20 40 80 Feet

APPENDIX A. CITY OF WEST LINN WRA MAP

MAY 2014

Water Resource Area (WRA) Map

WATER RESOURCE AREA MAP DISCLAIMER
The Water Resource Areas (WRA) map has interpretive value for general planning purposes only and is not satisfactory for making site-specific land use decisions. This map is to be used in conjunction with detailed written code, tables, and figures provided in Chapter 32 of the West Linn Community Development Code (CDC). The May 2014 WRA Map is intended to identify WRA water features (wetlands, streams, ephemeral streams, and riparian corridors). It is not intended to delineate the exact WRA boundaries or water feature alignment. That task will be carried out by staff in the course of site visits where the provisions of Table 32-2 in CDC Chapter 32 shall apply. Chapter 32 of the West Linn Community Development Code (CDC): http://www.codepublishing.com/OR/WestLinn/CDC.html. Any questions or clarifications regarding WRA's should be directed to the West Linn Planning Department. A copy of the WRA Map is available for public inspection in the Planning Director's office (Ord. 1623 § 1, 2014)

Project site location

Map Developed by West Linn Planning Department and GIS

MAP OVERLAYS:
*Streams, Pipe Segments, Other Open Ditches, and Significant Riparian Corridors
Map Source: "Significant Riparian Corridors West Linn Goal 5 Inventory, January 2007"
Map publication date: 1/2/2007.
Modified Streams and added Ephemeral Streams, April 2013, July 2013, September 2013

**Locally Significant Wetlands and Other Wetlands
Map Source: "Local Wetland Inventory, West Linn Goal 5 Inventory, January 2005"
Map publication date: 6/5/2006.

***Taxlot Base Map provided by Clackamas County GIS, 2013

WETLANDS/GOAL 5 DISCLAIMER (DSL STANDARD):
Information shown on this map is for planning purposes only and wetland information is subject to change. There may be unmapped wetlands subject to regulation and all wetland boundary mapping is approximate. In all cases, actual field conditions determine wetland boundaries. You are advised to contact the Oregon Division of State Lands and the U.S. Army Corps of Engineers with any regulatory questions.

This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

Goal 5 Significant Riparian Corridors*

- Significant Riparian Corridors
- Streams
- Ephemeral Stream
- Piped Segments
- Upper Stream Reach of Fish Inventory 2003/2004 Survey

Goal 5 Wetland Inventory**

- Locally Significant Wetlands, DSL 2005
- Other Wetlands, DSL 2005
- TA-05 Specific Wetland Identifier
- Rivers & Ponds
- West Linn City Limits
- Taxlot Base Map***

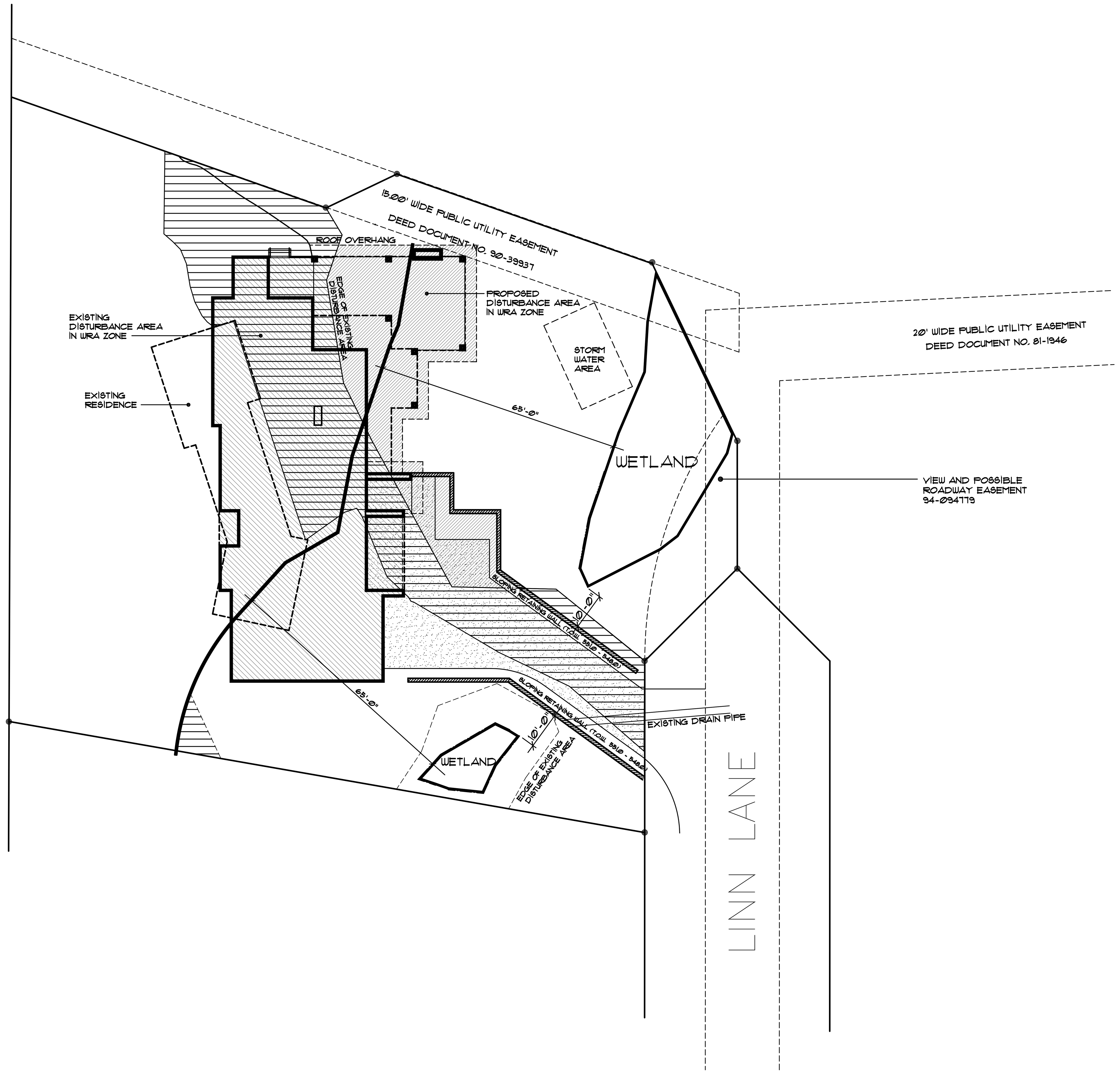
0 0.25 0.5 1 Miles

Map Created: 6/6/2014

LOC: G:\PROJECTS\GIS\GOAL5_2006\SIGRIPARIAN\SIGRIPARIAN_WETLANDS_201406V6_FINAL.MXD | KAHA
VERSION 5 TO VERSION 6: REMOVED "PROPOSED" FROM MAP TITLE

City of West Linn GIS GEOGRAPHIC INFORMATION SYSTEMS

APPENDIX B. SITE PLAN



PLOT PLAN

SCALE: 1" = 20'

5494 LINN LN.
WEST LINN, OR

A RESIDENCE FOR: THE JANSSEN FAMILY

APPLICANT : ROBERT EASTON
21520 LUPINE CT.
WEST LINN, OR 97068
(503) 866-8810

N

DISTURBANCE AREA (PERMANENT / PROPOSED)	1979 SQ. FT.
ROOF OVERHANG	237 SQ. FT.

R-10 ZONE
SETBACKS: FRONT 20'
REAR 20'
SIDE 7.5'

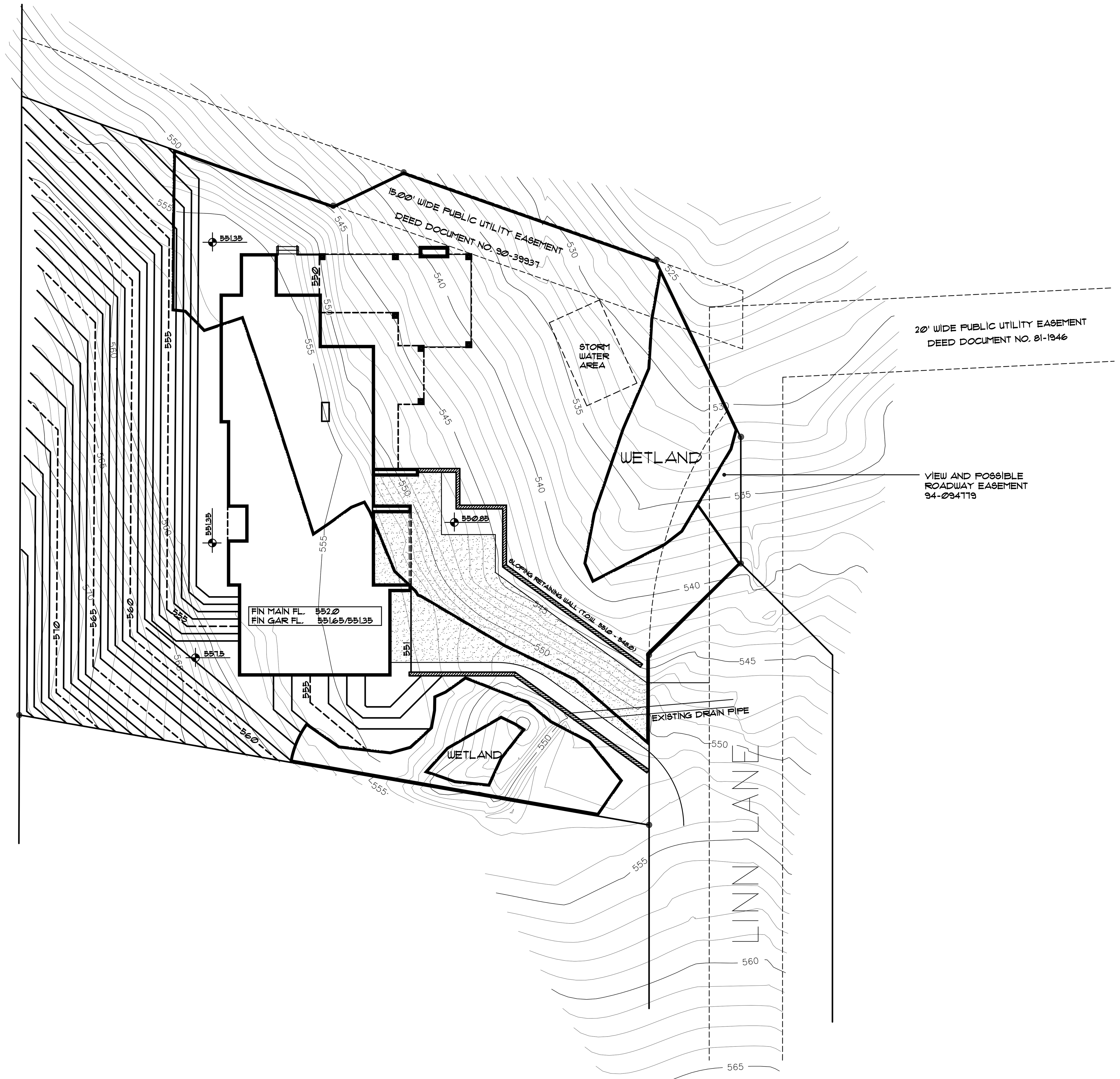
LOT AREA:	29,318 SQ. FT.
ALLOWABLE COVERAGE:	10,261 SQ. FT. (35%)
ACTUAL COVERAGE:	6780 SQ. FT. (23%)
ALLOWABLE FAR:	13,193 SQ. FT. (45%)
ACTUAL FAR:	6385 SQ FT. (22%)

General Notes and Disclaimers: These drawings have been prepared to meet generally accepted professional standards. However, local variations may require changes. Likewise, building code requirements vary with location and change from time to time. Before starting construction, the builder must review and be responsible for all details and dimensions, and ensure that these plans meet all current requirements in your area. It is also suggested that a local architect and/or engineer be retained to review and make any changes necessary to ensure that plans meet all requirements, and that you check with your local building department to see if a professional stamp is required on drawings filed for permit purposes. All applicable construction shall conform to the latest editions of either "Uniform Building Code" or the "BOCA Basic Building Code," or any other locally required code. Codes govern over drawings. Dimensions govern over scale. Verify all mechanical requirements before framing. Verify topographic and subsurface conditions, and adapt foundation plans accordingly.

Barclay
HOME DESIGNS
F.A.I.B.D.
12112 S NEW ERA RD
OREGON CITY, OR 97045
(503)970-4257

A

JANSSEN



GRADING PLAN

SCALE: 1" = 20'

5494 LINN LN.
WEST LINN, OR

A RESIDENCE FOR: THE JANSSEN FAMILY

APPLICANT : ROBERT EASTON
21520 LUPINE CT.
WEST LINN, OR 97068
(503) 866-8810

TOTAL WRA AREA:	13,911 SQ. FT.
DISTURBANCE AREA:	4729 SQ. FT.

R-10 ZONE

SETBACKS:	FRONT	20'
	REAR	20'
	SIDE	7.5'

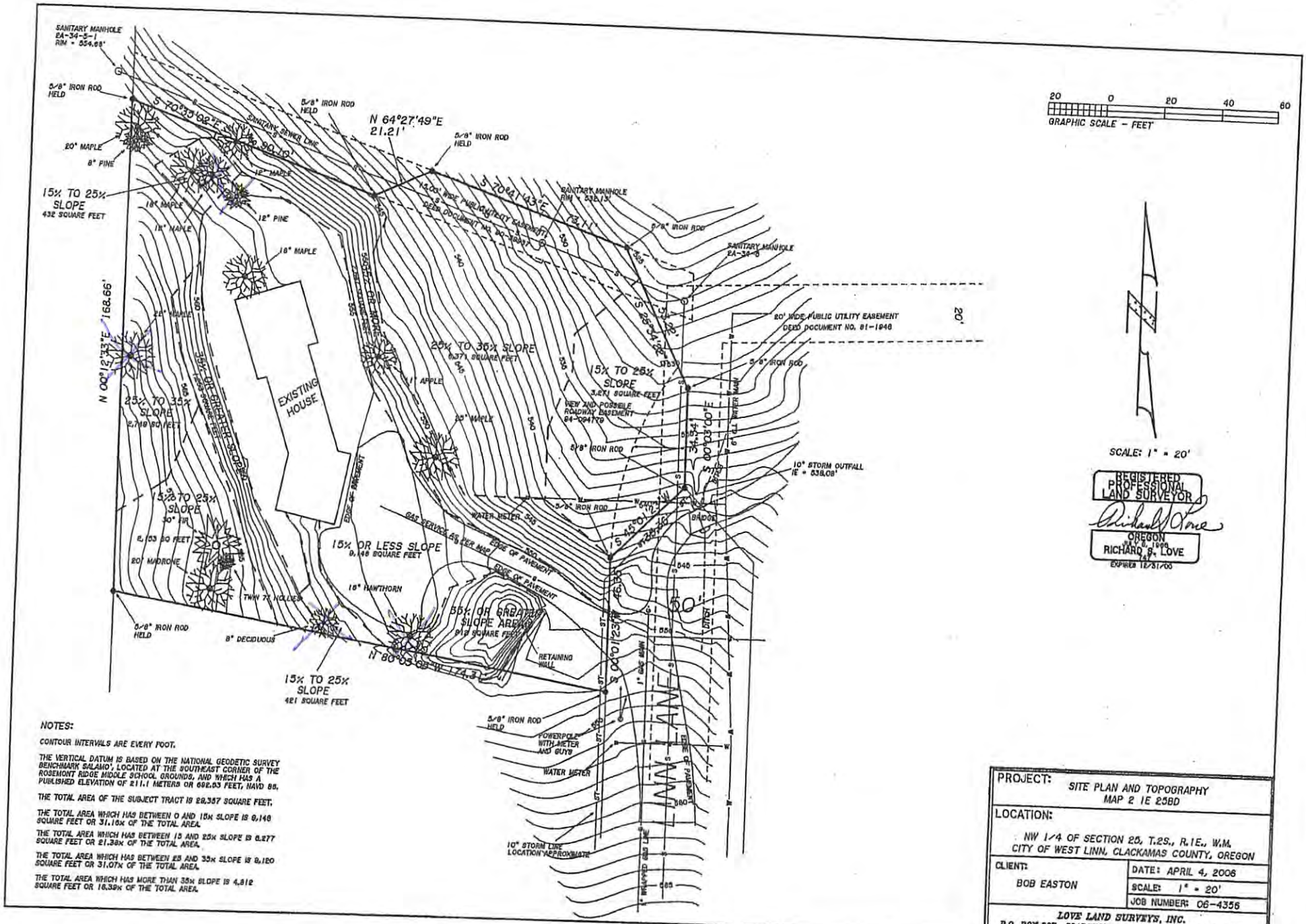
LOT AREA:	29,318 SQ. FT.
ALLOWABLE COVERAGE:	10,261 SQ. FT. (35%)
ACTUAL COVERAGE:	6780 SQ. FT. (23%)
ALLOWABLE FAR:	13,193 SQ. FT. (45%)
ACTUAL FAR:	6385 SQ FT. (22%)

Barclay HOME DESIGNS F.A.I.B.D.
12112 S NEW ERA RD
OREGON CITY, OR 97045
(503)970-4257

B

JANSSEN

APPENDIX C. SITE SURVEY



NOTES:

CONTOUR INTERVALS ARE EVERY FOOT.

THE VERTICAL DATUM IS BASED ON THE NATIONAL GEODETIC SURVEY BENCHMARK SALAMO', LOCATED AT THE SOUTHEAST CORNER OF THE ROSEMONT RIDGE MIDDLE SCHOOL GROUNDS, AND WHICH HAS A PUBLISHED ELEVATION OF 211.1 METERS OR 692.63 FEET, NAVD 88.

THE TOTAL AREA OF THE SUBJECT TRACT IS 28,357 SQUARE FEET.

THE TOTAL AREA WHICH HAS BETWEEN 0 AND 15% SLOPE IS 8,148 SQUARE FEET OR 31.16% OF THE TOTAL AREA.

THE TOTAL AREA WHICH HAS BETWEEN 15 AND 25% SLOPE IS 6,277 SQUARE FEET OR 21.38% OF THE TOTAL AREA.

THE TOTAL AREA WHICH HAS BETWEEN 25 AND 35% SLOPE IS 8,120 SQUARE FEET OR 31.07% OF THE TOTAL AREA.

THE TOTAL AREA WHICH HAS MORE THAN 35% SLOPE IS 4,812 SQUARE FEET OR 16.39% OF THE TOTAL AREA.

PROJECT: SITE PLAN AND TOPOGRAPHY MAP 2 1E 25BD	
LOCATION: NW 1/4 OF SECTION 25, T.2S., R.1E., W.M. CITY OF WEST LINN, CLACKAMAS COUNTY, OREGON	
CLIENT: BOB EASTON	DATE: APRIL 4, 2006
	SCALE: 1" = 20'
	JOB NUMBER: 06-4356

LOVE LAND SURVEYS, INC.
P.O. BOX 807 GLADSTONE, OR 97027 (503)-656-4915

APPENDIX D. GEOTECHNICAL STUDY

HARDMAN GEOTECHNICAL SERVICES INC.
Practical, Cost-Effective Engineering Solutions

10110 SW Nimbus Avenue, Suite B-5
Portland, Oregon 97223
HGSIgeotech.com
503.530.8076

March 3, 2023
HGSI Project No. 23-3058

Jared Eck
Ledgewood Construction
PO Box 298
Sherwood OR 97140

503.522.8700
jared@ledgewoodconstruction.net

Via email with hard copies mailed on request

Subject: **Geotechnical Engineering Report and Slope Stability Evaluation**
Proposed Residential Development
5494 Linn Lane
West Linn, Oregon

This report presents the results of a geotechnical engineering study conducted by Hardman Geotechnical Services Inc. (HGSI) for the proposed residential development at 5494 Linn Lane in West Linn, Oregon (Figure 1). The purpose of this study was to evaluate subsurface conditions and perform general reconnaissance at the site to provide geotechnical recommendations for future site development. This geotechnical study was performed in accordance with HGSI Proposal No. 23-770, dated January 27, 2023, and your subsequent authorization of our proposal and *General Conditions for Geotechnical Services*.

SITE DESCRIPTION AND PROPOSED DEVELOPMENT

Available information indicates the property is approximately 0.67 acres and irregular in shape. The site is currently occupied by a single-family residence, reportedly constructed in 1955. The existing residence is single-story with attic and basement levels. The site slopes moderately to steeply down to the northeast.

It is to our understanding that the proposed construction will likely be in the general area of the existing home. We anticipate the new home will be of "daylight basement" construction to conform to existing topography. Although a grading plan was not received for this project, it is believed that moderate cuts and fills will be necessary due to site grades. Evaluation of slope stability for long term conditions as well as stability of temporary excavations needed to construct the home are addressed in this report.

REGIONAL GEOLOGY AND SEISMIC SETTING

The subject site lies within the Portland Basin, a broad structural depression situated between the Coast Range on the west and the Cascade Range on the east. The Portland Basin is a northwest-southwest trending structural basin produced by broad regional down warping of the area. The Portland Basin is approximately 20 miles wide and 45 miles long and is filled with consolidated and unconsolidated sedimentary rocks of late Miocene, Pliocene and Pleistocene age.

Geologic maps indicate the subject site is underlain at an undetermined depth by Miocene age basalt of the Columbia River Basalt Group. The basalt underlying the subject site is typically gray to black, dense, fine-grained, low-olivine basalt; locally porphyritic; locally deeply weathered (Schlicker & Finlayson, 1979). Interflow zones between flows are typically vesicular, scoriaceous, and brecciated, and sometimes include sedimentary rocks. Schlicker & Finlayson (1979) designate the site area as having "Thin soils: Areas mapped as thin soils overlie hard bedrock at depths of 2 feet or less. Unit includes soil developed from basalt residuum, thin soil deposited on bedrock, and bare rock outcrop areas."

At least three major seismic source zones capable of generating damaging earthquakes are known to exist in the region. These include the Portland Hills Fault Zone, Gales Creek-Newberg-Mt. Angel Structural Zone, and the Cascadia Subduction Zone. These potential earthquake source zones are included in the determination of seismic design values for structures, as presented in the *Seismic Design* section.

FIELD EXPLORATION

Exploratory Hand Auger Borings

On February 16, 2023 four hand auger borings, designated HA-1 to HA-4, were dug to depths of approximately 1.5 to 8 feet below ground surface (bgs) at the approximate locations shown on Figure 2. It should be noted that exploration locations were determined in the field by pacing or taping distances from apparent property corners and other site features. As such, the locations of the explorations should be considered approximate.

Explorations were conducted under the full-time observation of HGSI personnel. Soil samples were classified in the field and representative portions were placed in relatively air-tight plastic bags. These soil samples were then returned to the laboratory for further examination and laboratory testing. Pertinent information including soil sample depths, stratigraphy, soil engineering characteristics, and groundwater occurrence was recorded. Soils were classified in general accordance with the Unified Soil Classification System.

Summary hand auger boring logs are attached. The stratigraphic contacts shown on the individual logs represent the approximate boundaries between soil types. The actual transitions may be more gradual. The soil and groundwater conditions depicted are only for the specific dates and locations reported, and therefore, are not necessarily representative of other locations and times.

LABORATORY TESTING

Moisture Content and Fines Content

Moisture content determinations were made for selected samples, measured as the weight of water divided by the weight of dry soil, expressed as a percentage. Tests were performed for samples at HA-2 at a depth of 2 feet, HA-3 at depths of 3.5 and 8 feet, and HA-4 at a depth of 3 feet. Results of the moisture content testing, performed in general accordance with ASTM D2216 are present in Table 1 below.

In addition, fines content determinations were made for HA-2 at 2 feet, in accordance with ASTM C117-13. The soil sample was washed through a No. 200 sieve to determine the percentage of silt and clay ("fines", defined as percentage passing the No. 200 sieve). It was determined that approximately 30% of the sample passed the No. 200 sieve indicating the soil sample is a silty sand (SM) material classified according to USCS. Test results are incorporated in the appropriate hand auger logs.

Table 1. Moisture Content Test Results

Hand Auger	Sample Depth (Feet)	Moisture Content (%)
HA-2	2.0	45.6
HA-3	3.5	29.4
HA-3	8.0	32.8
HA-4	3.0	35.6

SUBSURFACE CONDITIONS

The following discussion is a summary of subsurface conditions encountered in our explorations. For more detailed information regarding subsurface conditions at specific exploration locations, refer to the attached exploration logs. Also, please note that subsurface conditions can vary between exploration locations, as discussed in the *Uncertainty and Limitations* section below.

Soil

On-site soils consist of organic topsoil, native residual soil, and gravelly silts and clays interpreted as part of the Columbia River Basalt Group as described below.

Organic Topsoil – At the surface of all hand augers, materials consisted of soft, brown topsoil. This layer was organic with thin roots and slight black mottling. The topsoil layer extended about 6 inches to 1-foot bgs in all hand auger locations.

Native Residual Soil – Below topsoil in HA-2 through HA-4, our explorations encountered native residual soils. These soils were most likely formed as the result of heavy weathering of underlying basalt rock. This unit of residual soils was characterized by brown silt that tended to have higher moisture near the surface and increased in stiffness with depth. These characteristics along with the presence of mica and mottling were good indicators that the soils were native and may not have been disturbed other than surficial disturbance and weathering. This layer extended 2 to 3 feet bgs in the hand auger borings.

Weathered Columbia River Basalt – Below the topsoil and native silt layers, material consisted of weathered Columbia River Basalt in all hand auger borings making excavation very difficult. This material consisted of silty sand and silty clay that was generally stiff to hard with gravels and basalt fragments. This layer extended from below the topsoil layer to 20 inches in HA-1 and 3 to 8 feet bgs in hand augers HA-2 through HA-4. Borings HA-1, HA-2 and HA-4 encountered refusal in this layer at depths of 1.6, 3.2 and 4.2 feet respectively; typically, on less weathered rock materials.

Groundwater

Groundwater seepage was not encountered in the subsurface explorations conducted for this study, excavated to a maximum depth of 8.0 feet. Groundwater conditions may vary depending on the season, local subsurface conditions, changes in site utilization, and other factors. The groundwater conditions reported above are for the specific date and locations indicated, and therefore may not necessarily be indicative of other times and/or locations.

