

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):

X Middle Housing Land Division

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

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

Site Location/Address: 2355 Willamette Falls Drive	Assessor's Map No.:	31E02AB
	Tax Lot(s):	400
	Total Land Area:	20,174 SF

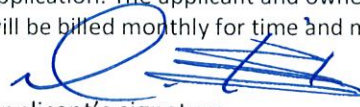
Brief Description of Proposal:

Middle Housing Land Division to create 4 sub-lots, one for each unit of a detached quadplex.

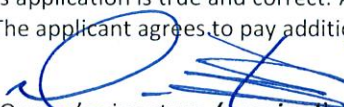
Applicant Name*: Icon Construction & Development, LLC Address: 1969 Willamette Falls Dr., Suite 260 City State Zip: West Linn, OR 97068	Phone: 503-657-0406 Email: darren@iconconstruction.net
Owner Name (required): Same as applicant Address: City State Zip:	Phone: Email:
Consultant Name: Rick Givens Address: 7669 SW Emery Circle City State Zip: Wilsonville, OR 97070	Phone: 503-351-8204 Email: rickgivens@gmail.com

1. Application fees are non-refundable, except for a deposit. For deposit-based applications, the City will bill for staff time and materials that exceed the initial deposit. The applicant is responsible for any additional charges associated with the application.
2. All information provided with the application is considered a public record and subject to disclosure.
3. The owner/applicant or their representative should attend all public hearings related to the application.
4. A decision may be reversed on appeal. The decision will become effective once the appeal period has expired.
5. Submit this form, application narrative, and all supporting documents as a single PDF through the web page:
<https://westlinnoregon.gov/planning/submit-land-use-application>

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


Applicant's signature


Date


Owner's signature (required)

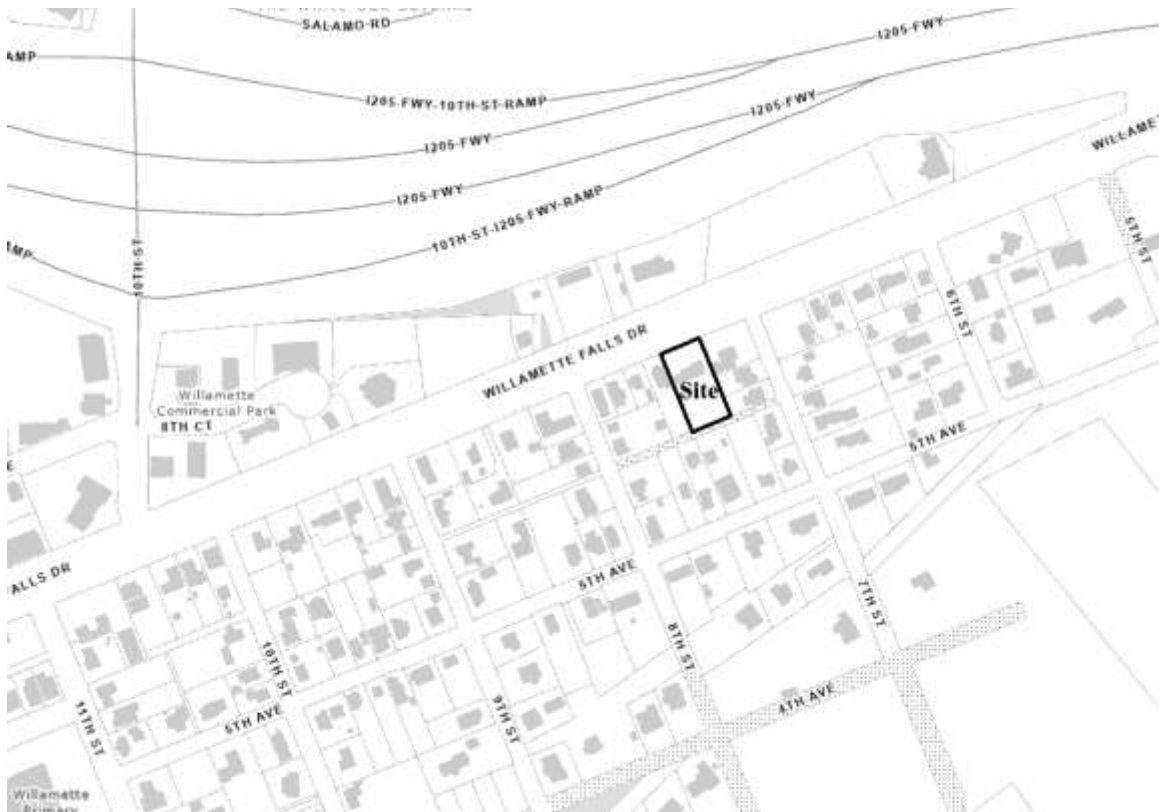

Date

Middle Housing Expedited Land Division Narrative

Tax Lot 31E02AB00400 2355 Willamette Falls Dr., West Linn

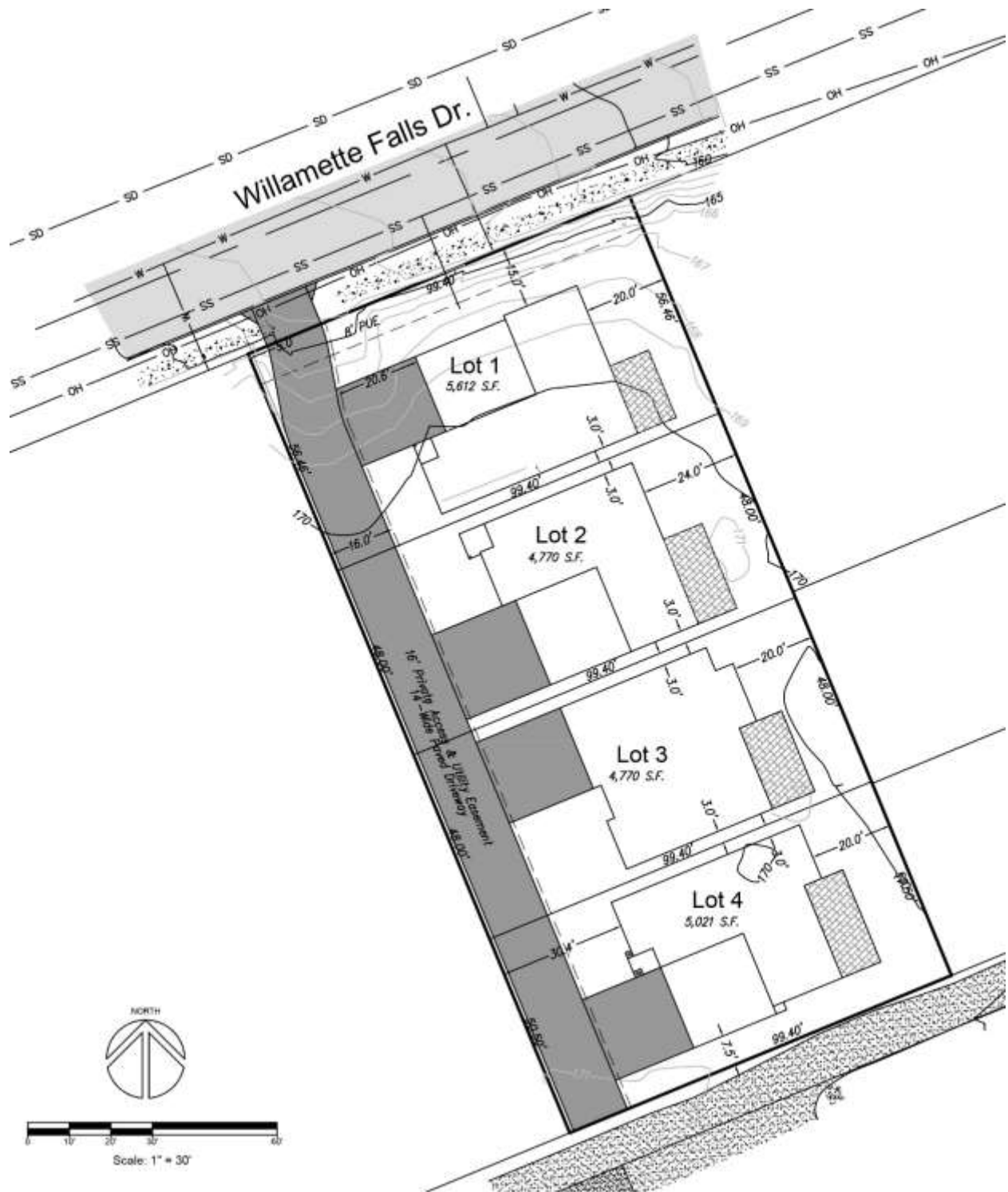
Icon Construction & Development, LLC

Proposal: This application requests approval of a middle housing Expedited Land Division (ELD) for an existing lot described as Tax Lot 31E02AB00400. The property is located at 2355 Willamette Falls Drive in the Willamette area of West Linn. This site is situated on the south side of Willamette Falls Drive near its intersection with 7th Street.



Vicinity Map

The property is developed with an existing single-family home that County records indicate was built in 1955. This house is proposed to be demolished to allow the redevelopment of the property with middle housing. As shown on the site plan on the following page, the property will be developed as a 4-unit detached quadplex, with each home to be built on its own subplot. Access will be provided to each subplot via a shared private driveway.



Site Plan



Crop from Assessor's Map
31E02AB

Existing Conditions

The subject property is shown outlined in yellow on the aerial photograph on the following page. The property is fairly level, rising approximately five feet from Willamette Falls Drive in front of the existing home, and then leveling out to virtually flat. The rear yard of the existing home has several coniferous and deciduous as a part of its landscaping. These are shown on the Existing Conditions Map submitted with this application. Most of these trees will need to be removed to allow for the redevelopment of the site. There are no creeks, wetlands or other natural resource areas on the property.



Aerial Photograph of Existing Conditions

Public Facilities

City of West Linn sanitary sewer, storm sewer and water lines are located in Willamette Falls Drive along the frontage of the property. Please refer to the Existing Conditions Map submitted with this application for location information. A preliminary utility plan and storm report for the project have been prepared by LEI Engineering & Surveying of Oregon and are included with our application package. Please refer to those documents for proposed utility information.

Compliance with Approval Criteria:

Consistent with the provisions of ORS 92.031, this proposed middle housing land division application will make use of the Expedited Land Division procedures set forth in ORS 197A.140 & ORS 197A.142(2). The approval criteria relevant to this application are found in ORS 92.031 and are discussed below.

92.031 Middle housing land division; conditions of approval.

(1) As used in this section, "middle housing land division" means a partition or subdivision of a lot or parcel on which the development of middle housing is allowed under ORS 197A.420 (2) or (3) or 197A.421.

Comment: This application involves a detached quadplex, with one home to be located on each of the four sub-parcels shown on the Tentative Plan. ORS 197A.420(1)(e)(A) states that "'Middle housing' means housing that consists of duplexes, triplexes, quadplexes, cottage clusters or townhouses." The proposed development will create a detached duplex consistent with this definition. The subject property is a parcel created through a normal land division process, not a middle housing land division. ORS 197A.420(2) states "(2) Except as provided in subsection (4) of this section, each county, each city with a population of 25,000 or greater, and each city with a population of 1,000 or greater within Metro, shall allow the development of all middle housing types on each lot or parcel zoned for residential use." The City of West Linn has a 2026 population of approximately 26,000. For all of the above reasons, the proposed use and the proposed Middle Housing Land Division is consistent with the requirements of ORS 92.031(1).

(2) A city or county shall approve a tentative plan for a middle housing land division if the application includes:

(a) Separate utilities, other than water or wastewater, for each dwelling unit;

Comment: As shown on the Preliminary Utility Plan submitted with this application, each of the four dwelling units will have separate utilities.

(b) A proposal for development of middle housing that is in compliance or must comply with the Oregon residential specialty code and land use regulations under ORS 197A.420 (5) that are applicable to the original lot or parcel and which may consist of:

- (A) A single duplex, triplex, quadplex, cottage cluster or structure containing townhouses;*
- (B) Additional units as allowed by ORS 197A.421 (3); and*
- (C) Retained or rehabilitated existing units allowed under ORS 197A.420 (4), if any;*

Comment: Compliance with the Oregon residential specialty code will be demonstrated with the building permit applications to be filed for each of the detached quadplex units. The proposed development consists of a single detached quadplex. No additional units or retained/rehabilitated existing units are included in this proposal.

(c) Proposed easements necessary for each dwelling unit on the plan for:

- (A) Locating, accessing, replacing and servicing all utilities;*
- (B) Pedestrian access from each dwelling unit to a private or public road;*
- (C) Any common use areas or shared building elements;*
- (D) Any dedicated driveways or parking; and*
- (E) Any dedicated common area;*

Comment: The unit on Parcels 1 will have direct driveway access to Willamette Falls Drive and individual sewer and water service connections to services in Willamette Falls Drive. Parcel 2 through 4 will share a driveway. An easement is provided for the shared driveway, as indicated on the Tentative Plan. Individual water and sewer utilities serving these units are located in a private utility easement located within the access easement. Pedestrian access for Parcel 1 is available from a sidewalk along the Willamette Falls Drive frontage. Parcels 2 through 4 will make use of the shared driveway to access the Willamette Falls Drive sidewalk. There are no other common use areas or shared building elements. There are no proposed dedicated parking areas. There are no proposed dedicated common areas.

(d) Exactly one dwelling unit on each resulting lot or parcel, except for:

- (A) Lots, parcels or tracts used as common areas; or*
- (B) Lots or parcels with a detached single-unit dwelling and accessory dwelling unit or a duplex as allowed under ORS 197A.420 (4); and*

Comment: Each of the four sub-parcels will have exactly one dwelling unit located on it.

(e) Evidence demonstrating how buildings or structures on a resulting lot or parcel will comply with applicable building codes provisions relating to new property lines and, notwithstanding the creation of new lots or parcels, how structures or buildings located on the newly created lots or parcels will comply with the Oregon residential specialty code.

Comment: Proposed setbacks for each of the proposed detached quadplex units are indicated on the Tentative Plan. These setbacks exceed the minimum standards of the Oregon residential specialty code. Compliance with building code requirements will be reviewed with the building permits for each unit.

(3) A city or county may add conditions to the approval of a tentative plan for a middle housing land division to:

(a) Subject to subsection (6) of this section, prohibit the further division of the resulting lots or parcels.

Comment: The applicant does not object to a condition prohibiting further division of the parcels created by this Middle Housing Land Division.

(b) Require that a notation appear on the final plat indicating that the approval was given under this section.

Comment: The required notation will be provided on the final plat.

(4) In reviewing an application for a middle housing land division, a city or county:

(a) Shall apply the procedures applicable to an expedited land division under ORS 197A.140, if requested by the applicant and without regard to the criteria in ORS 197A.142 (1).

Comment: As noted above, the applicant requests that this application be processed as an expedited land division under ORS 197A.140.

(b) May require street frontage improvements where a resulting lot or parcel abuts the street consistent with land use regulations implementing ORS 197A.420.

Comment: Willamette Falls Drive is improved with pavement, curbs and a sidewalk along the project frontage. The applicant recognizes that frontage improvements may be required in conjunction with this application. If further improvements are required, the applicant reserves the right to comment when they are proposed by staff.

(c) May not subject an application to approval criteria except as provided in this section, including that a lot or parcel require driveways, vehicle access, parking or minimum or maximum street frontage.

Comment: The Conditions of Approval issued by the City for the proposed Middle Housing Land Division will be reviewed by the applicant for compliance with this provision.

(d) May not subject the application to procedures, ordinances or regulations adopted under ORS 92.044 or 92.046 that are inconsistent with this section or, only if requested by the applicant, ORS 197A.140.

Comment: The Conditions of Approval issued by the City for the proposed Middle Housing Land Division will be reviewed by the applicant for compliance with this provision.

(e) Shall allow the submission of an application for a tentative plan for a middle housing land division before, after or at the same time as the submission of an application for building permits for the middle housing.

Comment: The City of West Linn has adopted policies consistent with this provision.

(f) May require the dedication of right of way if the original parcel did not previously provide a dedication.

Comment: No right-of-way dedication along Willamette Falls Drive is anticipated.

(g) May require separate water and wastewater utilities for each dwelling unit.

Comment: Separate water and wastewater utilities are provided for each dwelling unit, as shown on the Preliminary Utility Plan.

(h) Shall allow any existing units allowed under ORS 197A.420 (4) to be considered a single middle housing unit and allow for the unit to be allocated its own lot or parcel by the division.

Comment: Not applicable. There are no existing units on the subject property.

(5) The type of middle housing developed on the original parcel is not altered by a middle housing land division.

Comment: Not applicable. There is no existing middle housing developed on the property.

(6) Notwithstanding ORS 197A.425 (1) and subsection (4)(d) and (e) of this section, a city or county may prohibit or add approval criteria to the allowance of a new accessory dwelling unit on, or a subsequent middle housing land division of, a lot or parcel resulting from a middle housing land division:

(a) To the extent allowed under this section and ORS 197A.420; and

(b) Provided that the middle housing land division lots or parcels may be used to create housing that is at or above the minimum density for the zoning of the land.

Comment: Not applicable. No new accessory dwelling units or subsequent middle housing land divisions are proposed.

(7) Notwithstanding any other provision of ORS 92.010 to 92.192, within the same calendar year as an original partition that was not a middle housing land division, a city or county may allow one or more of the resulting vacant parcels to be further partitioned into not more than three parcels through a middle housing land division.

Comment: Not applicable. The subject property is not a part of an earlier partition within the same calendar year.

(8) The tentative approval of a middle housing land division is void if and only if a final subdivision or partition plat is not approved within three years of the tentative approval. Nothing in this section prohibits a city or county from requiring a final plat before issuing building permits. [2021 c.103 §2; 2024 c.102 §10; 2025 c.476 §14]

Comment: The applicant plans to record the final partition plat for this Middle Housing Land Division prior to the expiration of the three-year tentative approval period.

ORS 197A.140 Expedited land division; procedures; application fee. *Notwithstanding any other requirement applicable to a land use decision under ORS chapter 197 or 197A, for an application that is reviewed as an expedited land division based on the request of the applicant:*

(1) A decision is not subject to the requirements of ORS 197.797.

(2) A local government:

(a) Shall make a decision to approve or deny the application within 63 days of receiving a completed application as described in ORS 215.246 or 227.178, based on whether the application satisfies the substantive requirements of the applicable land use regulations. An approval may include conditions to ensure that the application meets the applicable land use regulations.

(b) May not hold a hearing on the application or allow any third party to intervene to oppose the application.

(c) Shall issue a written determination of compliance or noncompliance with applicable land use regulations that includes a summary statement explaining the determination. The summary statement may be in any form reasonably intended to communicate the local government's basis for the determination. The determination must include an explanation of the applicant's right to appeal the determination under ORS 197.830 to 197.855.

(d) Shall provide notice of the decision to the applicant but may not require that notice be given to any other person.

(e) May assess an application fee calculated to recover the estimated full cost of processing an application based on the estimated average cost of such applications. Within one year of establishing a fee under this section, the city or county shall review and revise the fee, if necessary, to reflect actual experience in processing expedited land decisions.

(3) Only the applicant may appeal an expedited land division made under this section. [Formerly 197.365]

Comment: The applicant is requesting this Middle Housing Land Division be processed in accordance with the provisions of ORS 197A.140. The requisite fee for this expedited land division has been paid by the applicant. The provisions of this section establish the process for the review of this application and are not in themselves approval criteria which need to be addressed in this narrative.

197A.142 Eligibility for expedited land division.

(1) If requested by the applicant, a local government shall approve a partition or subdivision made under ORS 92.010 to 92.192, 92.205 to 92.245 or 92.830 to 92.845 as an expedited land division under ORS 197A.140 if the division:

(a) Includes only land that is zoned for residential uses and is within an urban growth boundary.

Comment: The subject property is located within the Portland Metro Urban Growth Boundary and is zoned Residential, R-10 by the City of West Linn. This criterion is met.

(b) Is solely for the purposes of residential use, including recreational or open space uses accessory to residential use.

Comment: This application proposes a residential detached quadplex. No nonresidential uses are proposed. This criterion is met.

(c) Does not provide for dwellings or accessory buildings to be located on land that is specifically mapped and designated in the comprehensive plan and land use regulations for full or partial protection of natural features under the statewide planning goals that protect:

- (A) Open spaces, scenic and historic areas and natural resources;*
- (B) The Willamette River Greenway;*
- (C) Estuarine resources;*
- (D) Coastal shorelands; and*
- (E) Beaches and dunes.*

Comment: The subject property does not contain any open spaces, scenic or natural resource areas that have been mapped by the City of West Linn's comprehensive plan or land use regulations. It is not located within the Willamette River Greenway. It is not located in an area of estuarine resources, coastal shorelands or beaches and dunes.

(d) Satisfies minimum street or other right-of-way connectivity standards established by acknowledged land use regulations or, if such standards are not contained in the applicable regulations, as required by statewide planning goals or rules.

Comment: The area surrounding the subject property is fully developed with an interconnecting grid of streets with rights-of-way meeting City standards. This street pattern complies with

connectivity requirements of the City's Transportation Systems Plan, CDC provisions and statewide planning goals and rules.

(e) Will result in development that either:

(A) Creates enough lots or parcels to allow building residential units at 80 percent or more of the maximum net density permitted by the zoning designation of the site; or

(B) Will be sold or rented to households with incomes below 120 percent of the median family income for the county in which the project is built.

Comment: The proposed Middle Housing Land Division will allow for the construction of four homes on a lot that contains 20,174 sq. ft. The maximum density allowed under standard R-10 development would be two units. This would also be the minimum density permitted. The proposed four units satisfy this criterion.

(2) ORS 197A.140 applies to all elements of a local government comprehensive plan and land use regulations applicable to a land division, including any planned unit development standards and any procedures designed to regulate:

(a) The physical characteristics of permitted uses;

(b) The dimensions of the lots or parcels to be created; or

(c) Transportation, sewer, water, drainage and other facilities or services necessary for the proposed development, including but not limited to right-of-way standards, facility dimensions and on-site and off-site improvements.

Comment: ORS 197A.140 is applicable to the proposed MHL. As discussed in this narrative, the proposed development satisfies the applicable development standards of the Community Development Code.

(3) An application under this section must describe the manner in which the proposed division complies with each of the provisions of subsection (1) of this section. [Formerly 197.360]

Comment: The information provided in this narrative demonstrates compliance.

Compliance with R-10 Standards:

Comment: The City of West Linn adopted Ordinance 1736 to provide for compliance with state requirements for middle housing. The adopted standards allow for middle housing in all residential districts, including the R-10 district applicable to the subject property. The only limitations provided in the updated standards are dimensional requirements that do not discourage development of middle housing. The applicable dimensional standards for the R-10 zone are found in CDC 13.070 and are shown in the table below.