CONCLUSIONS AND RECOMMENDATIONS

Results of this study indicate that the proposed development is geotechnically feasible, provided that the recommendations of this report are incorporated into the design and construction phases of the project. Included in this report is an evaluation of potential slope stability impacts to the proposed new structures. Recommendations are also presented below regarding site preparation and undocumented fill removal, engineered fill, wet weather earthwork, spread footing foundations, below-grade retaining walls, perimeter footing drains, seismic design, excavating conditions and utility trench backfill, and erosion control considerations.

Slope Stability and Landslide Hazard Evaluation

For the purpose of evaluating slope stability, we reviewed published geologic and hazard mapping, reviewed regional site topography and LiDAR images, and performed a field reconnaissance. LiDAR, which stands for Light Detection and Ranging, is a remote sensing method that uses light in the form of a pulsed laser to measure ranges (variable distances) to the earth. This method can "see" through structures and tree cover to show the ground surface elevations without obstructions, a useful tool in imaging earth forms and identifying landslide topology.

Regional geologic mapping and the Oregon Department of Geology and Mineral Industries (DOGAMI) online landslide database (SLIDO, 2021) shows a large landslide complex that encompasses the site and dozens of other existing residences in the area (Figure 3a). The slide is mapped as a Rockslide Translational Landslide feature with "Moderate" (11-29%) confidence level. The slide feature is mapped as being pre-Historic (older than 150 years), and if present may have attained a state of equilibrium following the original land sliding. SLIDO indicates the depth of original sliding to be deep (estimated at 39 feet).

From site explorations and the geologic mapping, it appears that the site is in the oversteepened "headscarp" area of the ancient landslide. The body of the mapped ancient feature is northwest of the subject site (Figures 3a and 3b).

The DOGAMI Landslide Susceptibility mapping for Shallow and Deep Landslides was reviewed as part of this study. The area of the existing home and proposed facilities is mapped as having "High" susceptibility for shallow slides, less than 15 feet deep (Figure 3b). Steep slope areas above the homesite are mapped as having a "Moderate" susceptibility for shallow landsliding. The DOGAMI Susceptibility Mapping indicates the site and surrounding areas have "High" susceptibility for deep landslides, defined as extending greater than 15 feet below ground surface.

On the site itself, we did not observe evidence, either from surface reconnaissance or in the subsurface explorations, which would definitively indicate the presence of a landslide. Based on these considerations, we conclude an active landslide is most likely not present on or near the site. In either case, the presence of an ancient landslide or the lack thereof, is not indicative of a significant slope stability hazard to the site. In our opinion, a numeric slope stability analysis is not warranted.

A minimum footing-to-slope setback of 7 feet is recommended. The setback should be measured horizontally, from the face of the nearest slope to the outside edge of the footing. Where structures are located closer than the recommended setback distance, it may be necessary to deepen the footing to achieve the recommended setback. HGSI should observe foundation excavations prior to formwork and reinforcing steel placement, to verify footing-to-slope setbacks are adequate.

Storm water management systems (if any) should be constructed such that potential overflow is discharged in a controlled manner away from structures and slopes, and all systems should include an adequate factor of safety. During and following site development within sloped areas, surface runoff should be collected and

storm water should be discharged in a controlled manner. In no case should uncontrolled stormwater runoff be allowed to flow over slopes.

To our knowledge, the planned development does not involve any significant cuts or fills, other than the excavation needed for the planned development. Based on our observations and results of the slope stability evaluation, it is our opinion that no special design or construction provisions are needed to address slope issues on the site. Development of the site is not anticipated to have negatively impact slope stability of the site or adjacent properties. The project will be designed and constructed per current building codes, City of West Linn requirements, and the current standard-of-practice in geotechnical engineering. As such, it is our opinion that adequate slope stability factors of safety will be maintained for the design life of the proposed development, provided significant changes are not made to site topography or drainage conditions.

It should be noted that this evaluation is based on limited observation of surficial features, the subsurface explorations performed and review of available geologic literature. Deep subsurface explorations and quantification of slope stability factors of safety using numerical methods were beyond the scope of this study.

Site Preparation and Undocumented Fill Removal

The areas of the site to be graded should first be cleared of vegetation and any loose debris; and debris from clearing should be removed from the site. We anticipate that the average depth of topsoil stripping will be about 12 inches over most of the site. The final depth of stripping removal may vary depending on local subsurface conditions and the contractor's methods and should be determined based on site observations after the initial stripping has been performed. Stripped organic soil and pavement sections should be stockpiled separately and only in designated areas or removed from the site and stripping operations should be observed and documented by HGSI. Existing subsurface structures (foundations, tile drains, old utility lines, septic leach fields, etc.) beneath areas of proposed structures and pavement should be removed and the excavations backfilled with engineered fill.

Undocumented fills were not encountered in any borings. There is potential for fills to be present on site in areas beyond our explorations. If encountered beneath proposed structures, pavements, or other settlement-sensitive improvements, undocumented fill should be removed down to firm inorganic native soils and the removal area backfilled with engineered fill. HGSI should observe removal excavations (if any) prior to fill placement to verify that over excavations are adequate and an appropriate bearing stratum is exposed.

In construction areas, once stripping has been verified, the area should be ripped or tilled to a depth of 12 inches, moisture conditioned, and compacted in-place prior to the placement of engineered fill. Exposed subgrade soils should be evaluated by HGSI. For large areas, this evaluation is normally performed by proof-rolling the exposed subgrade with a fully loaded scraper or dump truck. For smaller areas where access is restricted, the subgrade should be evaluated by probing the soil with a steel probe. Soft/loose soils identified during subgrade preparation should be compacted to a firm and unyielding condition or over-excavated and replaced with engineered fill, as described below. The depth of overexcavation, if required, should be evaluated by HGSI at the time of construction.

Engineered Fill

In general, we anticipate that non-organic soils will be suitable for use as engineered fill in dry weather conditions, provided they are properly moisture conditioned for compaction. Imported fill material must be approved by the geotechnical engineer prior to being imported to the site. Oversize material greater than 6 inches in size should not be used within 3 feet of foundation footings, and material greater than 12 inches in diameter should not be used in engineered fill.

Engineered fill should be compacted in horizontal lifts not exceeding 8 inches using standard compaction equipment. We recommend that engineered fill be compacted to at least 90 percent of the maximum dry density determined by ASTM D1557 (Modified Proctor) or equivalent. On-site soils may be wet or dry of optimum; therefore, we anticipate that moisture conditioning of native soil will be necessary for compaction operations.

Proper test frequency and earthwork documentation usually requires daily observation and testing during stripping, rough grading, and placement of engineered fill. Field density testing should conform to ASTM D2922 and D3017, or D1556. Engineered fill should be periodically observed and tested by HGSI. Typically, one density test is performed for at least every 2 vertical feet of fill placed or every 50 yd^3, whichever requires more testing.

Wet Weather Earthwork

The on-site soils are moisture sensitive and may be difficult to handle or traverse with construction equipment during periods of wet weather. Earthwork is typically most economical when performed under dry weather conditions. Earthwork performed during the wet-weather season will probably require expensive measures such as cement treatment or imported granular material to compact fill to the recommended engineering specifications. If earthwork is to be performed or fill is to be placed in wet weather or under wet conditions when soil moisture content is difficult to control, HGSI should be contacted for additional recommendations.

Under wet weather, the construction area will unavoidably become wet, and the condition of exposed fill and native soils will degrade. To limit the impacts of wet weather on the finished building pad surface, consideration may be given to placement of a crushed aggregate pad. Where used, we recommend the working pad be constructed using 1½"–0 crushed aggregate and should have minimum thickness of at least 12 inches. This thickness is considered adequate to support light construction traffic but will not be sufficient to support heavy traffic such as loaded dump trucks or other heavy rubber-tired equipment.

Spread Footing Foundations

Conventional isolated or continuous spread footings may be used to support the proposed structure, provided they are founded on competent native soils, or compacted engineered fill placed directly upon the competent native soils. We recommend a maximum allowable bearing pressure of 2,000 pounds per square foot (psf) for designing spread footings bearing on undisturbed native soils or engineered fill. The recommended maximum allowable bearing pressure may be increased by a factor of 1.33 for short term transient conditions such as wind and seismic loading. Exterior footings should be founded at least 18 inches below the lowest adjacent finished grade. Minimum footing widths should be determined by the project engineer/architect in accordance with applicable design codes.

A footing-to-slope setback of 7 feet is recommended. The setback should be measured from the bottom, outside edge of the footing horizontally to the face of the nearest slope. If needed, foundations can be deepened to achieve the recommended footing-to-slope setback.

Assuming construction is accomplished as recommended herein, and for the foundation loads anticipated, we estimate total settlement of spread foundations of less than about 1 inch and differential settlement between two adjacent load-bearing components supported on competent soil of less than about ½ inch. We anticipate that most of the estimated settlement will occur during construction, as loads are applied.

Wind, earthquakes, and unbalanced earth loads will subject the proposed structure to lateral forces. Lateral forces on a structure will be resisted by a combination of sliding resistance of its base or footing on the underlying soil and passive earth pressure against the buried portions of the structure. For use in design, a

coefficient of friction of 0.5 may be assumed along the interface between the base of the footing and subgrade soils. Passive earth pressure for buried portions of structures may be calculated using an equivalent fluid weight of 390 pounds per cubic foot (pcf), assuming footings are cast against dense, natural soils or engineered fill. The recommended coefficient of friction and passive earth pressure values do not include a safety factor. The upper 12 inches of soil should be neglected in passive pressure computations unless it is protected by pavement or slabs on grade.

Footing excavations should be trimmed neat and the bottom of the excavation should be carefully prepared. Loose, wet or otherwise softened soil should be removed from the footing excavation prior to placing reinforcing steel bars. HGSI should observe foundation excavations prior to placing crushed rock, to verify that adequate bearing soils have been reached. Due to the high moisture sensitivity of on-site soils, construction during wet weather may require overexcavation of footings and backfill with compacted, crushed aggregate.

Below-Grade Structural Retaining Walls

Lateral earth pressures against below-grade retaining walls will depend upon the inclination of any adjacent slopes, type of backfill, degree of wall restraint, method of backfill placement, degree of backfill compaction, drainage provisions, and magnitude and location of any adjacent surcharge loads. At-rest soil pressure is exerted on a retaining wall when it is restrained against rotation. In contrast, active soil pressure will be exerted on a wall if its top is allowed to rotate or yield a distance of roughly 0.001 times its height or greater. If the subject retaining walls will be free to rotate at the top, they should be designed for an active earth pressure equivalent to that generated by a fluid weighing 35 pcf for level backfill against the wall. For restrained walls, an at-reset equivalent fluid pressure of 54 pcf should be used in design, again assuming level backfill against the wall. These values assume that the recommended drainage provisions are incorporated, and hydrostatic pressures are not allowed to develop against the wall.

During a seismic event, lateral earth pressures acting on below-grade structural walls will increase by an incremental amount that corresponds to the earthquake loading. Based on the Mononobe-Okabe equation and peak horizontal accelerations appropriate for the site location, seismic loading should be modeled using the active or at-rest earth pressures recommended above, plus an incremental rectangular-shaped seismic load of magnitude 5H, where H is the total height of the wall.

We assume relatively level ground surface below the base of the walls. As such, we recommend passive earth pressure of 390 pcf for use in design, assuming wall footings are cast against competent native soils or engineered fill. If the ground surface slopes down and away from the base of any of the walls, a lower passive earth pressure should be used and HGSI should be contacted for additional recommendations.

A coefficient of friction of 0.5 may be assumed along the interface between the base of the wall footing and native materials. The recommended coefficient of friction and passive earth pressure values do not include a safety factor, and an appropriate safety factor should be included in design. The upper 12 inches of soil should be neglected in passive pressure computations unless it is protected by pavement or slabs on grade.

The above recommendations for lateral earth pressures assume that the backfill behind the subsurface walls will consist of properly compacted structural fill, and no adjacent surcharge loading. If the walls will be subjected to the influence of surcharge loading within a horizontal distance equal to or less than the height of the wall, the walls should be designed for the additional horizontal pressure. For uniform surcharge pressures, a uniformly distributed lateral pressure of 0.3 times the surcharge pressure should be added.

The recommended equivalent fluid densities assume a free-draining condition behind the walls so that hydrostatic pressures do not build up. This can be accomplished by placing a 12-inch-wide zone of crushed

drain rock containing less than 5 percent fines against the walls. A 3-inch minimum diameter perforated, plastic drain pipe should be installed at the base of the walls and connected to a sump to remove water from the crushed drain rock zone. The drain pipe should be wrapped in filter fabric (Mirafi 140N or other as approved by the geotechnical engineer) to minimize clogging. The above drainage measures are intended to remove water from behind the wall to prevent hydrostatic pressures from building up. Additional drainage measures may be specified by the project architect or structural engineer, for damp-proofing or other reasons.

HGSI should be contacted during construction to verify subgrade strength in wall keyway excavations, to verify that backslope soils are in accordance with our assumptions, and to take density tests on the wall backfill materials.

Perimeter Footing Drains

We recommend the outside edge of perimeter footings be provided with a drainage system consisting of 4-inch minimum diameter perforated PVC pipe embedded in a minimum of 1 ft^3 per lineal foot of clean, crushed drain rock. The drain pipe and surrounding drain rock should be wrapped in non-woven geotextile (Mirafi 140N, or approved equivalent) to minimize the potential for clogging and/or ground loss due to piping. Water collected from the footing drains should be directed into the local storm drain system or other suitable outlet. A minimum 0.5 percent fall should be maintained throughout the drain and non-perforated pipe outlet. The footing drains should include clean-outs to allow periodic maintenance and inspection.

Down spouts and roof drains should collect roof water in a system separate from the footing drains in order to reduce the potential for clogging. Roof drain water should be directed to an appropriate discharge point well away from structural foundations. Grades should be sloped downward and away from buildings to reduce the potential for ponded water near structures.

Seismic Design

We recommend Site Class C (Very Dense Soil and Soft Rock) be used for design per the International Building Code, which references ASCE 7-16. Design values determined for the site using the ASCE 7-16 Hazard Tool are summarized on Table 2, for Risk Category II. A copy of the Hazard Tool output is attached at the end of this report.

Table 2. Recommended Earthquake Ground Motion Parameters (ASCE 7-16)

Parameter	Value
Location (Lat, Long), degrees	45.3688, -122.6333
Mapped Spectral Acceleration Values (MCE, Site Class B):	
Short Period, S_S	0.845 g
1.0 Sec Period, S_1	0.379 g
Design Values for **Site Class C** (Very Dense Soil and Soft Rock):	
Peak Ground Acceleration PGA_M	0.457
F_a	1.2
F_v	1.5
$SD_S = 2/3 \times F_a \times S_S$	0.676 g
$SD_1 = 2/3 \times F_v \times S_1$	0.379 g

Soil liquefaction is a phenomenon wherein saturated soil deposits temporarily lose strength and behave as a liquid in response to earthquake shaking. Soil liquefaction is generally limited to loose, granular soils located below the water table. Stiff soil material along with gravels and rock were encountered in our subsurface explorations to the maximum depth of exploration, 8 feet. Static groundwater beneath the site is several hundred feet bgs. Therefore, soils under the project site are considered not susceptible to liquefaction. It is our opinion that special design or construction measures are not required to mitigate the effects of liquefaction, given the expected height of the planned building.

Excavating Conditions and Utility Trench Backfill

We anticipate that on-site soils can be excavated using conventional heavy equipment such as trackhoes. Hand auger boring HA-1, HA-2 and HA-4 met refusal at 20 inches, 38 inches, and 50 inches bgs respectively, on gravels and basalt rock. It is likely that these boulders can be removed using large excavator equipment. The contractor should be prepared to excavate and dispose of oversize boulders where encountered.

Perched groundwater conditions often occur over fine-grained native deposits, particularly during the wet season. If encountered, the contractor should be prepared to implement an appropriate dewatering system for installation of the utilities. At this time, we anticipate that dewatering systems consisting of ditches, sumps and pumps would be adequate for control of groundwater where encountered during construction conducted during the dry season. Regardless of the dewatering system used, it should be installed and operated such that in-place soils are prevented from being removed along with the groundwater.

Vibrations created by traffic and construction equipment may cause some caving and raveling of excavation walls. In such an event, lateral support for the excavation walls should be provided by the contractor to prevent loss of ground support and possible distress to existing or previously constructed structural improvements.

Utility trench backfill should consist of ¾”-0 crushed rock, compacted to at least 90% of the maximum dry density obtained by Modified Proctor (ASTM D1557) or equivalent. Initial backfill lift thicknesses for a ¾” -0” crushed aggregate base may need to be as great as 4 feet to reduce the risk of flattening underlying flexible pipe. Subsequent lift thickness should not exceed 1 foot. If imported granular fill material is used, then the lifts for large vibrating plate-compaction equipment (e.g. hoe compactor attachments) may be up to 2 feet, provided that proper compaction is being achieved and each lift is tested. Use of large vibrating compaction equipment should be carefully monitored near existing structures and improvements due to the potential for vibration-induced damage.

Adequate density testing should be performed during construction to verify that the recommended relative compaction is achieved. Typically, one density test is taken for every 4 vertical feet of backfill on each 200-lineal-foot section of trench.

Erosion Control Considerations

Results of our subsurface exploration did not indicate the presence of soils considered unusually susceptible to erosion. The primary erosion hazard will occur during construction in areas where vegetation has been removed, particularly during wet weather. Erosion during construction can be minimized by implementing the project erosion control plan, which should include judicious use of bio-bags, silt fences, or other appropriate technology. Where used, erosion control devices should be in place and remain in place throughout site preparation and construction.

Erosion and sedimentation of exposed soils can also be minimized by quickly re-vegetating exposed areas of soil, and by staging construction such that large areas of the project site are not denuded and exposed at the

same time. Areas of exposed soil requiring immediate and/or temporary protection against exposure should be covered with either mulch or erosion control netting/blankets.

UNCERTAINTIES AND LIMITATIONS

We have prepared this report for the owner and his/her consultants for use in design of this project only. This report should not be construed as a warranty of the subsurface conditions. Experience has shown that soil and groundwater conditions can vary significantly over small distances. Inconsistent conditions can occur between explorations that may not be detected by a geotechnical study. If, during future site operations, subsurface conditions are encountered which vary appreciably from those described herein, HGSI should be notified for review of the recommendations of this report, and revision of such if necessary.

Sufficient geotechnical monitoring, testing and consultation should be provided during construction to confirm that the conditions encountered are consistent with those indicated by explorations. Recommendations for design changes will be provided should conditions revealed during construction differ from those anticipated, and to verify that the geotechnical aspects of construction comply with the contract plans and specifications.

Within the limitations of scope, schedule and budget, HGSI executed these services in accordance with generally accepted professional principles and practices in the field of geotechnical engineering at the time the report was prepared. No warranty, expressed or implied, is made. The scope of our work did not include environmental assessments or evaluations regarding the presence or absence of wetlands or hazardous or toxic substances in the soil, surface water, or groundwater at this site.

We appreciate this opportunity to be of service.

Sincerely,

HARDMAN GEOTECHNICAL SERVICES INC.

Ashlyn Kashima, E.I.T.
Engineering Staff

Scott L. Hardman, P.E., G.E.
Geotechnical Engineer

Attachments: References
Figure 1 – Vicinity Map
Figure 2 – Site Plan
Figure 3a – Bare Earth LiDAR and Landslides
Figure 3b – Landslide Susceptibility
Log of Hand Auger Borings (4 Sheets)
ASCE 7-16 Seismic Parameters (1 Sheet)

REFERENCES

Madin, I.P., 1990, Earthquake hazard geology maps of the Portland metropolitan area, Oregon: Oregon Department of Geology and Mineral Industries Open-File Report 0-90-2, scale 1:24,000, 22 p.

Oregon Department of Geology and Mineral Industries SLIDO, Version 4.4, updated October 29, 2021. https://gis.dogami.oregon.gov/maps/slido/

Schlicker, H.G. and Finlayson, C.T., 1979, Geology and Geologic Hazards of northwestern Clackamas County, Oregon: Oregon Department of Geology and Mineral Industries, Bulletin No. 99, 79 p., scale 1:24,000.

Snyder, D.T., 2008, Estimated Depth to Ground Water and Configuration of the Water Table in the Portland, Oregon Area: U.S. Geological Survey Scientific Investigations Report 2008–5059, 41 p., 3 plates.

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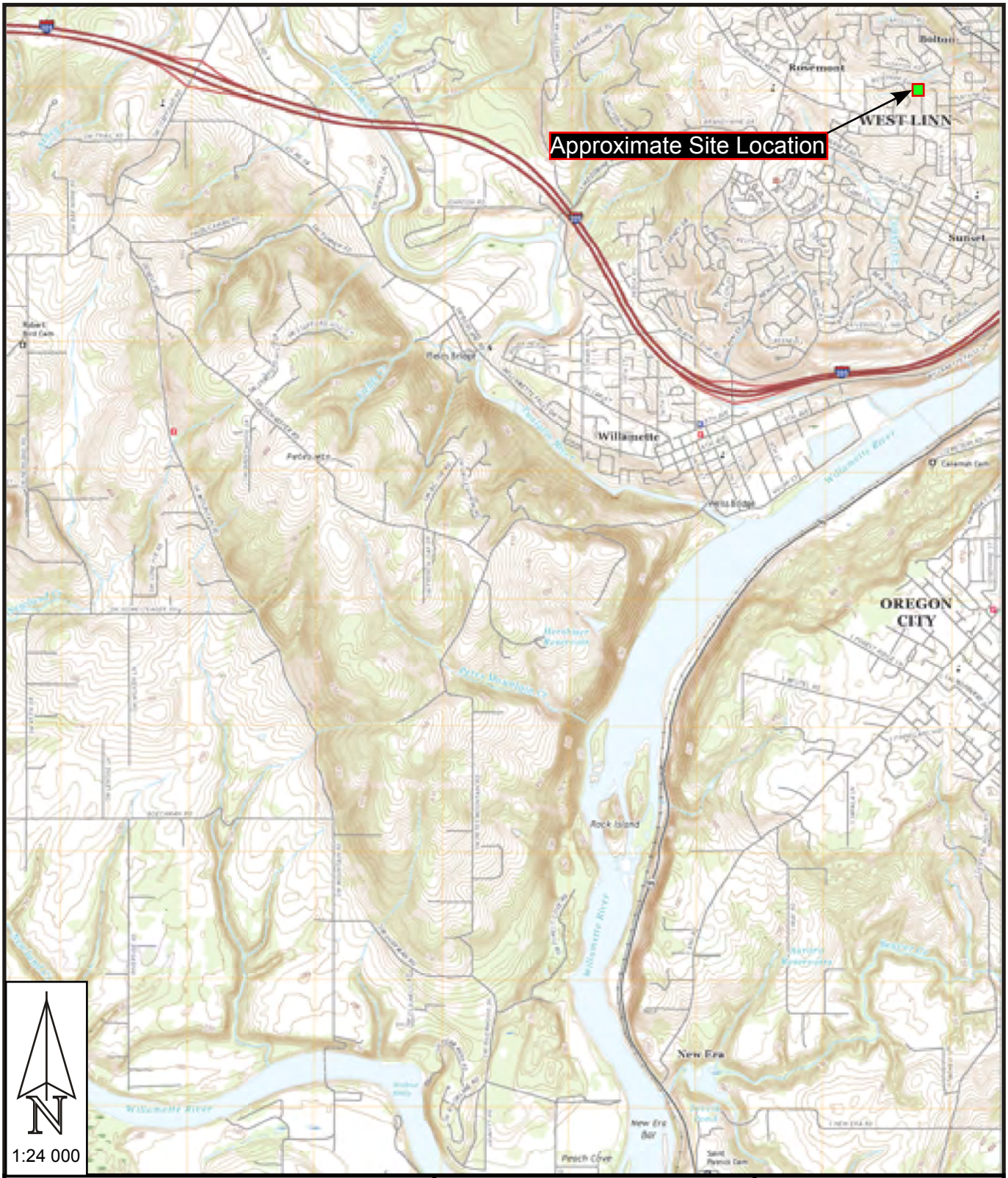
VICINITY MAP