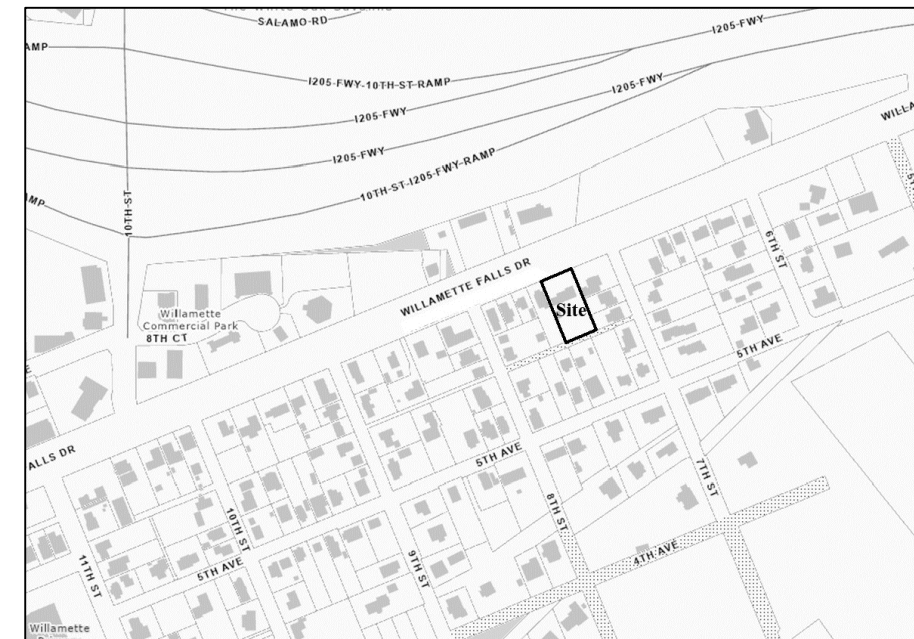
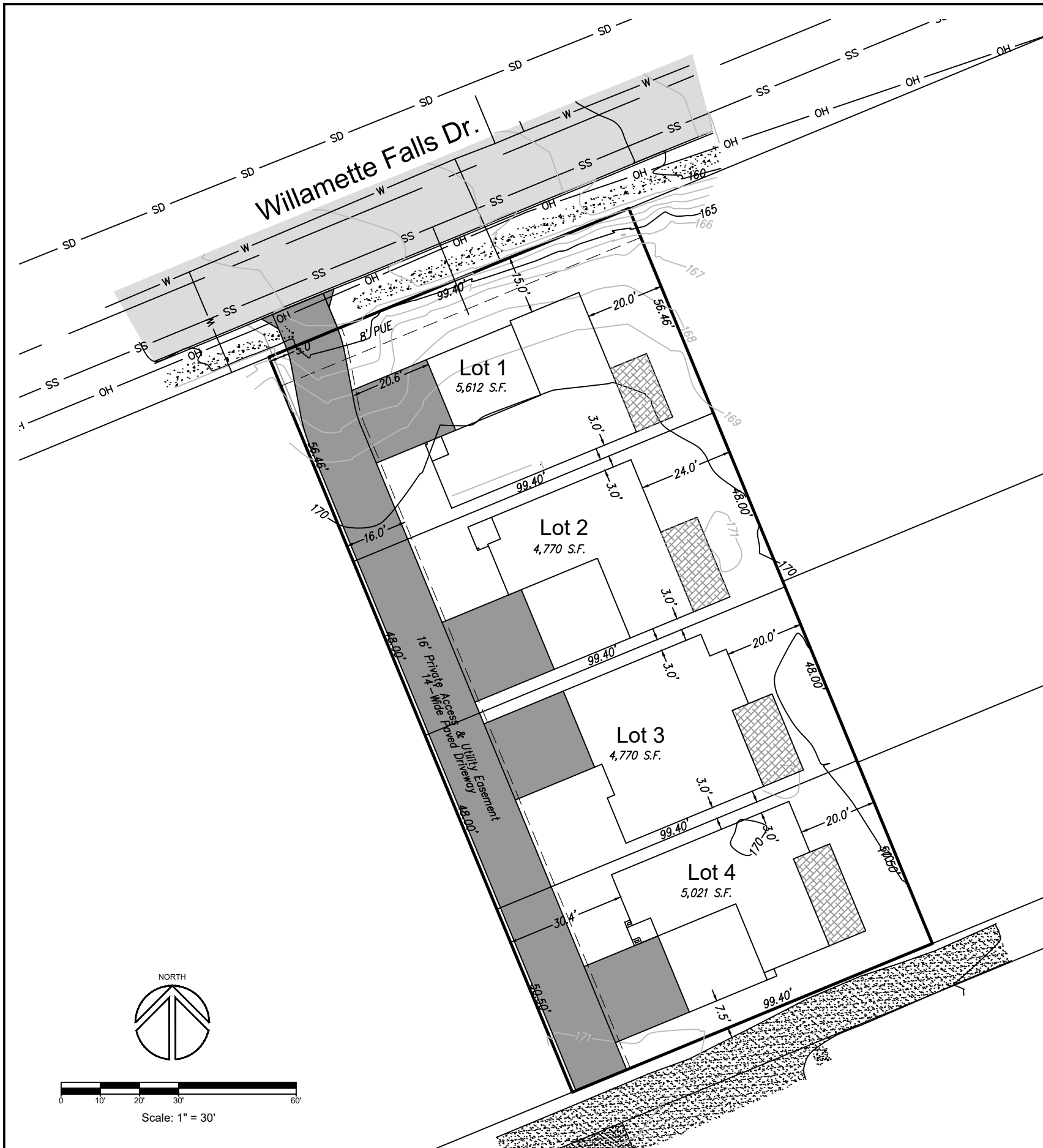
STANDARD	REQUIREMENT	ADDITIONAL NOTES	COMMENT
----------	-------------	------------------	---------

<i>Minimum lot size</i>	<i>10,000 SF</i>	<i>For a single-family attached or detached unit.</i>	Not applicable to detached quadplexes.
<i>Average min. Lot or Parcel size for a Townhouse Project</i>	<i>1,500 SF</i>		Not applicable to detached quadplexes.
<i>Minimum lot width at front lot line</i>	<i>35 ft.</i>	<i>Does not apply to Townhouses or Cottage Clusters.</i>	The minimum lot width proposed is 48 feet.
<i>Average Minimum lot width</i>	<i>50 ft.</i>	<i>Does not apply to Townhouses or Cottage Clusters.</i>	Does not apply to detached quadplexes.
<i>Minimum Yard Dimensions or Minimum building setbacks</i>		<i>Except as specified in CDC 25.070(C)(1) through (4) for the Willamette Historic District.</i> <i>Front, rear, and side yard setbacks for in a Cottage Cluster Project are 10 ft. There are no additional setbacks for individual structures on individual lots, but minimum distance between structures shall follow applicable building code requirements.</i>	Not applicable to the proposed project as it does not include a Cottage Cluster.
<i>Front Yard</i>	<i>20 ft</i>	<i>Except for steeply sloped lots where the provisions of CDC 41.010 shall apply.</i>	The proposed minimum front yard setback is 20 feet.
<i>Interior Side Yard</i>	<i>7.5 ft</i>	<i>Townhouse common walls that are attached may have a 0 ft side setback.</i>	This standard is not applicable to quadplex units along their common line. A 3' setback is proposed on the common lot lines.
<i>Street Side Yard</i>	<i>15 ft</i>		Sublot 1 is a corner lot. The street proposed side yard dimension is 15'. Sublot 4 abuts an alley along its side yard and a 7.5' setback is proposed.
<i>Rear Yard</i>	<i>20 ft</i>		The minimum rear yard proposed is 20 feet.
<i>Maximum Building Height</i>	<i>35 ft</i>	<i>Except for steeply sloped lots in which case the provisions of Chapter 41 CDC shall apply.</i>	Homes to be built will comply with the maximum 35' height standard. Compliance with height standards will be reviewed with the building permit application.
<i>Maximum Lot Coverage</i>	<i>35%</i>	<i>Maximum lot cover does not apply to Cottage Clusters. However, the maximum building footprint for a Cottage Cluster is less than 900 sf per dwelling unit.</i>	Lot coverage for the home to be built on the four sublots will comply with the 35% standard as will be demonstrated at the time of building permit application.

		• <i>This does not include detached garages, carports, or accessory structures.</i> • <i>A developer may deduct up to 200 sf for an attached garage or carport.</i>	
<i>Minimum Accessway Width to a lot which does not abut a street or a flag lot</i>	<i>15 ft</i>		A 16'-wide accessway width is proposed.
<i>Maximum Floor Area Ratio</i>	<i>0.45</i>	<i>Max FAR does not apply to cottage clusters.</i>	Not applicable. The proposed project is for detached quadplexes.
<i>Duplex, Triplex, and Quadplex</i>	<i>0.60</i>	<i>Type I and II lands shall not be counted toward lot area when determining allowable floor area ratio, except that a minimum floor area ratio of 0.30 shall be allowed regardless of the classification of lands within the property. That 30 percent shall be based upon the entire property including Type I and II lands. Existing residences in excess of this standard may be replaced to their prior dimensions when damaged without the requirement that the homeowner obtain a non-conforming structures permit under Chapter 66 CDC.</i>	Compliance with the floor area ratio standard for the homes to be built on the four sublots will comply with this standard and will be reviewed at the time of building permit application.

Grading and Utility Plans per CDC 85.170(C)-(E)

A Preliminary Utility Plan, prepared by LEI Engineering & Surveying of Oregon is included with this application. This drawing shows all sewer, water and storm services required to serve the proposed sublots. No site grading is proposed at this time. Future grading for the foundations for the homes to be built on the lots will be submitted with the building permit applications prior to the commencement of home construction.



Vicinity Map

Owner/Applicant:
Icon Construction & Development, LLC
1969 Willamette Falls Dr., Suite 260
West Linn, OR 97068
PH: (503) 657-0406

Legal: 31E02AB00400

Address: 2355 Willamette Falls Dr.

Water: City of West Linn

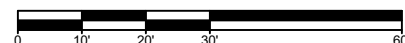
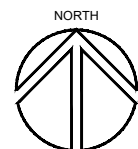
Sewer: City of West Linn

Contours: Site Survey

Site Area: 20,174 S.F.

Surveyor:
Centerline Concepts, Inc.
19376 Molalla Ave., Suite 120
Oregon City, OR 97045
PH: (503) 650-0188

Zoning: R-10



Scale: 1" = 30'

DESIGNED:	R.E.G.			
DRAWN:	R.E.G.			
SCALE:	1" = 30'			
DATE:	8-18-2026			
FILE:	26-ICN-100	DATE	NO.	REVISION

Richard E. Givens, Planning Consultant
7669 SW Emery Circle
Wilsonville, OR 97070
PH: (503) 351-8204

APPLICANT: Icon Construction & Development, LLC
1969 Willamette Falls Dr., Suite 260
West Linn, OR 97068
PH: (503) 657-0406

Tentative Plan MHL D
4 Lot Detached Quadplex

SHEET:
1/1

A PORTION OF LOT "B", BLOCK 60,
"WILLAMETTE TRACTS",
LOCATED IN THE
N.E. 1/4 SECTION 2, T.3S., R.1E., W.M.
CITY OF WEST LINN, CLACKAMAS COUNTY, OREGON
MARCH 19, 2026 SCALE 1"=20'

THE VERTICAL DATUM FOR THIS SURVEY IS BASED UPON A STATIC GPS OBSERVATION OF LOCAL CONTROL POINTS THROUGH OPUS. DATUM IS NAVD 88.

A TRIMBLE S6-SERIES ROBOTIC INSTRUMENT WAS USED TO COMPLETE A CLOSED LOOP FIELD TRAVERSE.

THE BASIS OF BEARINGS FOR THIS SURVEY IS PER MONUMENTS FOUND AND HELD PER RECORD OF SURVEY RECORDED UNDER PRIVATE SURVEY NUMBER 2016-97, CLACKAMAS COUNTY SURVEY RECORDS.

THE PURPOSE OF THIS SURVEY IS TO RESOLVE AND DETERMINE THE PERIMETER BOUNDARY OF THE SUBJECT PROPERTY, TO SHOW ALL PERTINENT BOUNDARY ISSUES AND ENCROACHMENTS. NO PROPERTY CORNERS WERE SET IN THIS SURVEY.

NO WARRANTIES ARE MADE AS TO MATTERS OF UNWRITTEN TITLE, SUCH AS ADVERSE POSSESSION, ESTOPPEL, ACQUIESCENCE, ETC.
NO TITLE REPORT WAS SUPPLIED OR USED IN THE PREPARATION OF THIS MAP.

THE UNDERGROUND UTILITIES AS SHOWN ON THIS MAP ARE SHOWN BASED ON A COMBINATION OF INFORMATION, INCLUDING VISIBLE ABOVE GROUND STRUCTURES, AVAILABLE AS BUILT AND GIS MAPPING FROM LOCAL JURISDICTIONS, AS WELL AS SURFACE MARKINGS BY ONE CALL TICKET NUMBER 26055991 DATED 3/12/2026.

THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED.

THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES ARE IN THE EXACT LOCATION INDICATED, ALTHOUGH HE DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE.

THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES. SUBSURFACE AND ENVIRONMENTAL CONDITIONS WERE NOT EXAMINED OR CONSIDERED AS A PART OF THIS SURVEY. NO STATEMENT IS MADE CONCERNING THE EXISTENCE OF UNDERGROUND OR OVERHEAD CONTAINERS OR FACILITIES THAT MAY AFFECT THE USE OR DEVELOPMENT OF THIS TRACT. THIS SURVEY DOES NOT CONSTITUTE A TITLE SEARCH BY SURVEYOR.

INVERT ELEVATIONS AND PIPE SIZES SHOWN ARE APPROXIMATE ONLY, BASED ON FIELD OBSERVATIONS AS WELL AS AVAILABLE AS-BUILT DATA. ALL PIPE SIZES SHALL BE FIELD VERIFIED BY THE OWNER, ENGINEER, CONTRACTOR, AND GOVERNING AGENCY PRIOR TO ANY CONSTRUCTION ACTIVITY. SURVEYOR DOES NOT WARRANT THE ACCURACY OF ANY PIPE SIZES SHOWN ON THIS SURVEY.

Some Symbols shown may not be used on map

- | | | |
|--|---|---------------------|
| 12"  DECIDUOUS TREE |  SOP | TRAFFIC SIGNAL POLE |
| 24"  EVERGREEN TREE |  UTILITY POLE | |
|  DEAD TREE |  LIGHT POLE | |
|  STORM SEWER MANHOLE |  GUY WIRE | |
|  CATCH BASIN |  ELECTRIC BOX | |
|  CURB INLET |  ELECTRIC METER | |
|  AREA DRAIN |  TRANSFORMER | |
|  DITCH INLET |  ELECTRIC RISER | |
|  SANITARY SEWER CLEANOUT |  HEAT PUMP | |
|  SANITARY SEWER MANHOLE |  GATE POST | |
|  FIRE HYDRANT |  CABLE TV BOX | |
|  WATER MANHOLE |  CABLE TV RISER | |
|  WATER METER |  OVERHEAD LINE | |
|  WATER VALVE |  GAS LINE | |
|  HOSE BIB |  ELECTRICAL LINE | |
|  IRRIGATION CONTROL VALVE |  COMMUNICATIONS LINE | |
|  GAS VALVE |  SANITARY SEWER LINE | |
|  GAS METER |  STORM DRAIN LINE | |
|  MAILBOX |  WATER LINE | |
|  UTILITY RISER |  FENCE LINE | |
|  UTILITY BOX |  HANDRAIL | |
|  TELEPHONE MANHOLE |  ARBORVITAE ROW | |
|  TELEPHONE RISER | FD = FOUND | |
| > STORM OUTFALL | IP = IRON PIPE | |
| — SIGN | IR = IRON ROD | |
|  BOLLARD | YPC = YELLOW PLASTIC CAP | |
| ● FOUND MONUMENT | S.F. = SQUARE FEET | |
| ○ DOWN SPOUT TO STORM SYSTEM | P/L = PROPERTY LINE | |
|  DOWN SPOUT TO SPLASH GUARD OR GROUND W/ PIPE DIRECTION | | |
|  COLUMN | | |

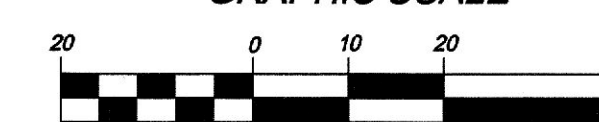
SIGNED ON: 23 MAY 2026

REGISTERED
PROFESSIONAL
LAND SURVEYOR

OREGON
JULY 13, 2004
TOBY G. BOLDEN
60377LS

RENEWS: DECEMBER 31, 2027

GRAPHIC SCALE



(IN FEET)
1 INCH = 20 FT.



CENTERLINE CONCEPTS
LAND SURVEYING, INC.

19376 MOLALLA AVE., SUITE 120
OREGON CITY, OREGON 97045
PHONE 503.650.0188 FAX 503.650.0189

PLOTTED:M:\PROJECTS\CON-WILLAMETTE FALLS DR-2355\DWG\ECM-C3D.dwg

2355 WILLAMETTE FALLS DRIVE

Stormwater Analysis Report

August 18, 2026

Submitted To:

ICON Construction & Development, LLC
1969 Willamette Falls Drive, Suite 260
West Linn, OR 97068

Developer:

ICON Construction & Development, LLC
1969 Willamette Falls Drive, Suite 260
West Linn, Oregon 97068

Prepared by:

LEI Engineering & Surveying of Oregon, LLC
2564 19th Street SE
Salem, Oregon 97302



EXPIRES: 06/30/2028

Table of Contents

	Page
TABLE OF CONTENTS	II
1 INTRODUCTION.....	1
2 STATEMENT OF THE PROJECT	1
3 EXISTING CONDITIONS	2
3.1 Geotechnical Report and Infiltration Testing	2
4 PROPOSED DEVELOPMENT	3
4.1 Post-Development Hydrology	4
4.2 Water Quality	5
4.3 Flow Control	5
5 OPERATIONS AND MAINTENANCE	6
6 CONCLUSIONS.....	6

List of Figures

Figure 1: Vicinity Map of 2355 Willamette Falls Drive.....	1
Figure 2: 2355 Willamette Falls Drive Partition.....	3
Figure 3: City of West Linn Standard Drywell	4

List of Tables

Table 1: Rainfall Data by Return Frequency.....	4
Table 2: Post Development Stormwater Runoff by Sub-Catchment	5

Appendices

Appendix A: Existing Conditions Exhibit	
Appendix B: Post-Development Basins Exhibit	
Appendix C: Stormwater Facility Exhibit	
Appendix D: NRCS Soils Survey	
Appendix E: Geotechnical Investigation and Consultation Report	
Appendix F: Basin Hydrology Computations	
Appendix G: Well Logs	
Appendix H: Sample Operations and Maintenance Agreement	

1 Introduction

This Stormwater Report presents a drainage analysis of stormwater runoff and treatment for the proposed 4-lot residential partition at 2355 Willamette Falls Dr, West Linn, Oregon. Stormwater runoff will be treated entirely onsite through infiltration facilities. This analysis follows the City of West Linn Stormwater Management Manual (Stormwater Standards).

2 Statement of the Project

The subject property currently consists of one 0.5-acre residential lot with a single-family house, two sheds, and a driveway. See Figure 1 and Appendix A for more details. This lot is currently in City of West Linn jurisdiction. This development will result in 12,556 square feet of impervious surfaces and 7,618 square feet of pervious surfaces. See Appendix B for details.

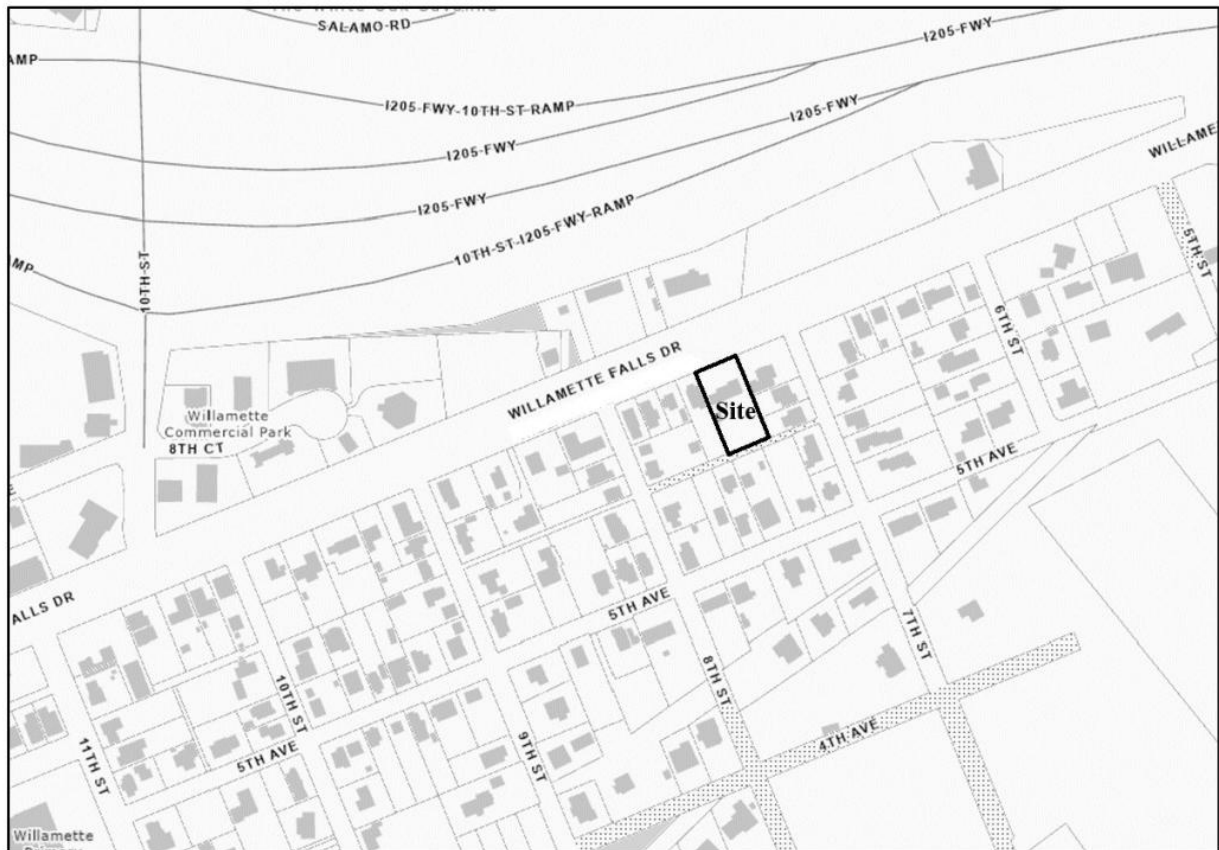


Figure 1: Vicinity Map of 2355 Willamette Falls Drive

3 Existing Conditions

The existing condition consists of one residential lot that is 0.5 acres in size included in Clackamas County Assessor's Map 3 1E 02AB Lot 400. Currently, one single-family dwelling, two sheds, and a driveway reside on this lot. Stormwater runoff on this site largely flows north towards Willamette Falls Drive. Stormwater runoff from the single-family dwelling is routed to the storm system by standard gutter piping along the perimeter of the dwelling.

The zone for the lots included in this development are R-10, single-family residential detached. There are no major drainages, drainage ways, or wetlands located in the lots. The Existing Conditions Exhibit included in Appendix A shows the locations of existing utilities in and around the lots.

3.1 Geotechnical Report and Infiltration Testing

A Geotechnical Investigation and Consultation Services Investigation and report were completed for the subject property in February of 2026. See Appendix E for full Geotechnical Report. Geotechnical investigations identified a layer of silt (ML) soil that extends to a depth of approximately 4.5' with a measured infiltration rate of 0.2 in/hr. A silty sand (SM) layer was encountered below this depth, exhibiting an infiltration rate of 6.1 in/hr. The proposed underground storage chamber system is designed to sit within this layer of silty sand soil. A representative infiltration rate of 3.0 in/hr, based on the testing within the silty sand stratum, was selected for this design. Groundwater was not encountered during the geotechnical investigation to a depth of 9 feet. The report indicates that groundwater may not be encountered until a depth of 40 feet to 60 feet below the existing surface. Well reports produced for neighboring properties did not encounter ground water to a maximum depth of 15 feet. The proposed drywells are designed with at least 5 feet of separation between the bottom of the drywell and the high groundwater level. See attached Geotechnical Report and Well Reports in Appendix E for more details.

Additional infiltration testing was performed on August 13, 2026, in the location of the proposed drywell. This testing found infiltration of 36 in/hr and 20 in/hr at a depth of 5' and 8', respectively. A factor of safety of 2 was applied to the lower infiltration rate, resulting in a design infiltration rate of 10 in/hr for the proposed drywell. See the attached infiltration testing report in Appendix E for more details.

A NRCS Soils Report was also generated for the subject property (See Appendix D). The report states that the site consists of two soil types, Willamette silt loam (~75%) and Woodburn silt loam (~25%). Willamette silt loam is in Hydrological soil group C, with slopes ranging from 0 to 3 percent. Woodburn silt loam is in Hydrological soil group C, with slopes ranging from 3 to 8 percent.

4 Proposed Development

The proposed development includes a 4-lot partition and a shared drive along the west property line. See Figure 2 below and Appendix B for details.

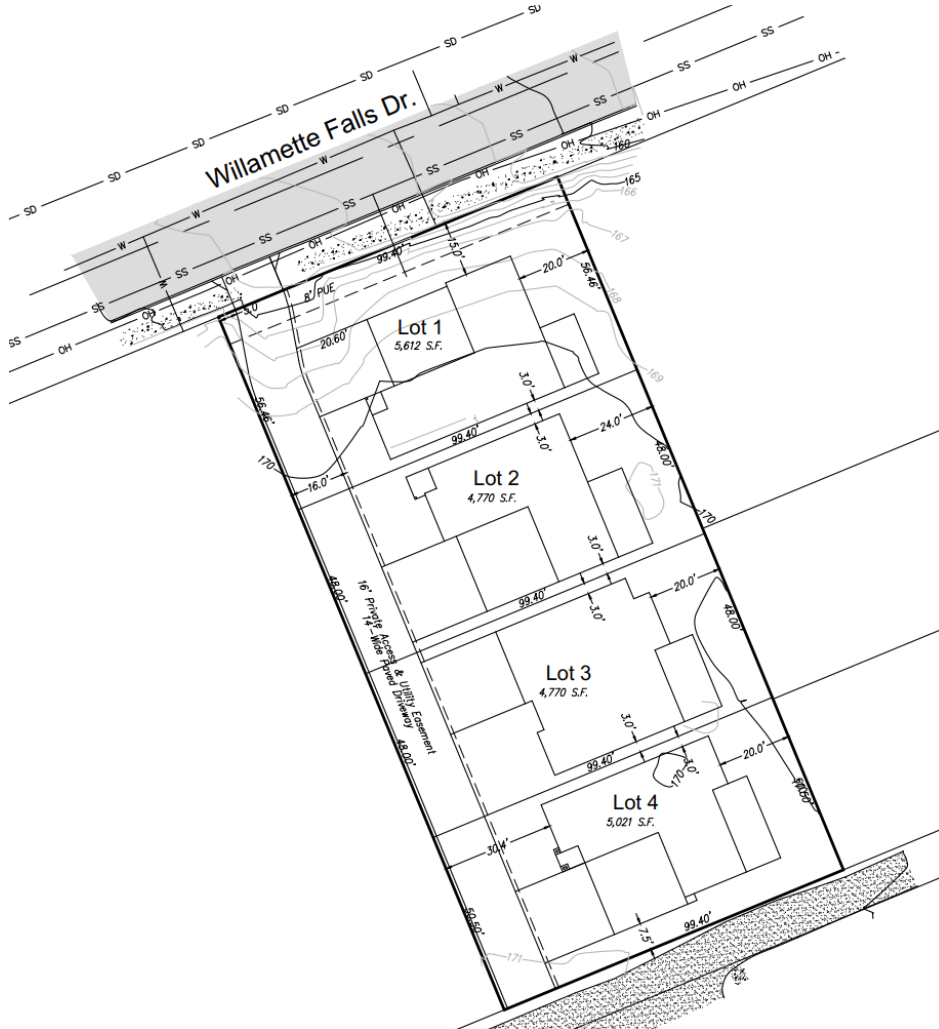


Figure 2: 2355 Willamette Falls Drive Partition

Stormwater runoff for the new lots and private driveway will be treated with a combination of a drywell and an ADS Stormtech® underground chamber system, as shown on the Exhibit in Appendix C and Figure 3. These facilities were chosen based primarily on the moderate to good infiltration rates found in the existing soil at depths below 4.5'. Vegetated facilities were not considered due to poor infiltration rates present at shallow depths. Porous Pavement was also ruled out for this reason. Ecoroofs were not considered since the proposed buildings will have pitched roofs.

The proposed drywell has a setback of 9.8' as measured from the center of the drywell to the property line. The ADS Stormtech® chamber system has a set of 5' as measured from the outside of the perimeter stones to the property line.

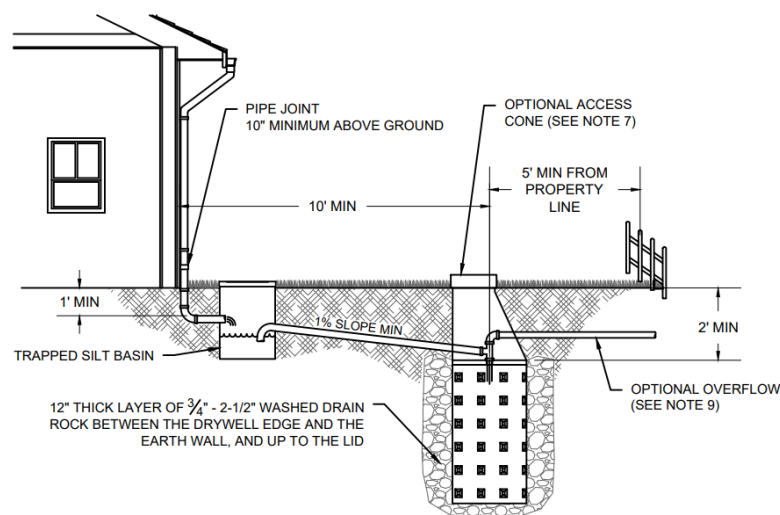


Figure 3: City of West Linn Standard Drywell

4.1 Post-Development Hydrology

Post-development stormwater hydrology and hydraulics analysis was performed using the HydroCAD 10.2 software package and the Santa Barbara Urban Hydrograph method. Rainfall data for the analysis is shown in Table 1 below.