Project: 5494 Linn Lane West Linn, Oregon	Project No. 23-3058	FIGURE 1

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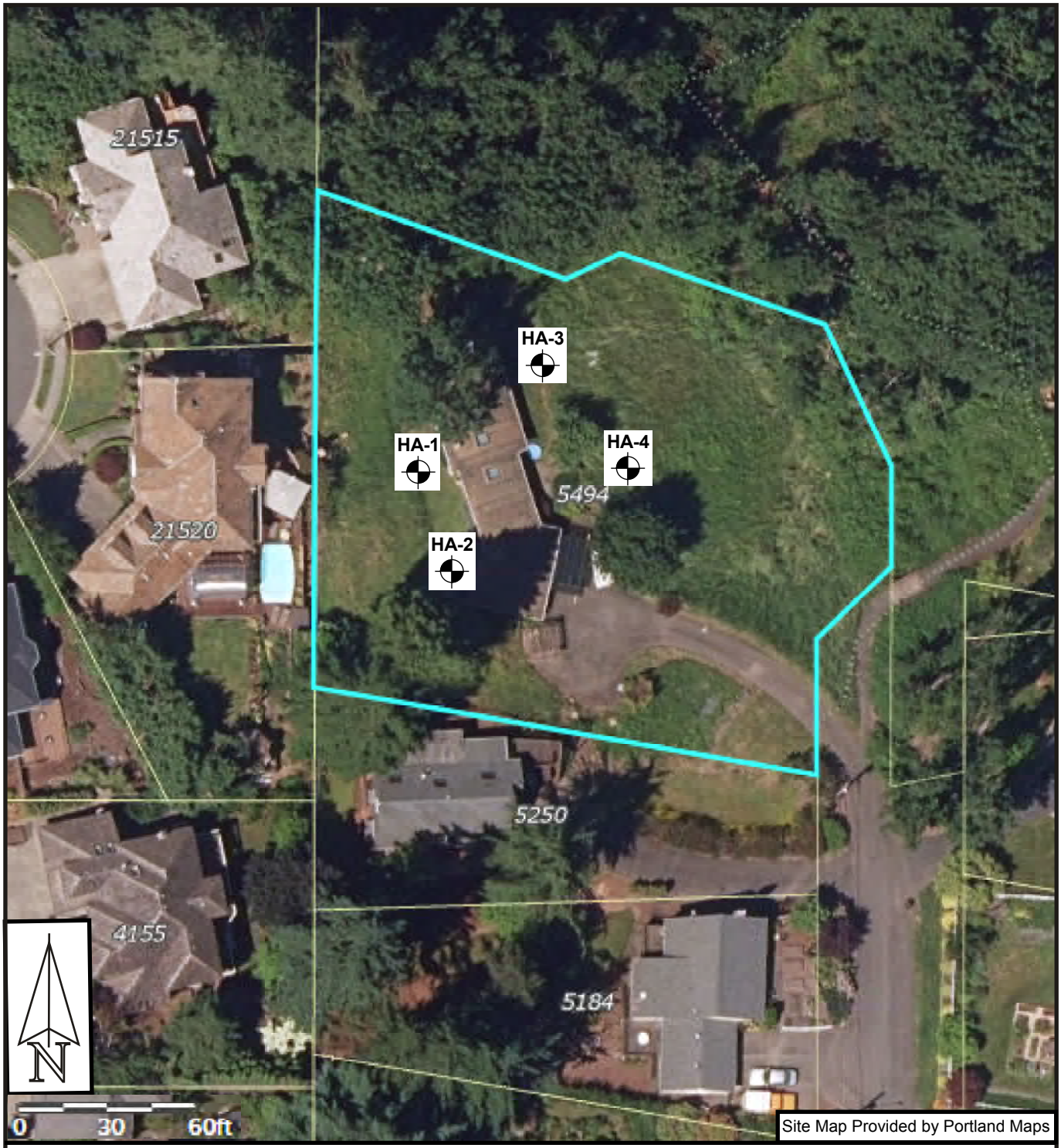
SITE MAP



Site Map Provided by Portland Maps

Legend

Site Boundary

HA-X Hand Auger Locations

Project:	5494 Linn Lane West Linn, Oregon	Project No. 23-3058	FIGURE 2

HARDMAN GEOTECHNICAL SERVICES INC
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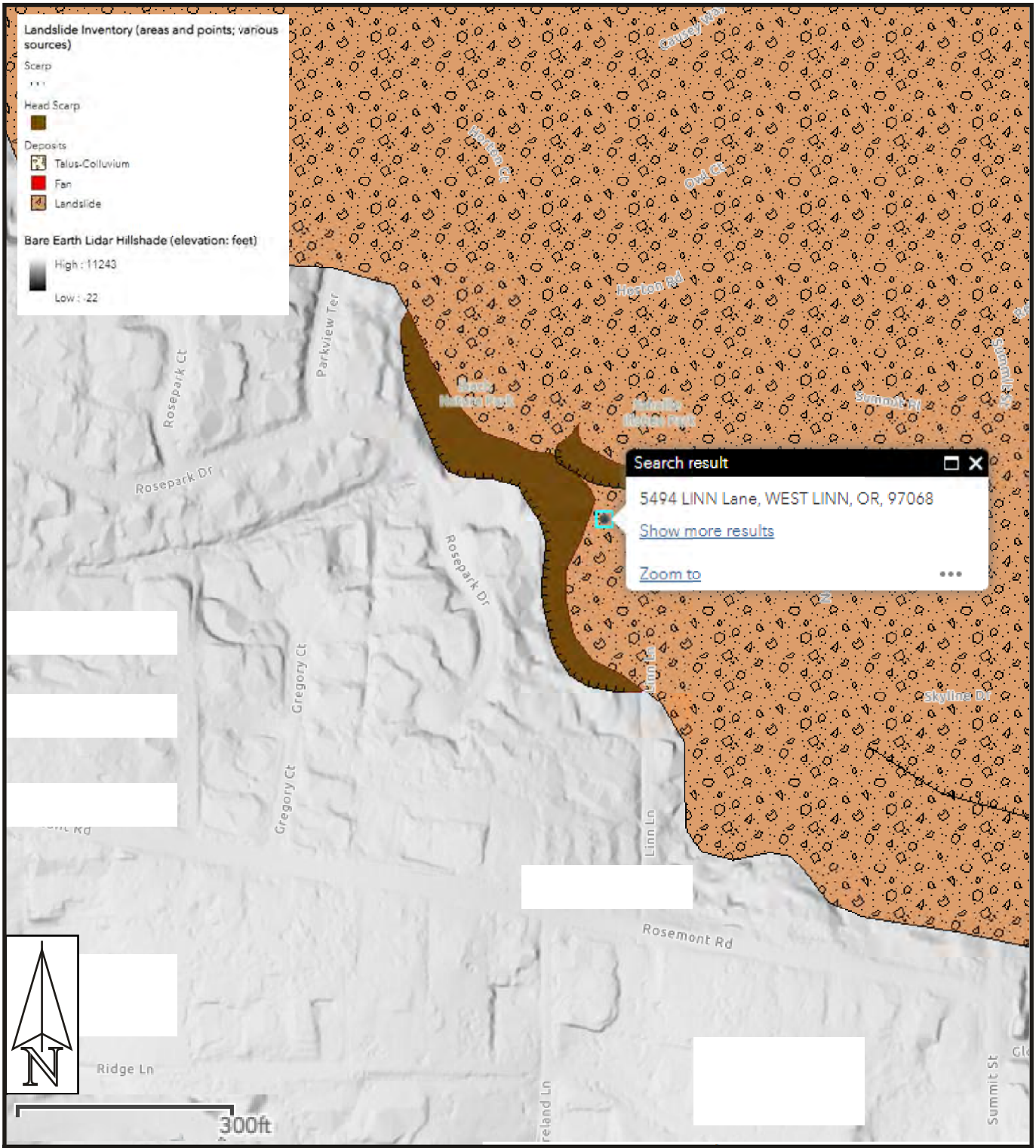
BARE EARTH LiDAR & LANDSLIDES



Legend

Approximate Site Location

Project: 5494 Linn Lane West Linn, Oregon	Project No. 23-3058	FIGURE 3a

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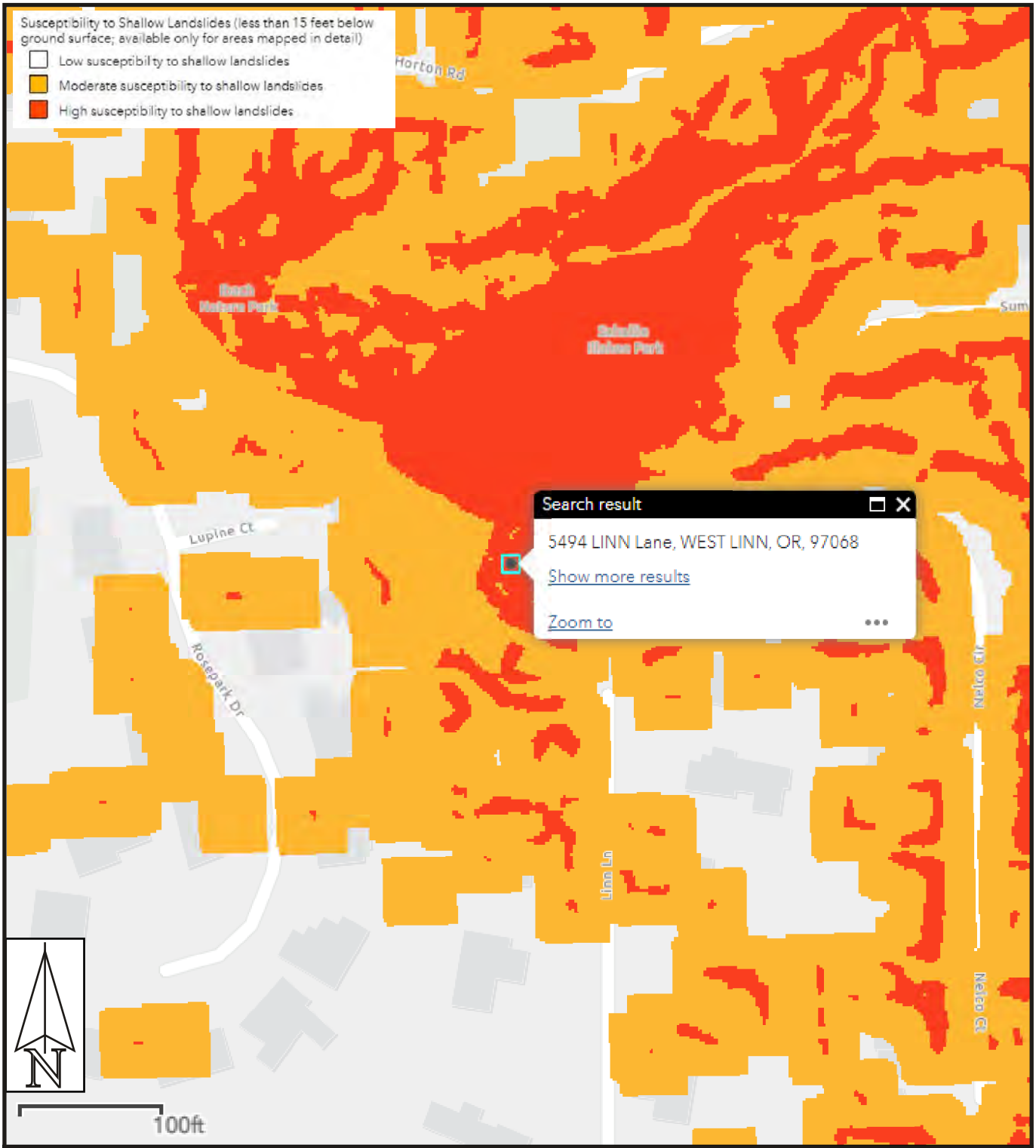
LANDSLIDE SUSCEPTIBILITY



Legend

Approximate Site Location

Project: 5494 Linn Lane West Linn, Oregon	Project No. 23-3058	FIGURE 3b

LOG OF HAND AUGER BORING

Project: 5494 Linn Lane West Linn, Oregon	Project No. 23-3058	Boring No. **HA - 1**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Interval	Sample Designation	Moisture Content (%)	Groundwater	Material Description
1						Moist, soft, brown, organic silt (OL), organic with thin roots [Topsoil]
						Slightly moist, stiff/hard, brown with traces of orange and yellow, sandy silt mixture (ML) with bits of small gravel and weathered basalt fragments, scrapping from 10" to 1.5', 2" diameter black basalt rock at 1', soil color changed to a redish brown at 1.5 feet [Columbia River Basalt]
2						*Boring refusal on rock at 20 inches, no sample retained* *No groundwater or seepage encountered* *No caving of side walls*
3						
4						
5						
6						
7						
8						
9						
10						

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LEGEND

S-# Soil Sample Depth Interval and Designation

Water Level at Time of Excavation

Date Bored: 2/16/2023

Logged By: AK

Surface Elevation:

LOG OF HAND AUGER BORING

Project: 5494 Linn Lane West Linn, Oregon	Project No. 23-3058	Boring No. **HA - 2**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Interval	Sample Designation	Moisture Content (%)	Groundwater	Material Description
1						Moist, soft, brown, organic silt (OL), organic with thin roots, black mottling and orange staining at 9" [Topsoil]
2		☒	S-1	45.6		Slightly moist, slightly stiff, brown with traces of orange, sandy silt mixture (ML) with bits of small gravel and weathered basalt fragments, slightly micaceous [Native Residual Soil]
3						Slightly moist to moist, stiff/hard, brown with traces of orange, silty SAND (SM) with bits of small gravel, weathered soft basalt fragments and small sandstone [Columbia River Basalt] Sieve Wash: 30% of sample passed #200 sieve
4						*Boring refusal on rock at 38 inches, no sample retained* *No groundwater or seepage encountered* *No caving of sidewalls*
5						
6						
7						
8						
9						
10						

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LEGEND

☒ S-# — Soil Sample Depth Interval and Designation

▽ — Water Level at Time of Excavation

Date Bored: 2/16/2023
Logged By: AK
Surface Elevation:

LOG OF HAND AUGER BORING

Project: 5494 Linn Lane West Linn, Oregon	Project No. 23-3058	Boring No. **HA - 3**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Interval	Sample Designation	Moisture Content (%)	Groundwater	Material Description
0						Moist, soft, brown, organic silt (OL), organic with thin roots, black mottling and orange staining at 9" [Topsoil]
1						Slightly moist, slightly stiff, brown, SILT (ML) with bits of small gravel and gray sandstone, slightly organic with roots, slightly micaceous, slight black mottles [Native Residual Soil]
2						Slightly moist, slightly stiff, orange/brown with red staining, silty SAND (SM) with bits of small gravel, slight black mottles, 2" rock at 2.5 feet [Columbia River Basalt]
3						
4		☒	S-2	29.4		Slightly moist, stiff, brown with orange staining, silty CLAY with small gravels (CL), slight black mottles, purple and red staining at 5.5 feet [Columbia River Basalt]
5						
6						
7		☒	S-3	32.8		
8						*Boring terminated at 8.0 feet* *No groundwater or seepage encountered* *No caving of sidewalls*
9						
10						

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LEGEND

☒ S-# — Soil Sample Depth Interval and Designation

▽ — Water Level at Time of Excavation

Date Bored: 2/16/2023

Logged By: AK

Surface Elevation:

LOG OF HAND AUGER BORING

Project: 5494 Linn Lane West Linn, Oregon	Project No. 23-3058	Boring No. **HA - 4**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Interval	Sample Designation	Moisture Content (%)	Groundwater	Material Description
1						Moist, soft, brown, organic silt (OL), organic with thin roots, black mottling and orange staining at 9" [Topsoil]
2						Slightly moist, slightly stiff, brown, silt and clay mixture (ML) with bits of small gravel, slightly organic with roots, slightly micaceous, slight black mottles, scrapping on gravel and rock [Native Residual Soil]
3		☒	S-4	35.6		Slightly moist, slightly stiff to stiff, brown with orange staining, silty CLAY with small gravels (CL), slightly micaceous, scrapping on basalt [Columbia River Basalt]
4						
5						*Boring refusal on rock at 50 inches, no sample retained* *No groundwater or seepage encountered* *No caving of sidewalls*
6						
7						
8						
9						
10						

HARDMAN GEOTECHNICAL SERVICES INC
Practical, Cost-Effective Engineering Solutions

LEGEND

☒ S-# — Soil Sample Depth Interval and Designation

▽ — Water Level at Time of Excavation

Date Bored: 2/16/2023

Logged By: AK

Surface Elevation:

⚠ This is a beta release of the new ATC Hazards by Location website. Please contact us with feedback.

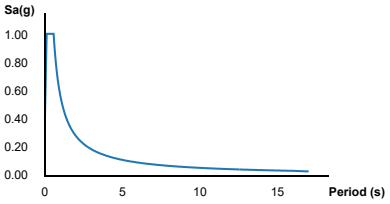
ℹ The ATC Hazards by Location website will not be updated to support ASCE 7-22. Find out why.

Hazards by Location

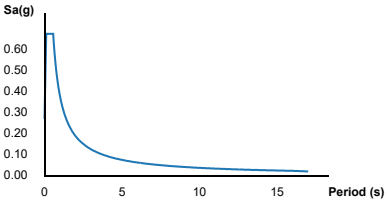
Search Information

Address:	5494 Linn Ln, West Linn, OR 97068, USA
Coordinates:	45.3688072, -122.633368
Elevation:	558 ft
Timestamp:	2023-02-20T21:48:00.928Z
Hazard Type:	Seismic
Reference Document:	ASCE7-16
Risk Category:	II
Site Class:	C

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	0.845	MCE_R ground motion (period=0.2s)
S_1	0.379	MCE_R ground motion (period=1.0s)
S_{MS}	1.014	Site-modified spectral acceleration value
S_{M1}	0.568	Site-modified spectral acceleration value
S_{DS}	0.676	Numeric seismic design value at 0.2s SA
S_{D1}	0.379	Numeric seismic design value at 1.0s SA

Additional Information

Name	Value	Description
SDC	D	Seismic design category
F_a	1.2	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.892	Coefficient of risk (0.2s)
CR_1	0.867	Coefficient of risk (1.0s)
PGA	0.38	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	0.457	Site modified peak ground acceleration
T_L	16	Long-period transition period (s)
SsRT	0.845	Probabilistic risk-targeted ground motion (0.2s)
SsUH	0.948	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	1.5	Factored deterministic acceleration value (0.2s)
S1RT	0.379	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.437	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	0.6	Factored deterministic acceleration value (1.0s)
PGAd	0.5	Factored deterministic acceleration value (PGA)

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Please note that the ATC Hazards by Location website will not be updated to support ASCE 7-22. Find out why.

Disclaimer

Hazard loads are provided by the U.S. Geological Survey Seismic Design Web Services.

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APPENDIX E. SITE PHOTOGRAPHS

Photo Point 1. From the driveway facing southwest toward Wetland 1. The stormwater pipe which discharges into the wetland is visible in the background (offsite).

Photo Point 1. From the driveway facing northeast toward Wetland 2 occupying the bottom of the steep-sided swale.

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Aurora, OR. 97002
503.678.6007

Photo Point 2. From the central portion of the site facing southeast toward the upper portion of Wetland 2 bound by the driveway and road embankments and steep slopes.

Photo Point 2. From the central portion of the site facing northeast toward the lower portion of Wetland 2 and redosier dogwood thicket at the site boundary.

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Photo Point 2. From the central portion of the site facing northwest along the Wetland 2 side slope.

Photo Point 2. From the central portion of the site facing southwest toward the existing residence at the top of the slope.

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Aurora, OR. 97002
503.678.6007

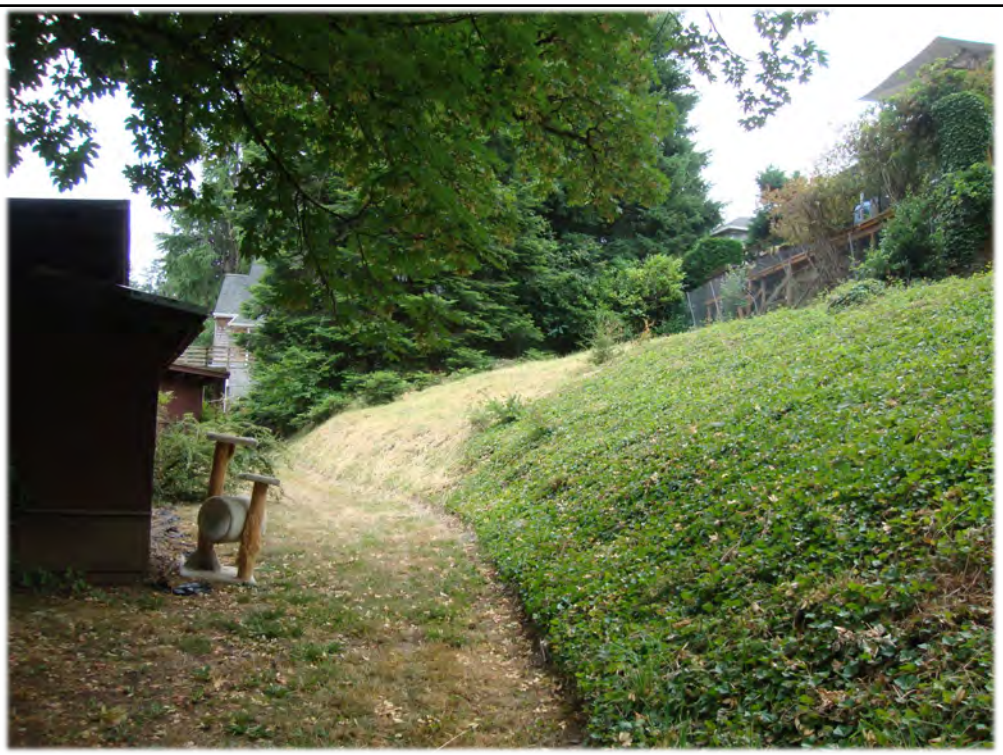

Photo Point 3. From the northwestern site corner facing south along steep slope behind the existing residence.

Photo Point 3. From the northwestern site corner facing east toward the top of the slope.

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503.678.6007

Photo Point 3. From the northwestern site corner facing north

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Aurora, OR. 97002
503.678.6007

APPENDIX F. WETLAND DETERMINATION FORMS

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys and Coast Region

Project/Site: Linn Lane City/County: West Linn/Clackamas 7/10/2023
Applicant/Owner: Kevin Janssen State: OR Sampling Point: 1
Investigator(s): K Cartwright Section, Township, Range: T2S, R1E, Section 25BD
Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): concave Slope (%): 3-5%
Subregion (LRR): Northwest Forests and Coast (LRR A) Lat: 45.368606 Long: -122.6331243 Datum:
Soil Map Unit Name: Cornelius silt loam 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: Plot placed in swale bottom at upper end. Blackberry was recently mown to facilitate access

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status?
1.			
2.			
3.			
4.			
Total Cover:	0		
Shrub Stratum			
1. *Rubus armeniacus*	100	Y	FAC
2.			
3.			
4.			
5.			
Total Cover:	100		
Herb Stratum			
1. *Carex sp*	5	Y	FACW
2. *Athyrium cyclosorum*	15	Y	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
Total Cover:	20		
Woody Vine Stratum			
1.			
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 80 % Cover of Biotic Crust 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	x1 = **0**
FACW species	x2 = **0**
FAC species	x3 = **0**
FACU species	x4 = **0**
UPL species	x5 = **0**
Column Totals: **0** (A)	**0** (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 Adaptation1 (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: Litter cover

SOIL

Sampling Point: 1

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	10 YR 3/2	90					SiL	10% rock fragments
6-16	10 YR 3/2	82	7.5 YR 4/6	10	C	M	SiL	5% rock fragments
			7.5 YR 4/6	3	C	PL		

[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 Muck 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 (any one indicator is sufficient)

- ___ 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)
- X Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed 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 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:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys and Coast Region

Project/Site: Linn Lane City/County: West Linn/Clackamas 7/10/2023
Applicant/Owner: Kevin Janssen State: OR Sampling Point: 2
Investigator(s): K Cartwright Section, Township, Range: T2S, R1E, Section 25BD
Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): none Slope (%): 3-5%
Subregion (LRR): Northwest Forests and Coast (LRR A) Lat: 45.368624 Long: -122.6331358 Datum:
Soil Map Unit Name: Cornelius silt loam 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 placed several feet above swale bottom. Blackberry recently mown to facilitate access

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status?
1.			
2.			
3.			
4.			
Total Cover:	0		
Shrub Stratum			
1. *Rubus armeniacus*	70	Y	FAC
2.			
3.			
4.			
5.			
Total Cover:	70		
Herb Stratum			
1. *Rubus ursinus*	30	Y	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
Total Cover:	30		
Woody Vine Stratum			
1.			
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 70 % Cover of Biotic Crust 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	x1 = **0**
FACW species	x2 = **0**
FAC species	x3 = **0**
FACU species	x4 = **0**
UPL species	x5 = **0**
Column Totals: **0** (A)	**0** (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 Adaptation1 (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: Litter cover

SOIL

Sampling Point: 2

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
0-16	10 YR 3/3	95	10 YR 3/4	5	C	M	SiL	

[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 Muck 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 (any one indicator is sufficient)

- ___ 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 Plowed 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: Linn Lane City/County: West Linn/Clackamas 7/10/2023
Applicant/Owner: Kevin Janssen State: OR Sampling Point: 3
Investigator(s): K Cartwright Section, Township, Range: T2S, R1E, Section 25BD
Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): none Slope (%): 3-5%
Subregion (LRR): Northwest Forests and Coast (LRR A) Lat: 45.368784 Long: -122.6330003 Datum:
Soil Map Unit Name: Cornelius silt loam 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: Plot placed several feet above swale bottom.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status?
1.			
2.			
3.			
4.			
Total Cover:	0		
Shrub Stratum			
1. *Rubus armeniacus*	10	Y	FAC
2.			
3.			
4.			
5.			
Total Cover:	10		
Herb Stratum			
1. *Rubus ursinus*	20	Y	FACU
2. *Schedonorus arundinaceus*	50	Y	FAC
3. *Cirsium arvense*	5		FAC
4. *Geum macrophyllum*	5		FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
Total Cover:	80		
Woody Vine Stratum			
1.			
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 20 % Cover of Biotic Crust 0

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: **67%** (A/B)

Prevalence Index Worksheet:

Total % Cover of:	Multiply by:
OBL species	x1 = **0**
FACW species	x2 = **0**
FAC species	x3 = **0**
FACU species	x4 = **0**
UPL species	x5 = **0**
Column Totals: **0** (A)	**0** (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 Adaptation1 (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: Litter cover

SOIL

Sampling Point: 3

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
0-16	10 YR 3/3	95					SiL	5% rock fragments

[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 Muck 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 (any one indicator is sufficient)

- ___ 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 Plowed 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: Linn Lane City/County: West Linn/Clackamas 7/10/2023
Applicant/Owner: Kevin Janssen State: OR Sampling Point: 4
Investigator(s): K Cartwright Section, Township, Range: T2S, R1E, Section 25BD
Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): concave Slope (%): 3-5%
Subregion (LRR): Northwest Forests and Coast (LRR A) Lat: 45.368767 Long: -122.6329599 Datum:
Soil Map Unit Name: Cornelius silt loam 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: Plot placed in swale bottom at upper end.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status?
1.			
2.			
3.			
4.			
Total Cover:	0		
Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	0		
Herb Stratum			
1. *Schedonorus arundinaceus*	50	Y	FAC
2. *Geum macrophyllum*	10		FAC
3. *Epilobium ciliatum*	15		FACW
4. *Cirsium arvense*	10		FAC
5. *Stachys chamissonis*	10		FACW
6.			
7.			
8.			
9.			
10.			
11.			
Total Cover:	95		
Woody Vine Stratum			
1.			
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 5 % Cover of Biotic Crust 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	x1 = **0**
FACW species	x2 = **0**
FAC species	x3 = **0**
FACU species	x4 = **0**
UPL species	x5 = **0**
Column Totals: **0** (A)	**0** (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 Adaptation1 (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: Litter cover

SOIL

Sampling Point: 4

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	10 YR 3/2	100					SiL	
6-16	10 YR 3/2	95	7.5 YR 4/4	5	C	M	SiL	

[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 Muck 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 (any one indicator is sufficient)

- ___ 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 Plowed 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)
- 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 ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

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: Linn Lane City/County: West Linn/Clackamas 7/10/2023
Applicant/Owner: Kevin Janssen State: OR Sampling Point: 5
Investigator(s): K Cartwright Section, Township, Range: T2S, R1E, Section 25BD
Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): none Slope (%): 3-5%
Subregion (LRR): Northwest Forests and Coast (LRR A) Lat: 45.368715 Long: -122.6329361 Datum:
Soil Map Unit Name: Cornelius silt loam 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: Plot placed several feet above swale bottom.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status?
1.			
2.			
3.			
4.			
Total Cover:	0		
Shrub Stratum			
1. *Rubus armeniacus*	30	Y	FAC
2.			
3.			
4.			
5.			
Total Cover:	30		
Herb Stratum			
1. *Rubus ursinus*	20	Y	FACU
2. *Schedonorus arundinaceus*	20	Y	FAC
3. *Cirsium arvense*	40	Y	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
Total Cover:	80		
Woody Vine Stratum			
1.			
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 20 % Cover of Biotic Crust 0

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	x1 = **0**
FACW species	x2 = **0**
FAC species	x3 = **0**
FACU species	x4 = **0**
UPL species	x5 = **0**
Column Totals: **0** (A)	**0** (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 Adaptation1 (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: Litter cover

SOIL

Sampling Point: 5

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
0-16	10 YR 3/3	100					SiL	

[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 Muck 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 (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
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- ___ Algal Mat or Crust (B4)
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- ___ Oxidized Rhizospheres along Living Roots (C3)
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- ___ Recent Iron Reduction in Plowed 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:

White Pelican Consulting, LLC

Environmental Engineering & Data Analysis

WBE, DBE, ESB Oregon Certified # 12223

July 2nd, 2024

5494 LINN LN

WEST LINN, OR 97068

Stormwater Management Report (SWMR)

PREPARED FOR:

Kevin Janssen

khjanssen@yahoo.com

541-515-0653

PREPARED BY:

White Pelican Consulting, LLC

Deborah Beck P.E.

PO BOX #33946

Portland, OR 97292

(503) 847-9455

White Pelican Consulting, LLC

Environmental Engineering & Data Analysis

WBE, DBE, ESB Oregon Certified # 12223

TABLE OF CONTENTS

White Pelican Consulting, LLC

Environmental Engineering & Data Analysis

WBE, DBE, ESB Oregon Certified # 12223

ENGINEERS CERTIFICATION

I hereby certify that this Stormwater Management Report for 5494 Linn Ln, West Linn, OR 97068, has been prepared by me or under my supervision and meets the minimum standards of the City of West Linn and normal standards of engineering practice. I hereby acknowledge and agree that the jurisdiction does not and will not assume liability for the sufficiency, suitability, or performance of drainage facilities designed by me.

EXPIRES: 12/31/2025

White Pelican Consulting, LLC

Deborah A. Beck, P.E.

Principle Engineer

dbeck@whitepelicanconsulting.com | 503.847.9455 | www.WhitePelicanConsulting.com

PROJECT SUMMARY

This project proposes to manage stormwater resulting from new construction at 5494 Linn Ln, West Linn, OR 97068 with two StormTech chamber systems. The roof runoff will be directed to a lined MC-7200 StormTech chamber system with sumped catch basin inlet and orifice constricted outlet. The driveway runoff will be directed to a lined SC-310 StormTech chamber system with sumped down-turn elbow style catch basin inlet and an orifice constricted outlet. The two StormTech systems will provide pollution reduction and flow control before releasing the overflow to existing stormwater pipe located east of the site. The new construction includes a new single-family residence (roof coverage ~7,163 sq. ft) and driveway (~1,662 sq. ft.).

SITE LOCATION AND DESCRIPTION

5494 Linn Ln, West Linn, OR 97068 (site), tax lot ID 21E25BD00500, is entirely located within Clackamas County and is zoned R10. R10 is single-dwelling zone which allows 1 dwelling unit per 10,000 ft². The site is in the Johnson Creek Watershed (source Metro Maps). The site is 0.67 acres (~29,185 sq. ft.) with an existing single-family residence and driveway.
Two wetlands totaling 0.05 acre were identified onsite during a Natural Resource Assessment conducted by Schott & Associates Inc. Wetland 1 (0.006-acre onsite) is at the bottom of the swale south of the existing driveway and Wetland 2 (0.04 acre onsite) is at the bottom of the broad swale north of the existing driveway.

The Landslide Susceptibility mapping was performed by the Hardman Geotechnical Services, Inc and showed the existing home and proposed facilities are mapped as having "High" susceptibility for shallow slides less than 15 ft deep.

SOILS

The soils on the site are listed as Cornelius silt loam, 8 to 15 percent slopes (23C), Wetted Drainage Class "Moderately Well Drained" and are rated Hydrologic soil group C (NRCS Soil Web).

SLOPES

Slopes on the site surrounding where the new residence is to be located are generally >20%. Due to the steep slopes combined with the landslide susceptibility ratings of the site, infiltration of collected stormwater is not recommended.

dbeck@whitepelicanconsulting.com | 503.847.9455 | www.WhitePelicanConsulting.com

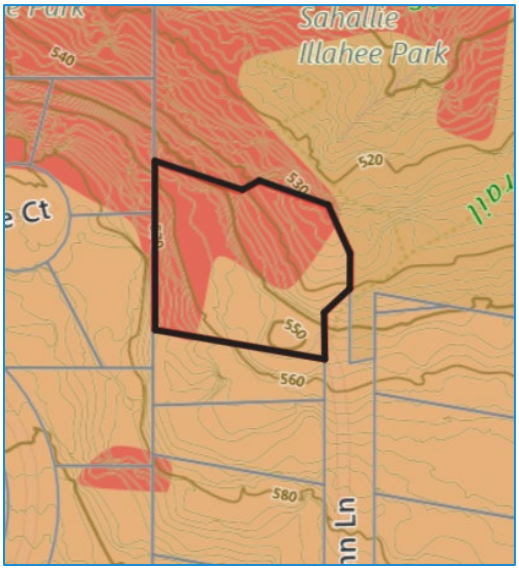


FIGURE 1. SLOPES AS SHOWN IN METRO MAPS, LIGHT ORANGE >10%, PINK >25%.

Groundwater

Hardman Geotechnical Services Inc. (HGS) prepared a Geotech Report of the site and as part of their analysis took soil borings down to 8 ft. HGS did not encounter groundwater in the soil borings.

EXISTING STORMWATER CONDITIONS

Existing impervious areas include a single-family residence and asphalt driveway servicing the residence. The existing house has gutter and downspouts that drain to ground and discharge at an unknown location. The existing driveway drains to grade.

PROPOSED CONDITIONS AND STORMWATER FACILITIES

Proposed construction includes a demolition of the existing house, construction of a new single-family house and replacing and enlarging the existing driveway. The new impervious areas and associated square footage are in Table 1 below. Due to the site consisting mostly of slopes >20% and being rated as a landslide concern, lined orifice-controlled systems were chosen to manage the stormwater resulting from the new impervious areas. The roof runoff will be directed to a lined MC-7200 StormTech chamber system with sumped catch basin inlet and orifice constricted outlet. The driveway runoff will be directed to a lined SC-310 StormTech chamber system with sumped down-turn elbow style catch basin inlet and an orifice constricted outlet. Combined, the two StormTech systems will provide pollution reduction and flow control before releasing the overflow to existing stormwater pipe located east of the site. Should the StormTech chamber systems be overwhelmed by a very large storm, the stormwater will flow out of the nyloplast basin grates and downslope to the nearby wetland and to the tributary to Barlow Creek running through Shallie Illahee Park.

TABLE 1:NEW IMPERVIOUS AREAS

Areas	Sq. Ft.
New Residence Roof	7,163
Improved driveway - uncovered areas	1,662
Total New Impervious	8,825

DESIGN HYDROLOGY AND SIZING

Areas used in Model

The areas used in the modeling for sizing the stormwater facilities are listed in Table 1 above.

New Impervious Area Runoff

Design hydrology for on-site stormwater runoff from the proposed new construction and infiltration of the runoff was calculated using HydroCAD 10.20 modeling software. HydroCAD 10 uses the Santa Barbara Urban Hydrograph (SBUH) Method.

The city of West Linn requires systems performing flow-control to be sized for 10-yr storm events. The 2-yr, 10-yr and 25-yr events of expected flows both pre-development and post-development were modeled. The peak flow rates determined are listed in Table 2 and Table 3.

The two StormTech chamber systems are expected to fully capture and detain the runoff resulting from the 10-yr and 25-yr storm events while slowly releasing the captured flows at rates below the determined pre-development flow. Figure 2 shows the hydrographs of the 10-yr storm for each system. The HydroCAD® Modeling Output is in Appendix C.

TABLE 2: MODELED PRE-DEVELOPMENT PEAK FLOW RATES

Peak cfs of Pre-Dev Rain Event			
Area	2-yr	10-yr	25-yr
House	0.026	0.056	0.072
Driveway	0.006	0.013	0.017
Total	0.032	0.069	0.089

TABLE 3:MODELED POST-DEVELOPMENT FLOW RATES

Peak cfs of Post-Dev Rain Event			
Area	2-yr	10-yr	25-yr
House - StormTech MC-7200	0.011	0.013	0.015
Driveway- StormTech SC-310	0.007	0.009	0.010
Total	0.018	0.022	0.025

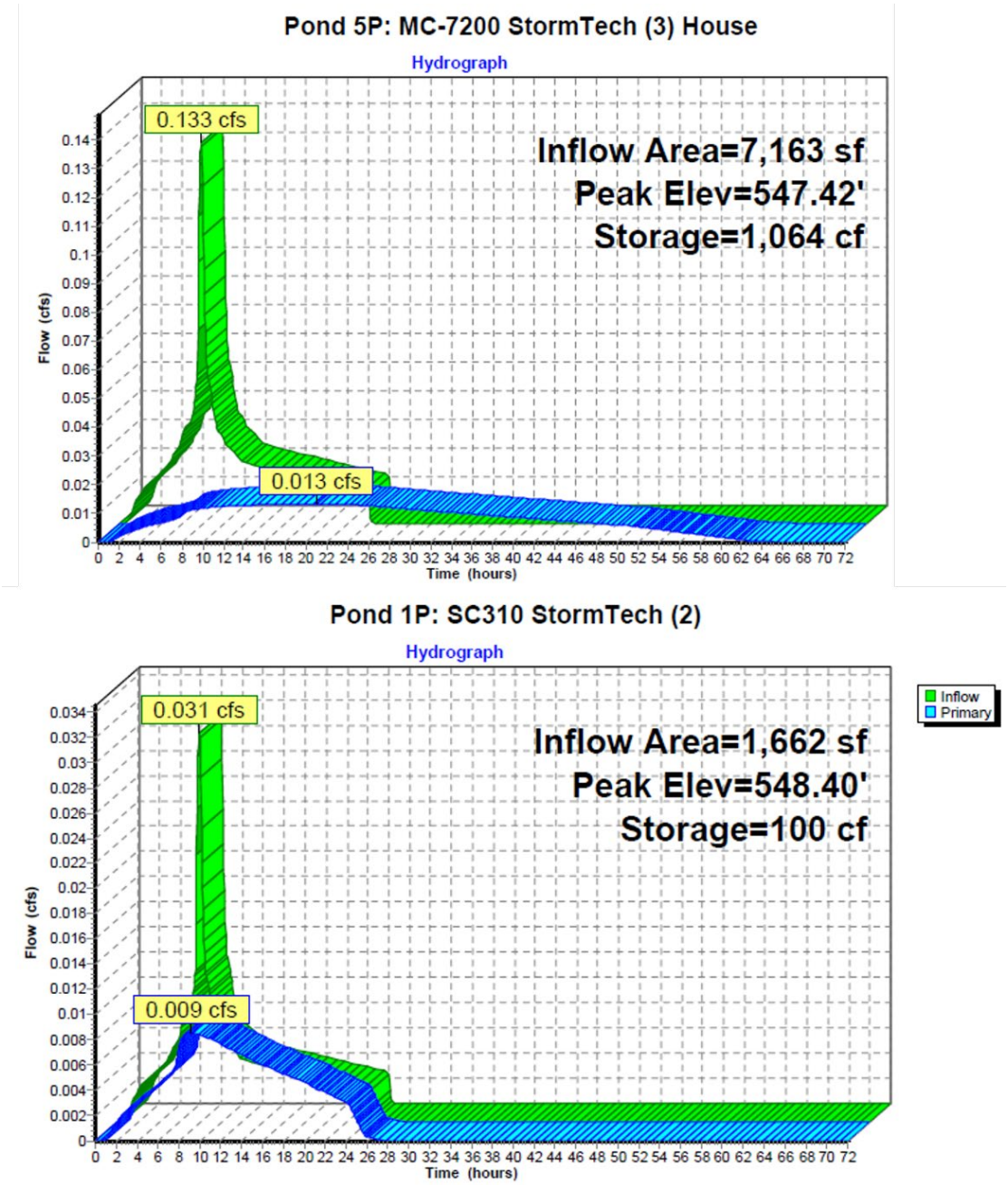
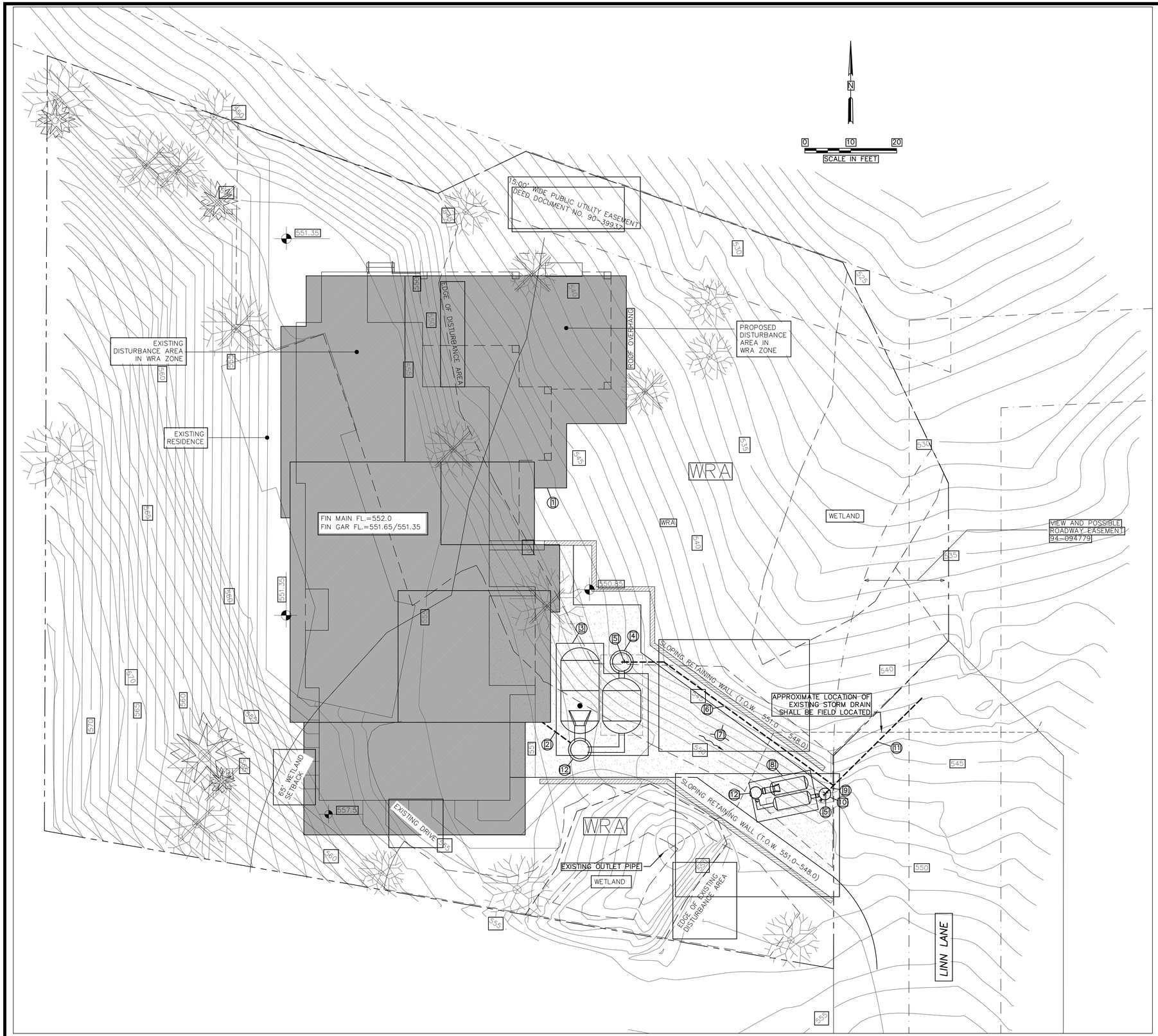


FIGURE 2: HYDROGRAPH OF 10-YR STORM IN THE MC-7200 STORMTECH THREE-CHAMBER SYSTEM (TOP) AND THE SC-310 STORMTECH TWO-CHAMBER SYSTEM BOTTOM.



GENERAL NOTES:

CONTRACTOR IS RESPONSIBLE FOR VERIFICATION OF ALL UTILITIES PRIOR TO CONSTRUCTION AND SHALL NOTIFY ENGINEER IMMEDIATELY OF ANY CONFLICTS WITH THESE PLANS UPON DISCOVERY.

THE CONTRACTOR SHALL PREVENT SEDIMENT LADEN WATER FROM LEAVING THE SITE. ALL ADJACENT
DOWNSTREAM STORM DRAIN INLETS SHALL BE PROTECTED FROM SILTATION.

THE CONTRACTOR SHALL NOT ALLOW ANY WASH WATER OR DEBRIS TO ENTER NEW PIPES OR CHANNELS DURING CONSTRUCTION.

THE CONTRACTOR SHALL AT ALL TIMES PROVIDE AND MAINTAIN AMPLE MEANS AND DEVICES TO REMOVE AND DISPOSE OF ALL WATER ENTERING THE TRENCH EXCAVATION DURING THE PROCESS OF LAYING THE PIPE.

INSTALL CONTINUOUS INSULATED COPPER TRACER WIRE OR MAGNETIC TAPE AS REQUIRED BY THE OREGON PLUMBING SPECIALTY CODE.

UNLESS OTHERWISE NOTED, ALL STORM DRAIN PIPES ARE TO HAVE A MIMUMIM 1% DOWNSLOPE TO THE NEAREST STORMWATER FACILITY. STORM DRAIN PIPES ARE TO BE PVC SCHEDULE 40, ABS SCHEDULE 40, OR CAST IRON AND FOLLOW OREGON PLUMBING SPECIALTY CODE.

ALL STORM WATER PIPE CONNECTIONS TO CATCH BASINS, MANHOLES, PLANTERS AND OTHER RELATED STRUCTURES SHALL BE WATER TIGHT AS PER OREGON PLUMBING SPECIALTY CODE.

STORMWATER FACILITIES, STRUCTURES, AND PIPING SHOWN ARE INTENDED TO BE FOR SCHEMATIC PURPOSES ONLY. THE CONTRACTOR SHALL ADJUST THE ALIGNMENT AND GRADE OF THE STORMWATER SYSTEM AS NECESSARY TO ACCOMMODATE THE NEW CONSTRUCTION AND TOPOGRAPHY, WHILE MAINTAINING MINIMUM SLOPE REQUIREMENTS.

ALL COMPONENTS OF THE PRIVATE STORMWATER SYSTEM SHALL BE CONSTRUCTED PER OREGON PLUMBING SPECIALTY CODE REQUIREMENTS.

CONSTRUCTION NOTES:

1. DIRECT DOWNSPOUTS FROM ROOF TO STORM DRAIN PIPE DISCHARGING TO MC-7200 STORMTECH SYSTEM. USE 4 INCH STORM DRAIN LINE. 4 INCH CONVEYANCE PIPE MUST BE CAST IRON, ABS SCHEDULE 40, OR PVC SCHEDULE 40 AND HAVE MINIMUM 1% GRADE AND FOLLOW OREGON PLUMBING SPECIALITY CODE.

2. STORM PIPE COLLECTING ROOF RUNOFF AND DISCHARGING TO NYLOPLAST BASIN (OR EQUIVALENT) ATTACHED TO MC-7200 STORMTECH SYSTEM. MIN 4 INCH CONVEYANCE PIPE MUST BE CAST IRON, ABS SCHEDULE 40, OR PVC SCHEDULE 40 AND HAVE MINIMUM 1% GRADE AND FOLLOW OREGON PLUMBING SPECIALITY CODE.

3. INSTALL 3 MC-7200 STORMTECH CHAMBERS INSIDE LINED ROCK GALLERY. INSTALL PER MANUFACTURERS INSTALLATION INSTRUCTIONS. SEE DETAILS. USE CONCEPTUAL ELEVATIONS AS NOTED IN DETAILS. MC-7200 CHAMBER SYSTEM IS FOR ROOF DRAINAGE ONLY.

4. CONCRETE OUTLET STRUCTURE. 48 INCH DIAMETER MANHOLE. DISCHARGE MC-7200 SYSTEM DRAIN PIPE TO OUTLET. INSTALL A GATE VALVE WITH 0.5 INCH ORIFICE DRILLED IN THE PLATE ON THE OUTLET PIPE MAKING SURE GATE VALVE IS ACCESSIBLE FROM INSIDE MANHOLE, OR INSTALL ORIFICE PLATE WITH 0.5 INCH OPENING OVER OUTLET PIPE. WATERPROOF INLET AND OUTLET PIPE OPENINGS.

5. GATE VALVE OR ORIFICE PLATE WITH 0.5 INCH ORIFICE DRILLED IN PLATE. AFTER INSTALL, GATE VALVE IS TO BE FULLY SHUT TO ALLOW PROPER FUNCTION OF THE ORIFICE.

6. 6 INCH SOLID DRAIN PIPE DISCHARGING TO EXISTING STORM DRAINAGE PIPE.

7. SLOPE DRIVEWAY TO DRAIN TO OPEN GRATE ON SUMPED NYLOPLAST BASIN ATTACHED TO SC-310 STORMTECH SYSTEM.

8. INSTALL 2 SC-310 STORMTECH CHAMBERS INSIDE LINED ROCK GALLERY AT LOW POINT OF DRIVEWAY. INSTALL PER MANUFACTURERS INSTALLATION INSTRUCTIONS. SEE DETAILS. USE CONCEPTUAL ELEVATIONS AS NOTED IN DETAILS.

9. 3 INCH DRAIN PIPE DRAINING LINED SC-310 ROCK GALLEY. CONNECT TO GATE VALVE INSIDE 12 INCH NYLOPLAST DRAIN BASIN. CONNECT TO 6 INCH DRAIN PIPE DISCHARGING TO EXISTING STORM DRAINAGE PIPE.

10. MIN 12 INCH DIAMETER NYLOPLAST BASIN OR EQUIVALENT. RUN DRAIN PIPE FROM SC-310 ROCK GALLERY TO BASIN. INSTALL GATE VALVE WITH 0.5 INCH ORIFICE DRILLED IN PLATE. AFTER INSTALL, GATE VALVE IS TO BE FULLY SHUT TO ALLOW PROPER FUNCTION OF THE ORIFICE.

11. 6 INCH SOLID DRAIN PIPE DISCHARGING TO EXISTING 12 INCH STORM DRAIN PIPE NEAR WALKING BRIDGE. FIELD LOCATE APPROPRIATE CONNECTION POINT TO MAINTAIN 1% DOWNSLOPE. 6 INCH CONVEYANCE PIPE MUST BE CAST IRON, ABS SCHEDULE 40, OR PVC SCHEDULE 40 AND HAVE MINIMUM 1% GRADE AND FOLLOW OREGON PLUMBING SPECIALITY CODE.

12. 18 INCH DIAMETER STORMTECH NYLOPLAST BASIN OR EQUIVALENT. MINIMUM 18 INCH SUMP. INSTALL DOWN-TURN ELBOW ON OUTLET PIPE. MAY TOP WITH REDUCER TO DECREASE DIAMETER OF GRATE.

White Pelican Consulting

WHITE PELICAN CONSULTING IS NOT LIABLE FOR THE ACCURACY OF THE TOPOGRAPHY INFORMATION. IT IS THE SOLE RESPONSIBILITY OF THE BUILDER TO VERIFY ALL SITE CONDITIONS, INCLUDING ANY FILL PLACED ON THE SITE, AND INFORM OWNERS OF ANY POTENTIAL FIELD MODIFICATIONS.