Table 1: Rainfall Data by Return Frequency

Return Frequency	Rainfall Depth (in)
WQ	1.00
2-Year	2.50
10-Year	3.45
25-Year	3.90

Post development basins were delineated and labeled for stormwater modeling and analysis (See Appendix B). All sub-catchments shown below are modeled as 100% impervious areas with a curve number of 98. For the purposes of analysis, the impervious area for Lot 1 through Lot 4 were calculated assuming full build out of the building envelope plus 250 sq. ft. for personal driveways and other hardscape features. It is assumed pervious areas will have negligible effect on the drywells and were excluded from these calculations. See

attached Stormwater Plan for more details. Stormwater runoff by sub-catchment is shown in Table 2 (Detailed HydroCAD Output in Appendix F).

Table 2: Post Development Stormwater Runoff by Sub-Catchment

Sub-Catchment	Impervious Area (sq ft)	TC (min)	Q ₂₅ (cfs)
Lot 1	2,304	5	0.05
Lot 2	2,493	5	0.05
Lot 3	2,493	5	0.05
Lot 4	2,386	5	0.05
Shared Private Drive - North	715	5	0.02
Shared Private Drive - South	2,165	5	0.05

4.2 Water Quality

A pretreatment structure with an oil-water separator will be installed upstream of any proposed infiltration facility. The pretreatment structure will consist of a standard catch basin with 18-inch sump and trapped outlet (snout) as pretreatment. Stormwater runoff from the water quality event will be treated before it enters the proposed drywell or ADS Stormtech® chamber system.

4.3 Flow Control

Flow control is satisfied if a stormwater treatment facility can fully infiltrate the 25-year recurrence interval design storm. HydroCAD Version 10.2 and the Santa Barbara Urban Hydrograph method were used to model stormwater runoff for the development, using rainfall data from Table 1. No downstream analysis was performed since the proposed facilities fully infiltrate the 25-yr design storm.

Stormwater runoff from Lot 1 and the northern portion of the shared private drive will be managed by the proposed drywell. The drywell was modeled as a 48" diameter section surrounded with a 12" band of rock with 40% void ratio. The drywells were modeled with a design infiltration rate of 10.0 in/hr, based on the infiltration rates observed in the additional infiltration testing report. See Appendix B, Appendix C and the Civil Engineering Plans. During the 25-year design storm, 0.06 cfs of runoff enters the drywell and this runoff fully infiltrates within 5 hours of the end of the storm. See Appendix F for HydroCAD computations.

Stormwater runoff from Lot 2 through Lot 4 and the southern portion of the shared private drive will be treated for flood control with the proposed ADS Stormtech® DC-780 chamber system. During the 25-year design storm, 0.20 cfs of runoff enters the chamber system and fully infiltrates about 6 hours of the end of the storm. See Appendix F for HydroCAD computations.

5 Operations and Maintenance

The stormwater facilities will be operated and maintained per an Operations and Maintenance Agreement filed with the City of West Linn. Guidance for operation and maintenance of water quality facilities is provided in the City of West Linn Water Quality Facility Inspection Guidance Manual. A sample Operations and Maintenance Agreement is included in Appendix H.

6 Conclusions

A Stormwater Analysis was performed for the partition of 2355 Willamette Falls Dr in West Linn, Oregon following the City of West Linn Stormwater Standards. As noted in this report, the subject is composed of one lot containing a single-family residence. Stormwater management for this site will be achieved through pretreatment catch basins for water quality treatment, one 48" diameter drywell, and an ADS Stormtech® chamber system for 100% infiltration of the 25-year design storm.

Appendix A
Existing Conditions Exhibit

A PORTION OF LOT "B", BLOCK 60,
"WILLAMETTE TRACTS",
LOCATED IN THE
N.E. 1/4 SECTION 2, T.3S., R.1E., W.M.
CITY OF WEST LINN, CLACKAMAS COUNTY, OREGON
MARCH 19, 2026 SCALE 1"=20'

THE VERTICAL DATUM FOR THIS SURVEY IS BASED UPON A STATIC GPS OBSERVATION OF LOCAL CONTROL POINTS THROUGH OPUS.
DATUM IS NAVD 88.

A TRIMBLE S6-SERIES ROBOTIC INSTRUMENT WAS USED TO COMPLETE A CLOSED LOOP FIELD TRAVERSE.

THE BASIS OF BEARINGS FOR THIS SURVEY IS PER MONUMENTS FOUND AND HELD PER RECORD OF SURVEY RECORDED UNDER PRIVATE SURVEY NUMBER 2016-97, CLACKAMAS COUNTY SURVEY RECORDS.

THE PURPOSE OF THIS SURVEY IS TO RESOLVE AND DETERMINE THE PERIMETER BOUNDARY OF THE SUBJECT PROPERTY, TO SHOW ALL PERTINENT BOUNDARY ISSUES AND ENCROACHMENTS. NO PROPERTY CORNERS WERE SET IN THIS SURVEY.

NO WARRANTIES ARE MADE AS TO MATTERS OF UNWRITTEN TITLE, SUCH AS ADVERSE POSSESSION, ESTOPPEL, ACQUIESCENCE, ETC.
NO TITLE REPORT WAS SUPPLIED OR USED IN THE PREPARATION OF THIS MAP.

THE UNDERGROUND UTILITIES AS SHOWN ON THIS MAP ARE SHOWN BASED ON A COMBINATION OF INFORMATION, INCLUDING VISIBLE ABOVE GROUND STRUCTURES, AVAILABLE AS BUILT AND GIS MAPPING FROM LOCAL JURISDICTIONS, AS WELL AS SURFACE MARKINGS BY ONE CALL TICKET NUMBER 26055991 DATED 3/12/2026.

THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED.

THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES ARE IN THE EXACT LOCATION INDICATED, ALTHOUGH HE DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE.

THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES. SUBSURFACE AND ENVIRONMENTAL CONDITIONS WERE NOT EXAMINED OR CONSIDERED AS A PART OF THIS SURVEY. NO STATEMENT IS MADE CONCERNING THE EXISTENCE OF UNDERGROUND OR OVERHEAD CONTAINERS OR FACILITIES THAT MAY AFFECT THE USE OR DEVELOPMENT OF THIS TRACT. THIS SURVEY DOES NOT CONSTITUTE A TITLE SEARCH BY SURVEYOR.

INVERT ELEVATIONS AND PIPE SIZES SHOWN ARE APPROXIMATE ONLY, BASED ON FIELD OBSERVATIONS AS WELL AS AVAILABLE AS-BUILT DATA. ALL PIPE SIZES SHALL BE FIELD VERIFIED BY THE OWNER, ENGINEER, CONTRACTOR, AND GOVERNING AGENCY PRIOR TO ANY CONSTRUCTION ACTIVITY. SURVEYOR DOES NOT WARRANT THE ACCURACY OF ANY PIPE SIZES SHOWN ON THIS SURVEY.

Some Symbols shown may not be used on map

- | | | |
|--|---|---------------------|
| 12"  DECIDUOUS TREE |  SOP | TRAFFIC SIGNAL POLE |
| 24"  EVERGREEN TREE |  UTILITY POLE | |
|  DEAD TREE |  LIGHT POLE | |
|  STORM SEWER MANHOLE |  GUY WIRE | |
|  CATCH BASIN |  ELECTRIC BOX | |
|  CURB INLET |  ELECTRIC METER | |
|  AREA DRAIN |  TRANSFORMER | |
|  DITCH INLET |  ELECTRIC RISER | |
|  SANITARY SEWER CLEANOUT |  HEAT PUMP | |
|  SANITARY SEWER MANHOLE |  GATE POST | |
|  FIRE HYDRANT |  CABLE TV BOX | |
|  WATER MANHOLE |  CABLE TV RISER | |
|  WATER METER |  OVERHEAD LINE | |
|  WATER VALVE |  GAS LINE | |
|  HOSE BIB |  ELECTRICAL LINE | |
|  IRRIGATION CONTROL VALVE |  COMMUNICATIONS LINE | |
|  GAS VALVE |  SANITARY SEWER LINE | |
|  GAS METER |  STORM DRAIN LINE | |
|  MAILBOX |  WATER LINE | |
|  UTILITY RISER |  FENCE LINE | |
|  UTILITY BOX |  HANDRAIL | |
|  TELEPHONE MANHOLE |  ARBORVITAE ROW | |
|  TELEPHONE RISER | FD = FOUND | |
| > STORM OUTFALL | IP = IRON PIPE | |
| — SIGN | IR = IRON ROD | |
|  BOLLARD | YPC = YELLOW PLASTIC CAP | |
| ● FOUND MONUMENT | S.F. = SQUARE FEET | |
| ○ DOWN SPOUT TO STORM SYSTEM | P/L = PROPERTY LINE | |
|  DOWN SPOUT TO SPLASH GUARD OR GROUND W/ PIPE DIRECTION | | |
|  COLUMN | | |

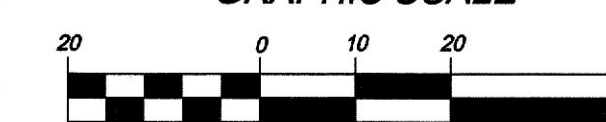
SIGNED ON: 23 MAR 2006

REGISTERED
PROFESSIONAL
LAND SURVEYOR

OREGON
JULY 13, 2004
TOBY G. BOLDEN
60377LS

RENEWS: DECEMBER 31, 2027

GRAPHIC SCALE



(IN FEET)
1 INCH = 20 FT.

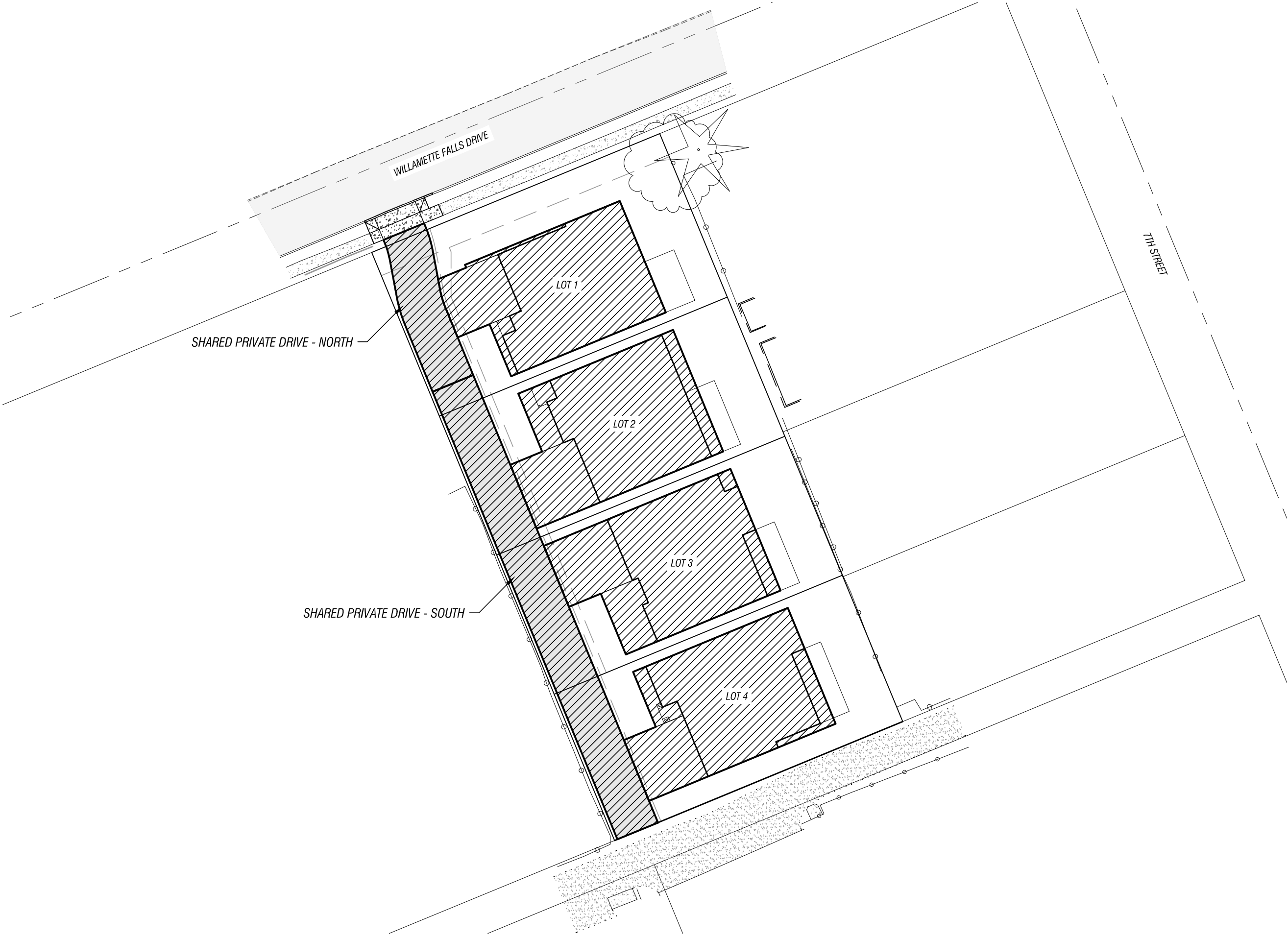


CENTERLINE CONCEPTS
LAND SURVEYING, INC.

19376 MOLALLA AVE., SUITE 120
OREGON CITY, OREGON 97045
PHONE 503.650.0188 FAX 503.650.0189

PLOTTED:M:\PROJECTS\CON-WILLAMETTE FALLS DR-2355\DWG\ECM-C3D.dwg

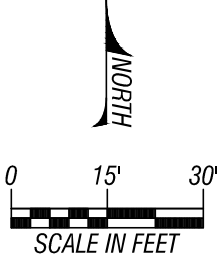
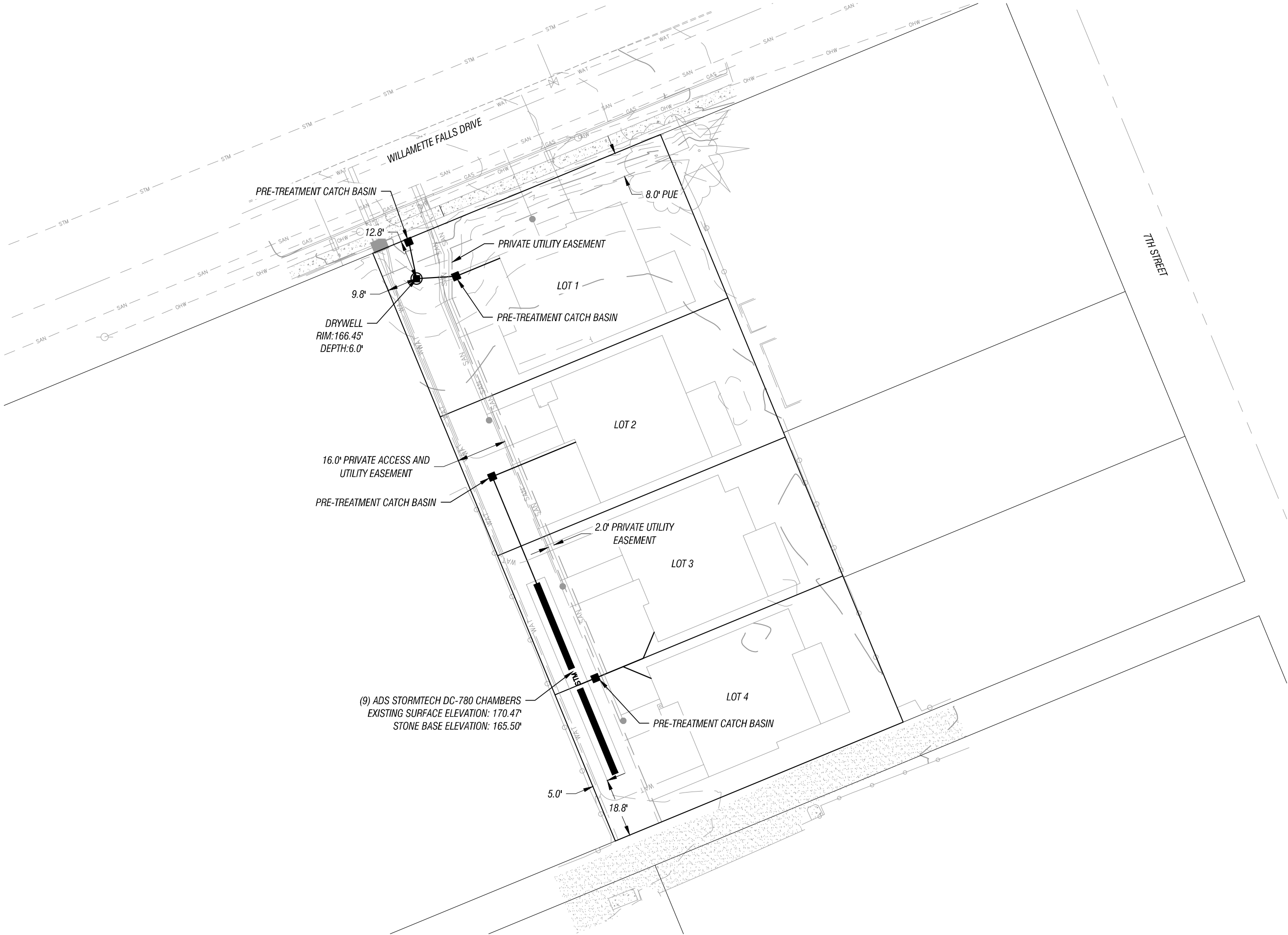
Appendix B
Post-Development Basins Exhibit



LEI ENGINEERING & SURVEYING OF OREGON 2564 19TH ST SE Salem, Oregon 97302 (503) 399-3828 www.leiengineering.com		2355 WILLAMETTE FALLS DR 4-LOT MIDDLE HOUSING DIVISION		NORTH 0 15' 30' SCALE IN FEET	
POST-DEVELOPMENT SUBCATCHMENTS		PREPARED FOR: ICON CONSTRUCTION & DEVELOPMENT, LLC		REUSE OF DOCUMENTS: THIS DOCUMENT, AND THE IDEAS AND DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF LEI ENGINEERING AND IS NOT TO BE USED, WHOLE OR IN PART, FOR ANY OTHER PROJECT WITHOUT THE WRITTEN AUTHORIZATION OF LEI ENGINEERING. ©LEI ENGINEERING	
SCALE 1" = 30'		PROJECT NO. 72-04			
SHEET 1 OF 2		SD-1			

Appendix C

Stormwater Facility and Pipe Network Exhibit



2355 WILLAMETTE FALLS DR
4-LOT MIDDLE HOUSING DIVISION

PREPARED FOR:
ICON CONSTRUCTION & DEVELOPMENT, LLC

LEIENGINEERING
& SURVEYING
OF OREGON

2564 19TH ST SE
Salem, Oregon 97302
(503) 399-3828
www.leiengineering.com

STORMWATER PLAN

SCALE
1" = 30'
PROJECT NO.
72-04
SHEET
2 OF 2

SD-2

Appendix D
NRCS Soils Survey



United States
Department of
Agriculture

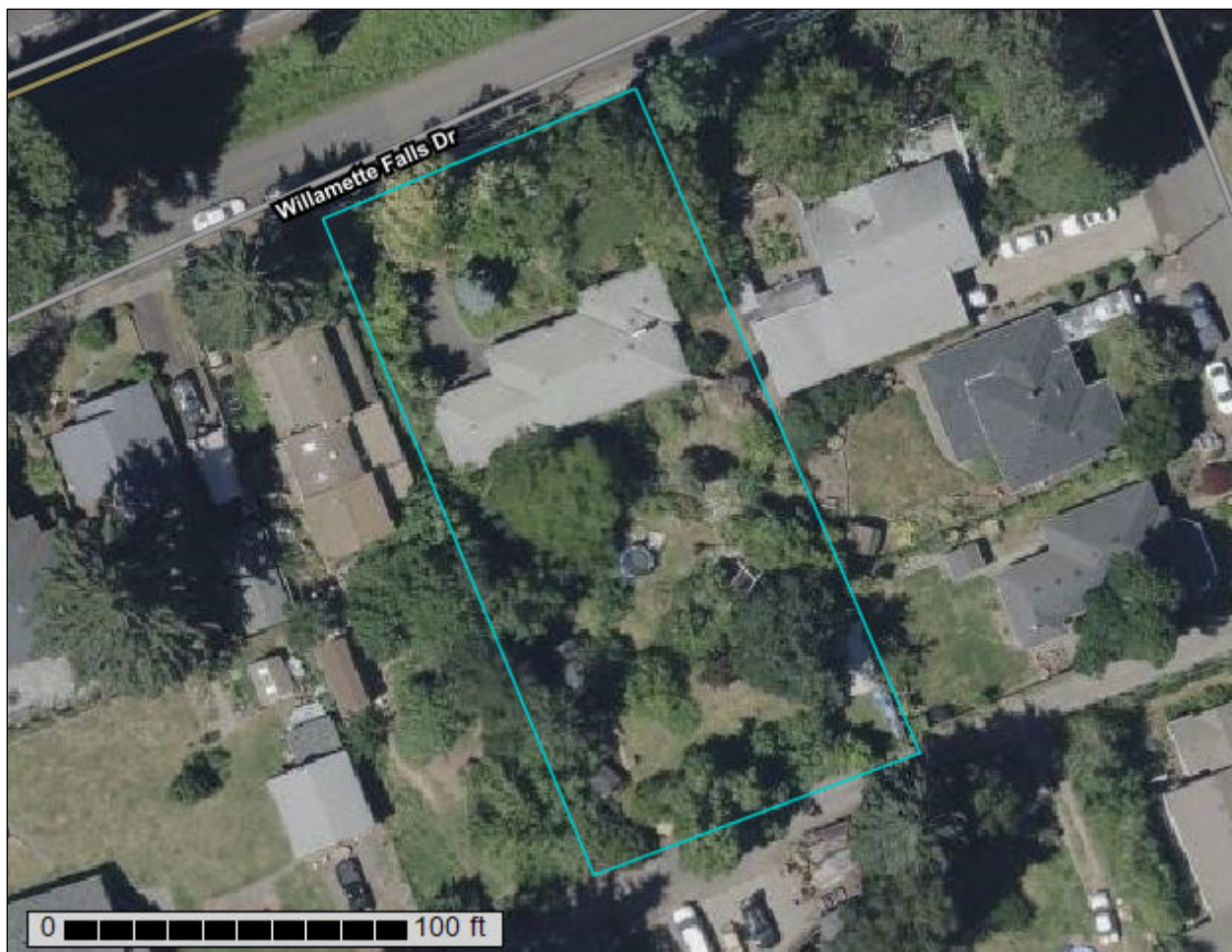
NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for **Clackamas County Area, Oregon**

**2355 Willamette Falls Drive, West
Linn, OR 97068**



March 13, 2026

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Preface	2
How Soil Surveys Are Made	5
Soil Map	8
Soil Map.....	9
Legend.....	10
Map Unit Legend.....	11
Map Unit Descriptions.....	11
Clackamas County Area, Oregon.....	13
88A—Willamette silt loam, wet, 0 to 3 percent slopes.....	13
91B—Woodburn silt loam, 3 to 8 percent slopes.....	14
Soil Information for All Uses	16
Soil Reports.....	16
Soil Physical Properties.....	16
Engineering Properties.....	16
References	20

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Clackamas County Area, Oregon
Survey Area Data: Version 22, Sep 9, 2025

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 1, 2024—Jul 1, 2024

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
88A	Willamette silt loam, wet, 0 to 3 percent slopes	0.4	75.3%
91B	Woodburn silt loam, 3 to 8 percent slopes	0.1	24.7%
Totals for Area of Interest		0.5	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Clackamas County Area, Oregon

88A—Willamette silt loam, wet, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 227q
Elevation: 150 to 350 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 165 to 210 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Willamette, wet, and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Willamette, Wet

Setting

Landform: Broad terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Stratified glaciolacustrine deposits

Typical profile

H1 - 0 to 14 inches: silt loam
H2 - 14 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 30 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Ecological site: R002XC008OR - Valley Terrace Group
Forage suitability group: Moderately Well Drained < 15% Slopes (G002XY004OR)
Other vegetative classification: Moderately Well Drained < 15% Slopes (G002XY004OR)
Hydric soil rating: No

91B—Woodburn silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 227z
Elevation: 150 to 400 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 165 to 210 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Woodburn and similar soils: 90 percent
Minor components: 4 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodburn

Setting

Landform: Broad valley terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Stratified glaciolacustrine deposits

Typical profile

H1 - 0 to 16 inches: silt loam
H2 - 16 to 38 inches: silty clay loam
H3 - 38 to 60 inches: silt loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 25 to 32 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: R002XC008OR - Valley Terrace Group
Forage suitability group: Moderately Well Drained < 15% Slopes (G002XY004OR)
Other vegetative classification: Moderately Well Drained < 15% Slopes (G002XY004OR)
Hydric soil rating: No

Minor Components

Huberly

Percent of map unit: 2 percent

Landform: Swales on valley terraces

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Other vegetative classification: Poorly Drained (G002XY006OR)

Hydric soil rating: Yes

Dayton

Percent of map unit: 1 percent

Landform: Broad terraces

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Other vegetative classification: Poorly Drained (G002XY006OR)

Hydric soil rating: Yes

Aquolls

Percent of map unit: 1 percent

Landform: Flood plains

Hydric soil rating: Yes

Soil Information for All Uses

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Soil Physical Properties

This folder contains a collection of tabular reports that present soil physical properties. The reports (tables) include all selected map units and components for each map unit. Soil physical properties are measured or inferred from direct observations in the field or laboratory. Examples of soil physical properties include percent clay, organic matter, saturated hydraulic conductivity, available water capacity, and bulk density.

Engineering Properties

This table gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Hydrologic soil group is a group of soils having similar runoff potential under similar storm and cover conditions. The criteria for determining Hydrologic soil group is found in the National Engineering Handbook, Chapter 7 issued May 2007(<http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba>). Listing HSGs by soil map unit component and not by soil series is a new concept for the engineers. Past engineering references contained lists of HSGs by soil series. Soil series are continually being defined and redefined, and the list of soil series names changes so frequently as to make the task of maintaining a single national list virtually impossible. Therefore, the criteria is now used to calculate the HSG using the component soil properties and no such national series lists will be maintained. All such references are obsolete and their use should be discontinued. Soil properties that influence runoff potential are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. These properties are depth to a seasonal high water table, saturated hydraulic conductivity after prolonged wetting, and depth to a layer with a very slow water transmission

rate. Changes in soil properties caused by land management or climate changes also cause the hydrologic soil group to change. The influence of ground cover is treated independently. There are four hydrologic soil groups, A, B, C, and D, and three dual groups, A/D, B/D, and C/D. In the dual groups, the first letter is for drained areas and the second letter is for undrained areas.