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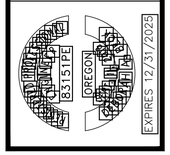
email: dbeck@whitepelicanconsulting.com

JANSEN RESIDENCE
5494 LINN LANE
WEST LINN, OREGON 97068
STORMWATER MANAGEMENT
SITE PLAN



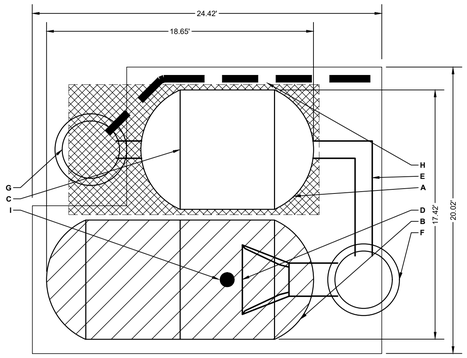
DATE	
7/2/24	
SCALE	PROJ. NO.
1"=10'	
DRAWN BY	CHECKED BY
TRT	DAB

SW1

PROPOSED LAYOUT: HOUSE MC-7200		CONCEPTUAL ELEVATIONS	
3	STORMTECH MC-7200 CHAMBERS	MAXIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	8.25
4	STORMTECH MC-7200 END CAPS	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	7.75
12	STONE ABOVE (in)	MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	7.75
9	STONE BELOW (in)	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	7.75
40	STONE VOID	TOP OF STONE:	6.75
1559	INSTALLED SYSTEM VOLUME (CF) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)	TOP OF MC-7200 CHAMBER:	5.75
		12" x 12" TOP MANIFOLD INVERT:	3.75
		24" ISOLATOR ROW PLUS INVERT:	0.94
		12" BOTTOM CONNECTION INVERT:	0.88
425	SYSTEM AREA (SF)	BOTTOM OF MC-7200 CHAMBER:	0.75
88.9	SYSTEM PERIMETER (ft)	UNDERDRAIN INVERT:	0.00
137	THERMOPLASTIC LINER (SY) (20% OVERAGE)	BOTTOM OF STONE:	0.00

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PREFABRICATED END CAP	A	12" TOP PARTIAL CUT END CAP. PART#: MC7200IEPP12T / TYP OF ALL 12" TOP CONNECTIONS	35.69"	
PREFABRICATED END CAP	B	24" BOTTOM PARTIAL CUT END CAP, PART#: MC7200IEPP24B / TYP OF ALL 24" BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	2.26"	
PREFABRICATED END CAP	C	12" BOTTOM PARTIAL CUT END CAP, PART#: MC7200IEPP12B / TYP OF ALL 12" BOTTOM CONNECTIONS	1.55"	
FLAMP	D	INSTALL FLAMP ON 24" ACCESS PIPE / PART#: MCFLAMP		
MANIFOLD	E	12" x 12" TOP MANIFOLD, ADS N-12	35.69"	
CONCRETE STRUCTURE	F	(DESIGN BY ENGINEER / PROVIDED BY OTHERS)		2.5 CFS IN
CONCRETE STRUCTURE	G	OCS (DESIGN BY ENGINEER / PROVIDED BY OTHERS)		2.0 CFS OUT
UNDERDRAIN	H	6" ADS N-12 DUAL WALL PERFORATED HDPE UNDERDRAIN		
INSPECTION PORT	I	4" SEE DETAIL		



ISOLATOR ROW PLUS (SEE DETAIL)

PLACE MINIMUM 17.50' OF ADSPLUS175 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

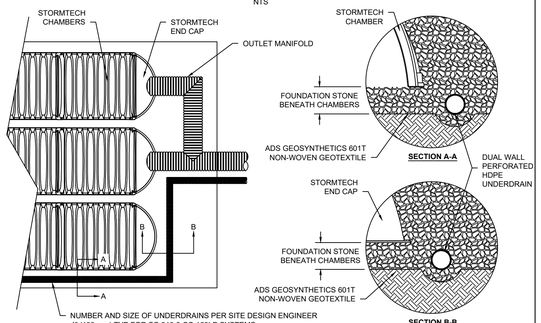
THERMOPLASTIC LINER (SEE TECH NOTE #6.50 PROVIDED BY OTHERS / DESIGN BY OTHERS)

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- ADS DOES NOT DESIGN OR PROVIDE MEMBRANE LINER SYSTEMS FOR CISTERNS (RAINWATER HARVESTING). TO MINIMIZE THE LEAKAGE POTENTIAL OF LINER SYSTEMS, THE MEMBRANE LINER SYSTEM SHOULD BE DESIGNED BY A KNOWLEDGEABLE GEOTEXTILE PROFESSIONAL AND INSTALLED BY A QUALIFIED CONTRACTOR.
- **NOT FOR CONSTRUCTION:** THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

UNDERDRAIN DETAIL

NTS



5 UNDERDRAIN DETAIL

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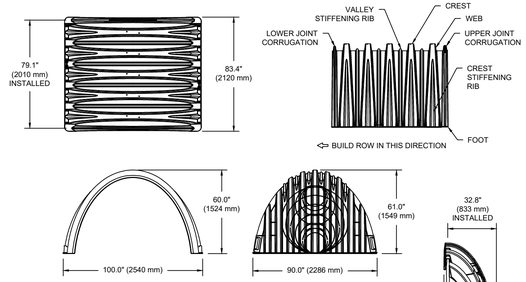
MC-7200 TECHNICAL SPECIFICATION

NTS



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	100.0" X 60.0" X 79.1"	(2540 mm X 1524 mm X 2010 mm)
CHAMBER STORAGE	175.9 CUBIC FEET	(4.98 m³)
MINIMUM INSTALLED STORAGE*	267.3 CUBIC FEET	(7.56 m³)
WEIGHT (NOMINAL)	205 lbs.	(92.9 kg)

NOMINAL END CAP SPECIFICATIONS

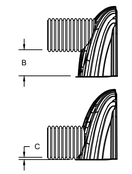
SIZE (W X H X INSTALLED LENGTH)	90.0" X 61.0" X 32.8"	(2286 mm X 1549 mm X 833 mm)
END CAP STORAGE	39.5 CUBIC FEET	(1.12 m³)
MINIMUM INSTALLED STORAGE*	115.3 CUBIC FEET	(3.26 m³)
WEIGHT (NOMINAL)	90 lbs.	(40.8 kg)

*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION AND BETWEEN CHAMBERS, 12" (305 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY.

PARTIAL CUT HOLES AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PARTIAL CUT HOLES AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

PART #	STUB	B	C
MC7200IEPP06T	6" (150 mm)	42.54" (1081 mm)	---
MC7200IEPP06B		---	0.86" (22 mm)
MC7200IEPP08T	8" (200 mm)	40.50" (1029 mm)	---
MC7200IEPP08B		---	1.01" (26 mm)
MC7200IEPP10T	10" (250 mm)	38.37" (975 mm)	---
MC7200IEPP10B		---	1.33" (34 mm)
MC7200IEPP12T	12" (300 mm)	35.69" (907 mm)	---
MC7200IEPP12B		---	1.55" (39 mm)
MC7200IEPP15T	15" (375 mm)	32.72" (831 mm)	---
MC7200IEPP15B		---	1.70" (43 mm)
MC7200IEPP18T	18" (450 mm)	29.36" (746 mm)	---
MC7200IEPP18TW			
MC7200IEPP18B		---	1.97" (50 mm)
MC7200IEPP18BW			
MC7200IEPP24T	24" (600 mm)	23.05" (585 mm)	---
MC7200IEPP24TW			
MC7200IEPP24B		---	2.26" (57 mm)
MC7200IEPP24BW			
MC7200IEPP30BW	30" (750 mm)	---	2.95" (75 mm)
MC7200IEPP36BW	36" (900 mm)	---	3.25" (83 mm)
MC7200IEPP42BW	42" (1050 mm)	---	3.55" (90 mm)

NOTE: ALL DIMENSIONS ARE NOMINAL



CUSTOM PREFABRICATED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-7200 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

2 MC-7200 TECHNICAL SPECIFICATION

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

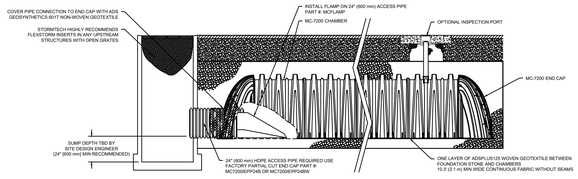
STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45° (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.



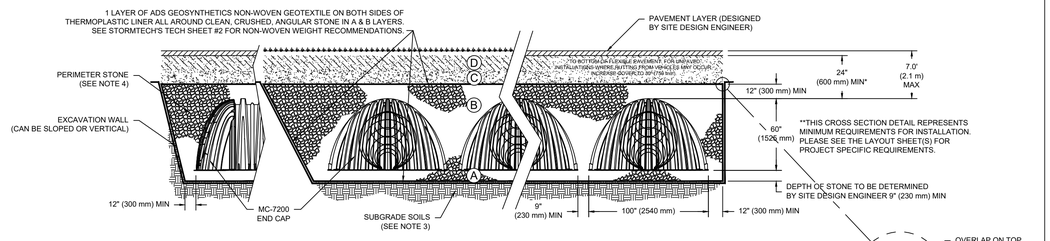
MC-7200 ISOLATOR ROW PLUS DETAIL
NTS

3 MC-7200 ISOLATOR ROW PLUS DETAIL

ACCEPTABLE FILL MATERIALS: STORMTECH MC-7200 CHAMBER SYSTEMS

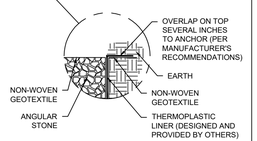
	MATERIAL LOCATION	DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE[3]	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE[3]	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.
5. WHERE RECYCLED CONCRETE AGGREGATE IS USED IN LAYERS 'A' OR 'B' THE MATERIAL SHOULD ALSO MEET THE ACCEPTABILITY CRITERIA OUTLINED IN TECHNICAL NOTE 6.20 "RECYCLED CONCRETE STRUCTURAL BACKFILL".



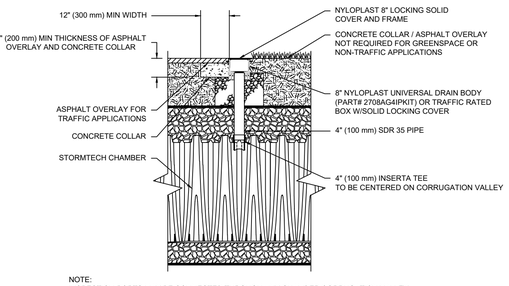
NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101
2. MC-7200 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 450 LBS/FT/% THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.



THERMOPLASTIC LINER DETAIL

1 MC-7200 CROSS SECTION DETAIL

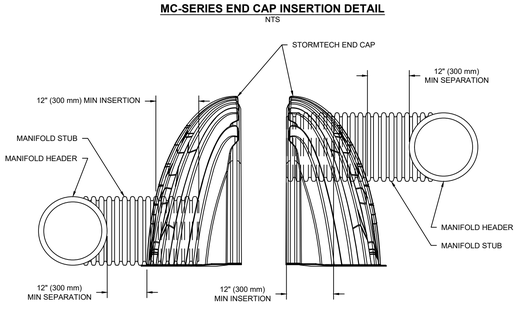


NOTE:
INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION VALLEY.

4" PVC INSPECTION PORT DETAIL (MC SERIES CHAMBER)
NTS

4 4" PVC INSPECTION PORT DETAIL (MC SERIES CHAMBER)

MC-SERIES END CAP INSERTION DETAIL
NTS



NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.

6 MC-SERIES END CAP INSERTION DETAIL

WHITE PELICAN CONSULTING
PORTLAND, OREGON
503-847-9455
www.whitepelicanconsulting.com
email: dbeck@whitepelicanconsulting.com

JANSEN RESIDENCE
5494 LINN AVENEU
WEST LINN, OREGON 97068
STORMWATER MANAGEMENT DETAILS

DATE	
5/24/24	
SCALE	PROJ. NO.
NTS	
DRAWN BY	CHECKED BY
TRT	DB

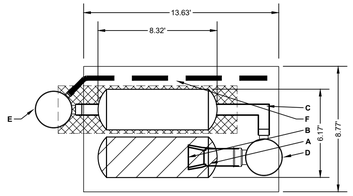
SW2

PROPOSED LAYOUT: DRIVEWAY SC-310		
2	STORMTECH SC-310 CHAMBERS	
4	STORMTECH SC-310 END CAPS	
6	STONE ABOVE (in)	
6	STONE BELOW (in)	
40	STONE VOID	
129	INSTALLED SYSTEM VOLUME (CF) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)	
120	SYSTEM AREA (SF)	
44.8	SYSTEM PERIMETER (ft)	
30	THERMOPLASTIC LINER (SY) (20% OVERAGE)	

CONCEPTUAL ELEVATIONS	
MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	9.83
MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	3.83
MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	3.33
MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	3.33
MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	3.33
TOP OF STONE:	2.33
TOP OF SC-310 CHAMBER:	1.83
8" x 8" TOP MANIFOLD INVERT:	0.79
12" ISOLATOR ROW PLUS INVERT:	0.58
8" BOTTOM CONNECTION INVERT:	0.55
BOTTOM OF SC-310 CHAMBER:	0.50
UNDERDRAIN INVERT:	0.00
BOTTOM OF STONE:	0.00

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PREFABRICATED EZ END CAP	A	12" BOTTOM PREFABRICATED EZ END CAP, PART#: SC310ECEZ / TYP OF ALL 12" BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	0.90"	
FLAMP	B	INSTALL FLAMP ON 12" ACCESS PIPE / PART#: SC31012RAMP		
MANIFOLD	C	8" x 8" TOP MANIFOLD, MOLDED FITTINGS	3.50"	
NYLOPLAST (INLET W/ ISO PLUS ROW)	D	18" DIAMETER (24.00" SUMP MIN)		0.9 CFS IN
NYLOPLAST (OUTLET)	E	12" DIAMETER (DESIGN BY ENGINEER)		0.7 CFS OUT
UNDERDRAIN	F	4" ADS N-12 DUAL WALL PERFORATED HDPE UNDERDRAIN		



ISOLATOR ROW PLUS (SEE DETAIL)

PLACE MINIMUM 17.50' OF ADSPLUS175 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

THERMOPLASTIC LINER (SEE TECH NOTE #6.50 PROVIDED BY OTHERS / DESIGN BY OTHERS)

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
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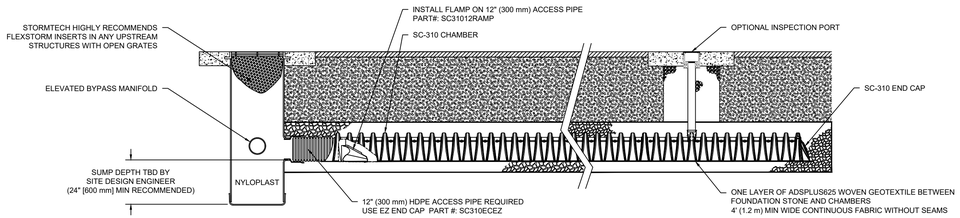
3 SC-310 ISOLATOR ROW PLUS DETAIL



SC-310 ISOLATOR ROW PLUS DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45° (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

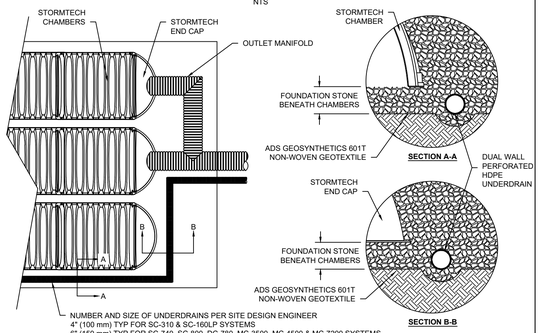
STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

UNDERDRAIN DETAIL
NTS



4 UNDERDRAIN DETAIL

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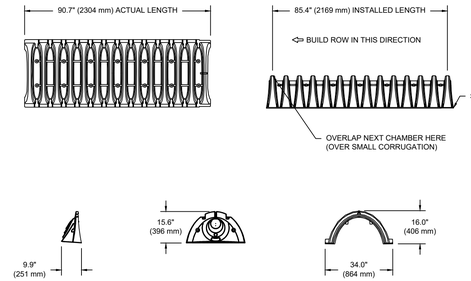
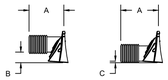
SC-310 TECHNICAL SPECIFICATION
NTS



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	34.0" X 16.0" X 85.4"	(864 mm X 406 mm X 2169 mm)
CHAMBER STORAGE	14.7 CUBIC FEET	(0.42 m³)
MINIMUM INSTALLED STORAGE*	31.0 CUBIC FEET	(0.88 m³)
WEIGHT	35.0 lbs.	(16.8 kg)

*ASSUMES 6" (152 mm) ABOVE, BELOW, AND BETWEEN CHAMBERS



PRE-FAB STUB AT BOTTOM OF END CAP WITH FLAMP END WITH "BR"
PRE-FAB STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PRE-FAB STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
PRE CORED END CAPS END WITH "PC"

PART #	STUB	A	B	C
SC310EPE06T / SC310EPE06TPC	6" (150 mm)	9.6" (244 mm)	5.8" (147 mm)	---
SC310EPE06B / SC310EPE06BPC			---	0.5" (13 mm)
SC310EPE08T / SC310EPE08TPC	8" (200 mm)	11.9" (302 mm)	3.5" (89 mm)	---
SC310EPE08B / SC310EPE08BPC			---	0.6" (15 mm)
SC310EPE10T / SC310EPE10TPC	10" (250 mm)	12.7" (323 mm)	1.4" (36 mm)	---
SC310EPE10B / SC310EPE10BPC			---	0.7" (18 mm)
SC310ECEZ*	12" (300 mm)	13.5" (343 mm)	---	0.9" (23 mm)

ALL STUBS, EXCEPT FOR THE SC310ECEZ ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC310ECEZ THE 12" (300 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 0.25" (6 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

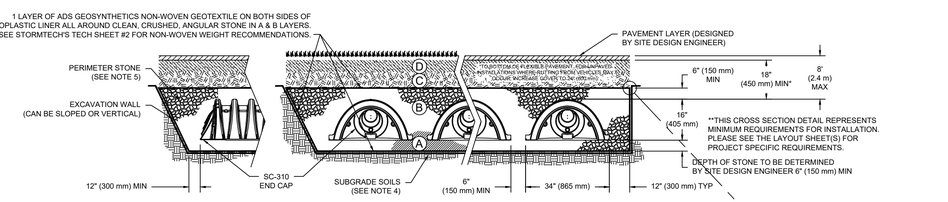
NOTE: ALL DIMENSIONS ARE NOMINAL

2 SC-310 TECHNICAL SPECIFICATION

ACCEPTABLE FILL MATERIALS: STORMTECH SC-310 CHAMBER SYSTEMS

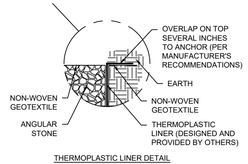
	MATERIAL LOCATION	DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145* A-1, A-2-4, A-3 OR AASHTO M43* 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETES	AASHTO M43* 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETES	AASHTO M43* 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.
5. WHERE RECYCLED CONCRETE AGGREGATE IS USED IN LAYERS 'A' OR 'B' THE MATERIAL SHOULD ALSO MEET THE ACCEPTABILITY CRITERIA OUTLINED IN TECHNICAL NOTE 6.20 "RECYCLED CONCRETE STRUCTURAL BACKFILL".



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2922 (POLETHYLENE) OR ASTM F2418 (POLYPROPYLENE), "STANDARD SPECIFICATION FOR CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-310 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 400 LBS/FT/% . THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.



THERMOPLASTIC LINER DETAIL

1 SC-310 CROSS SECTION DETAIL

White Pelican Consulting

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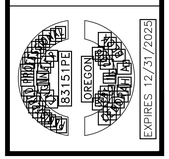
WHITE PELICAN CONSULTING
PORTLAND, OREGON
503-847-9455
www.whitepelicanconsulting.com
email: dbeck@whitepelicanconsulting.com

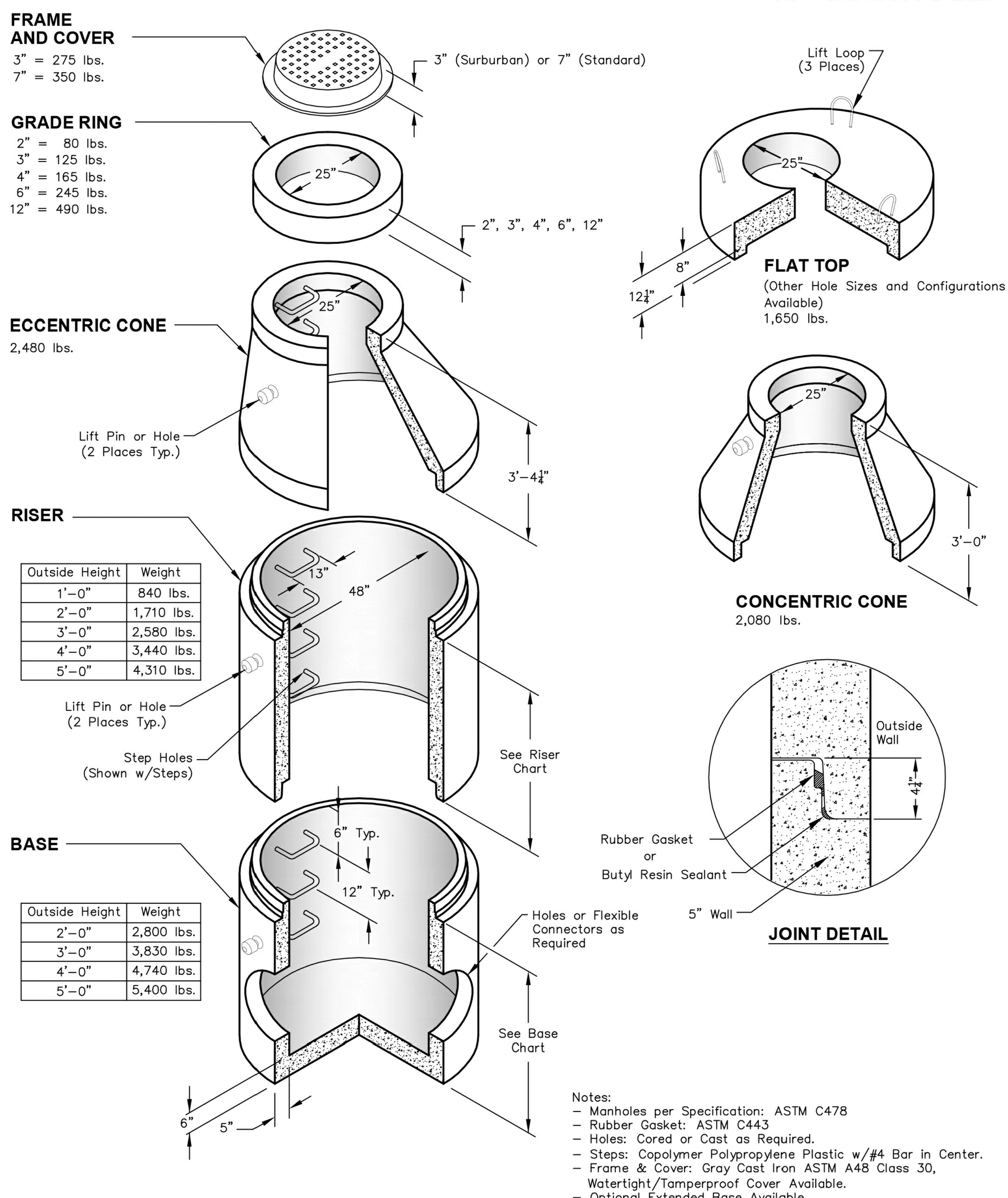
JANSEN RESIDENCE
5494 LINE AVENUE
WEST LINN, OREGON 97068
STORMWATER MANAGEMENT DETAILS



DATE	
5/24/24	
SCALE	PROJ. NO.
NTS	
DRAWN BY	CHECKED BY
TRT	DB

SW3

48" MANHOLE



RISER

Outside Height	Weight
1'-0"	840 lbs.
2'-0"	1,710 lbs.
3'-0"	2,580 lbs.
4'-0"	3,440 lbs.
5'-0"	4,310 lbs.

BASE

Outside Height	Weight
2'-0"	2,800 lbs.
3'-0"	3,830 lbs.
4'-0"	4,740 lbs.
5'-0"	5,400 lbs.

Notes:
- Manholes per Specification: ASTM C478
- Rubber Gasket: ASTM C443
- Holes: Cored or Cast as Required.
- Steps: Copolymer Polypropylene Plastic w/#4 Bar in Center.
- Frame & Cover: Gray Cast Iron ASTM A48 Class 30, Watertight/Tamperproof Cover Available.
- Optional Extended Base Available.

Oldcastle Precast®	48" MANHOLE	48" MANHOLE
PO Box 323, Wilsonville, Oregon 97070-0323	File Name: 020-48MH	
Tel: (503) 682-2844 Fax: (503) 682-2657	Issue Date: 2017	
	oldcastleprecast.com/wilsonville	

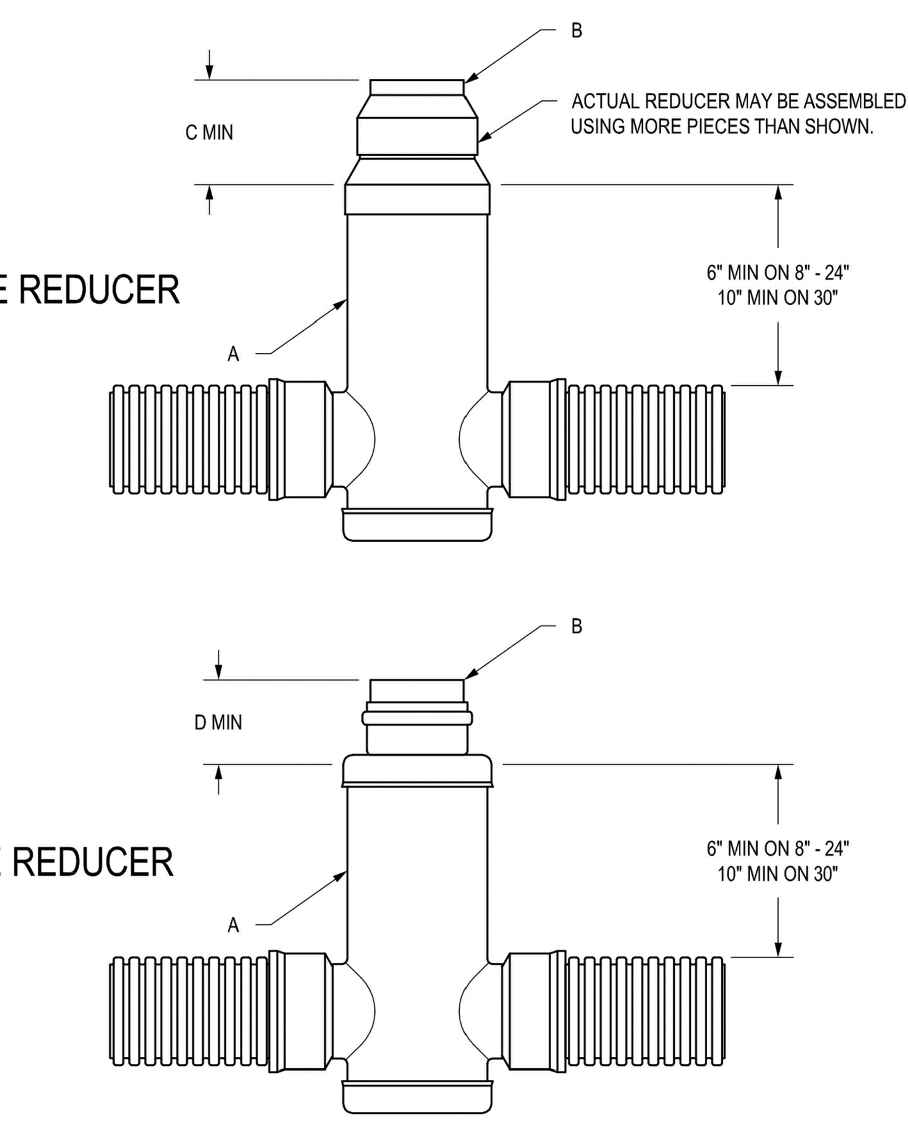
1.0

MANHOLE DETAIL NTS 1

A	B	C	D
10"	8"	6.00	9.00
12"	8"	12.00	9.00
12"	10"	6.00	10.00
15"	8"	18.50	9.00
15"	10"	12.50	10.00
15"	12"	6.50	
18"	8"	25.50	9.00
18"	10"	19.50	10.00
18"	12"	13.50	11.50
18"	15"	7.00	
24"	8"	36.50	9.00
24"	10"	30.50	10.00
24"	12"	24.50	11.00
24"	15"	18.00	12.00
24"	18"	11.00	
30"	8"	46.50	9.00
30"	10"	40.50	10.00
30"	12"	34.50	11.50
30"	15"	28.00	12.00
30"	18"	21.00	14.50
30"	24"	13.50	

CONE STYLE REDUCER

CAP STYLE REDUCER



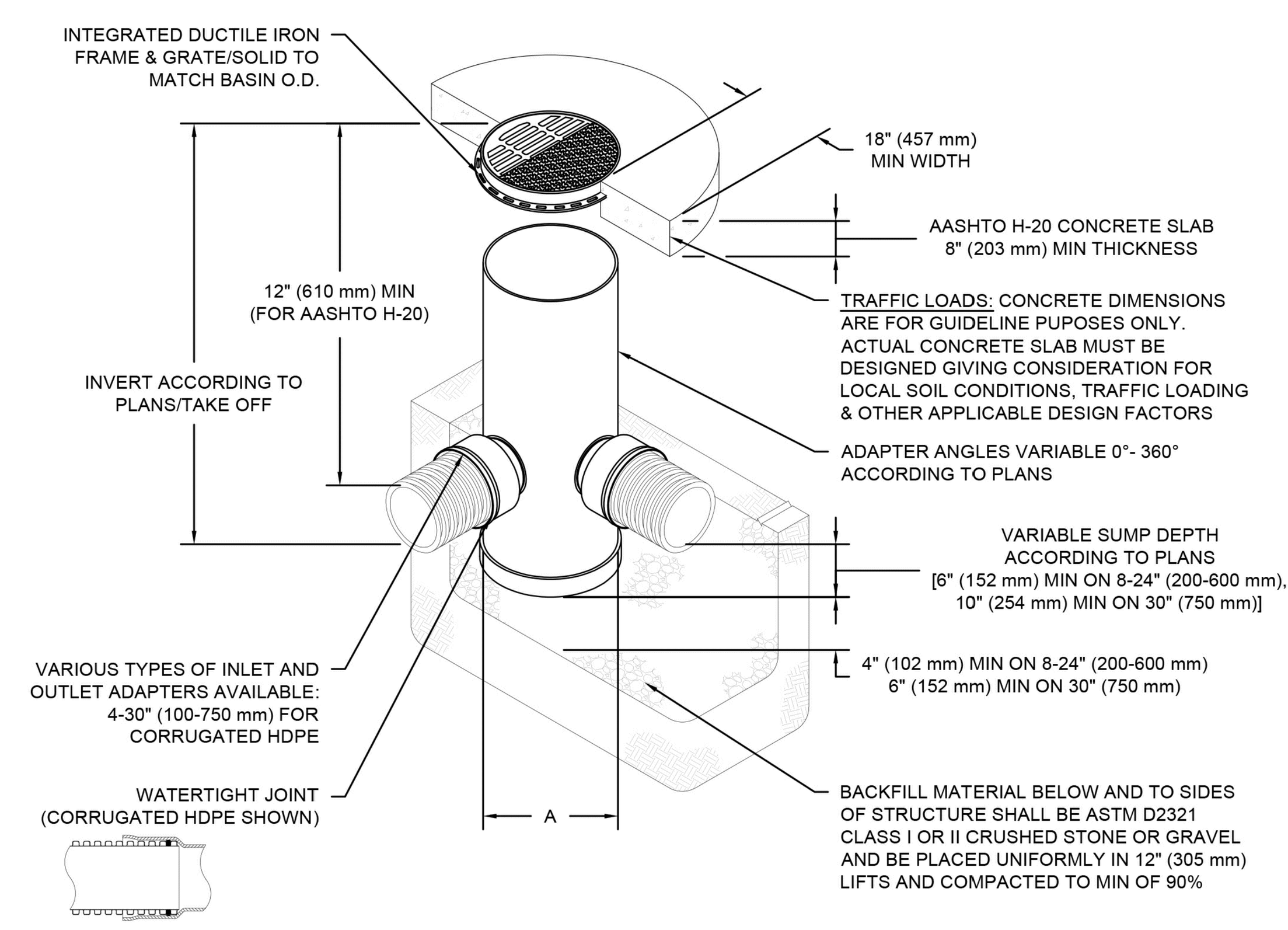
NOTE: DIMENSIONS ARE FOR REFERENCE ONLY
ACTUAL DIMENSIONS MAY VARY

DRAWN BY CJA	MATERIAL	Nyloplast 3130 VERONA AVE BUFORD, GA 30518 PHN (770) 932-2443 FAX (770) 932-2490 www.nyloplast-us.com
DATE 2-6-03		
REVISED BY JJC	PROJECT NO./NAME	TITLE DRAIN BASIN WITH REDUCER OPTIONS
DATE 7-10-13		
DWG SIZE A	SCALE 1:25 SHEET 1 OF 1	DWG NO. 7001-110-104 REV E

DRAIN BASIN DETAIL NTS 2

NYLOPLAST DRAIN BASIN

NTS



NOTES

1. 8-30" (200-750 mm) GRATES/SOLID COVERS SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
2. 12-30" (300-750 mm) FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
3. DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS
4. DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS & HANCOR DUAL WALL) & SDR 35 PVC
5. FOR COMPLETE DESIGN AND PRODUCT INFORMATION: **WWW.NYLOPLAST-US.COM**
6. TO ORDER CALL: **800-821-6710**

A	PART #	GRATE/SOLID COVER OPTIONS		
8" (200 mm)	2808AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
10" (250 mm)	2810AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
12" (300 mm)	2812AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
15" (375 mm)	2815AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
18" (450 mm)	2818AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
24" (600 mm)	2824AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
30" (750 mm)	2830AG	PEDESTRIAN AASHTO H-20	STANDARD AASHTO H-20	SOLID AASHTO H-20

REDUCER DETAIL NTS 3

White Pelican Consulting

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WHITE PELICAN CONSULTING
PORTLAND, OREGON
503-847-9455
www.whitepelicanconsulting.com
email: dbeck@whitepelicanconsulting.com

JANSEN RESIDENCE
5494 LINE AVENUE
WEST LINN, OREGON 97068
STORMWATER MANAGEMENT
DETAILS

EXPIRES 12/31/2025

DATE 5/31/24	
SCALE NTS	PROJ. NO.
DRAWN BY TRT	CHECKED BY DB

SW4

OPERATIONS AND MAINTENANCE (O&M)

StormTech Chamber System

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.

2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

Nyloplast or Catch Basin

Maintenance Component	Spring	Summer	Fall	Winter	24-hr Precip > 1"
Replace or repair inlets if they are cracked or broken. Reseal inlet pipes if they are not watertight.		X	X		
Remove sediment from catchbasin.	X		X		X
Remove leaf litter/debris from gutters.	X		X		
Check trench drains leading to the facility and remove any soil or debris.	X	X	X	X	X
Remove inspection portal lid and check for spalling or cracking of walls and for root intrusions. Repair as necessary.		X	X		
Remove inspection portal lid and check sediment depth. Have professionally cleaned when depth of sediment or debris is 6" or greater.		X	X		
Remove Inspection portal lid and contact City stormwater engineers (503.635.0270) if ponding occurs for more than 48 hours.	X		X	X	X

ENGINEERING CONCLUSIONS

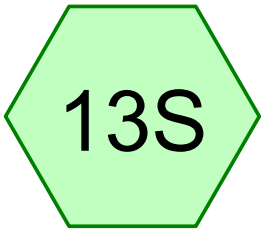
Stormwater runoff from the post-development impervious areas will be directed to two separate lined StormTech chamber systems each with a 0.5 inch orifice limiting the rate of drainage from the systems to below pre-development levels. These stormwater facilities will meet both pollution reduction and flow control requirements as specified by the City of West Linn.

The proposed installation of the two lined StormTech chamber systems as described in this report are expected to meet the site's needs for stormwater management of impervious areas on the site.

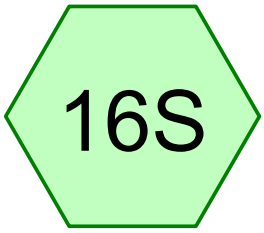
APPENDIX A: NATURAL RESOURCE ASSESSMENT AND GEOTECH REPORT

Submitted as separate document due to large file size.

APPENDIX B: HYDROCAD MODELING OUTPUT



Pre-Dev House Roof



Pre-Dev Driveway

Subcat Reach Pond Link

Routing Diagram for 5494 Linn Ln West Linn
Prepared by White Pelican Consulting, Printed 5/30/2024

Summary for Subcatchment 13S: Pre-Dev House Roof

Runoff = 0.026 cfs @ 7.99 hrs, Volume= 500 cf, Depth= 0.84"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2-yr Rainfall=2.50"

	Area (sf)	CN	Description
*	7,163	79	
	7,163	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 16S: Pre-Dev Driveway

Runoff = 0.006 cfs @ 7.99 hrs, Volume= 116 cf, Depth= 0.84"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2-yr Rainfall=2.50"

	Area (sf)	CN	Description
*	1,662	79	
	1,662	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 13S: Pre-Dev House Roof

Runoff = 0.056 cfs @ 7.98 hrs, Volume= 912 cf, Depth= 1.53"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10-yr Rainfall=3.45"

	Area (sf)	CN	Description
*	7,163	79	
	7,163	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 16S: Pre-Dev Driveway

Runoff = 0.013 cfs @ 7.98 hrs, Volume= 212 cf, Depth= 1.53"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10-yr Rainfall=3.45"

	Area (sf)	CN	Description
*	1,662	79	
	1,662	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 13S: Pre-Dev House Roof

Runoff = 0.072 cfs @ 7.98 hrs, Volume= 1,124 cf, Depth= 1.88"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-yr Rainfall=3.90"

	Area (sf)	CN	Description
*	7,163	79	
	7,163	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 16S: Pre-Dev Driveway

Runoff = 0.017 cfs @ 7.98 hrs, Volume= 261 cf, Depth= 1.88"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-yr Rainfall=3.90"

	Area (sf)	CN	Description
*	1,662	79	
	1,662	79	100.00% Pervious Area

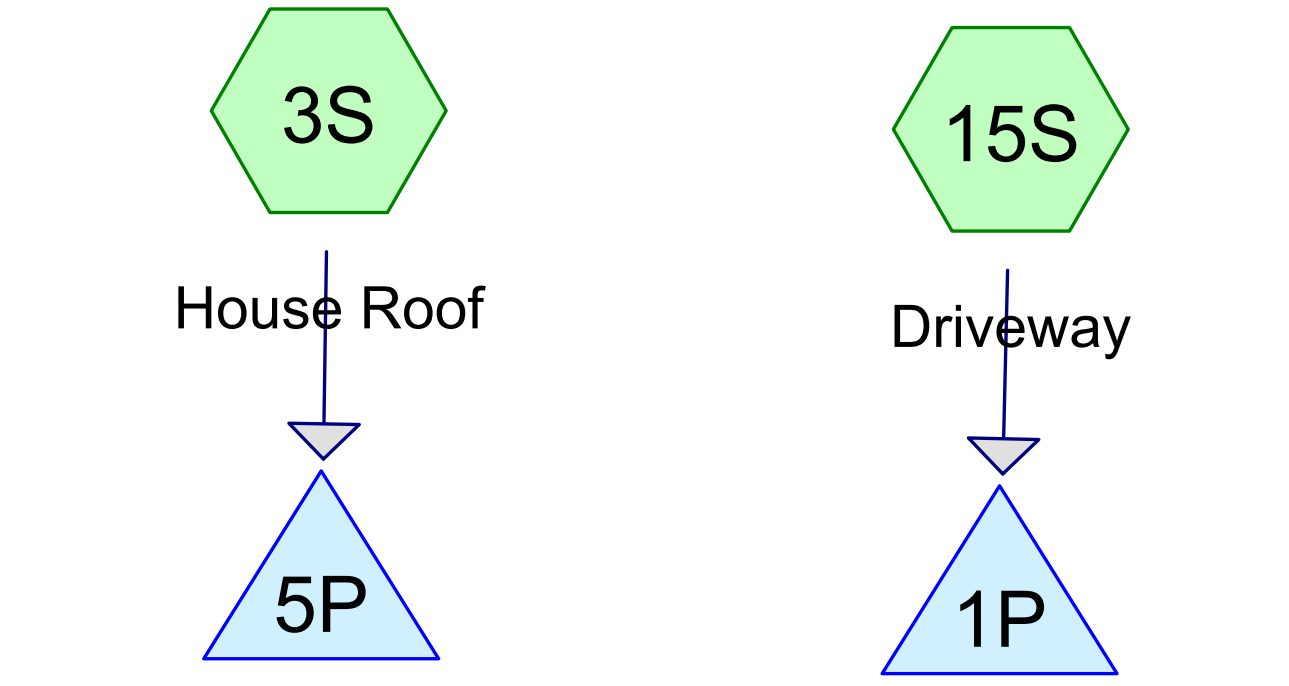
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Events for Subcatchment 13S: Pre-Dev House Roof

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-yr	2.50	0.026	500	0.84
10-yr	3.45	0.056	912	1.53
25-yr	**3.90**	**0.072**	**1,124**	**1.88**

Events for Subcatchment 16S: Pre-Dev Driveway

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-yr	2.50	0.006	116	0.84
10-yr	3.45	0.013	212	1.53
25-yr	**3.90**	**0.017**	**261**	**1.88**



Subcat Reach Pond Link

Routing Diagram for 5494 Linn Ln West Linn
Prepared by White Pelican Consulting, Printed 5/30/2024

Summary for Subcatchment 3S: House Roof

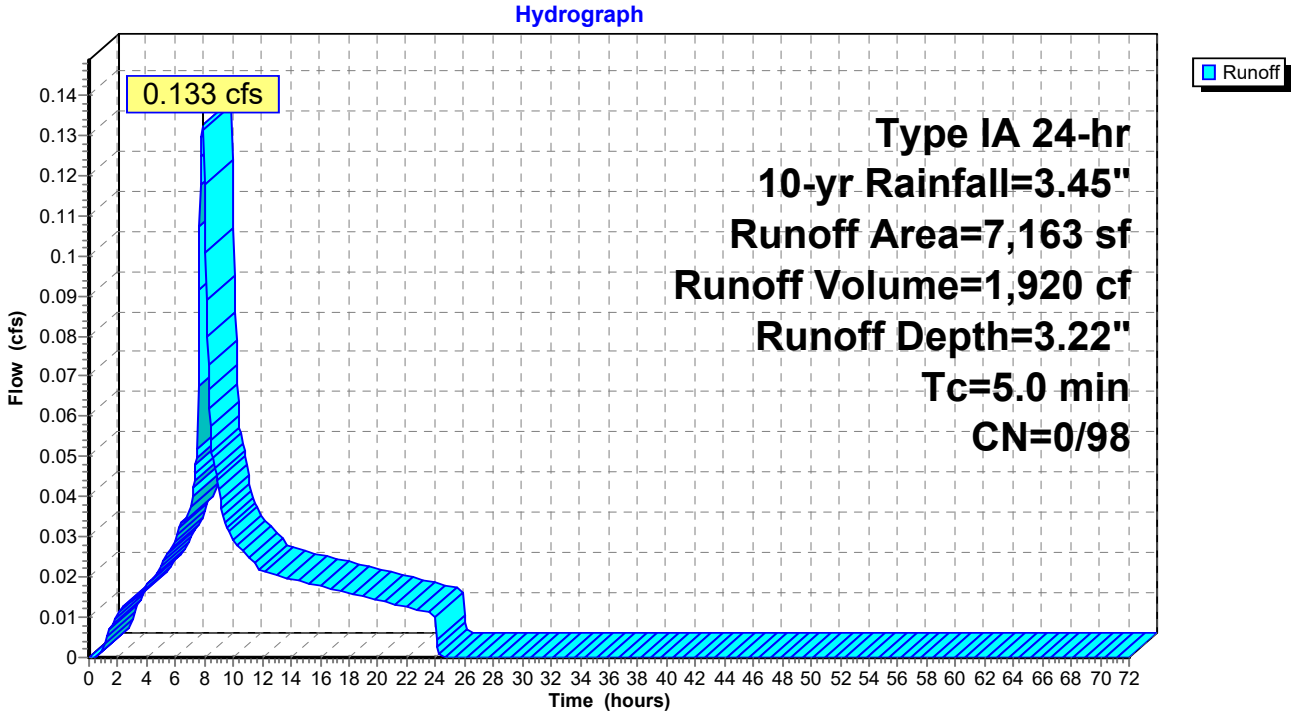
Runoff = 0.133 cfs @ 7.90 hrs, Volume= 1,920 cf, Depth= 3.22"
Routed to Pond 5P : MC-7200 StormTech (3) House

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10-yr Rainfall=3.45"

	Area (sf)	CN	Description
*	7,163	98	Roof
	7,163	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 3S: House Roof



Summary for Subcatchment 15S: Driveway

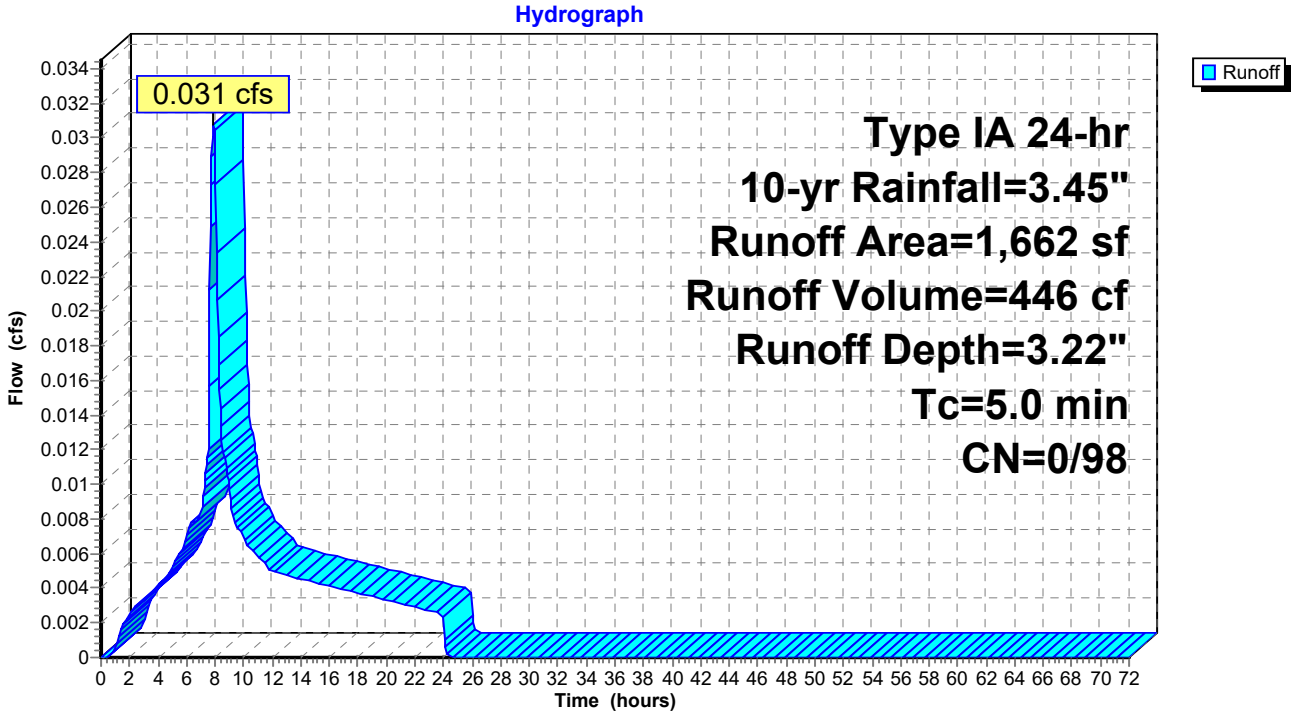
Runoff = 0.031 cfs @ 7.90 hrs, Volume= 446 cf, Depth= 3.22"
Routed to Pond 1P : SC310 StormTech (2)

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10-yr Rainfall=3.45"

	Area (sf)	CN	Description
*	1,662	98	Roof
	1,662	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 15S: Driveway



Summary for Pond 1P: SC310 StormTech (2)

Inflow Area = 1,662 sf,100.00% Impervious, Inflow Depth = 3.22" for 10-yr event
Inflow = 0.031 cfs @ 7.90 hrs, Volume= 446 cf
Outflow = 0.009 cfs @ 9.18 hrs, Volume= 446 cf, Atten= 72%, Lag= 76.9 min
Primary = 0.009 cfs @ 9.18 hrs, Volume= 446 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 548.40' @ 9.18 hrs Surf.Area= 120 sf Storage= 100 cf

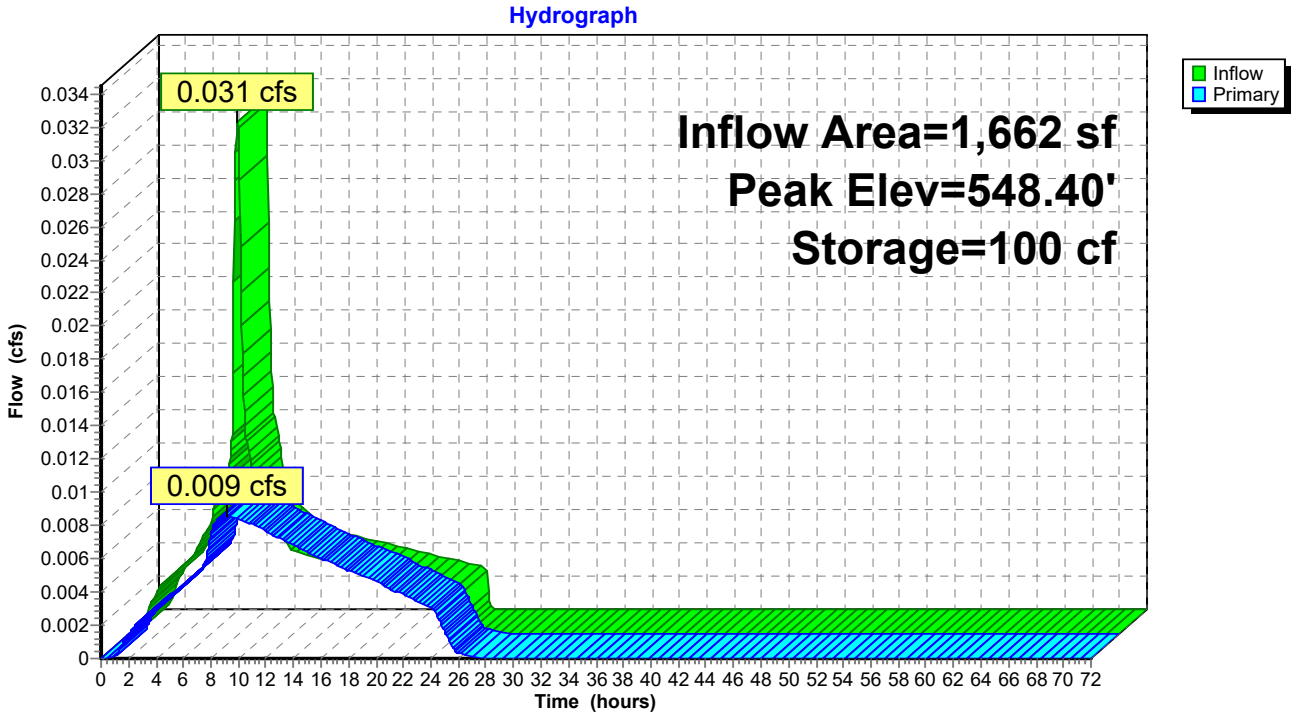
Plug-Flow detention time= 131.8 min calculated for 446 cf (100% of inflow)
Center-of-Mass det. time= 131.5 min (795.9 - 664.4)

Volume	Invert	Avail.Storage	Storage Description
#1	546.67'	100 cf	**8.77'W x 13.63'L x 2.33'H Prismatoid** 279 cf Overall - 29 cf Embedded = 249 cf x 40.0% Voids
#2	547.17'	29 cf	**ADS_StormTech SC-310 +Cap** x 2 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 2 Chambers in 2 Rows
		129 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	546.67'	**0.5" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.009 cfs @ 9.18 hrs HW=548.40' (Free Discharge)
↑—**1=Orifice/Grate** (Orifice Controls 0.009 cfs @ 6.29 fps)

Pond 1P: SC310 StormTech (2)