The four hydrologic soil groups are described in the following paragraphs:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly."

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group

Custom Soil Resource Report

index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Percentage of rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

References:

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Custom Soil Resource Report

Absence of an entry indicates that the data were not estimated. The asterisk '*' denotes the representative texture; other possible textures follow the dash. The criteria for determining the hydrologic soil group for individual soil components is found in the National Engineering Handbook, Chapter 7 issued May 2007(<http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba>). Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Engineering Properties—Clackamas County Area, Oregon														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			<i>In</i>				<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>
88A—Willamette silt loam, wet, 0 to 3 percent slopes														
Willamette, wet	85	C	0-14	Silt loam	ML	A-4	0- 0- 0	0- 0- 0	100-100-100	100-100-100	95-98-100	95-98-100	35-38-40	5-8 -10
			14-60	Silty clay loam, silt loam	CL	A-7	0- 0- 0	0- 0- 0	100-100-100	100-100-100	95-98-100	95-98-100	40-45-50	15-20-25
91B—Woodburn silt loam, 3 to 8 percent slopes														
Woodburn	90	C	0-16	Silt loam	ML	A-4	0- 0- 0	0- 0- 0	100-100-100	95-98-100	85-90-95	70-78-85	25-28-30	NP-3 -5
			16-38	Silty clay loam, silt loam	CL	A-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	95-98-100	85-90-95	30-35-40	10-15-20
			38-60	Silt loam, silty clay loam	CL-ML, CL, ML	A-4	0- 0- 0	0- 0- 0	100-100-100	100-100-100	95-98-100	80-85-90	25-30-35	5-8 -10

References

- American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.
- American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.
- Federal Register. July 13, 1994. Changes in hydric soils of the United States.
- Federal Register. September 18, 2002. Hydric soils of the United States.
- Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.
- National Research Council. 1995. Wetlands: Characteristics and boundaries.
- Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262
- Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577
- Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580
- Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.
- United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.
- United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374
- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelpdb1043084>

Custom Soil Resource Report

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Appendix E
Geotechnical Investigation and Consultation Report



Real-World Geotechnical Solutions
Investigation • Design • Construction Support

Preliminary Geotechnical Engineering Report

Project Information:	2355 Willamette Falls Drive GeoPacific Project No. 25-6951 February 25, 2026
Site Location:	2355 Willamette Falls Drive West Linn, Oregon
Client:	Icon Construction & Development, LLC Harlan Borow 1969 Willamette Falls Drive, Suite 260 West Linn Oregon, 97068 Email: harlan@iconconstruction.net

TABLE OF CONTENTS

1.0	PROJECT INFORMATION	1
2.0	SITE AND PROJECT DESCRIPTION	1
3.0	REGIONAL GEOLOGIC SETTING.....	2
4.0	REGIONAL SEISMIC SETTING	2
4.1	Portland Hills Fault Zone	2
4.2	Cascadia Subduction Zone	3
5.0	FIELD EXPLORATION AND SUBSURFACE CONDITIONS.....	3
5.1	Soil Descriptions	4
5.2	Shrink-Swell Potential.....	4
5.3	Groundwater and Soil Moisture	4
5.4	Infiltration Testing	5
6.0	PRELIMINARY CONCLUSIONS AND RECOMMENDATIONS.....	5
6.1	Site Preparation Recommendations.....	6
6.2	Grading Considerations	7
6.3	Engineered Fill.....	7
6.4	Excavating Conditions and Utility Trench Backfill	8
6.5	Erosion Control Considerations.....	9
6.6	Wet Weather Earthwork.....	9
6.7	Spread Foundations	10
6.8	Footing and Roof Drains.....	11
6.9	Pavement Design – Onsite Street	11
7.0	SEISMIC DESIGN	12
7.1	Soil Liquefaction	12
8.0	UNCERTAINTIES AND LIMITATIONS.....	13
	REFERENCES	15
	CHECKLIST OF RECOMMENDED GEOTECHNICAL TESTING AND OBSERVATION	16
	APPENDIX	

List of Appendices

Figures

Exploration Logs – Hand Auger Boring Logs HA-1 through HA-3

List of Figures

- 1 Vicinity Map
- 2 Site Plan and Exploration Locations
- 3 Fill Slope Detail



Real-World Geotechnical Solutions
Investigation • Design • Construction Support

February 25, 2026
Project No. 25-6951

Icon Construction & Development, LLC

Harlan Borow

1969 Willamette Falls Drive, Suite 260
West Linn Oregon, 97068
Email: harlan@iconconstruction.net

SUBJECT: PRELIMINARY GEOTECHNICAL ENGINEERING REPORT
2355 WILLAMETTE FALLS DRIVE
WEST LINN, OREGON

1.0 PROJECT INFORMATION

This report presents the results of a geotechnical engineering study conducted by GeoPacific Engineering, Inc. (GeoPacific) for the above-referenced project. The purpose of our investigation was to evaluate subsurface conditions at the site and to provide geotechnical recommendations for site development. This geotechnical study was performed in accordance with GeoPacific Proposal No. P-9352, dated February 17, 2026, and your subsequent authorization of our proposal and General Conditions for Geotechnical Services. This report is considered preliminary since a grading plan has not yet been developed.

2.0 SITE AND PROJECT DESCRIPTION

The subject site is located on the south side of Willamette Falls Drive in the City of West Linn, Clackamas County, Oregon (Figure 1). The site consists of one parcel, which is approximately 0.46 acres in size (Figure 2). Topography on the site is generally flat to very gently sloping down to the north with grades of less than 5 percent. An approximately 5-foot high slope that declines to the north at grades of approximately 50 percent is present along the northern property line – adjacent to Willamette Falls Drive. The property is currently occupied by one home and two outbuildings. Vegetation consists primarily of grass, landscaping, and sparse trees.

GeoPacific understands that the property will be partitioned into 3 lots for single family homes and associated underground utilities. A grading plan has not yet been provided for our review. However, we anticipate that cuts and fills up to 6 feet may be required. The homes will likely be constructed with typical spread foundations and wood framing, with maximum structural loading on column footings and continuous strip footings on the order of 10 to 35 kips, and 2 to 4 kips per foot, respectively. The existing structures will be removed.

3.0 REGIONAL GEOLOGIC SETTING

Regionally, the subject site lies within the Willamette Valley/Puget Sound lowland, a broad structural depression situated between the Coast Range on the west and the Cascade Range on the east. A series of discontinuous faults subdivide the Willamette Valley into a mosaic of fault-bounded, structural blocks (Yeats et al., 1996). Uplifted structural blocks form bedrock highlands, while down-warped structural blocks form sedimentary basins.

The site is underlain by the Quaternary age (last 1.6 million years) Catastrophic Flood Deposits associated with repeated glacial outburst flooding of the Willamette Valley (Schlicker and Finlayson, 1979; Madin, 1990). The last of these outburst floods occurred about 10,000 years ago. These flood deposits typically consist of horizontally layered, micaceous, silt to coarse sand forming poorly defined to distinct beds less than 3 feet thick. The silt and sand units may contain inclusions of gravel.

Regional geologic mapping indicates the Catastrophic Flood Deposits are underlain by basalt bedrock belonging to the Columbia River Basalt Formation (Schlicker and Finlayson, 1979; Beeson et al., 1989; Madin, 1990). The Miocene aged (about 14.5 to 16.5 million years ago) Columbia River Basalt Formation is a thick sequence of lava flows which form the crystalline basement of the Tualatin Valley (Beeson et al., 1989). The basalts are composed of dense, finely crystalline rock that is commonly fractured along blocky and columnar vertical joints. Individual basalt flow units typically range from 25 to 125 feet thick and interflow zones are typically vesicular, scoriaceous, brecciated, and sometimes include sedimentary rocks. The upper portion of the basalt is typically weathered to a residual soil composed of silt to clay.

4.0 REGIONAL SEISMIC SETTING

At least two potential source zones capable of generating damaging earthquakes are thought to exist in the region. These include the Portland Hills Fault Zone and the Cascadia Subduction Zone.

4.1 Portland Hills Fault Zone

The Portland Hills Fault Zone is a series of NW-trending faults that include the central Portland Hills Fault, the western Oatfield Fault, and the eastern East Bank Fault. These faults occur in a northwest-trending zone that varies in width between 3.5 and 5.0 miles. The combined three faults vertically displace the Columbia River Basalt by 1,130 feet and appear to control thickness changes in late Pleistocene (approx. 780,000 years) sediment (Madin, 1990). The Portland Hills Fault occurs along the Willamette River at the base of the Portland Hills and is approximately 4.8 miles northeast of the site. The Oatfield Fault occurs along the western side of the Portland Hills and is approximately 3.8 miles northeast of the site. The East Bank Fault occurs along the eastern margin of the Willamette River and is located approximately 11.5 miles north of the site. The accuracy of the fault mapping is stated to be within 500 meters (Wong, et al., 2000). No historical seismicity is correlated with the mapped portion of the Portland Hills Fault Zone, but in 1991 a M3.5 earthquake occurred on a NW-trending shear plane located 1.3 miles east of the fault (Yelin, 1992). Although there is no definitive evidence of recent activity, the Portland Hills Fault Zone is assumed to be potentially active (Geomatrix Consultants, 1995). The Bolton fault is a northwest striking member of the Portland Hills

fault zone that is approximately 2.1 miles northeast of the site and forms a northeast facing escarpment in the Miocene basalt.

According to the USGS Earthquake Hazards Program, the fault was originally mapped as a down-to-the-northeast normal fault but has also been mapped as part of a regional-scale zone of right-lateral, oblique slip faults, and as a steep escarpment caused by asymmetrical folding above a south-west dipping, blind thrust fault. The Portland Hills fault offsets the Miocene age Columbia River Basalts, and Miocene to Pliocene aged sedimentary rocks of the Troutdale Formation. No fault scarps on surficial Quaternary deposits have been described along the fault trace, and the fault is mapped as buried by the Pleistocene aged Missoula flood deposits. No historical seismicity is correlated with the mapped portion of the Portland Hills Fault Zone, but in 1991 a M3.5 earthquake occurred on a NW-trending shear plane located 1.3 miles east of the fault (Yelin, 1992). Although there is no definitive evidence of recent activity, the Portland Hills Fault Zone is assumed to be potentially active (Geomatrix Consultants, 1995).

4.2 Cascadia Subduction Zone

The Cascadia Subduction Zone is a 680-mile-long zone of active tectonic convergence where oceanic crust of the Juan de Fuca Plate is subducting beneath the North American continent at a rate of 4 cm per year (Goldfinger et al., 1996). A growing body of geologic evidence suggests that prehistoric subduction zone earthquakes have occurred (Atwater, 1992; Carver, 1992; Peterson et al., 1993; Geomatrix Consultants, 1995). This evidence includes: (1) buried tidal marshes recording episodic, sudden subsidence along the coast of northern California, Oregon, and Washington, (2) burial of subsided tidal marshes by tsunami wave deposits, (3) paleoliquefaction features, and (4) geodetic uplift patterns on the Oregon coast. Radiocarbon dates on buried tidal marshes indicate a recurrence interval for major subduction zone earthquakes of 250 to 650 years with the last event occurring 300 years ago (Atwater, 1992; Carver, 1992; Peterson et al., 1993; Geomatrix Consultants, 1995). The inferred seismogenic portion of the plate interface lies approximately along the Oregon Coast at depths of between 20 and 40 kilometers below the surface.

5.0 FIELD EXPLORATION AND SUBSURFACE CONDITIONS

Our site-specific explorations for this report were conducted on February 19, 2026 and consisted of three exploratory hand auger borings. The hand auger borings (designated HA-1 through HA-3) were excavated to depths ranging between 7 and 9 feet with hand equipment provided by GeoPacific. The exploration locations are presented on Figure 2. It should be noted that our explorations were located in the field by pacing or taping distances from apparent property corners and other site features shown on the plans provided. As such, the locations of the explorations should be considered approximate.

A GeoPacific Certified Engineering Geologist continuously monitored the field exploration program and logged the hand auger borings. Soils observed in the explorations were classified in general accordance with the Unified Soil Classification System (USCS). During exploration, our geologist also noted geotechnical conditions such as soil consistency, moisture and groundwater conditions. Logs of explorations are attached to this report. The following report sections are based on the exploration program and summarize subsurface conditions encountered at the site.

5.1 Soil Descriptions

On-site soils consist of topsoil horizon and Catastrophic Flood Deposits as described below.

Undocumented Fill: Undocumented fill was not encountered in our explorations conducted for this study. However, it is possible that areas of undocumented fill exist outside our explorations, especially in the vicinities of the existing structures and of the street right-of-way.

Topsoil Horizon: The ground surface at our explorations locations was directly underlain by a topsoil horizon. The dark brown topsoil horizon generally consisted of Organic SILT (OL) that was soft and contained fine grass roots throughout the upper 4 to 6 inches. The topsoil horizon typically had a moderate organic content and extended to depths ranging between 9 and 14 inches at the locations of hand auger borings HA-1 through HA-3.

Catastrophic Flood Deposits: Underlying the topsoil horizon in our hand auger explorations were Catastrophic Flood Deposits. The upper portion of these soils typically consisted of micaceous, light brown, Clayey SILT (ML) that had a medium stiff to stiff consistency. In our explorations, the clayey silt transitioned to SILT (ML) with trace fine grained sand below depths of 3 to 4.5 feet. At the locations of hand auger borings HA-1 through HA-3, the silt with trace sand was underlain by stiff, Sandy SILT (ML) that was interbedded with medium dense, Silty SAND (SM). In our hand auger borings HA-1 and HA-2, the interbedded silty sand and sandy silt extended beyond the maximum depth of exploration (9 feet). At the location of hand auger boring HA-3, practical refusal on gravel was achieved at a depth of 7 feet. The gravel is interpreted to be a lens of gravel occasionally contained within the Catastrophic Flood Deposits.

5.2 Shrink-Swell Potential

Soils encountered in our explorations consisted of clayey silt, silt, and sand, which generally display low plasticity. Based upon the results of our investigation and our local experience with the soil layers in the vicinity of the subject site, the silt, clay, and basalt bedrock soil types observed onsite are not considered potentially expansive.

5.3 Groundwater and Soil Moisture

On February 19, 2026, soils encountered in our hand auger borings were generally moist to very moist. Neither static groundwater nor perched groundwater seepage was encountered in explorations conducted to a maximum depth of 9 feet. Regional groundwater mapping indicates that static groundwater is present at a depth of approximately 40 to 60 feet below the existing ground surface (Snyder, 2008).

Experience has shown that temporary perched storm-related groundwater conditions often occur within the surface soils over fine-grained native deposits such as those beneath the site, particularly during the wet season. It is anticipated that groundwater conditions will vary depending on the season, local subsurface conditions, changes in site utilization, and other factors. Perched groundwater may be encountered in localized areas and seeps and springs may exist in areas not explored and may become evident during site grading. If groundwater springs or seeps are observed to be present during site grading, subdrains may be needed to control and divert subsurface water.

The geotechnical engineer should be alerted by the earthworks contractor to any subsurface springs that become apparent during site grading for additional evaluation and recommendations.

5.4 Infiltration Testing

Soil infiltration testing was performed using the open hole infiltration method in hand auger borings HA-1 at a depth of 4.0 feet and HA-2 at a depth of 5.5 feet. The soil at the bottom of the hand auger borings was pre-saturated. The water level was measured to the nearest tenth of an inch every fifteen minutes to half hour with reference to the ground surface. Readings continued until rates stabilized. Table 1 presents the results of our falling head infiltration testing.

Table 1. Summary of Infiltration Test Results

Exploration	Depth (feet)	Soil Type	Infiltration Rate (in/hr)	Hydraulic Head Range (inches)
HA-1	4.0	SILT (ML) trace sand	0.2	8-11
HA-2	5.5	Silty Sand (SM)	6.1	5-24

Infiltration rates within Catastrophic Flood Deposits can differ significantly over short distances and depths due to the variability in silt content. Infiltration rates have been reported without applying a factor of safety. The system designer should apply an appropriate factor of safety for calculations. Adequate separation from the confining layers and groundwater levels should be maintained for stormwater management.

Infiltration rates presented in this report should not be applied to inappropriate or complex hydrological models such as a closed basin without extensive further studies. Evaluating environmental implications of stormwater disposal at this site are beyond the scope of this study.

Stormwater management systems should be constructed as specified by the designer and/or in accordance with the applicable stormwater design codes. Stormwater exceeding storage capacities will need to be directed to a suitable surface discharge location, away from structures. Stormwater management systems may need to include overflow outlets, surface water control measures and/or be connected to the street storm drain system, if available. In no case should stormwater be allowed to flow uncontrolled over the ground surface.

6.0 PRELIMINARY CONCLUSIONS AND RECOMMENDATIONS

Our site investigation indicates that the proposed construction appears to be geotechnically feasible, provided that the recommendations of this report are incorporated into the design and construction phases of the project. Our conclusions and recommendations are considered preliminary since a grading plan has not yet been finalized. The primary geotechnical concerns for the project include:

1. The presence of medium dense granular soils that are generally prone to caving. Although caving was not observed in our hand auger borings, medium dense sandy soils were encountered at depths below 4.5 to 5 feet. These soil conditions could make utility trenching

difficult, especially in the winter months when perched groundwater seepage is prevalent. Adequate shoring should be maintained.

2. The presence of interbedded silt and sand soils that may limit infiltration capacity. Infiltration rates within Catastrophic Flood Deposits can differ significantly over short distances and depths due to the variability in silt content. The silty layers with low permeability should be considered in the design of stormwater disposal facilities for the site. Adequate separation from groundwater levels should be maintained.

The following report sections provide recommendations for site development and construction in accordance with the current applicable codes and local standards of practice.

6.1 Site Preparation Recommendations

Areas of proposed construction and areas to receive fill should be cleared of any organic and inorganic debris. Inorganic debris and organic materials from clearing should be removed from the site. Organic-rich soils and root zones should then be stripped from construction areas of the site or where engineered fill is to be placed. The average depth of stripping of existing topsoil is estimated to be approximately 9 inches across the majority of the site, however depth of organic soil layers may increase in some areas due to the abundance of trees. The final depth of soil removal will be determined based on a site inspection after the stripping/excavation has been performed. Stripped topsoil should be removed from areas proposed for placement of engineered fill. Any remaining topsoil should be stockpiled only in designated areas and stripping operations should be observed and documented by the geotechnical engineer or his representative.

Where encountered, undocumented fills and any subsurface structures (dry wells, basements, driveway and landscaping fill, old utility lines, septic leach fields, field drain tiles, etc.) should be completely removed and the excavations backfilled with engineered fill. Field drain tiles, if encountered, should be intercepted at the high end of the site and routed to the storm drain system. Existing trench backfill soils overlying the field drains should be removed and replaced with engineered fill.

Undocumented fill was not encountered in our explorations conducted for this study. However, areas of undocumented fill may be present outside our exploration locations, especially in the vicinities of the existing structures and of the street right-of-way. If encountered within the zones of proposed roadways, structures, retaining walls, or areas to receive engineered fill, undocumented fill and any buried topsoil horizons should be removed to firm inorganic native soils and replaced with properly compacted engineered fill. Organic or otherwise deleterious portions of the fill should be exported from the site. Portions of undocumented fill soils that do not contain significant percentages of organics may be stockpiled for later use as engineered fill provided they are properly moisture conditioned for compaction and not mixed with topsoil or other organic/unsuitable materials. The final depth of removal should be determined on the basis of a site inspection after the initial stripping / fill excavation has been performed.

Exposed subgrade soils should be evaluated by the geotechnical engineer. 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.

Areas proposed to be left at grade may require additional over-excavation of foundation areas in order to reach soils which will provide adequate bearing support for the proposed foundations. Site earthwork may be impacted by perched groundwater.

6.2 Grading Considerations

Where incorporated into the project, all grading for the proposed construction should be performed as engineered grading in accordance with the applicable building code at the time of construction with the exceptions and additions noted herein. Site grading should be conducted in accordance with the requirements outlined in the 2021 International Building Code (IBC), and 2022 Oregon Structural Specialty Code (OSSC), Chapter 18 and Appendix J. Areas proposed for fill placement should be prepared as described in the *Site Preparation Recommendations* section of this report. Proper test frequency and earthwork documentation usually requires daily observation and testing during stripping, rough grading, and placement of engineered fill. Permanent cut and fill slopes should be constructed no steeper than 2H:1V (50% grade) and slopes over 10 feet in height should be evaluated for stability concerns. Engineered fill placed on existing sloped areas inclining at, or steeper than an approximately twenty percent grade should be constructed on a keyway as indicated on Figure 3 and benches and incorporate drainage measures if groundwater seepage is encountered. In order to achieve adequate compaction along slope margins, we recommend that fill slopes are constructed with a minimum 3 foot horizontal overbuild and then trimmed back to the design grade. Erosion on slopes can be minimized as outlined in the Erosion Control Considerations section of this report.

6.3 Engineered Fill

We anticipate that existing native soils can be used as engineered fill, provided they are adequately moisture conditioned. If undocumented fill soils are encountered and proposed for re-use as engineered fill, the geotechnical engineer and/or his designated representative should be contacted to observe the soil conditions and provide recommendations for re-use. 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 95 percent of the maximum dry density determined by ASTM D698 (Standard Proctor) or equivalent. Field density testing should conform to ASTM D2922 and D3017, or D1556. All engineered fill should be observed and tested by the project geotechnical engineer or his representative. Typically, one density test is performed for at least every 2 vertical feet of fill placed or every 500 yd³, whichever requires more testing. Because testing is performed on an on-call basis, we recommend that the earthwork contractor be held contractually responsible for test scheduling and frequency.

Site earthwork will be impacted by soil moisture and shallow groundwater conditions. Earthwork in wet weather would likely require extensive use of cement or lime treatment, or other special

measures, at considerable additional cost compared to earthwork performed under dry-weather conditions.

6.4 Excavating Conditions and Utility Trench Backfill

We anticipate that on-site soils can be excavated using conventional heavy equipment such as trackhoes. Our explorations encountered silty sand soils within the Catastrophic Flood Deposits. These medium dense sand units can be prone to caving, especially in the winter months when perched groundwater seepage is prevalent. Although caving was not encountered in our hand auger borings, adequate shoring should be maintained.

All temporary cuts in excess of 4 feet in height should be sloped in accordance with U.S. Occupational Safety and Health Administration (OSHA) regulations (29 CFR Part 1926) or be shored. The existing native soils are classified as Type B and C Soils and temporary excavation side slope inclinations as steep as 1.5H:1V may be assumed for planning purposes. This cut slope inclination is applicable to excavations above groundwater seepage zones only. Maintenance of safe working conditions, including temporary excavation stability, is the responsibility of the contractor. Actual slope inclinations at the time of construction should be determined based on safety requirements and actual soil and groundwater conditions.

Saturated soils and groundwater may be encountered in utility trenches, particularly during the wet season. We anticipate that dewatering systems consisting of ditches, sumps and pumps would be adequate for control of perched groundwater. 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.

PVC pipe should be installed in accordance with the procedures specified in ASTM D2321. We recommend that trench backfill be compacted to at least 95 percent of the maximum dry density determined by ASTM D1557 (Modified Proctor) or equivalent. Initial backfill lift thickness 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.

6.5 Erosion Control Considerations

During our field exploration program, we did not observe soil or topographic conditions which are considered highly susceptible to erosion. In our opinion, the primary concern regarding erosion potential will occur during construction in areas that have been stripped of vegetation. Erosion at the site during construction can be minimized by implementing the project erosion control plan, which should include judicious use of straw wattles, fiber rolls, and silt fences. If used, these erosion control devices should 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. Areas of exposed soil requiring permanent stabilization should be seeded with an approved grass seed mixture, or hydroseeded with an approved seed-mulch-fertilizer mixture.

6.6 Wet Weather Earthwork

Soils underlying the site are likely to be moisture sensitive and will 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 require expensive measures such as cement treatment or imported granular material to compact areas where fill may be proposed 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, the following recommendations should be incorporated into the contract specifications.

- Earthwork should be performed in small areas to minimize exposure to wet weather. Excavation or the removal of unsuitable soils should be followed promptly by the placement and compaction of clean engineered fill. The size and type of construction equipment used may have to be limited to prevent soil disturbance. Under some circumstances, it may be necessary to excavate soils with a backhoe to minimize subgrade disturbance caused by equipment traffic.
- The ground surface within the construction area should be graded to promote run-off of surface water and to prevent the ponding of water.
- Material used as engineered fill should consist of clean, granular soil containing less than 5 percent passing the No. 200 sieve. The fines should be non-plastic. Alternatively, cement treatment of on-site soils may be performed to facilitate wet weather placement.
- The ground surface within the construction area should be sealed by a smooth drum vibratory roller, or equivalent, and under no circumstances should be left uncompacted and exposed to moisture. Soils which become too wet for compaction should be removed and replaced with clean granular materials.
- Excavation and placement of fill should be observed by the geotechnical engineer to verify that all unsuitable materials are removed and suitable compaction and site drainage is achieved.

- Geotextile silt fences, straw wattles, and fiber rolls should be strategically located to control erosion.

If cement or lime treatment is used to facilitate wet weather construction, GeoPacific should be contacted to provide additional recommendations and field monitoring.

6.7 Spread Foundations

It is our understanding that the proposed development will include the construction of 3 lots for single family homes. Based on our current understanding of the proposed grading, maximum cuts and fills may be up to 6 feet. A grading plan has not been provided for our review. GeoPacific should review the finalized site layout and grading plan to provide additional recommendations, if necessary. The proposed single-family residential homes will likely be constructed on typical spread foundations with square column footings, continuous strip footings, and crawl spaces. We anticipate wood-framed construction above the foundations with maximum structural loading on column footings and continuous strip footings on the order of 10 to 35 kips, and 2 to 4 kips/foot respectively.

Residential structures may be supported on shallow foundations bearing on competent undisturbed, low expansive native soils and/or engineered fill, appropriately designed and constructed as recommended in this report. Foundation design, construction, and setback requirements should conform to the applicable building code at the time of construction. For maximization of bearing strength and protection against frost heave, spread footings should be embedded at a minimum depth of 12 inches below exterior grade. Minimum foundation and slab reinforcement should be specified by the structural engineer.

The anticipated allowable soil bearing pressure is 1,500 lbs/ft² for footings bearing on competent, low expansivity, native soil and/or engineered fill. A maximum column load of 40 kips is recommended for the site. The recommended maximum allowable bearing pressure may be increased by 1/3 for short-term transient conditions such as wind and seismic loading. For heavier loads, the geotechnical engineer should be consulted. The coefficient of friction between on-site soil and poured-in-place concrete may be taken as 0.42, which includes no factor of safety.

Excavations near structural footings should not extend within a 1H:1V plane projected downward from the bottom edge of footings. Footing excavations should penetrate through topsoil, undocumented fill, and any loose soil to competent subgrade that is suitable for bearing support. All footing excavations should be trimmed neat, and all loose or softened soil should be removed from the excavation bottom prior to placing reinforcing steel bars. Due to the moisture sensitivity of on-site native soils, foundations constructed during the wet weather season may require overexcavation of footings and backfill with compacted, crushed aggregate.

Our recommendations are for house construction incorporating raised wood floors and conventional spread footing foundations. If living space of the structures will incorporate basements, a geotechnical engineer should be consulted to make recommendations for retaining walls, waterproofing, underslab drainage, and wall subdrains. After site development, a Final Soil Engineer's Report may either confirm or modify the above recommendations.

6.8 Footing and Roof Drains

If the proposed structures will have raised floors, and no concrete slab-on-grade floors are used, it is our opinion that perimeter footing drains would not be necessary, based on experience with standard local construction practices. If required by the building official, or if it is desired to reduce the potential for moist crawl spaces, footing drains may be installed. GeoPacific may comment on the need for perimeter footing drains depending on conditions encountered in the field during foundation subgrade preparation and the configurations of individual house foundations. If concrete slab-on-grade floors are used in living spaces, perimeter footing drains should be installed. If footing drains are desired by the owner or required by the building official, GeoPacific may be consulted to provide recommendations for the footing drains.

Construction should include typical measures for controlling subsurface water beneath the homes, including positive crawlspace drainage to an adequate low-point drain exiting the foundation, visqueen covering the exposed ground in the crawlspace, and crawlspace ventilation (foundation vents). The homebuyers should be informed and educated that some slow flowing water in the crawlspaces is considered normal and not necessarily detrimental to the home given these other design elements incorporated into its construction. Appropriate design professionals should be consulted regarding crawlspace ventilation, building material selection and mold prevention issues, which are outside GeoPacific's area of expertise.

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 the storm drain system. Grades should be sloped downward and away from buildings to reduce the potential for ponded water near structures.

6.9 Pavement Design – Onsite Street

For design purposes, we used an estimated resilient modulus of 7,500 for compacted native soil. Table 2 presents our recommended minimum dry-weather pavement section for onsite light-duty public streets. For streets subjected to loading from traffic other than passenger cars and occasional emergency vehicles and delivery vehicles, GeoPacific should be consulted to provide additional recommendations.

Table 2. Recommended Minimum Dry-Weather Pavement Section for Light-Duty Streets

Material Layer	Section Thickness (in)	Compaction Standard
Asphaltic Concrete (AC)	3	92% of Rice Density AASHTO T-209
Crushed Aggregate Base ¾"-0 (leveling course)	2	95% of Modified Proctor AASHTO T-180
Crushed Aggregate Base 1½"-0	8	95% of Modified Proctor AASHTO T-180
Subgrade	12	95% of Standard Proctor AASHTO T-99 or equivalent

Any pockets of soft soils, organic debris, or loose fill encountered during subgrade preparation should be removed and replaced with engineered fill (see *Site Preparation* Section). In order to verify subgrade strength, we recommend proof-rolling directly on subgrade with a loaded dump truck during dry weather and on top of base course in wet weather. Soft areas that pump, rut, or weave should be stabilized prior to paving. If pavement areas are to be constructed during wet weather, the subgrade and construction plan should be reviewed by the project geotechnical engineer at the time of construction so that condition specific recommendations can be provided. The moisture sensitive subgrade soils make the site a difficult wet weather construction project.

During placement of pavement section materials, density testing should be performed to verify compliance with project specifications. Generally, one subgrade, one base course, and one asphalt compaction test is performed for every 100 to 200 linear feet of paving.

7.0 SEISMIC DESIGN

The Oregon Department of Geology and Mineral Industries (Dogami), Oregon HazVu: 2026 Statewide GeoHazards Viewer indicates that the site is in an area where *severe* ground shaking is anticipated during an earthquake (Dogami HazVu, 2026). Structures should be designed to resist earthquake loading in accordance with the methodology described in the 2021 International Building Code (IBC) with applicable Oregon Structural Specialty Code (OSSC) revisions (current 2022). We recommend Site Class D be used for design as defined in ASCE 7-16, Chapter 20, and Table 20.3-1 and seismic design category D₀ as defined in 2021 International Residential Code (IRC) Table R301.2.2.1.1. Design values determined for the site using the American Society of Civil Engineers ASCE Hazards Tool (2025) are summarized in Table 3 and are based upon existing soil conditions.

Table 3. Recommended Earthquake Ground Motion Parameters (ASCE 7-16)

Parameter	Value
Location (Lat, Long), degrees	45.346, -122.647
Horizontal Design Response Parameters, 2% Exceedance in 50 years:	
Peak Ground Acceleration PGA _M	0.460 g
Short Period, S _s	0.833 g
1.0 Sec Period, S ₁	0.376 g
Soil Factors for Site Class D:	
F _a	1.167
F _v	1.924
SD _s = 2/3 x F _a x S _s	0.648 g
SD ₁ = 2/3 x F _v x S ₁	0.482 g
Seismic Design Category	D (D ₀ per 2021 IRC)

7.1 Soil Liquefaction

The Oregon Department of Geology and Mineral Industries (DOGAMI), Oregon HazVu: 2026 Statewide GeoHazards Viewer indicates that the site is in an area considered to be at *moderate* risk for soil liquefaction during an earthquake. Soil liquefaction is a phenomenon wherein saturated soil

deposits temporarily lose strength and behave as a liquid in response to ground shaking caused by strong earthquakes. Soil liquefaction is generally limited to loose sands and granular soils located below the water table, and fine-grained soils with a plasticity index less than 15.

Our subsurface explorations indicate that the site is underlain by flood deposits consisting of clayey silt, silt, and sand. Neither static groundwater nor perched groundwater seepage were encountered in our explorations conducted for this study to a maximum depth of 9 feet. Regional groundwater mapping indicates static groundwater is approximately 40 to 60 feet below the ground surface (Snyder, 2008). Soil moisture contents were generally moist to very moist.

For construction of single-family structures, special design or construction measures are not required by code to mitigate the effects of liquefaction. However, GeoPacific may be consulted to perform further study of seismic hazards on the site if desired. If multi-family residential, high occupancy, or critical structures were to be incorporated into plans for site development, further study and evaluation of seismic hazards would be required by code to more fully evaluate the potential adverse effects due to liquefaction. We anticipate that our additional explorations on the site for the purpose of evaluating seismic hazards would include cone penetrometer tests.

8.0 UNCERTAINTIES AND LIMITATIONS

We have prepared this report for the owner and their consultants for use in design of this project only. This report should be provided in its entirety to prospective contractors for bidding and estimating purposes; however, the conclusions and interpretations presented in 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, GeoPacific should be notified for review of the recommendations of this report, and revision of such if necessary.

The scope of this study includes measuring infiltration rates only. Rates of infiltration that were affected by impermeable soils or groundwater seepage were not reported. Environmental implications of stormwater disposal or City of West Linn, Clackamas County, or Oregon Department of Environmental Quality (DEQ) approval at this site are also beyond the scope of this report.

Infiltration test methods and procedures attempt to simulate the as-built conditions of the planned subsurface disposal system. However, due to natural variations in soil properties, actual infiltration rates may vary from the measured and/or recommended design rates. All systems should be constructed such that potential overflow is discharged in a controlled manner away from structures, and all systems should include an adequate factor of safety. Infiltration rates presented in this report should not be applied to inappropriate or complex hydrological models such as a closed basin without extensive further studies. This report presents infiltration test results only, and should not be construed as an approval of a system design.

Sufficient geotechnical monitoring, testing and consultation should be provided during construction to confirm that the conditions encountered are consistent with those indicated by explorations. The checklist attached to this report outlines recommended geotechnical observations and testing for the

Preliminary Geotechnical Engineering Report
Project No. 25-6951 2355 Willamette Falls Drive, West Linn, Oregon

project. 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.

This report should not be relied upon by third parties unless a reliance letter has been issued by GeoPacific specifically to that third party, otherwise the third party should rely upon their own due diligence and geotechnical studies only. Foundations, wood floors and slab-on-grade performance should be evaluated in accordance with ASCE Guidelines for Evaluation and Repair of Residential Foundations (ASCE Texas Chapter, 2009) when exceeding L/100 for overall tilting and L/360 for overall deflection across the length of the home, unless superseded by the builder's warranty guidelines. Localized deflections may exceed these tolerances due to other factors, such as built-in unevenness.

Within the limitations of scope, schedule and budget, GeoPacific attempted to execute these services in accordance with generally accepted professional principles and practices in the fields of geotechnical engineering and engineering geology 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,

GEOPACIFIC ENGINEERING, INC.



Beth K. Rapp, C.E.G.
Associate Engineering Geologist



Benjamin G. Anderson, P.E., G.E.
Associate Geotechnical Engineer

REFERENCES

- American Society of Civil Engineers (ASCE), 2026, Hazard Tool, <https://ascehazardtool.org>
- American Society of Civil Engineers Texas Section, 2009, Guidelines for the Evaluation and Repair of Residential Foundations, Version 2, 17 pages.
- Atwater, B.F., 1992, Geologic evidence for earthquakes during the past 2,000 years along the Copalis River, southern coastal Washington: *Journal of Geophysical Research*, v. 97, p. 1901-1919.
- Beeson, M.H., Tolan, T.L., and Madin, I.P., 1989, Geologic map of the Lake Oswego Quadrangle, Clackamas, Multnomah, and Washington Counties, Oregon: Oregon Department of Geology and Mineral Industries Geological Map Series GMS-59, scale 1:24,000.
- Carver, G.A., 1992, Late Cenozoic tectonics of coastal northern California: American Association of Petroleum Geologists-SEPM Field Trip Guidebook, May, 1992.
- Geomatrix Consultants, 1995, Seismic Design Mapping, State of Oregon: unpublished report prepared for Oregon Department of Transportation, Personal Services Contract 11688, January 1995.
- Goldfinger, C., Kulm, L.D., Yeats, R.S., Appelgate, B., MacKay, M.E., and Cochrane, G.R., 1996, Active strike-slip faulting and folding of the Cascadia Subduction-Zone plate boundary and forearc in central and northern Oregon: in *Assessing earthquake hazards and reducing risk in the Pacific Northwest*, v. 1: U.S. Geological Survey Professional Paper 1560, P. 223-256.
- 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, 2026, Oregon Hazvu: Statewide Geohazards Viewer: <https://gis.dogami.oregon.gov/hazvu/>
- Peterson, C.D., Darioenzo, M.E., Burns, S.F., and Burris, W.K., 1993, Field trip guide to Cascadia paleoseismic evidence along the northern California coast: evidence of subduction zone seismicity in the central Cascadia margin: *Oregon Geology*, v. 55, p. 99-144.
- 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.
- United States Geological Survey, 2026, USGS Earthquake Hazards Program Website (earthquake.usgs.gov).
- Wong, I. Silva, W., Bott, J., Wright, D., Thomas, P., Gregor, N., Li, S., Mabey, M., Sojourner, A., and Wang, Y., 2000, Earthquake Scenario and Probabilistic Ground Shaking Maps for the Portland, Oregon, Metropolitan Area; State of Oregon Department of Geology and Mineral Industries; Interpretative Map Series IMS-16.
- Yeats, R.S., Graven, E.P., Werner, K.S., Goldfinger, C., and Popowski, T., 1996, Tectonics of the Willamette Valley, Oregon: in *Assessing earthquake hazards and reducing risk in the Pacific Northwest*, v. 1: U.S. Geological Survey Professional Paper 1560, P. 183-222, 5 plates, scale 1:100,000.
- Yelin, T.S., 1992, An earthquake swarm in the north Portland Hills (Oregon): More speculations on the seismotectonics of the Portland Basin: *Geological Society of America, Programs with Abstracts*, v. 24, no. 5, p. 92.

CHECKLIST OF RECOMMENDED GEOTECHNICAL TESTING AND OBSERVATION

Item	Procedure	Timeframe	Whom	Done
1	Preconstruction meeting	Prior to beginning site work	Contractor, Developer, Civil and Geotechnical Engineers	
2	Fill removal from site or sorting and stockpiling	Prior to mass stripping	Soil Technician/ Geotechnical Engineer	
3	Stripping, aeration, and root-picking operations	During stripping	Soil Technician	
4	Compaction testing of engineered fill (95% of Standard Proctor)	During filling, tested every 2 vertical feet	Soil Technician	
5	Retaining Wall Keyway and Subbase	During Excavation	Soil Technician/ Geotechnical Engineer	
6	Retaining Wall Backfill and Geogrid Placement	During Construction	Soil Technician/ Geotechnical Engineer	
7	Compaction testing of trench backfill (95% of Modified Proctor)	During backfilling, tested every 4 vertical feet for every 200 lineal feet	Soil Technician	
8	Street Subgrade Inspection	Prior to placing base course	Soil Technician	
9	Top 3 feet of fill subgrade reevaluation of all lots	Late Winter/Early Spring	Soil Technician	
10	Base course compaction (95% of Modified Proctor)	Prior to paving, tested every 200 lineal feet	Soil Technician	
11	Foundation Subgrade Inspection	During Foundation Excavation	Soil Technician/ Geotechnical Engineer	



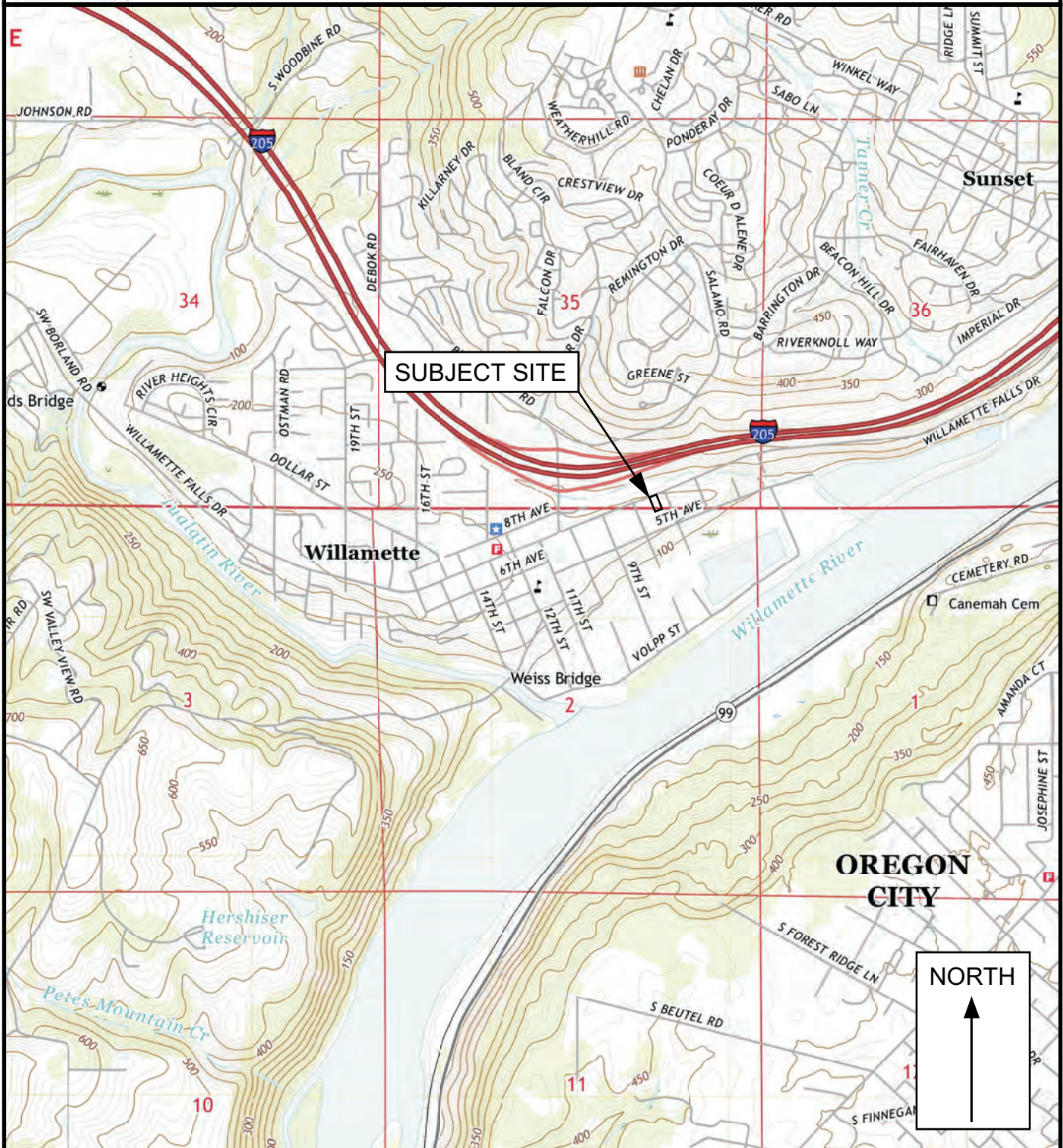
Real-World Geotechnical Solutions
Investigation • Design • Construction Support

FIGURES



14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445

VICINITY MAP



Legend

Approximate Scale 1 in = 2,000 feet

Date: 2/25/2026
Drawn by: EKR

Base map: U.S. Geological Survey 7.5 minute Topographic Map Series, Canby, Oregon Quadrangle, 2020.

Project: 2355 Willamette Falls Drive
West Linn, Oregon

Project No. 26-6951

FIGURE 1



14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445

SITE PLAN AND EXPLORATION LOCATIONS



Legend



Hand Auger Boring Designation
and Approximate Location

Date: 2/25/2026
Drawn by: EKR

0 50'
APPROXIMATE SCALE 1"=50'

Project: 2355 Willamette Falls Drive
West Linn, Oregon

Project No. 26-6951

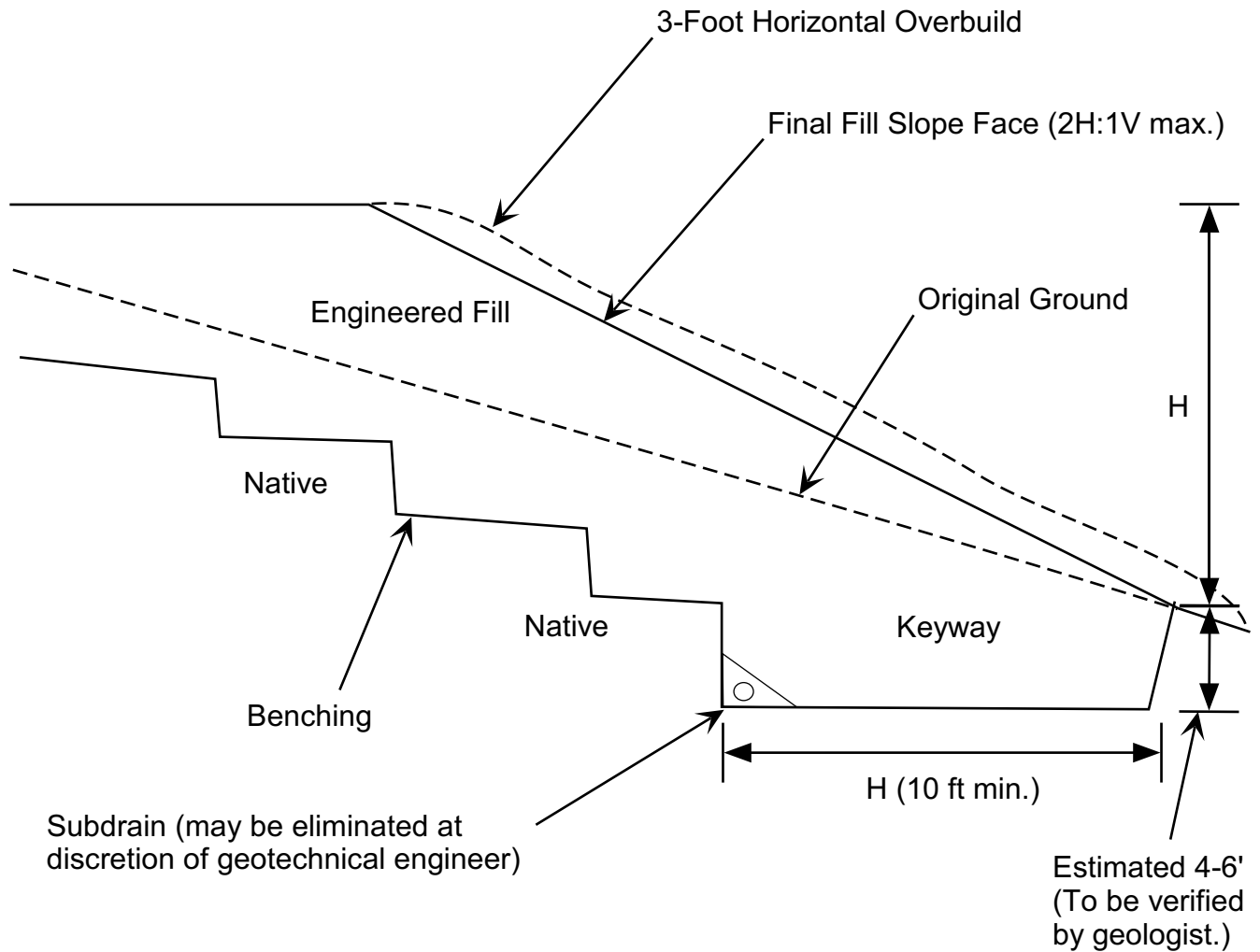
FIGURE 2



14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445

FILL SLOPE DETAIL

TYPICAL KEYWAY, BENCHING & FILL SLOPE DETAIL



Recommended subdrain is minimum 3-inch-diameter ADS Heavy Duty grade (or equivalent), perforated plastic pipe enveloped in a minimum of 3 cubic feet per lineal foot of 2" to 1/2" open-graded gravel drain rock wrapped with geotextile filter fabric (Mirafi 140N or equivalent).



Real-World Geotechnical Solutions
Investigation • Design • Construction Support

EXPLORATION LOGS



14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445

HAND AUGER LOG

Project: 2355 Willamette Falls Drive
West Linn, Oregon

Project No. 26-6951

Boring No. **HA-1**

Depth (ft)	Sample Type	Moisture Content (%)	Water Bearing Zone	Material Description
1				Moderately Organic SILT (OL), dark brown, fine grass roots to 6 inches, 9 inches, soft, moist (Topsoil Horizon)
2				Clayey SILT (ML), light brown, subtle to strong orange and gray mottling, micaceous, trace fine roots, trace charcoal fragments, stiff, moist (Catastrophic Flood Deposits)
3				Grades to silt, trace fine grained sand
4				Infiltration testing performed at 4.0 feet = 0.2 inches/hour
5				Sandy SILT (ML) and Silty SAND (SM), light brown to light gray brown, interbedded, strong orange and gray mottling, micaceous, sand is fine to medium grained, trace black staining, stiff/medium dense, moist (Catastrophic Flood Deposits)
6				
7				
8				
9				Hand Auger Boring Terminated at 9 Feet. No Groundwater or Seepage Encountered. No Caving Observed.
10				
11				
12				

LEGEND



Bag Sample



Bucket Sample



Seepage



Water Bearing Zone

Equipment: Ratchet-Handled Auger
Auger Diameter: 2.75 Inches
Auger Head Type: Mud Auger

Date Excavated: 2/19/2026
Logged By: B. Rapp
Surface Elevation:
Surface Conditions: **Grass**



14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445

HAND AUGER LOG

Project: 2355 Willamette Falls Drive
West Linn, Oregon

Project No. 26-6951

Boring No. **HA-2**

Depth (ft)	Sample Type	Moisture Content (%)	Water Bearing Zone	Material Description
1				Moderately Organic SILT (OL), dark brown, fine grass roots to 4 inches, 14 inches, soft to medium stiff, moist (Topsoil Horizon)
2				Clayey SILT (ML), light brown, subtle to strong orange and gray mottling, micaceous, trace fine roots, stiff, moist (Catastrophic Flood Deposits)
3				
4				
5				Grades to silt, trace fine grained sand, moist to very moist
6				Sandy SILT (ML) and Silty SAND (SM), light brown to light gray brown, interbedded, strong orange and gray mottling, micaceous, trace black staining, sand is fine to medium grained, stiff/medium dense, moist (Catastrophic Flood Deposits) Infiltration testing performed at 5.5 feet = 6.1 inches/hour
7				
8				
9				
10				Hand Auger Boring Terminated at 9 Feet. No Groundwater or Seepage Encountered. No Caving Observed.
11				
12				

LEGEND



Bag Sample



Bucket Sample



Seepage



Water Bearing Zone

Equipment: Ratchet-Handled Auger
Auger Diameter: 2.75 Inches
Auger Head Type: Mud Auger

Date Excavated: 2/19/2026
Logged By: B. Rapp
Surface Elevation:
Surface Conditions: Grass



14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445

HAND AUGER LOG

Project: 2355 Willamette Falls Drive
West Linn, Oregon

Project No. 26-6951

Boring No. **HA-3**

Depth (ft)	Sample Type	Moisture Content (%)	Water Bearing Zone	Material Description
1				Moderately Organic SILT (OL), dark brown, trace fine grass roots to 4 inches, 12 inches, soft, moist (Topsoil Horizon)
2				Clayey SILT (ML), light brown, strong orange and gray mottling, micaceous, trace fine roots, medium stiff, moist (Catastrophic Flood Deposits)
3				Grades to silt, trace fine grained sand, stiff
4				
5				Sandy SILT (ML) and Silty SAND (SM), light brown to light gray brown, interbedded, strong orange and gray mottling, micaceous, trace black staining, sand is fine to medium grained, stiff/medium dense, moist (Catastrophic Flood Deposits)
6				
7				
8				Practical Refusal on Gravel at 7 Feet. No Groundwater or Seepage Encountered. No Caving Observed.
9				
10				
11				
12				

LEGEND



Bag Sample



Bucket Sample



Seepage



Water Bearing Zone

Equipment: Ratchet-Handled Auger
Auger Diameter: 2.75 Inches
Auger Head Type: Mud Auger

Date Excavated: 2/19/2026
Logged By: B. Rapp
Surface Elevation:
Surface Conditions: Grass



Real-World Geotechnical Solutions
Investigation • Design • Construction Support

August 14, 2026
Project No. 26-6951

Icon Construction & Development, LLC
Harlan Borow
1969 Willamette Falls Drive, Suite 260
West Linn Oregon, 97068
Email: harlan@iconconstruction.net

Via email with hard copies mailed upon request

SUBJECT: RESULTS OF ADDITIONAL INFILTRATION TESTING
2355 WILLAMETTE FALLS DRIVE
WEST LINN, OREGON

Reference: GeoPacific Engineering, Inc., Preliminary Geotechnical Engineering Report, 2355 Willamette Falls Drive, West Linn, Oregon, Dated February 25, 2026.