Summary for Pond 5P: MC-7200 StormTech (3) House

Inflow Area = 7,163 sf,100.00% Impervious, Inflow Depth = 3.22" for 10-yr event
Inflow = 0.133 cfs @ 7.90 hrs, Volume= 1,920 cf
Outflow = 0.013 cfs @ 21.03 hrs, Volume= 1,920 cf, Atten= 90%, Lag= 788.1 min
Primary = 0.013 cfs @ 21.03 hrs, Volume= 1,920 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 547.42' @ 21.03 hrs Surf.Area= 429 sf Storage= 1,064 cf

Plug-Flow detention time= 992.6 min calculated for 1,920 cf (100% of inflow)
Center-of-Mass det. time= 992.5 min (1,657.0 - 664.4)

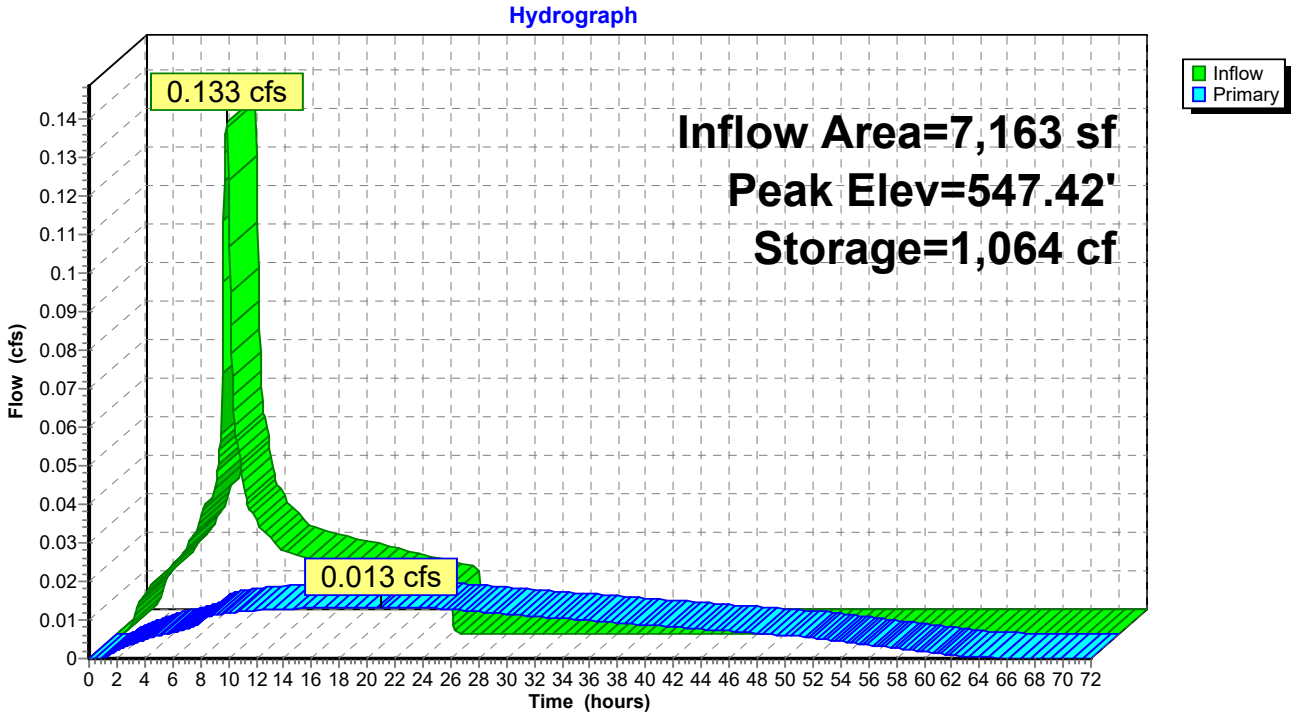
Volume	Invert	Avail.Storage	Storage Description
#1	543.25'	884 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 2,896 cf Overall - 686 cf Embedded = 2,210 cf x 40.0% Voids
#2	544.00'	686 cf	**ADS_StormTech MC-7200 +Cap** x 3 Inside #1 Effective Size= 91.2"W x 60.0"H => 26.68 sf x 6.59'L = 175.9 cf Overall Size= 100.0"W x 60.0"H x 6.95'L with 0.36' Overlap 3 Chambers in 2 Rows Cap Storage= 39.5 cf x 2 x 2 rows = 158.0 cf
		1,570 cf	Total Available Storage

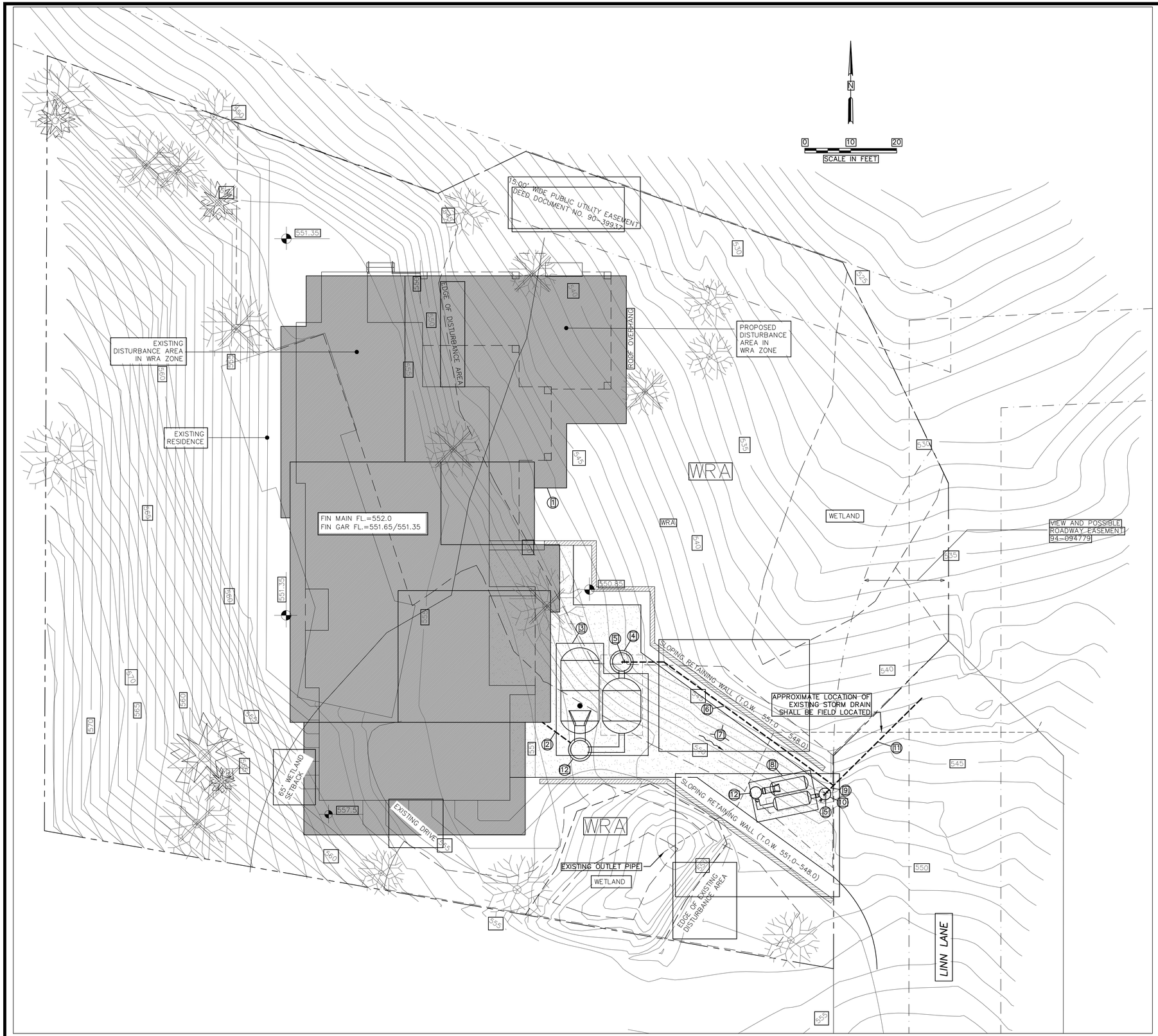
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
543.25	429	0	0
550.00	429	2,896	2,896

Device	Routing	Invert	Outlet Devices
#1	Primary	543.25'	**0.5" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.013 cfs @ 21.03 hrs HW=547.42' (Free Discharge)
↑—**1=Orifice/Grate** (Orifice Controls 0.013 cfs @ 9.81 fps)

Pond 5P: MC-7200 StormTech (3) House





GENERAL NOTES:

CONTRACTOR IS RESPONSIBLE FOR VERIFICATION OF ALL UTILITIES PRIOR TO CONSTRUCTION AND SHALL NOTIFY ENGINEER IMMEDIATELY OF ANY CONFLICTS WITH THESE PLANS UPON DISCOVERY.

THE CONTRACTOR SHALL PREVENT SEDIMENT LADEN WATER FROM LEAVING THE SITE. ALL ADJACENT
DOWNSTREAM STORM DRAIN INLETS SHALL BE PROTECTED FROM SILTATION.

THE CONTRACTOR SHALL NOT ALLOW ANY WASH WATER OR DEBRIS TO ENTER NEW PIPES OR CHANNELS DURING CONSTRUCTION.

THE CONTRACTOR SHALL AT ALL TIMES PROVIDE AND MAINTAIN AMPLE MEANS AND DEVICES TO REMOVE AND DISPOSE OF ALL WATER ENTERING THE TRENCH EXCAVATION DURING THE PROCESS OF LAYING THE PIPE.

INSTALL CONTINUOUS INSULATED COPPER TRACER WIRE OR MAGNETIC TAPE AS REQUIRED BY THE OREGON PLUMBING SPECIALTY CODE.

UNLESS OTHERWISE NOTED, ALL STORM DRAIN PIPES ARE TO HAVE A MIMUMIM 1% DOWNSLOPE TO THE NEAREST STORMWATER FACILITY. STORM DRAIN PIPES ARE TO BE PVC SCHEDULE 40, ABS SCHEDULE 40, OR CAST IRON AND FOLLOW OREGON PLUMBING SPECIALTY CODE.

ALL STORM WATER PIPE CONNECTIONS TO CATCH BASINS, MANHOLES, PLANTERS AND OTHER RELATED STRUCTURES SHALL BE WATER TIGHT AS PER OREGON PLUMBING SPECIALTY CODE.

STORMWATER FACILITIES, STRUCTURES, AND PIPING SHOWN ARE INTENDED TO BE FOR SCHEMATIC PURPOSES ONLY. THE CONTRACTOR SHALL ADJUST THE ALIGNMENT AND GRADE OF THE STORMWATER SYSTEM AS NECESSARY TO ACCOMMODATE THE NEW CONSTRUCTION AND TOPOGRAPHY, WHILE MAINTAINING MINIMUM SLOPE REQUIREMENTS.

ALL COMPONENTS OF THE PRIVATE STORMWATER SYSTEM SHALL BE CONSTRUCTED PER OREGON PLUMBING SPECIALTY CODE REQUIREMENTS.

CONSTRUCTION NOTES:

1. DIRECT DOWNSPOUTS FROM ROOF TO STORM DRAIN PIPE DISCHARGING TO MC-7200 STORMTECH SYSTEM. USE 4 INCH STORM DRAIN LINE. 4 INCH CONVEYANCE PIPE MUST BE CAST IRON, ABS SCHEDULE 40, OR PVC SCHEDULE 40 AND HAVE MINIMUM 1% GRADE AND FOLLOW OREGON PLUMBING SPECIALITY CODE.

2. STORM PIPE COLLECTING ROOF RUNOFF AND DISCHARGING TO NYLOPLAST BASIN (OR EQUIVALENT) ATTACHED TO MC-7200 STORMTECH SYSTEM. MIN 4 INCH CONVEYANCE PIPE MUST BE CAST IRON, ABS SCHEDULE 40, OR PVC SCHEDULE 40 AND HAVE MINIMUM 1% GRADE AND FOLLOW OREGON PLUMBING SPECIALITY CODE.

3. INSTALL 3 MC-7200 STORMTECH CHAMBERS INSIDE LINED ROCK GALLERY. INSTALL PER MANUFACTURERS INSTALLATION INSTRUCTIONS. SEE DETAILS. USE CONCEPTUAL ELEVATIONS AS NOTED IN DETAILS. MC-7200 CHAMBER SYSTEM IS FOR ROOF DRAINAGE ONLY.

4. CONCRETE OUTLET STRUCTURE. 48 INCH DIAMETER MANHOLE. DISCHARGE MC-7200 SYSTEM DRAIN PIPE TO OUTLET. INSTALL A GATE VALVE WITH 0.5 INCH ORIFICE DRILLED IN THE PLATE ON THE OUTLET PIPE MAKING SURE GATE VALVE IS ACCESSIBLE FROM INSIDE MANHOLE, OR INSTALL ORIFICE PLATE WITH 0.5 INCH OPENING OVER OUTLET PIPE. WATERPROOF INLET AND OUTLET PIPE OPENINGS.

5. GATE VALVE OR ORIFICE PLATE WITH 0.5 INCH ORIFICE DRILLED IN PLATE. AFTER INSTALL, GATE VALVE IS TO BE FULLY SHUT TO ALLOW PROPER FUNCTION OF THE ORIFICE.

6. 6 INCH SOLID DRAIN PIPE DISCHARGING TO EXISTING STORM DRAINAGE PIPE.

7. SLOPE DRIVEWAY TO DRAIN TO OPEN GRATE ON SUMPED NYLOPLAST BASIN ATTACHED TO SC-310 STORMTECH SYSTEM.

8. INSTALL 2 SC-310 STORMTECH CHAMBERS INSIDE LINED ROCK GALLERY AT LOW POINT OF DRIVEWAY. INSTALL PER MANUFACTURERS INSTALLATION INSTRUCTIONS. SEE DETAILS. USE CONCEPTUAL ELEVATIONS AS NOTED IN DETAILS.

9. 3 INCH DRAIN PIPE DRAINING LINED SC-310 ROCK GALLEY. CONNECT TO GATE VALVE INSIDE 12 INCH NYLOPLAST DRAIN BASIN. CONNECT TO 6 INCH DRAIN PIPE DISCHARGING TO EXISTING STORM DRAINAGE PIPE.

10. MIN 12 INCH DIAMETER NYLOPLAST BASIN OR EQUIVALENT. RUN DRAIN PIPE FROM SC-310 ROCK GALLERY TO BASIN. INSTALL GATE VALVE WITH 0.5 INCH ORIFICE DRILLED IN PLATE. AFTER INSTALL, GATE VALVE IS TO BE FULLY SHUT TO ALLOW PROPER FUNCTION OF THE ORIFICE.

11. 6 INCH SOLID DRAIN PIPE DISCHARGING TO EXISTING 12 INCH STORM DRAIN PIPE NEAR WALKING BRIDGE. FIELD LOCATE APPROPRIATE CONNECTION POINT TO MAINTAIN 1% DOWNSLOPE. 6 INCH CONVEYANCE PIPE MUST BE CAST IRON, ABS SCHEDULE 40, OR PVC SCHEDULE 40 AND HAVE MINIMUM 1% GRADE AND FOLLOW OREGON PLUMBING SPECIALITY CODE.

12. 18 INCH DIAMETER STORMTECH NYLOPLAST BASIN OR EQUIVALENT. MINIMUM 18 INCH SUMP. INSTALL DOWN-TURN ELBOW ON OUTLET PIPE. MAY TOP WITH REDUCER TO DECREASE DIAMETER OF GRATE.

White Pelican Consulting

WHITE PELICAN CONSULTING IS NOT LIABLE FOR THE ACCURACY OF THE TOPOGRAPHY INFORMATION. IT IS THE SOLE RESPONSIBILITY OF THE BUILDER TO VERIFY ALL SITE CONDITIONS, INCLUDING ANY FILL PLACED ON THE SITE, AND INFORM OWNERS OF ANY POTENTIAL FIELD MODIFICATIONS.

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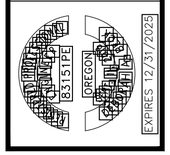
STORMWATER MANAGEMENT
SITE PLAN



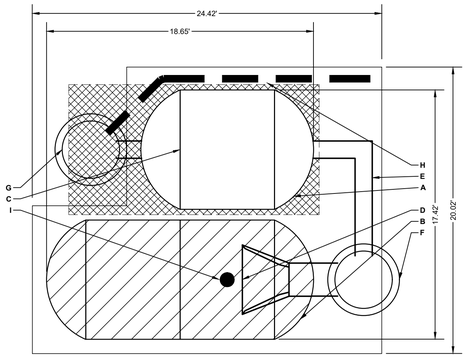
DATE	
7/2/24	
SCALE	PROJ. NO.
1"=10'	
DRAWN BY	CHECKED BY
TRT	DAB

SW1

PROPOSED LAYOUT: HOUSE MC-7200		CONCEPTUAL ELEVATIONS	
3	STORMTECH MC-7200 CHAMBERS	MAXIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	8.25
4	STORMTECH MC-7200 END CAPS	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	7.75
12	STONE ABOVE (in)	MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	7.75
9	STONE BELOW (in)	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	7.75
40	STONE VOID	TOP OF STONE:	6.75
1559	INSTALLED SYSTEM VOLUME (CF) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)	TOP OF MC-7200 CHAMBER:	5.75
		12" x 12" TOP MANIFOLD INVERT:	3.75
		24" ISOLATOR ROW PLUS INVERT:	0.94
		12" BOTTOM CONNECTION INVERT:	0.88
425	SYSTEM AREA (SF)	BOTTOM OF MC-7200 CHAMBER:	0.75
88.9	SYSTEM PERIMETER (ft)	UNDERDRAIN INVERT:	0.00
137	THERMOPLASTIC LINER (SY) (20% OVERAGE)	BOTTOM OF STONE:	0.00

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PREFABRICATED END CAP	A	12" TOP PARTIAL CUT END CAP. PART#: MC7200IEPP12T / TYP OF ALL 12" TOP CONNECTIONS	35.69"	
PREFABRICATED END CAP	B	24" BOTTOM PARTIAL CUT END CAP, PART#: MC7200IEPP24B / TYP OF ALL 24" BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	2.26"	
PREFABRICATED END CAP	C	12" BOTTOM PARTIAL CUT END CAP, PART#: MC7200IEPP12B / TYP OF ALL 12" BOTTOM CONNECTIONS	1.55"	
FLAMP	D	INSTALL FLAMP ON 24" ACCESS PIPE / PART#: MCFLAMP		
MANIFOLD	E	12" x 12" TOP MANIFOLD, ADS N-12	35.69"	
CONCRETE STRUCTURE	F	(DESIGN BY ENGINEER / PROVIDED BY OTHERS)		2.5 CFS IN
CONCRETE STRUCTURE	G	OCS (DESIGN BY ENGINEER / PROVIDED BY OTHERS)		2.0 CFS OUT
UNDERDRAIN	H	6" ADS N-12 DUAL WALL PERFORATED HDPE UNDERDRAIN		
INSPECTION PORT	I	4" SEE DETAIL		



ISOLATOR ROW PLUS (SEE DETAIL)

PLACE MINIMUM 17.50' OF ADSPLUS175 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

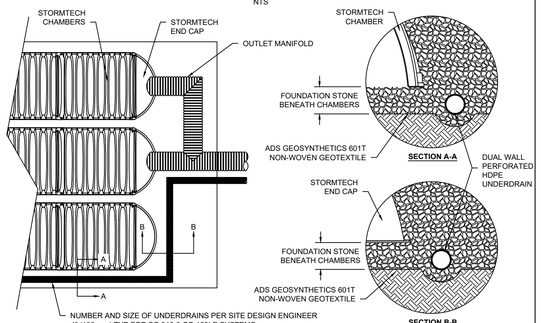
THERMOPLASTIC LINER (SEE TECH NOTE #6.50 PROVIDED BY OTHERS / DESIGN BY OTHERS)

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- ADS DOES NOT DESIGN OR PROVIDE MEMBRANE LINER SYSTEMS FOR CISTERNS (RAINWATER HARVESTING). TO MINIMIZE THE LEAKAGE POTENTIAL OF LINER SYSTEMS, THE MEMBRANE LINER SYSTEM SHOULD BE DESIGNED BY A KNOWLEDGEABLE GEOTEXTILE PROFESSIONAL AND INSTALLED BY A QUALIFIED CONTRACTOR.
- **NOT FOR CONSTRUCTION:** THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

UNDERDRAIN DETAIL

NTS



5 UNDERDRAIN DETAIL

SPACE INTENTIONALLY LEFT BLANK

MC-7200 TECHNICAL SPECIFICATION

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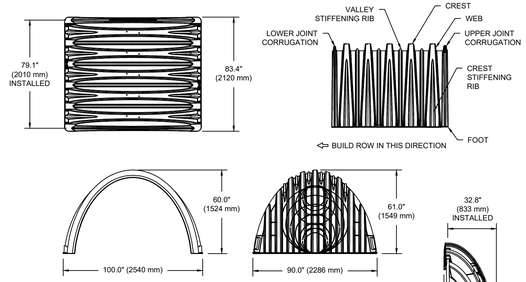


NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	100.0" X 60.0" X 79.1"	(2540 mm X 1524 mm X 2010 mm)
CHAMBER STORAGE	175.9 CUBIC FEET	(4.98 m³)
MINIMUM INSTALLED STORAGE*	267.3 CUBIC FEET	(7.56 m³)
WEIGHT (NOMINAL)	205 lbs.	(92.9 kg)

NOMINAL END CAP SPECIFICATIONS

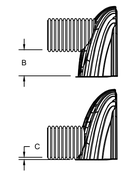
SIZE (W X H X INSTALLED LENGTH)	90.0" X 61.0" X 32.8"	(2286 mm X 1549 mm X 833 mm)
END CAP STORAGE	39.5 CUBIC FEET	(1.12 m³)
MINIMUM INSTALLED STORAGE*	115.3 CUBIC FEET	(3.26 m³)
WEIGHT (NOMINAL)	90 lbs.	(40.8 kg)

*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION AND BETWEEN CHAMBERS, 12" (305 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY.

PARTIAL CUT HOLES AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PARTIAL CUT HOLES AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

PART #	STUB	B	C
MC7200IEPP06T	6" (150 mm)	42.54" (1081 mm)	---
MC7200IEPP06B		---	0.86" (22 mm)
MC7200IEPP08T	8" (200 mm)	40.50" (1029 mm)	---
MC7200IEPP08B		---	1.01" (26 mm)
MC7200IEPP10T	10" (250 mm)	38.37" (975 mm)	---
MC7200IEPP10B		---	1.33" (34 mm)
MC7200IEPP12T	12" (300 mm)	35.69" (907 mm)	---
MC7200IEPP12B		---	1.55" (39 mm)
MC7200IEPP15T	15" (375 mm)	32.72" (831 mm)	---
MC7200IEPP15B		---	1.70" (43 mm)
MC7200IEPP18T	18" (450 mm)	29.36" (746 mm)	---
MC7200IEPP18TW			
MC7200IEPP18B		---	1.97" (50 mm)
MC7200IEPP18BW			
MC7200IEPP24T	24" (600 mm)	23.05" (585 mm)	---
MC7200IEPP24TW			
MC7200IEPP24B		---	2.26" (57 mm)
MC7200IEPP24BW			
MC7200IEPP30BW	30" (750 mm)	---	2.95" (75 mm)
MC7200IEPP36BW	36" (900 mm)	---	3.25" (83 mm)
MC7200IEPP42BW	42" (1050 mm)	---	3.55" (90 mm)

NOTE: ALL DIMENSIONS ARE NOMINAL



CUSTOM PREFABRICATED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-7200 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

2 MC-7200 TECHNICAL SPECIFICATION

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

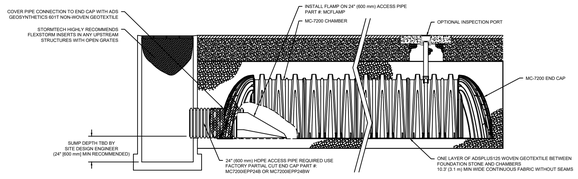
STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45° (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.



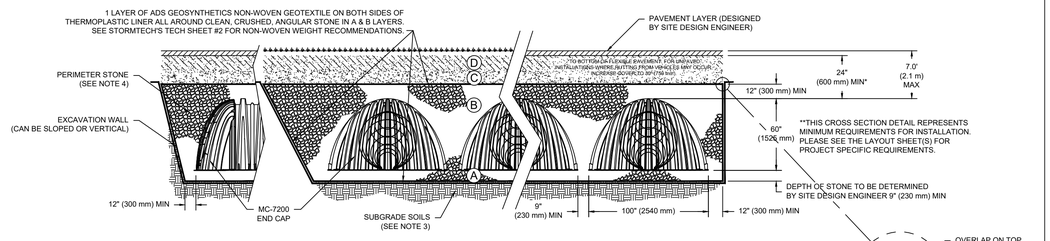
MC-7200 ISOLATOR ROW PLUS DETAIL
NTS

3 MC-7200 ISOLATOR ROW PLUS DETAIL

ACCEPTABLE FILL MATERIALS: STORMTECH MC-7200 CHAMBER SYSTEMS

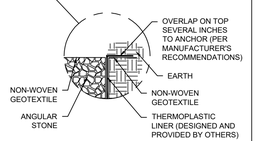
	MATERIAL LOCATION	DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE[3]	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE[3]	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.
5. WHERE RECYCLED CONCRETE AGGREGATE IS USED IN LAYERS 'A' OR 'B' THE MATERIAL SHOULD ALSO MEET THE ACCEPTABILITY CRITERIA OUTLINED IN TECHNICAL NOTE 6.20 "RECYCLED CONCRETE STRUCTURAL BACKFILL".



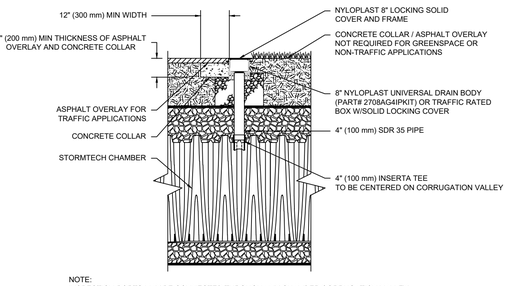
NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101
2. MC-7200 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 450 LBS/FT/% THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.