This letter presents the results of additional infiltration testing conducted by GeoPacific Engineering, Inc. (GeoPacific) for the above-referenced project. GeoPacific previously performed a geotechnical investigation of the site and conducted infiltration testing in two hand auger borings. The results of our previous infiltration tests were provided in the above-referenced report, dated February 25, 2026.

It is our understanding that a drywell is proposed near the northwest corner of the site. During our previous geotechnical investigation, we did not perform a subsurface exploration in the immediate vicinity of the proposed drywell, since plans for the stormwater management system had not yet been finalized. The City of West Linn expressed concern that subsurface conditions might vary and that the soils at the location of the proposed drywell might not infiltrate adequately.

In an effort to further study subsurface conditions at the location of the proposed drywell and to thus alleviate concerns about the performance of the proposed drywell, GeoPacific returned to the site on August 13, 2026 to perform additional infiltration testing. The approximate location of the hand augers are indicated on Figure 1.

It is our understanding that the design of the stormwater management system has been completed by others and that an infiltration rate of 6.1 inches per hour was utilized for design. This was the rate obtained in Silty Sand (SM) at a depth of 5.5 feet in hand auger boring HA-2.

SOIL CONDITIONS

Within our additional hand auger borings, designated HA-4 and HA-5, we encountered similar conditions to our previous explorations, but the sand appeared to contain less fines (passing No. 200 sieve) than in our previous explorations.

INFILTRATION TESTING

On August 13, 2026, we conducted infiltration testing within hand auger borings HA-4 and HA-5, within the Silty SAND (SM) using the open-hole testing method. The soils were presoaked prior to infiltration testing. During testing, the water level was measured to the nearest 0.01 foot from a fixed point, and the changes in water level were recorded at regular intervals until three successive measurements showing a consistent infiltration rate were achieved. The infiltration results are presented in the table below. The infiltration rates have been reported without applying a factor of safety. Care should be taken when estimating infiltration capacity at the site.

Table 1 – Summary of Additional Infiltration Test Results

Exploration ID	Depth (ft)	Soil Type	Infiltration Rate (in/hr)
HA-4	5.0	Silty SAND (SM)	36
HA-5	8.0	Silty SAND (SM)	20

The results of our additional infiltration tests indicate that the soils in the immediate vicinity of the proposed drywell in the northwestern portion of the site exhibit infiltration rates higher than the soils encountered in our previous explorations. Therefore, the drywell is anticipated to perform even better than anticipated.

Stormwater management systems should be constructed as specified by the designer and/or in accordance with the applicable stormwater design codes. The infiltration rates presented in this report do not incorporate a factor of safety. All systems should include an adequate factor of safety. Stormwater exceeding soil infiltration and/or soil storage capacities will need to be directed in a controlled manner to a suitable surface discharge location, away from structures.

UNCERTAINTIES AND LIMITATIONS

This scope of this study includes measuring infiltration rates only. Rates of infiltration that were affected by impermeable soils or groundwater seepage were not reported. This study did not include risk assessment for geologic hazards or flooding on the site. Environmental implications of stormwater disposal or ODEQ approval at this site are also beyond the scope of this report.

Infiltration test methods and procedures attempt to simulate the as-built conditions of the planned subsurface disposal system. However, due to natural variations in soil properties, actual infiltration rates may vary from the measured and/or recommended design rates. All systems should be constructed such that potential overflow is discharged in a controlled manner away from structures, and all systems should include an adequate factor of safety. Infiltration rates presented in this report should not be applied to inappropriate or complex hydrological models such as a closed basin without extensive further studies. This report presents infiltration test results only and should not be construed as an approval of a system design.

Please call if you have any questions or need further information.

We appreciate this opportunity to be of service.

Sincerely,

GEOPACIFIC ENGINEERING, INC.



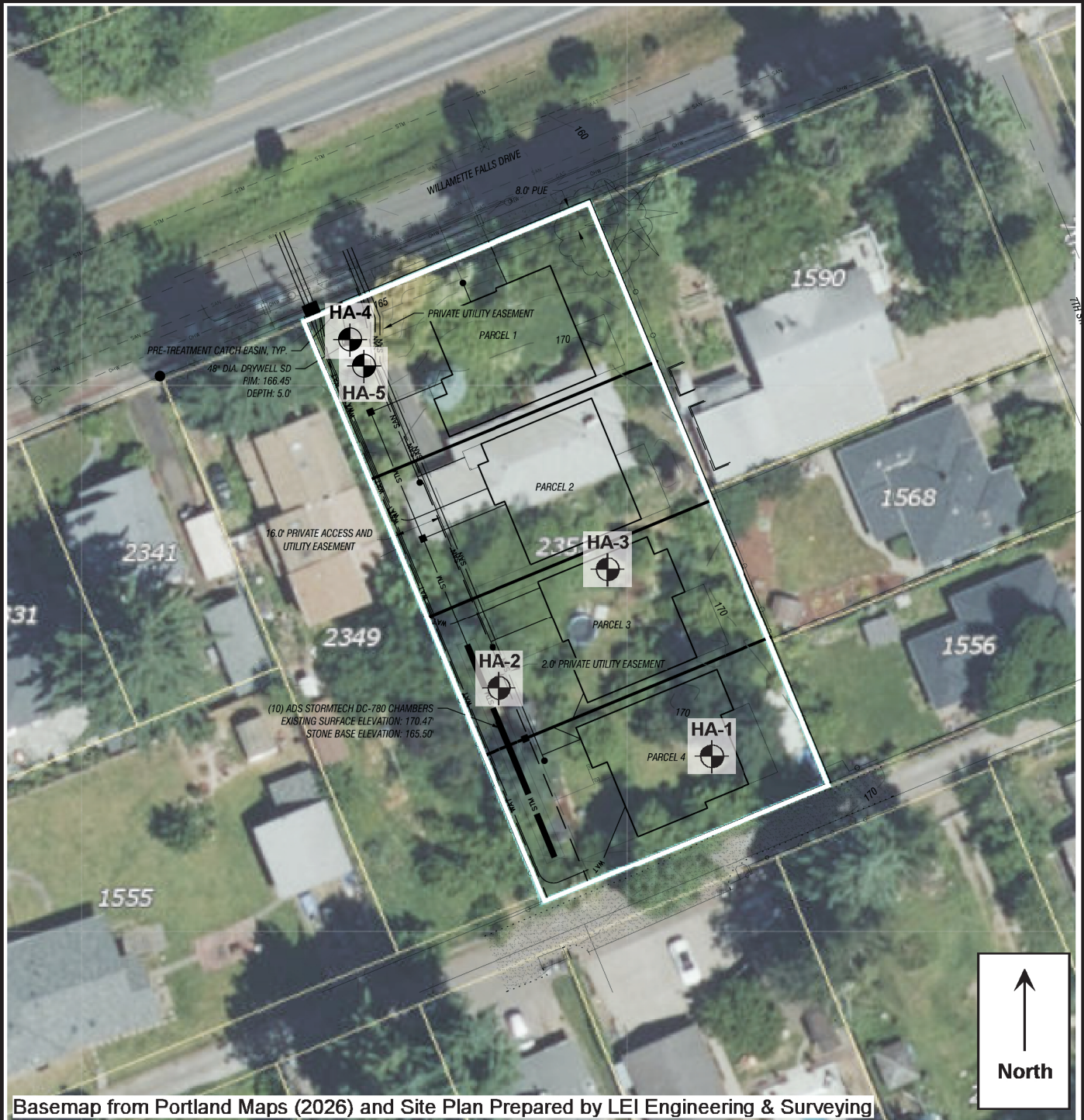
Benjamin G. Anderson, P.E., G.E.
Principal Geotechnical Engineer

Attachments: Figure 1 – Site Plan and Exploration Locations



14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445

SITE PLAN AND EXPLORATION LOCATIONS



Legend

HA-1
 Hand Auger Boring Designation
and Approximate Location

Date: 08/14/26

Drawn by: EKR/BGA

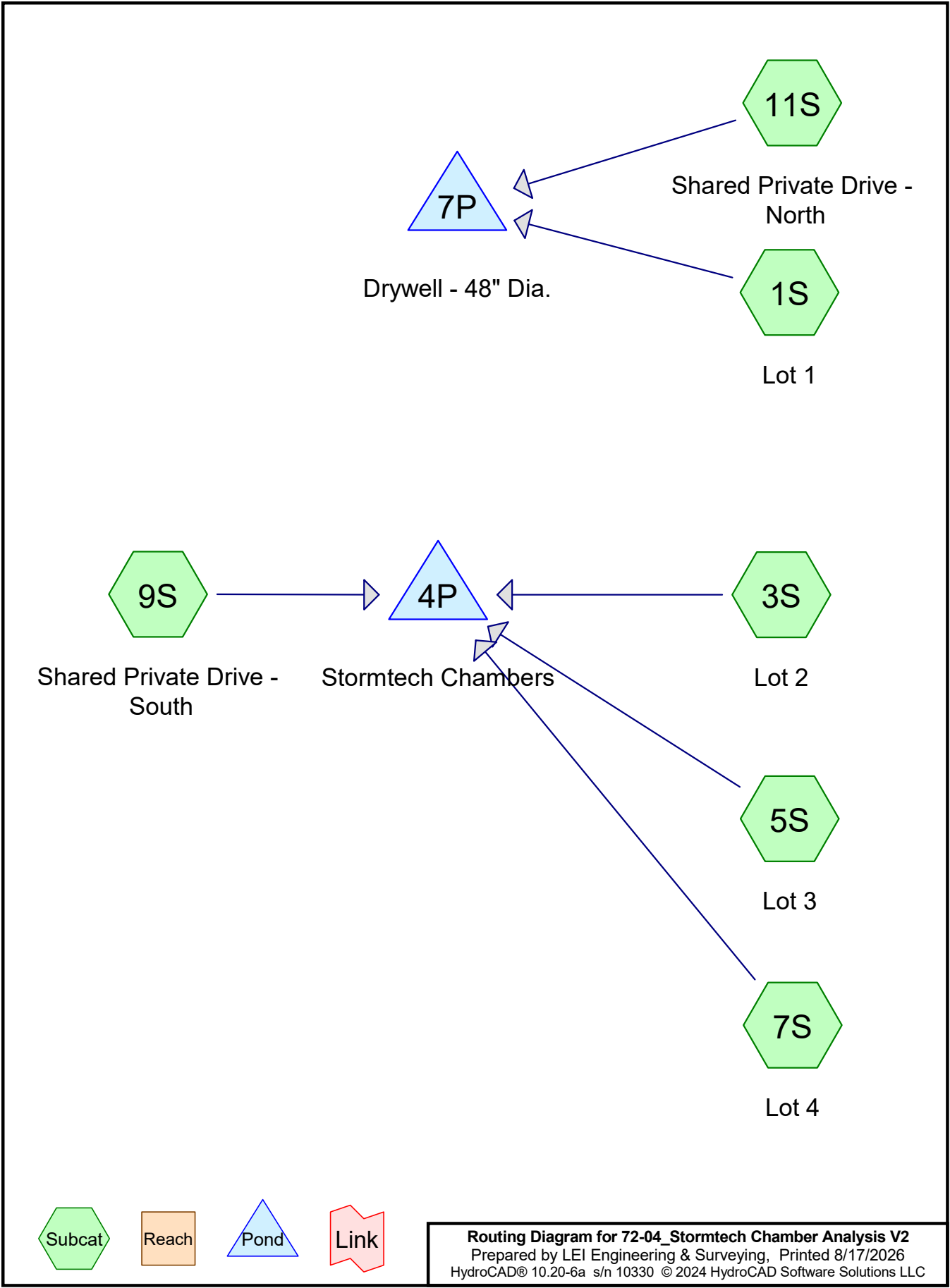
0 50'
APPROXIMATE SCALE 1"=50'

Project: 2355 Willamette Falls Drive
West Linn, Oregon

Project No. 26-6951

FIGURE 1

Appendix F
Basin Hydrology Computations



72-04_Stormtech Chamber Analysis V2

Prepared by LEI Engineering & Surveying

HydroCAD® 10.20-6a s/n 10330 © 2024 HydroCAD Software Solutions LLC

Printed 8/18/2026

Page 1

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	25-yr	Type IA 24-hr		Default	24.00	1	3.90	2

72-04_Stormtech Chamber Analysis V2

Prepared by LEI Engineering & Surveying

HydroCAD® 10.20-6a s/n 10330 © 2024 HydroCAD Software Solutions LLC

Type IA 24-hr 25-yr Rainfall=3.90"

Printed 8/18/2026

Page 2

Summary for Subcatchment 8S: Pre-development

Runoff = 0.04 cfs @ 8.22 hrs, Volume= 1,322 cf, Depth= 1.26"

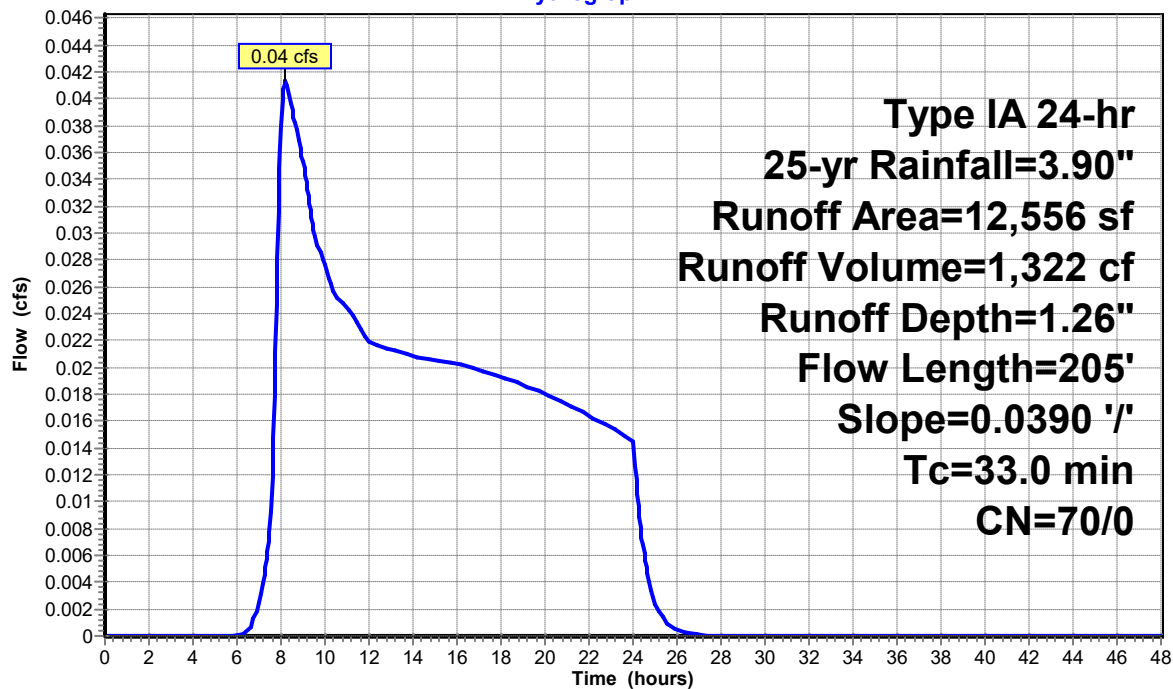
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-yr Rainfall=3.90"

	Area (sf)	CN	Description
*	12,556	70	Pre-development
	12,556	70	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.0	205	0.0390	0.10		Sheet Flow, Pre-development Woods: Light underbrush n= 0.400 P2= 2.50"

Subcatchment 8S: Pre-development

Hydrograph



72-04_Stormtech Chamber Analysis V2

Prepared by LEI Engineering & Surveying

HydroCAD® 10.20-6a s/n 10330 © 2024 HydroCAD Software Solutions LLC

Printed 8/17/2026

Page 1

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	25-yr	Type IA 24-hr		Default	24.00	1	3.90	2

72-04_Stormtech Chamber Analysis V2

Prepared by LEI Engineering & Surveying

HydroCAD® 10.20-6a s/n 10330 © 2024 HydroCAD Software Solutions LLC

Type IA 24-hr 25-yr Rainfall=3.90"

Printed 8/17/2026

Page 2

Summary for Subcatchment 1S: Lot 1

[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.05 cfs @ 7.90 hrs, Volume= 704 cf, Depth= 3.67"
Routed to Pond 7P : Drywell - 48" Dia.

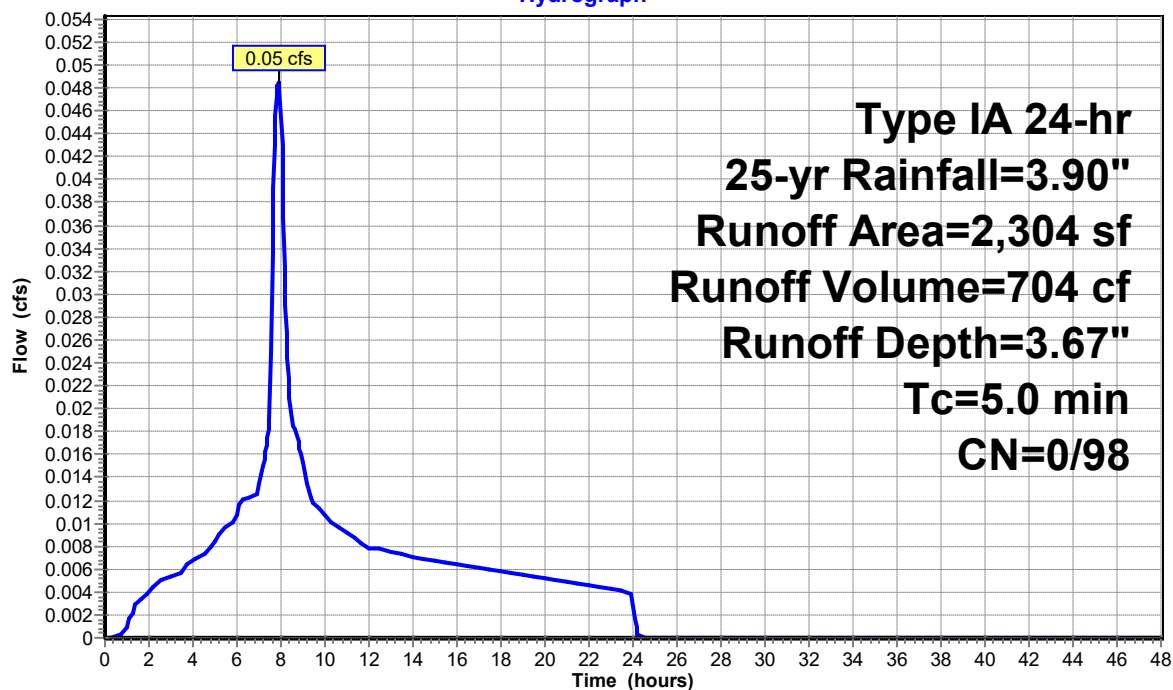
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, $dt=0.05$ hrs
Type IA 24-hr 25-yr Rainfall=3.90"

	Area (sf)	CN	Description
*	2,054	98	Roof Drains
*	250	98	Personal Driveway and Additional Hardscape
	2,304	98	Weighted Average
	2,304	98	100.00% Impervious Area

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

Subcatchment 1S: Lot 1

Hydrograph



72-04_Stormtech Chamber Analysis V2

Prepared by LEI Engineering & Surveying

HydroCAD® 10.20-6a s/n 10330 © 2024 HydroCAD Software Solutions LLC

Type IA 24-hr 25-yr Rainfall=3.90"

Printed 8/17/2026

Page 3

Summary for Subcatchment 3S: Lot 2

[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.05 cfs @ 7.90 hrs, Volume= 761 cf, Depth= 3.67"
Routed to Pond 4P : Stormtech Chambers

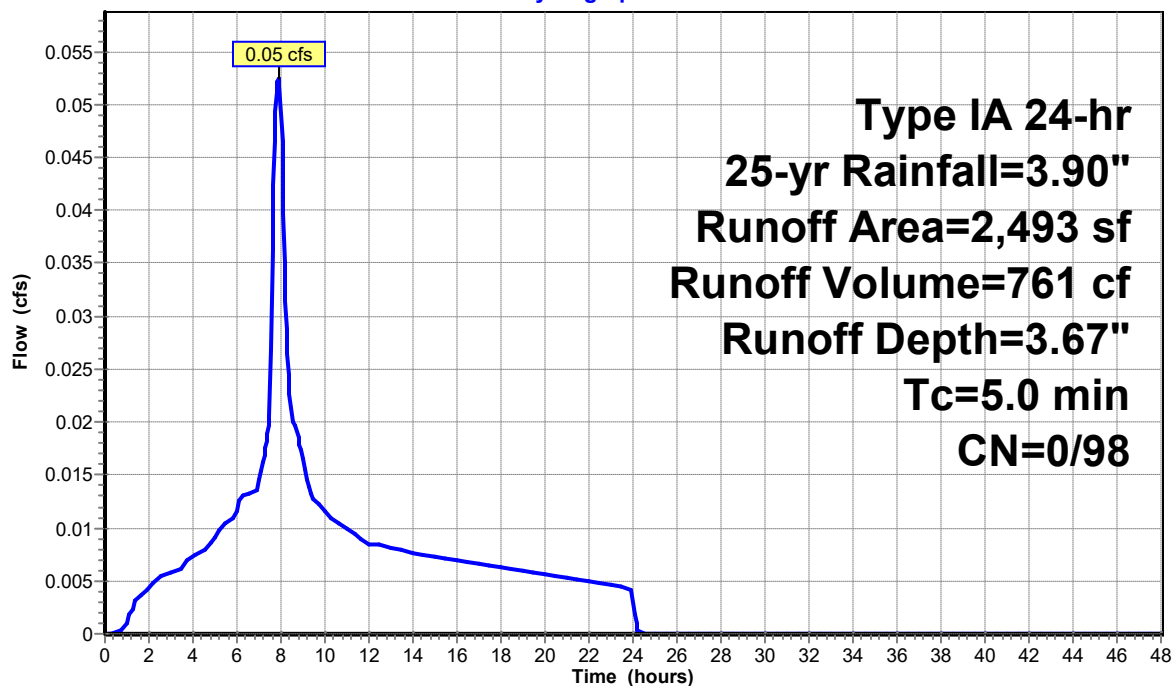
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, $dt=0.05$ hrs
Type IA 24-hr 25-yr Rainfall=3.90"

	Area (sf)	CN	Description
*	2,243	98	Roof Drains
*	250	98	Personal Driveway and Additional Hardscape
	2,493	98	Weighted Average
	2,493	98	100.00% Impervious Area

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

Subcatchment 3S: Lot 2

Hydrograph



72-04_Stormtech Chamber Analysis V2

Prepared by LEI Engineering & Surveying

HydroCAD® 10.20-6a s/n 10330 © 2024 HydroCAD Software Solutions LLC

Type IA 24-hr 25-yr Rainfall=3.90"

Printed 8/17/2026

Page 4

Summary for Subcatchment 5S: Lot 3

[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.05 cfs @ 7.90 hrs, Volume= 761 cf, Depth= 3.67"
Routed to Pond 4P : Stormtech Chambers

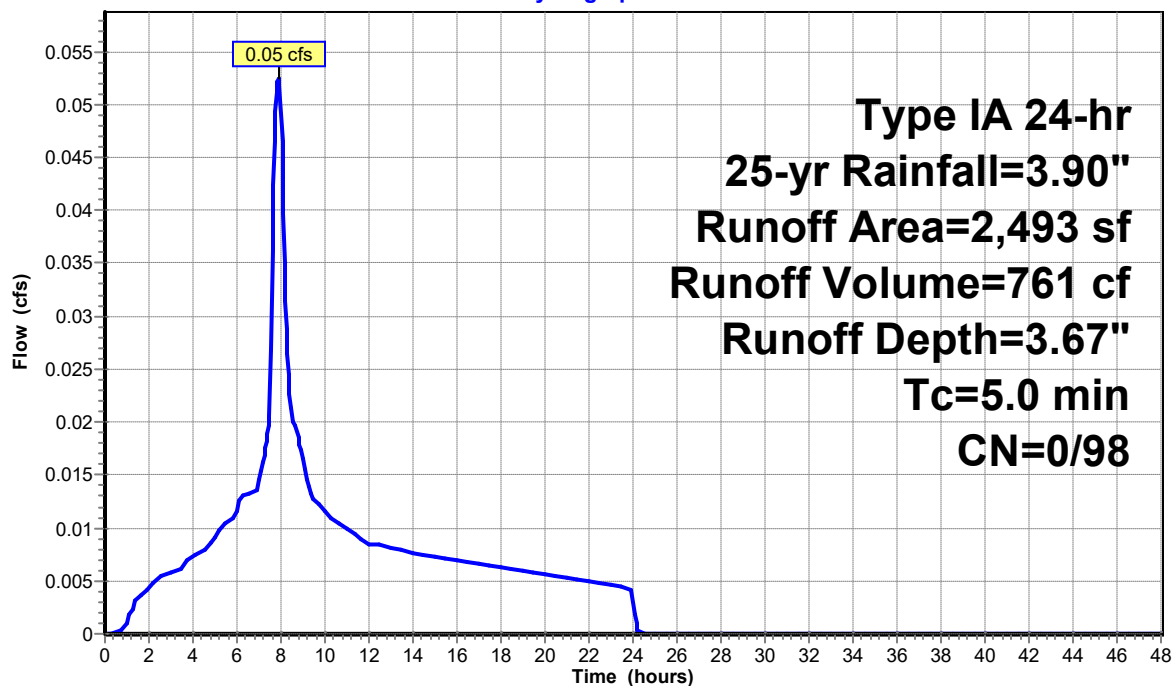
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, $dt=0.05$ hrs
Type IA 24-hr 25-yr Rainfall=3.90"

	Area (sf)	CN	Description
*	2,243	98	Roof Drains
*	250	98	Personal Driveway and Additional Hardscape
	2,493	98	Weighted Average
	2,493	98	100.00% Impervious Area

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

Subcatchment 5S: Lot 3

Hydrograph



72-04_Stormtech Chamber Analysis V2

Prepared by LEI Engineering & Surveying

HydroCAD® 10.20-6a s/n 10330 © 2024 HydroCAD Software Solutions LLC

Type IA 24-hr 25-yr Rainfall=3.90"

Printed 8/17/2026

Page 5

Summary for Subcatchment 7S: Lot 4

[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.05 cfs @ 7.90 hrs, Volume= 729 cf, Depth= 3.67"
Routed to Pond 4P : Stormtech Chambers

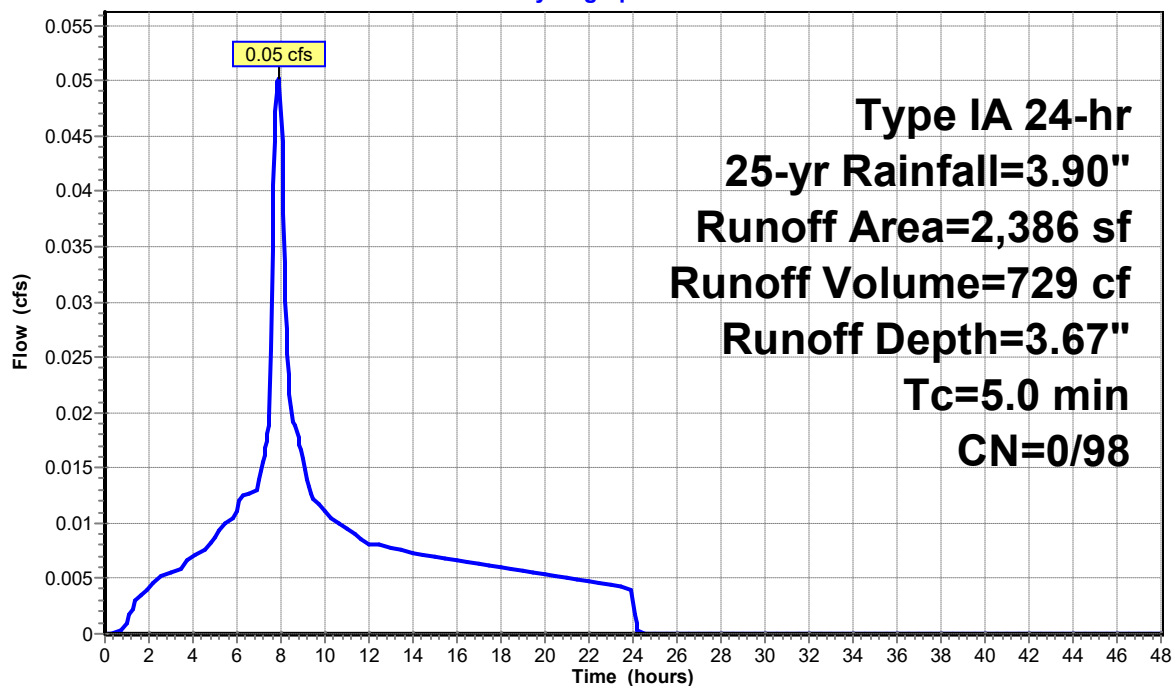
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, $dt=0.05$ hrs
Type IA 24-hr 25-yr Rainfall=3.90"

	Area (sf)	CN	Description
*	2,136	98	Roof Drains
*	250	98	Personal Driveway and Additional Hardscape
	2,386	98	Weighted Average
	2,386	98	100.00% Impervious Area

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

Subcatchment 7S: Lot 4

Hydrograph



72-04_Stormtech Chamber Analysis V2

Prepared by LEI Engineering & Surveying

HydroCAD® 10.20-6a s/n 10330 © 2024 HydroCAD Software Solutions LLC

Type IA 24-hr 25-yr Rainfall=3.90"

Printed 8/17/2026

Page 6

Summary for Subcatchment 9S: Shared Private Drive - South

[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.05 cfs @ 7.90 hrs, Volume= 661 cf, Depth= 3.67"
Routed to Pond 4P : Stormtech Chambers

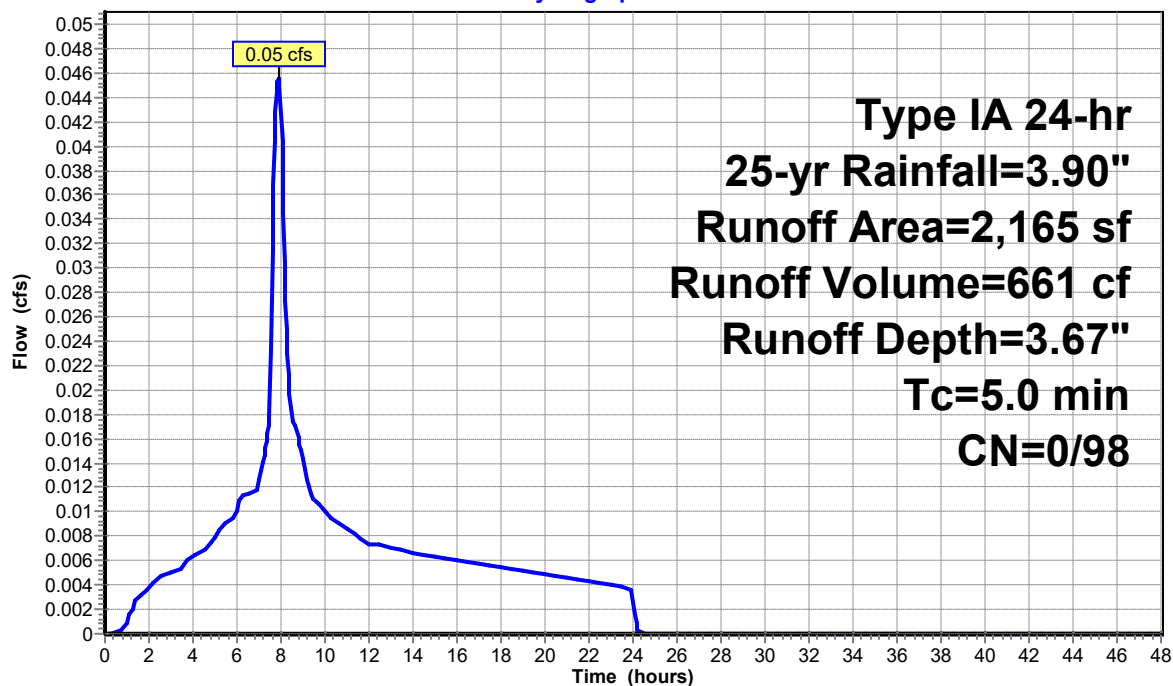
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, $dt= 0.05$ hrs
Type IA 24-hr 25-yr Rainfall=3.90"

	Area (sf)	CN	Description
*	2,165	98	Shared Drive
	2,165	98	100.00% Impervious Area

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

Subcatchment 9S: Shared Private Drive - South

Hydrograph



72-04_Stormtech Chamber Analysis V2

Prepared by LEI Engineering & Surveying

HydroCAD® 10.20-6a s/n 10330 © 2024 HydroCAD Software Solutions LLC

Type IA 24-hr 25-yr Rainfall=3.90"

Printed 8/17/2026

Page 7

Summary for Subcatchment 11S: Shared Private Drive - North

[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.02 cfs @ 7.90 hrs, Volume= 218 cf, Depth= 3.67"
Routed to Pond 7P : Drywell - 48" Dia.

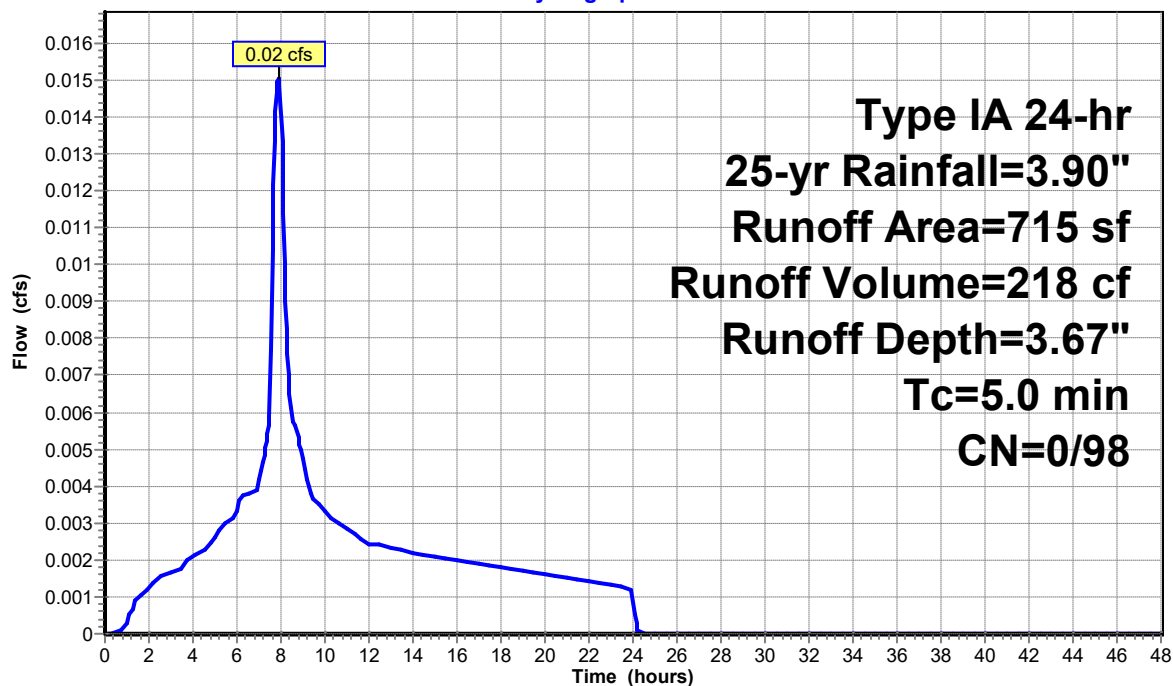
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, $dt= 0.05$ hrs
Type IA 24-hr 25-yr Rainfall=3.90"

	Area (sf)	CN	Description
*	715	98	Shared Drive
	715	98	100.00% Impervious Area

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

Subcatchment 11S: Shared Private Drive - North

Hydrograph



72-04_Stormtech Chamber Analysis V2

Type IA 24-hr 25-yr Rainfall=3.90"

Prepared by LEI Engineering & Surveying

Printed 8/17/2026

HydroCAD® 10.20-6a s/n 10330 © 2024 HydroCAD Software Solutions LLC

Page 8

Summary for Pond 4P: Stormtech Chambers

Inflow Area = 9,537 sf, 100.00% Impervious, Inflow Depth = 3.67" for 25-yr event
 Inflow = 0.20 cfs @ 7.90 hrs, Volume= 2,913 cf
 Outflow = 0.03 cfs @ 4.45 hrs, Volume= 2,913 cf, Atten= 85%, Lag= 0.0 min
 Discarded = 0.03 cfs @ 4.45 hrs, Volume= 2,913 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 103.40' @ 13.72 hrs Surf.Area= 423 sf Storage= 828 cf

Plug-Flow detention time= 289.9 min calculated for 2,910 cf (100% of inflow)
 Center-of-Mass det. time= 289.9 min (951.2 - 661.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	100.00'	466 cf	6.25'W x 67.70'L x 3.75'H Field A 1,587 cf Overall - 421 cf Embedded = 1,165 cf x 40.0% Voids
#2A	100.75'	421 cf	ADS_StormTech DC-780 b +Cap x 9 Inside #1 Effective Size= 45.4"W x 30.0"H => 6.49 sf x 7.12'L = 46.2 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Cap Storage= 2.7 cf x 2 x 1 rows = 5.3 cf
		888 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	100.00'	3.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.03 cfs @ 4.45 hrs HW=100.04' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.03 cfs)

72-04_Stormtech Chamber Analysis V2

Prepared by LEI Engineering & Surveying

HydroCAD® 10.20-6a s/n 10330 © 2024 HydroCAD Software Solutions LLC

Type IA 24-hr 25-yr Rainfall=3.90"

Printed 8/17/2026

Page 9

Pond 4P: Stormtech Chambers - Chamber Wizard Field A

Chamber Model = ADS_StormTech DC-780 b +Cap (ADS StormTech® DC-780 with cap storage)

Effective Size= 45.4"W x 30.0"H => 6.49 sf x 7.12'L = 46.2 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

Cap Storage= 2.7 cf x 2 x 1 rows = 5.3 cf

9 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 65.70' Row Length +12.0" End Stone x 2 = 67.70' Base Length

1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width

9.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.75' Field Height

9 Chambers x 46.2 cf + 2.7 cf Cap Volume x 2 x 1 Rows = 421.5 cf Chamber Storage

1,586.6 cf Field - 421.5 cf Chambers = 1,165.2 cf Stone x 40.0% Voids = 466.1 cf Stone Storage

Chamber Storage + Stone Storage = 887.5 cf = 0.020 af

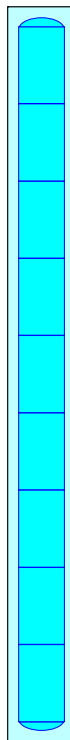
Overall Storage Efficiency = 55.9%

Overall System Size = 67.70' x 6.25' x 3.75'

9 Chambers

58.8 cy Field

43.2 cy Stone



72-04_Stormtech Chamber Analysis V2

Prepared by LEI Engineering & Surveying

HydroCAD® 10.20-6a s/n 10330 © 2024 HydroCAD Software Solutions LLC

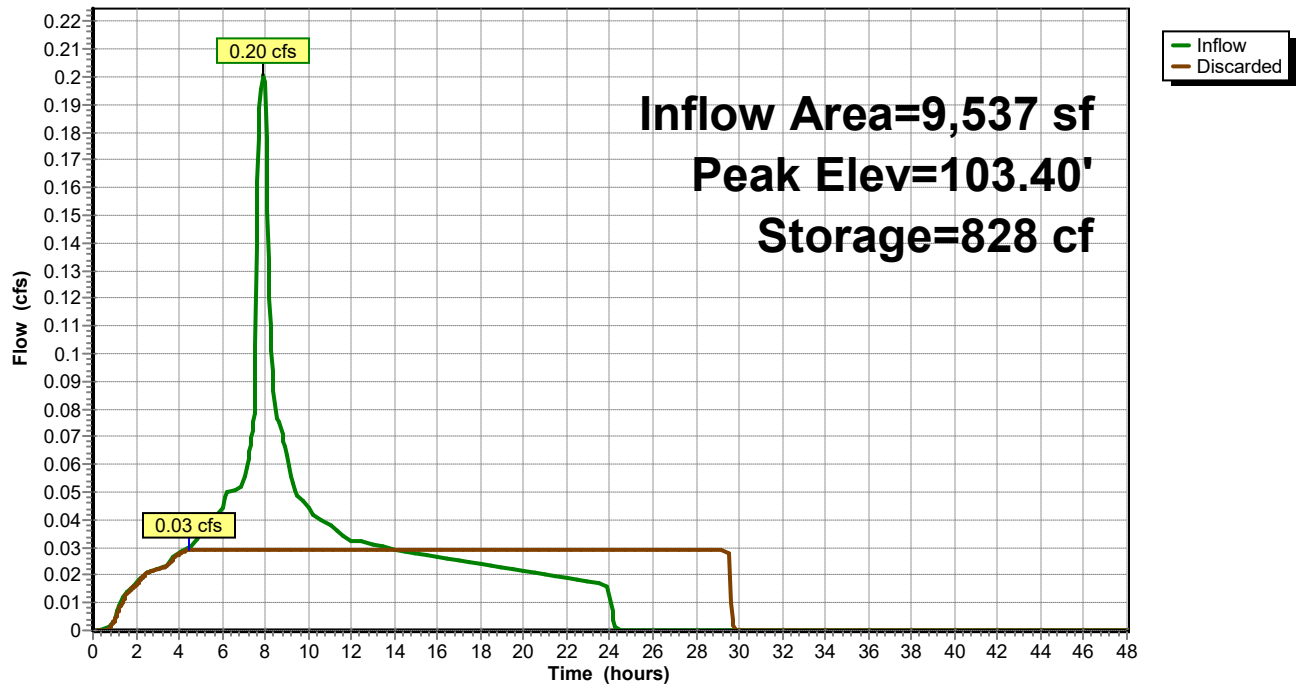
Type IA 24-hr 25-yr Rainfall=3.90"

Printed 8/17/2026

Page 10

Pond 4P: Stormtech Chambers

Hydrograph



72-04_Stormtech Chamber Analysis V2

Prepared by LEI Engineering & Surveying

HydroCAD® 10.20-6a s/n 10330 © 2024 HydroCAD Software Solutions LLC

Type IA 24-hr 25-yr Rainfall=3.90"

Printed 8/17/2026

Page 11

Summary for Pond 7P: Drywell - 48" Dia.

Inflow Area = 3,019 sf, 100.00% Impervious, Inflow Depth = 3.67" for 25-yr event
Inflow = 0.06 cfs @ 7.90 hrs, Volume= 922 cf
Outflow = 0.03 cfs @ 8.29 hrs, Volume= 922 cf, Atten= 49%, Lag= 23.6 min
Discarded = 0.03 cfs @ 8.29 hrs, Volume= 922 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 105.98' @ 8.29 hrs Surf.Area= 28 sf Storage= 113 cf

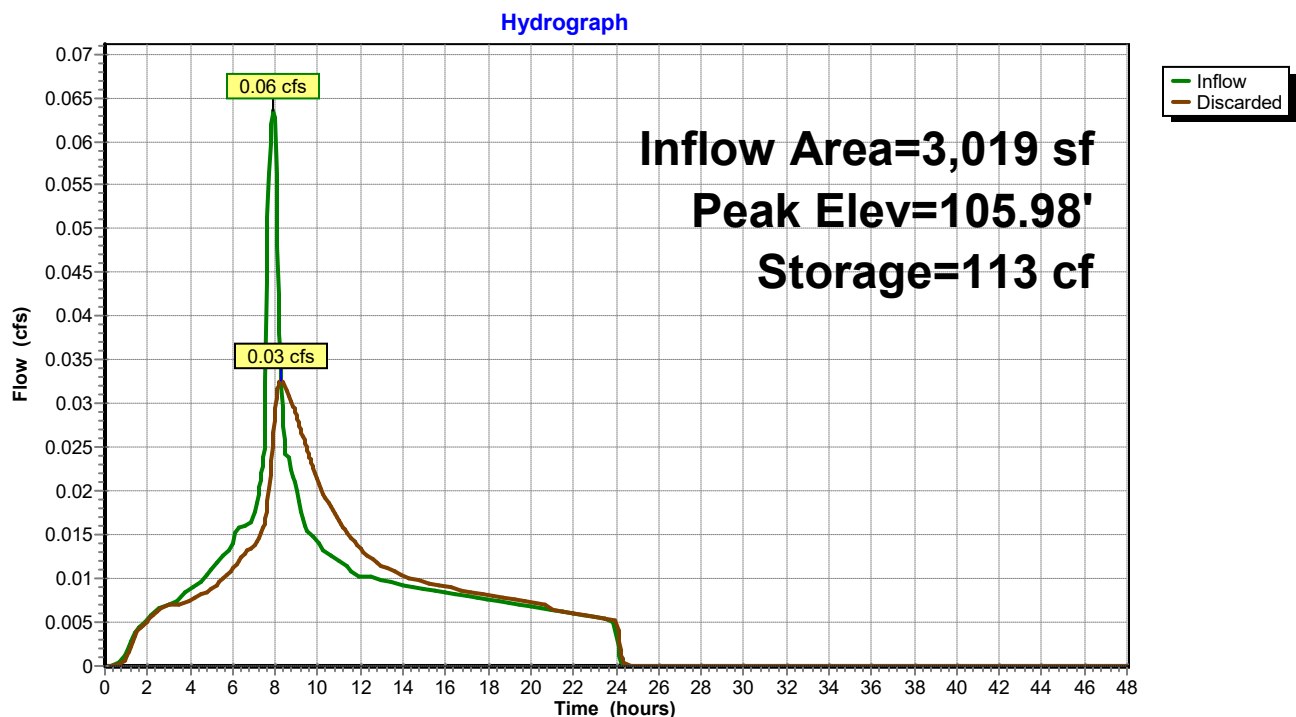
Plug-Flow detention time= 31.5 min calculated for 921 cf (100% of inflow)
Center-of-Mass det. time= 31.4 min (692.8 - 661.3)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	126 cf	4.00'D x 10.00'H Drywell Inside #2
#2	100.00'	63 cf	6.00'D x 10.00'H Rock Gallery
			283 cf Overall - 126 cf Embedded = 157 cf x 40.0% Voids
			188 cf Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	100.00'	10.000 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.03 cfs @ 8.29 hrs HW=105.98' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Pond 7P: Drywell - 48" Dia.



Appendix G
Well Logs

STATE OF OREGON
GEOTECHNICAL HOLE REPORT
(as required by OAR 690-240-035)

CLAC 60487

(1) OWNER/PROJECT: 04-0370 Hole Number B3
Name Beaker #1
Address 1892 6th Ave
City West Linn State OR Zip _____

(2) TYPE OF WORK
☒ New ☐ Deepening ☐ Alteration (repair/recondition) ☒ Abandonment

(3) CONSTRUCTION:
☐ Rotary Air ☒ Hand Auger ☐ Hollow Stem Auger
☐ Rotary Mud ☐ Cable Tool ☐ Push Probe ☐ Other _____

(4) TYPE OF HOLE:
☒ Uncased Temporary ☐ Cased Permanent
☐ Uncased Permanent ☐ Slope Stability ☐ Other _____

(5) USE OF HOLE:
Environmental Sampling

(6) BORE HOLE CONSTRUCTION:
Special Construction approval ☐ Yes ☒ No Depth of Completed Hole 10 ft.

HOLE			SEAL			Sacks or pounds
Diameter	From	To	Material	From	To	
<u>2 1/2"</u>	<u>0"</u>	<u>120</u>				

Backfill placed from _____ ft. to _____ ft. Material _____
Filter Pack placed from _____ ft. to _____ ft. Size of pack _____

(7) CASING/SCREEN:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:	<u>NA</u>				☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
Screen:	<u>NA</u>				☐	☐	☐	☐
					☐	☐	☐	☐
Slot size	<u>NA</u>				☐	☐	☐	☐

(8) WELL TEST:
☐ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian
Permeability NA Yield NA GPM NA
Conductivity NA PH NA
Temperature of water NA °F Depth artesian flow found NA ft.
Was water analysis done? ☐ Yes ☐ No
By whom? _____
Depth of strata analyzed. From _____ ft. to _____ ft.
Remarks: _____

WATER RESOURCES DEPT
SALEM, OREGON

(9) LOCATION OF HOLE by legal description:
County CLAC Latitude _____ Longitude _____
Township 33 Range 1E WM.
Section 02 NE 1/4 NW
Tax Lot 4001 Lot Not Subdivision _____
Street Address of Well (or nearest address) SAME

Map with location identified must be attached

(10) STATIC WATER LEVEL:
_____ ft. below land surface. Date _____
Artesian pressure NA lb. per square inch. Date NA

(11) SUBSURFACE LOG:
Ground Elevation _____

Material Description	From	To	SWL
<u>Dry Brown Silt</u>	<u>0</u>	<u>60</u>	
<u>Dry Dark Brown Silt</u>	<u>60</u>	<u>110</u>	
<u>Dry Brown Silt</u>	<u>110</u>	<u>120</u>	

Date Started 7-27-4 Date Completed 7-27-4

(12) ABANDONMENT LOG:

Material Description	From	To	Sacks or Pounds
<u>Native</u>	<u>0</u>	<u>2</u>	
<u>Bentonite</u>	<u>2</u>	<u>10</u>	<u>28</u>
RECEIVED SEP 23 2004 WATER RESOURCES DEPT SALEM, OREGON			
Date started	<u>7-27-4</u>	Date Completed	<u>7-27-4</u>

Professional Certification

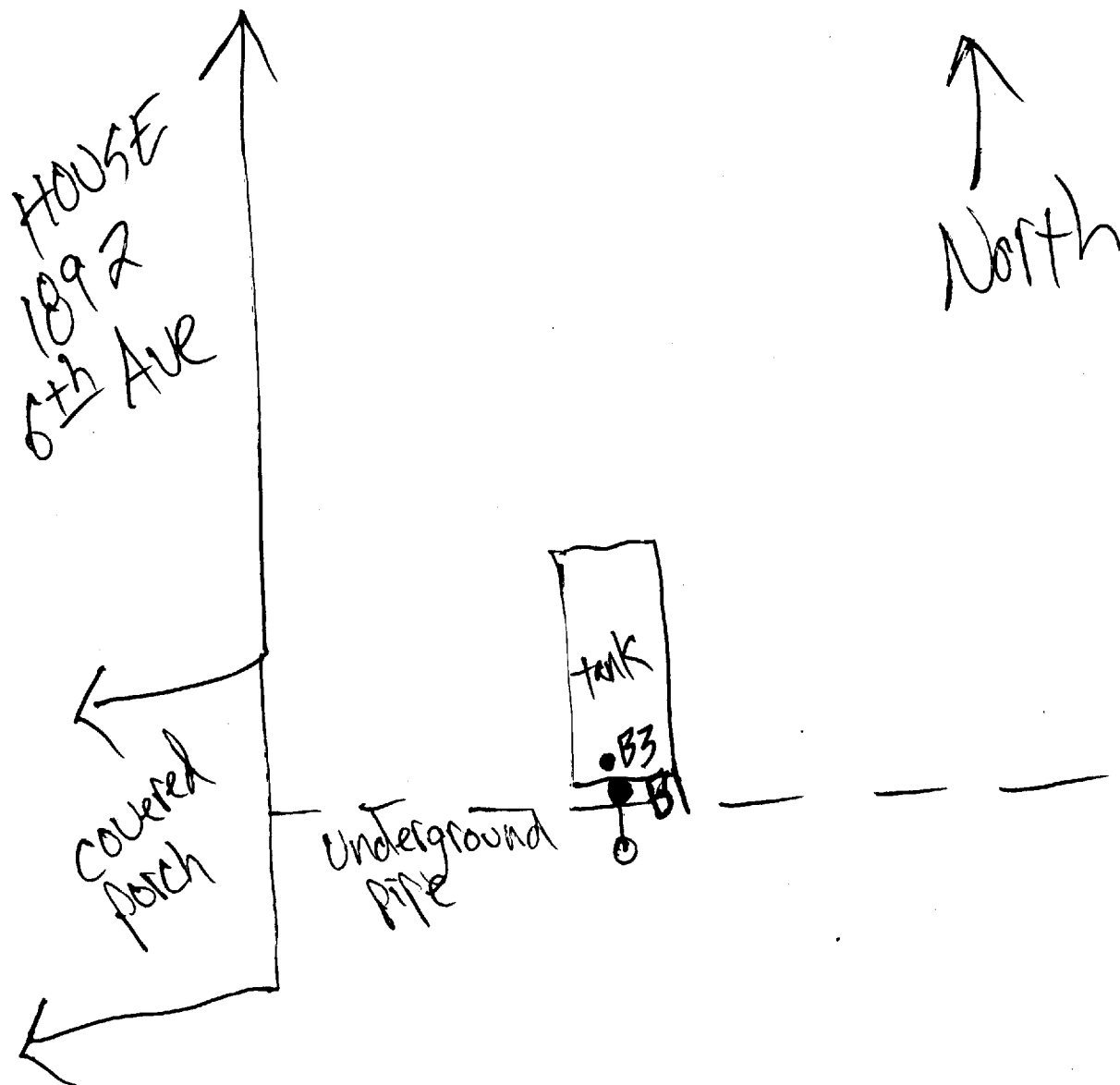
(to be signed by a licensed water supply or monitoring well constructor, or registered geologist or civil engineer).