THERMOPLASTIC LINER DETAIL

1 MC-7200 CROSS SECTION DETAIL

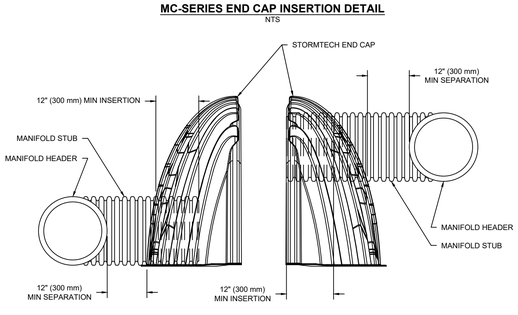


NOTE:
INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION VALLEY.

4" PVC INSPECTION PORT DETAIL (MC SERIES CHAMBER)
NTS

4 4" PVC INSPECTION PORT DETAIL (MC SERIES CHAMBER)

MC-SERIES END CAP INSERTION DETAIL
NTS



NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.

6 MC-SERIES END CAP INSERTION DETAIL

WHITE PELICAN CONSULTING
PORTLAND, OREGON
503-847-9455
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email: dbeck@whitepelicanconsulting.com

JANSEN RESIDENCE
5494 LINN AVENEU
WEST LINN, OREGON 97068
STORMWATER MANAGEMENT DETAILS

DATE	
5/24/24	
SCALE	PROJ. NO.
NTS	
DRAWN BY	CHECKED BY
TRT	DB

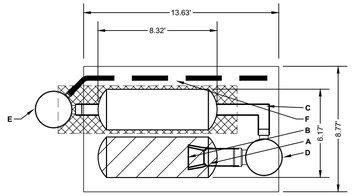
SW2

PROPOSED LAYOUT: DRIVEWAY SC-310		
2	STORMTECH SC-310 CHAMBERS	
4	STORMTECH SC-310 END CAPS	
6	STONE ABOVE (in)	
6	STONE BELOW (in)	
40	STONE VOID	
129	INSTALLED SYSTEM VOLUME (CF) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)	
120	SYSTEM AREA (SF)	
44.8	SYSTEM PERIMETER (ft)	
30	THERMOPLASTIC LINER (SY) (20% OVERAGE)	

CONCEPTUAL ELEVATIONS	
MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	9.83
MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	3.83
MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	3.33
MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	3.33
MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	3.33
TOP OF STONE:	2.33
TOP OF SC-310 CHAMBER:	1.83
8" x 8" TOP MANIFOLD INVERT:	0.79
12" ISOLATOR ROW PLUS INVERT:	0.58
8" BOTTOM CONNECTION INVERT:	0.55
BOTTOM OF SC-310 CHAMBER:	0.50
UNDERDRAIN INVERT:	0.00
BOTTOM OF STONE:	0.00

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PREFABRICATED EZ END CAP	A	12" BOTTOM PREFABRICATED EZ END CAP, PART#: SC310ECEZ / TYP OF ALL 12" BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	0.90"	
FLAMP	B	INSTALL FLAMP ON 12" ACCESS PIPE / PART#: SC31012RAMP		
MANIFOLD	C	8" x 8" TOP MANIFOLD, MOLDED FITTINGS	3.50"	
NYLOPLAST (INLET W/ ISO PLUS ROW)	D	18" DIAMETER (24.00" SUMP MIN)		0.9 CFS IN
NYLOPLAST (OUTLET)	E	12" DIAMETER (DESIGN BY ENGINEER)		0.7 CFS OUT
UNDERDRAIN	F	4" ADS N-12 DUAL WALL PERFORATED HDPE UNDERDRAIN		



ISOLATOR ROW PLUS (SEE DETAIL)

PLACE MINIMUM 17.50' OF ADSPLUS175 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

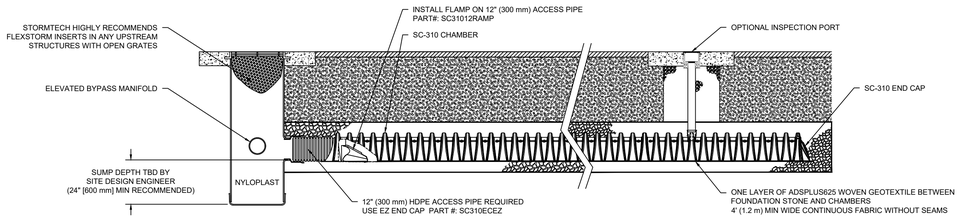
THERMOPLASTIC LINER (SEE TECH NOTE #6.50 PROVIDED BY OTHERS / DESIGN BY OTHERS)

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- ADS DOES NOT DESIGN OR PROVIDE MEMBRANE LINER SYSTEMS FOR CISTERNS (RAINWATER HARVESTING). TO MINIMIZE THE LEAKAGE POTENTIAL OF LINER SYSTEMS, THE MEMBRANE LINER SYSTEM SHOULD BE DESIGNED BY A KNOWLEDGEABLE GEOTEXTILE PROFESSIONAL AND INSTALLED BY A QUALIFIED CONTRACTOR.
- **NOT FOR CONSTRUCTION:** THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

SPACE INTENTIONALLY LEFT BLANK

3 SC-310 ISOLATOR ROW PLUS DETAIL



SC-310 ISOLATOR ROW PLUS DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45° (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

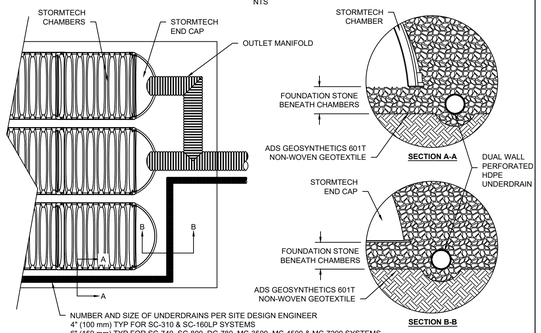
STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

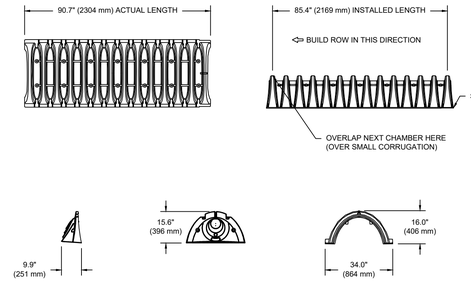
UNDERDRAIN DETAIL
NTS



4 UNDERDRAIN DETAIL

SPACE INTENTIONALLY LEFT BLANK

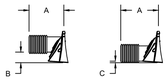
SC-310 TECHNICAL SPECIFICATION
NTS



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	34.0" X 16.0" X 85.4"	(864 mm X 406 mm X 2169 mm)
CHAMBER STORAGE	14.7 CUBIC FEET	(0.42 m³)
MINIMUM INSTALLED STORAGE*	31.0 CUBIC FEET	(0.88 m³)
WEIGHT	35.0 lbs.	(16.8 kg)

*ASSUMES 6" (152 mm) ABOVE, BELOW, AND BETWEEN CHAMBERS



PRE-FAB STUB AT BOTTOM OF END CAP WITH FLAMP END WITH "BR"
PRE-FAB STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PRE-FAB STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
PRE CORED END CAPS END WITH "PC"

PART #	STUB	A	B	C
SC310EPE06T / SC310EPE06TPC	6" (150 mm)	9.6" (244 mm)	5.8" (147 mm)	---
SC310EPE06B / SC310EPE06BPC			---	0.5" (13 mm)
SC310EPE08T / SC310EPE08TPC	8" (200 mm)	11.9" (302 mm)	3.5" (89 mm)	---
SC310EPE08B / SC310EPE08BPC			---	0.6" (15 mm)
SC310EPE10T / SC310EPE10TPC	10" (250 mm)	12.7" (323 mm)	1.4" (36 mm)	---
SC310EPE10B / SC310EPE10BPC			---	0.7" (18 mm)
SC310ECEZ*	12" (300 mm)	13.5" (343 mm)	---	0.9" (23 mm)

ALL STUBS, EXCEPT FOR THE SC310ECEZ ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC310ECEZ THE 12" (300 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 0.25" (6 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

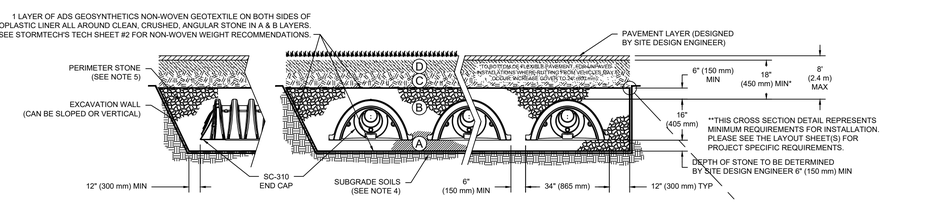
NOTE: ALL DIMENSIONS ARE NOMINAL

2 SC-310 TECHNICAL SPECIFICATION

ACCEPTABLE FILL MATERIALS: STORMTECH SC-310 CHAMBER SYSTEMS

	MATERIAL LOCATION	DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145* A-1, A-2-4, A-3 OR AASHTO M43* 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETES	AASHTO M43* 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETES	AASHTO M43* 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.
5. WHERE RECYCLED CONCRETE AGGREGATE IS USED IN LAYERS 'A' OR 'B' THE MATERIAL SHOULD ALSO MEET THE ACCEPTABILITY CRITERIA OUTLINED IN TECHNICAL NOTE 6.20 "RECYCLED CONCRETE STRUCTURAL BACKFILL".



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2922 (POLETHYLENE) OR ASTM F2418 (POLYPROPYLENE), "STANDARD SPECIFICATION FOR CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-310 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
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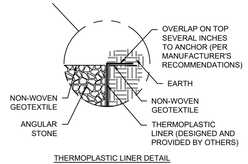
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 400 LBS/FT/% . THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.



THERMOPLASTIC LINER DETAIL

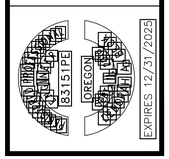
1 SC-310 CROSS SECTION DETAIL

White Pelican Consulting

WHITE PELICAN CONSULTING IS NOT LIABLE FOR THE ACCURACY OF THE TOPOGRAPHY INFORMATION. IT IS THE SOLE RESPONSIBILITY OF THE BUILDER TO VERIFY ALL SITE CONDITIONS, INCLUDING ANY FILL PLACED ON THE SITE, AND INFORM OWNERS OF ANY POTENTIAL FIELD MODIFICATIONS.

WHITE PELICAN CONSULTING
PORTLAND, OREGON
503-847-9455
www.whitepelicanconsulting.com
email: dbeck@whitepelicanconsulting.com

JANSEN RESIDENCE
5494 LINE AVENUE
WEST LINN, OREGON 97068
STORMWATER MANAGEMENT DETAILS



DATE	
5/24/24	
SCALE	PROJ. NO.
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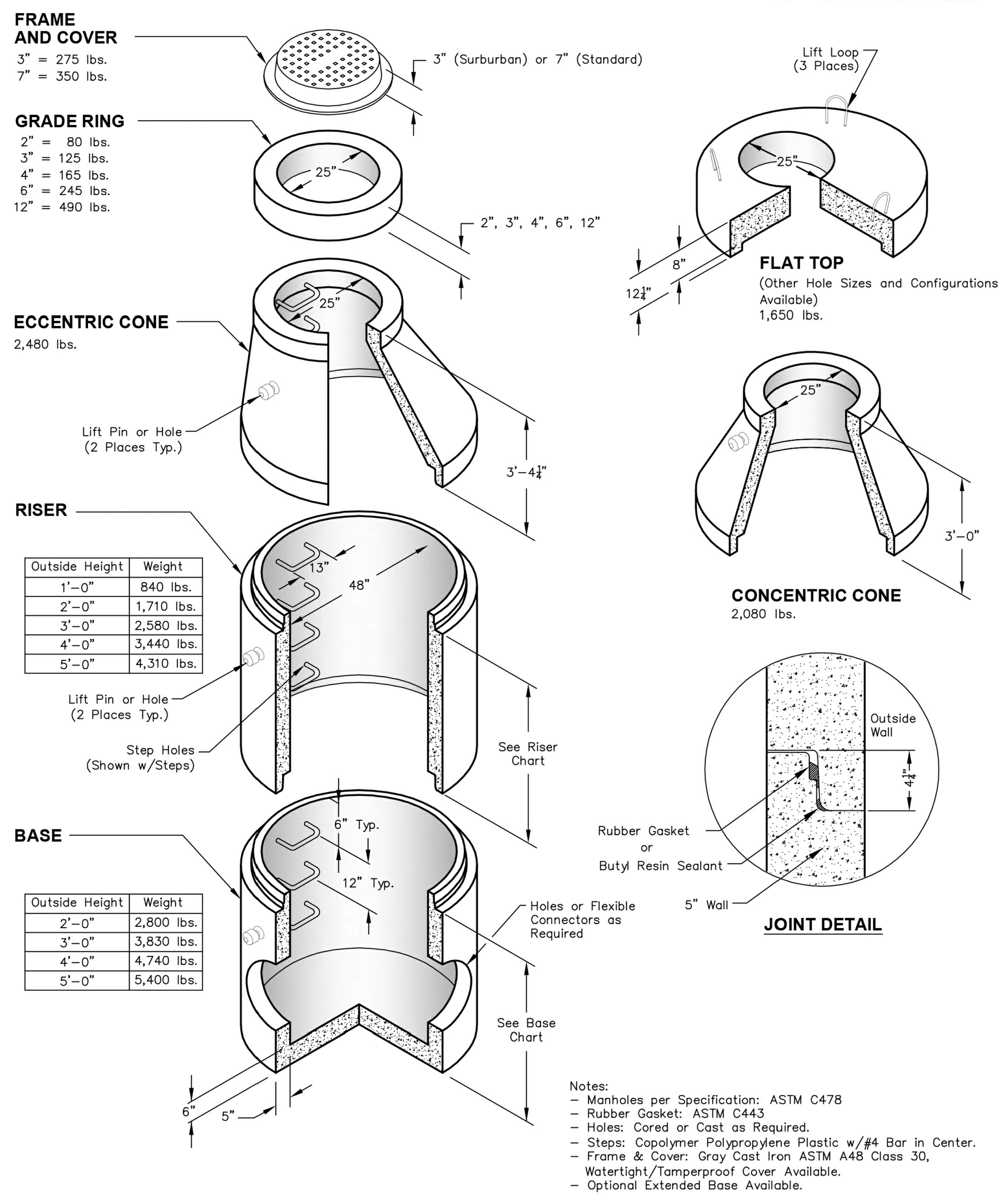
SW3

48" MANHOLE



RISER

Outside Height	Weight
1'–0"	840 lbs.
2'–0"	1,710 lbs.
3'–0"	2,580 lbs.
4'–0"	3,440 lbs.
5'–0"	4,310 lbs.

BASE

Outside Height	Weight
2'–0"	2,800 lbs.
3'–0"	3,830 lbs.
4'–0"	4,740 lbs.
5'–0"	5,400 lbs.

Notes:
- Manholes per Specification: ASTM C478
- Rubber Gasket: ASTM C443
- Holes: Cored or Cast as Required.
- Steps: Copolymer Polypropylene Plastic w/#4 Bar in Center.
- Frame & Cover: Gray Cast Iron ASTM A48 Class 30, Watertight/Tamperproof Cover Available.
- Optional Extended Base Available.

Oldcastle Precast®	48" MANHOLE	48" MANHOLE
PO Box 323, Wilsonville, Oregon 97070-0323	File Name: 020-48MH	
Tel: (503) 682-2844 Fax: (503) 682-2657	Issue Date: 2017	
	oldcastleprecast.com/wilsonville	

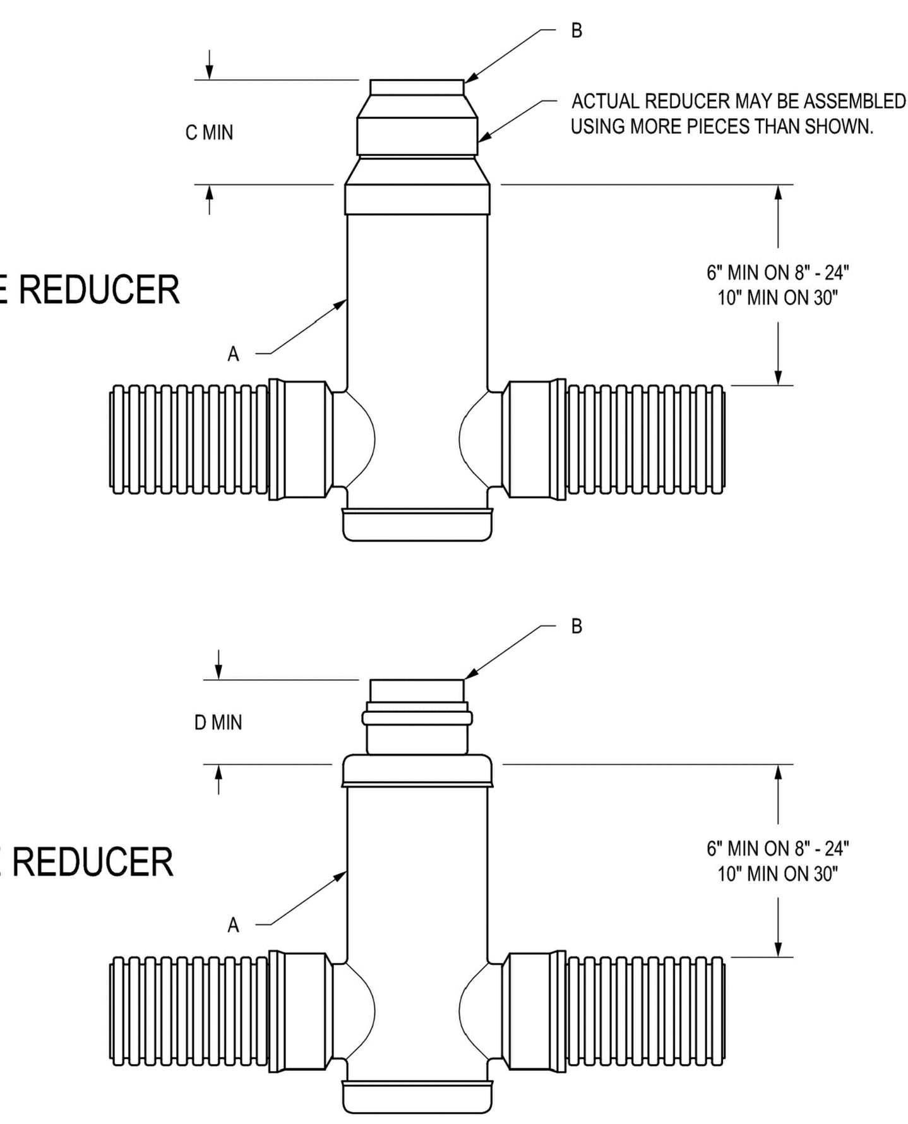
1.0

MANHOLE
DETAIL 1
NTS

A	B	C	D
10"	8"	6.00	9.00
12"	8"	12.00	9.00
12"	10"	6.00	10.00
15"	8"	18.50	9.00
15"	10"	12.50	10.00
15"	12"	6.50	
18"	8"	25.50	9.00
18"	10"	19.50	10.00
18"	12"	13.50	11.50
18"	15"	7.00	
24"	8"	36.50	9.00
24"	10"	30.50	10.00
24"	12"	24.50	11.00
24"	15"	18.00	12.00
24"	18"	11.00	
30"	8"	46.50	9.00
30"	10"	40.50	10.00
30"	12"	34.50	11.50
30"	15"	28.00	12.00
30"	18"	21.00	14.50
30"	24"	13.50	

CONE STYLE REDUCER

CAP STYLE REDUCER



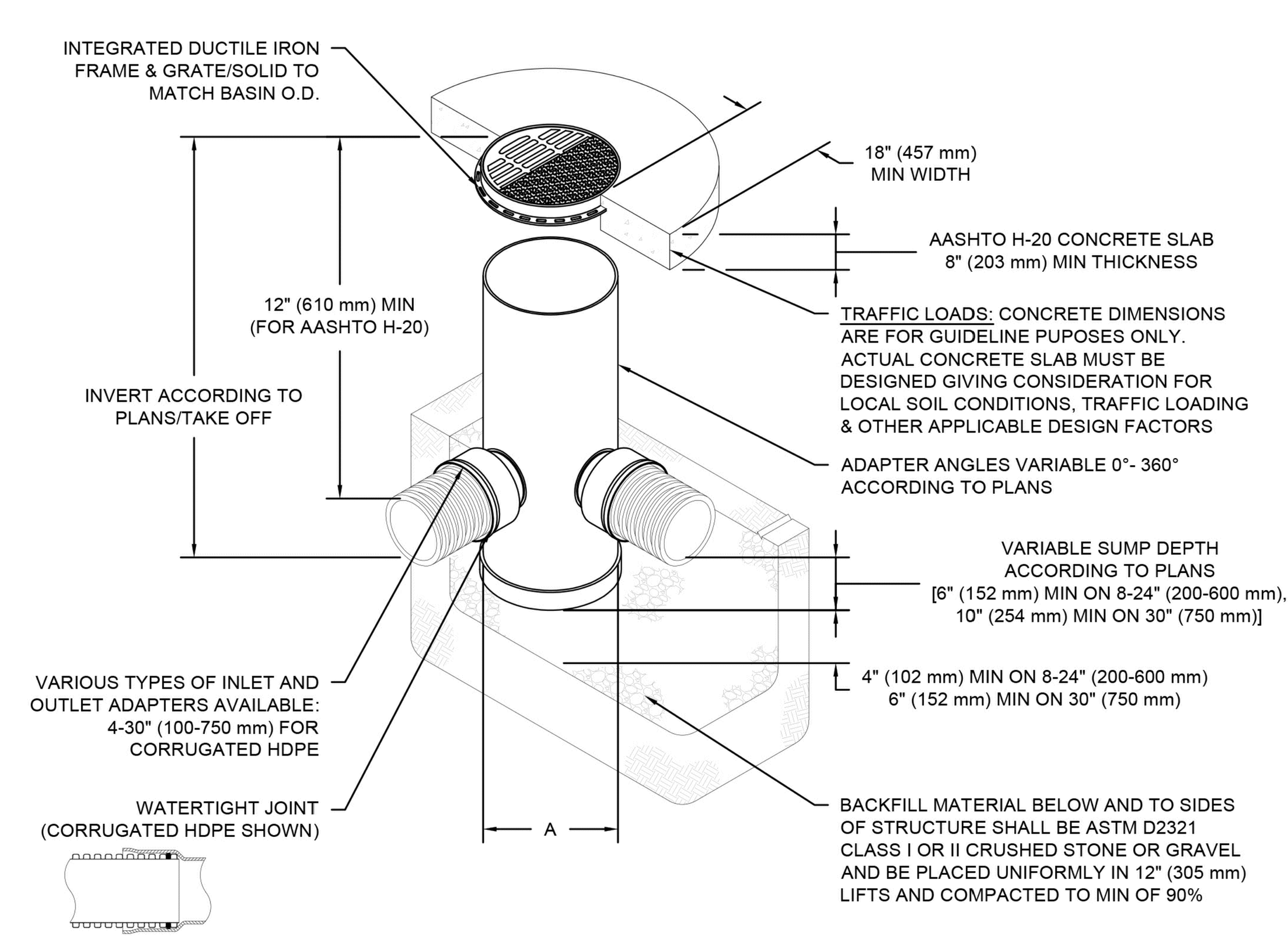
NOTE: DIMENSIONS ARE FOR REFERENCE ONLY
ACTUAL DIMENSIONS MAY VARY

DRAWN BY CJA	MATERIAL		Nyloplast 3130 VERONA AVE BUFORD, GA 30518 PHN (770) 932-2443 FAX (770) 932-2490 www.nyloplast-us.com
DATE 2-6-03			
REVISED BY JJC	PROJECT NO./NAME		TITLE DRAIN BASIN WITH REDUCER OPTIONS
DATE 7-10-13			
DWG SIZE A	SCALE 1:25	SHEET 1 OF 1	DWG NO. 7001-110-104 REV E

DRAIN BASIN
DETAIL 2
NTS

NYLOPLAST DRAIN BASIN

NTS



NOTES

1. 8-30" (200-750 mm) GRATES/SOLID COVERS SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
2. 12-30" (300-750 mm) FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
3. DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS
4. DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS & HANCOR DUAL WALL) & SDR 35 PVC
5. FOR COMPLETE DESIGN AND PRODUCT INFORMATION: **WWW.NYLOPLAST-US.COM**
6. TO ORDER CALL: **800-821-6710**

A	PART #	GRATE/SOLID COVER OPTIONS		
8" (200 mm)	2808AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
10" (250 mm)	2810AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
12" (300 mm)	2812AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
15" (375 mm)	2815AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
18" (450 mm)	2818AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
24" (600 mm)	2824AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
30" (750 mm)	2830AG	PEDESTRIAN AASHTO H-20	STANDARD AASHTO H-20	SOLID AASHTO H-20

REDUCER
DETAIL 3
NTS

White Pelican Consulting

WHITE PELICAN CONSULTING IS NOT LIABLE FOR THE ACCURACY OF THE TOPOGRAPHY INFORMATION. IT IS THE SOLE RESPONSIBILITY OF THE BUILDER TO VERIFY ALL SITE CONDITIONS, INCLUDING ANY FILL PLACED ON THE SITE, AND INFORM OWNERS OF ANY POTENTIAL FIELD MODIFICATIONS.

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JANSEN RESIDENCE
5494 LINE AVENUE
WEST LINN, OREGON 97068
STORMWATER MANAGEMENT
DETAILS

83151PE
OREGON
EXPIRES 12/31/2025

DATE 5/31/24
SCALE NTS
PROJ. NO.
DRAWN BY TRT
CHECKED BY DB

SW4