I accept responsibility for the construction, alteration, or abandonment work performed on during the construction dates reported above. All work performed during this time is in compliance with Oregon geotechnical hole construction standards. This report is true to the best of my knowledge and belief.

Signed [Signature] License or Registration Number 10524
Date 9-21-04
Affiliation CASCADE ENVIRONMENTAL SERVICES INC.

THIS REPORT MUST BE SUBMITTED TO THE WATER RESOURCES DEPARTMENT WITHIN 30 DAYS OF COMPLETION OF WORK

ORIGINAL & FIRST COPY-WATER RESOURCES DEPARTMENT SECOND COPY-CONSTRUCTOR THIRD COPY-CUSTOMER



RECEIVED

SEP 23 2004

WATER RESOURCES DEPT
SALEM, OREGON

STATE OF OREGON
GEOTECHNICAL HOLE REPORT
 (as required by OAR 690-240-0035)

1/14/2013

(1) OWNER/PROJECT Hole Number PO-1

PROJECT NAME/NBR: 1683

First Name ROB Last Name FERNANDEZ

Company

Address 2015 8TH AVE

City WEST LINN State OR Zip 97068

(2) TYPE OF WORK ☒ New ☐ Deepening ☒ Abandonment
☐ Alteration (repair/recondition)**(3) CONSTRUCTION**☐ Rotary Air ☐ Hand Auger ☐ Hollow stem auger☐ Rotary Mud ☐ Cable ☒ Push Probe☐ Other**(4) TYPE OF HOLE:**☒ Uncased Temporary ☐ Cased Permanent☐ Uncased Permanent ☐ Slope Stability☐ Other

Other:

(5) USE OF HOLE

SOIL SAMPLES

(6) BORE HOLE CONSTRUCTION Special Standard ☐ (Attach copy)

Depth of Completed Hole 15.00 ft.

BORE HOLE			SEAL			sacks/	
Dia	From	To	Material	From	To	Amt	lbs
2.25	0	15	Bentonite Chips	0	15	0.5	S

Backfill placed from 0 ft. to 15 ft. Material BENTONITE CHIPS
Filter pack from ft. to ft. Material Size**(7) CASING/SCREEN**

Casing	Screen	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
☐	☐						☐	☐	☐	☐
☐	☐						☐	☐	☐	☐
☐	☐						☐	☐	☐	☐
☐	☐						☐	☐	☐	☐
☐	☐						☐	☐	☐	☐

(8) WELL TESTS☐ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration(hr)

Temperature °F Lab analysis ☐ Yes By

Supervising Geologist/Engineer

Water quality concerns? ☐ Yes (describe below) TDS amount

From	To	Description	Amount	Units

(9) LOCATION OF HOLE (legal description)

County CLACKAMAS Twp 3.00 S N/S Range 1.00 E E/W WM

Sec 2 NE 1/4 of the NW 1/4 Tax Lot 100

Tax Map Number Lot

Lat ° ' " or DMS or DD

Long ° ' " or DMS or DD

☒ Street address of hole ☐ Nearest address2015 8TH AVE
WEST LINN, OR 97068**(10) STATIC WATER LEVEL**

Date SWL(psi) + SWL(ft)

Existing Well / Predeepening				
Completed Well				

Flowing Artesian? ☐

WATER BEARING ZONES

Depth water was first found

SWL Date	From	To	Est Flow	SWL(psi)	+ SWL(ft)

(11) SUBSURFACE LOG Ground Elevation

Material	From	To
ASPHALT	0	0.2
BROWN SILT	0.2	0.8
BROWN SANDY SILT	0.8	15

Date Started 9/8/2012 Completed 9/8/2012

(12) ABANDONMENT LOG:

Material	From	To	Amt	sacks/
Bentonite Chips	0	15	0.5	S

Date Started 9/8/2012 Completed 9/8/2012

Professional Certification (to be signed by an Oregon licensed water or monitoring well constructor, Oregon registered geologist or professional engineer).

I accept responsibility for the construction, deepening, alteration, or abandonment work performed during the construction dates reported above. All work performed during this time is in compliance with Oregon geotechnical hole construction standards. This report is true to the best of my knowledge and belief.

License/Registration Number 10495 Date 1/14/2013

First Name C MARCUS Last Name JOHNSON

Affiliation PACIFIC SOIL & WATER

GEOTECHNICAL HOLE REPORT - Map with location
identified must be attached and shall include an approximate
scale and north arrow

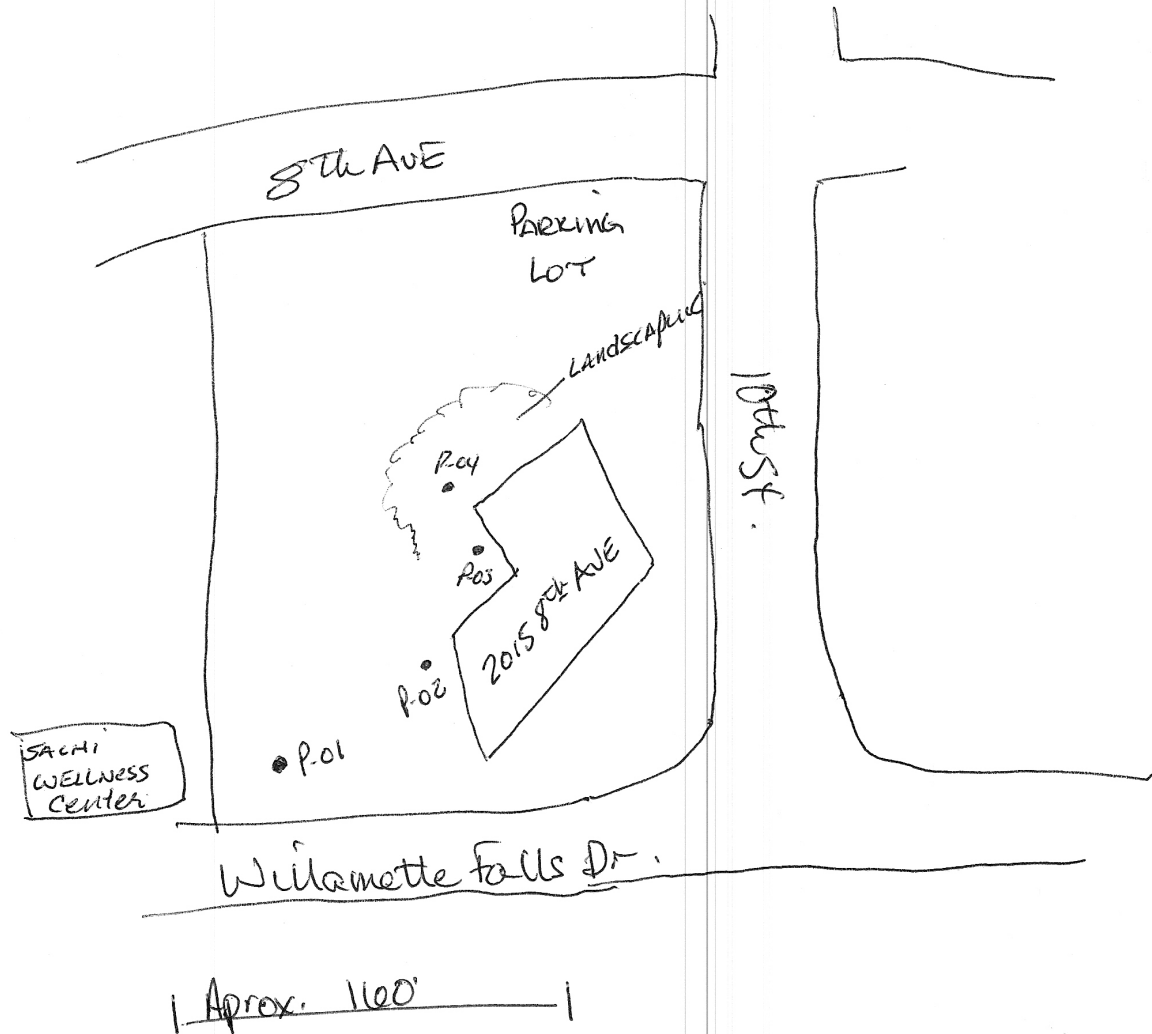
CLAC 69384

1/14/2013

Map of Hole

9-8-12 HANIN & Associates.

2015 8th Ave, West Linn, OR



Appendix H
Sample Operations and Maintenance Agreement



CITY OF West Linn

Private Stormwater Facility Inspection, Maintenance & Reporting Form

Complete & Return to:

West Linn Public Works - ESD

Private W.Q.F. Management Program

4100 Norfolk Street

West Linn, OR 97068

Or Fax to: (503) 657-3237

Or email to: dnorton@westlinnoregon.gov

If you have questions call either:

Dan Norton (503) 742-6078 or

Mike Cardwell (503) 742-8620 (Supervisor)

Facility Site Address:	
Business or Owner Name:	
Mailing Address:	
Phone:	Email:
Inspector & Title:	Date of Inspection: / / 20__

Please indicate what types of Stormwater Facilities are present, how many, when & what maintenance was performed or if the facility listed is non-applicable or N/A.

How many or N/A	Stormwater Facilities	Maintenance Required?		Date & Description of Maintenance Performed
	*Rain Gardens, Ponds, & Swales (*see back)	No ☐	Yes ☐	
	Catch Basins, or Inlets Structures	No ☐	Yes ☐	
	Pollution & Sediment Control Manholes	No ☐	Yes ☐	
	Conveyance Pipes & Ditches (size, length in feet):	No ☐	Yes ☐	
	Debris Barriers, Grates, or Racks	No ☐	Yes ☐	
	Drywells or French Drains	No ☐	Yes ☐	
	Dissipaters, or Outfall Structures	No ☐	Yes ☐	
	Fencing, Shrubbery Screens, Gates	No ☐	Yes ☐	
	Proprietary Media Filters ¹	No ☐	Yes ☐	
	Control Structures & Flow Restrictors	No ☐	Yes ☐	
	Underground Detention Systems	No ☐	Yes ☐	

- For proprietary or manufactured stormwater technology, please include the model number and manufacturer in the provided maintenance information.



CITY OF West Linn

Maintenance Indicator	Corrective Action
Clogged catch basin inlets or outlets	Remove sediment and debris from catch basins, trench drains, curb inlets, and pipes to maintain at least 50% conveyance capacity at all times.
Broken inlets or outlets	Repair or replace broken downspouts, curb cuts, standpipes, and screens as needed.
Cracked or exposed drain pipes	Repair/seal cracks. Replace when repair is insufficient. Cover with 6 inches of growing medium to prevent freeze/thaw and UV damage.
Check Dams missing, scattered or with gaps	Maintain rock check dams as per standard details.
Vegetation shall cover 75% of facility	Replant per original planting plan.
Dead or Strained vegetation	Irrigate as needed. Mulch as needed. DO NOT apply fertilizers, herbicides, or pesticides.
Tall grass and vegetation	Prune to allow sight lines and foot traffic. Prune to ensure inlets and outlets freely convey stormwater into and out of facility.
Erosion and or exposed soils	Fill-in and lightly compact areas of erosion with soil mix. Stabilize soils with plants.
Scouring at the inlet(s)	Replace splash blocks or inlet gravel/rock.
Ponding stormwater	Remove the top 2-4 inches of sediment at the end of the downspout extension and replace with soil mix. Rake, till or amend with soil mix to restore infiltration rate.
Slope slippage	Stabilize 3:1 slopes/banks with plantings.

Annual Maintenance Schedule

Summer: Make structural repairs. Improve filter medium as needed. Clear drains. Irrigate as needed.

Fall: Replant exposed soil and replace dead plants. Remove sediment and plant debris.

Winter: Monitor infiltration/flow through rates. Clear inlets and outlets/overflows to maintain conveyance.

Spring: Remove sediment and plant debris. Replant exposed soil and replace dead plants. Mulch as needed, but do not block the inlets, outlets, or flow path with mulch.

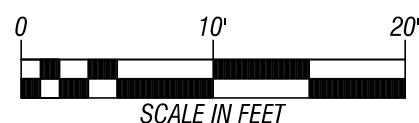
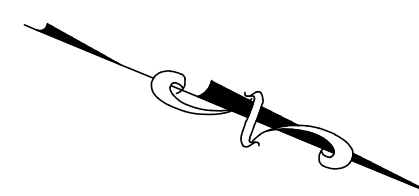
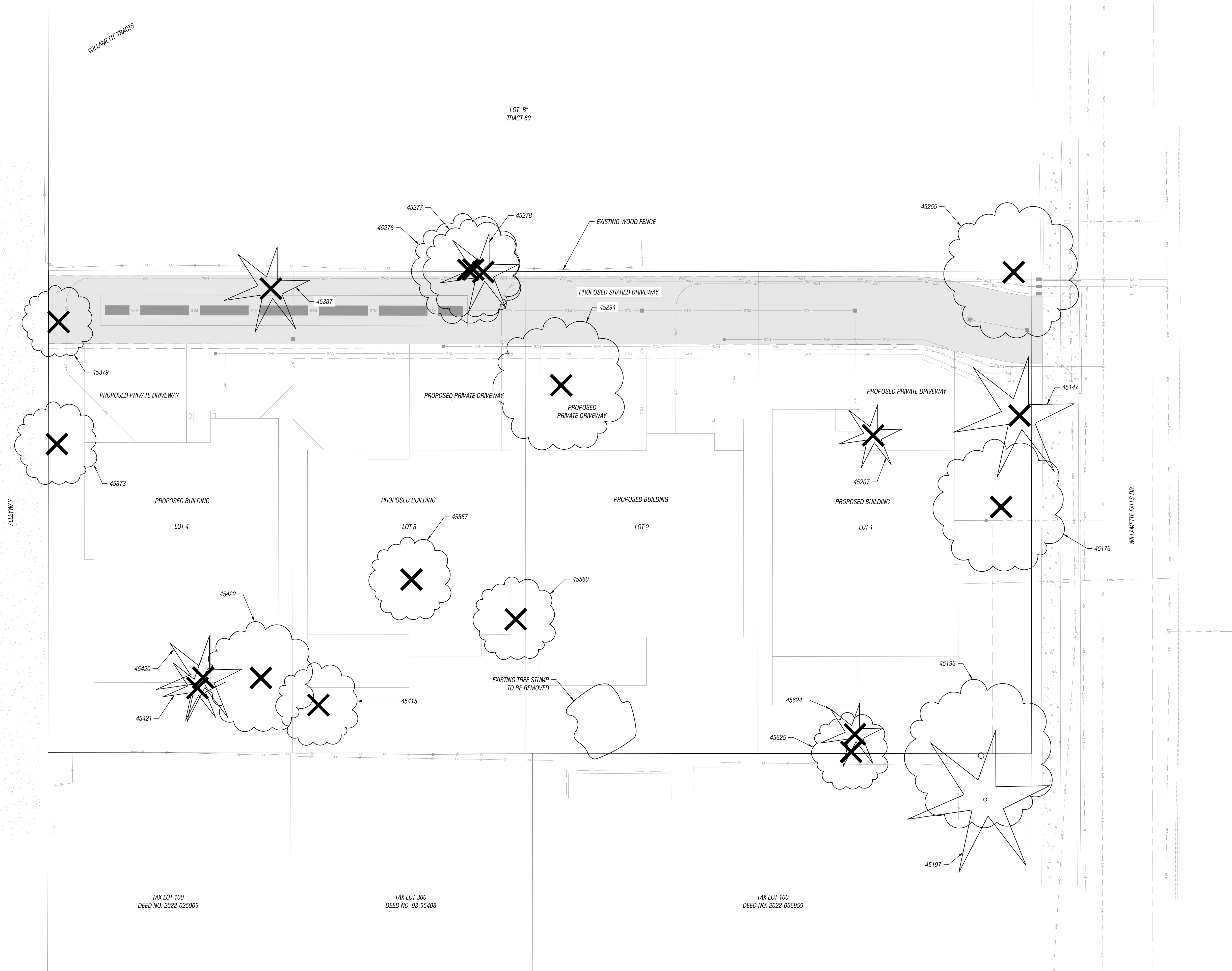
Maintenance Records: All facility operators are required to keep an annual inspection and maintenance log. Record date, description, and contractor (if applicable) for all structural repairs, landscape maintenance, and facility cleanout activities. Keep work orders and invoices on file and make available upon request of the City inspector.

Access: Maintain ingress/egress to design standards and for city inspectors to be able to inspect the facility.

Infiltration/Flow Control: All facilities shall drain within 48 hours. Record time/date, weather, and site conditions when ponding occurs. Growing/Filter Medium, including soil and gravels, shall sustain healthy plant cover.

Pollution Prevention: All sites shall implement Best Management Practices to prevent hazardous or solid wastes or excessive oil and sediment from contaminating stormwater. Record the time/date, weather, and site conditions if site activities contaminate stormwater. Record the time/date and description of corrective action taken.

Vectors (Mosquitoes and Rodents): Stormwater facilities shall not harbor mosquito larvae or rats that pose a threat to public health or that undermine the facility structure. Monitor standing water for small wiggling sticks perpendicular to the water's surface. Note holes/burrows in and around facilities. Call Clackamas County Vector Control at (503) 655-8394 for immediate assistance to eradicate vectors. Record the time/date, weather, and site conditions when vector activity is observed.



TREE TABLE			
TAG NUMBER	CATEGORY	DBH	REMOVE/PROTECT
45147	CT	30	REMOVE
45176	DT	23	REMOVE
45196	DT	30	PROTECT
45197	CT	48	PROTECT
45207	CT	9	REMOVE
45255	CT	24	REMOVE
45276	DT	16	REMOVE
45277	DT	13	REMOVE
45278	CT	13	REMOVE
45294	DT	23	REMOVE
45373	DT	CLU	REMOVE
45379	DT	8	REMOVE
45387	CT	15	REMOVE
45415	DT	CLU	REMOVE
45420	CT	15	REMOVE
45421	CT	9	REMOVE
45422	DT	16	REMOVE
45557	DT	10	REMOVE
45560	DT	CLU	REMOVE
45624	CT	9	REMOVE
45625	DT	9	REMOVE

NOTE:
CT = CONIFEROUS TREE
DT = DECIDUOUS TREE
X = TREES TO BE REMOVED

**FIRE CODE / LAND USE / BUILDING REVIEW
APPLICATION**



North Operating Center
11945 SW 70th Avenue
Tigard, OR 97223
Phone: 503-649-8577

South Operating Center
8445 SW Elligsen Rd
Wilsonville, OR 97070
Phone: 503-649-8577

REV 6-30-20

Project Information

Applicant Name: Rick Givens
Address: 7669 SW Emery Circle, Wilsonville, OR 97070
Phone: 503-351-8204
Email: rickgivens@gmail.com
Site Address: 2355 Willamette Falls Drive
City: West Linn
Map & Tax Lot #: 31E02AB00400
Business Name: Rick Givens, Planning Consultant
Land Use/Building Jurisdiction: Clackamas County
Land Use/ Building Permit # Not filed yet.

Choose from: Beaverton, Tigard, Newberg, Tualatin, North Plains, West Linn, Wilsonville, Sherwood, Rivergrove, Durham, King City, Washington County, Clackamas County, Multnomah County, Yamhill County

Project Description

4 lot Middle Housing Land Division with shared private driveway.

Permit/Review Type (check one):

- ☒ Land Use / Building Review - Service Provider Permit
☐ Emergency Radio Responder Coverage Install/Test
☐ LPG Tank (Greater than 2,000 gallons)
☐ Flammable or Combustible Liquid Tank Installation (Greater than 1,000 gallons)
 * Exception: Underground Storage Tanks (UST) are deferred to DEQ for regulation.
☐ Explosives Blasting (Blasting plan is required)
☐ Exterior Toxic, Pyrophoric or Corrosive Gas Installation (in excess of 810 cu.ft.)
☐ Tents or Temporary Membrane Structures (in excess of 10,000 square feet)
☐ Temporary Haunted House or similar
☐ OLCC Cannabis Extraction License Review
☐ Ceremonial Fire or Bonfire (For gathering, ceremony or other assembly)

For Fire Marshal's Office Use Only

TVFR Permit # 26-0090
Permit Type: SPP-West Linn
Submittal Date: 06-22-26
Assigned To: DFM Arn
Due Date: NA
Fees Due: \$0.
Fees Paid: \$0.

Approval/Inspection Conditions

(For Fire Marshal's Office Use Only)

This section is for application approval only

Fire Marshal or Designee

06-23-26
Date

Conditions:

See approved fire service plan. Fire flow deferred.
Parcels 3 & 4 conditioned for UACS, OFC D108.1
due to fire access.

See Attached Conditions: ☐ Yes ☐ No

Site Inspection Required: ☒ Yes ☐ No

This section used when site inspection is required

Inspection Comments:

Final TVFR Approval Signature & Emp ID _____ Date _____

CENTURION



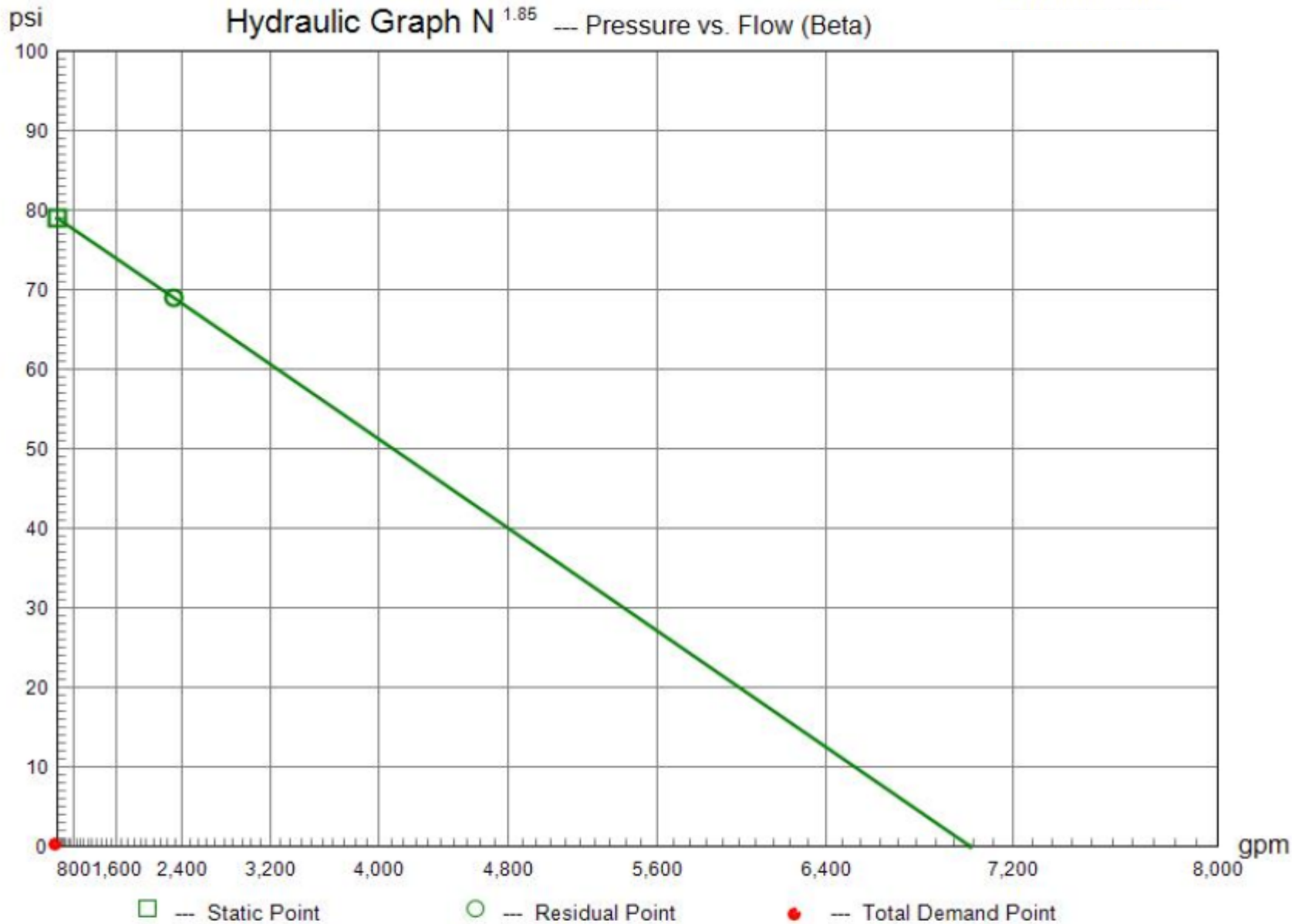
FIRE PROTECTION



APPROVAL OF PLANS IS NOT AN APPROVAL OF OMISSIONS OR OVERSIGHTS
Jason Am...
Deputy Fire Marshal II



TVF&R Permit# 26-0090



Project Location: 2355 Willamette Falls Dr. West Linn, OR 97068

Flow Test: Hydrant Elev.= 170 ft., Static Pressure= 79 psi, Residual Pressure= 69 psi, Flow= 2300 gpm

Tester and/or Witness By: BRENT BARKER Phone: 503-894-0563 Date: 6/20/2026

System Demand Data: Pressure = psi, Flow= gpm, Hose Stream= gpm

Designer: Phone: A.H.J.

Hydrant flow data calculated using provided flow information from city of West Linn.

Note:

CENTURION FIRE PROTECTION

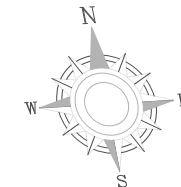
OFFICES@CENTURIONFIREPRO.COM
503-593-9791

ccb #204812 wbe #9680



ESTIMATED AVAILABLE WATER SUPPLY AT 2355 WILLAMETTE FALLS DRIVE WEST LINN, OR 97068

INFORMATION PROVIDED FOR ICON CONSTRUCTION & DEVELOPMENT, LLC



KEY PLAN



CENTURION FIRE PROTECTION

OFFICES@CENTURIONFIREPRO.COM

503-593-9791

ccb #204812 wbe #9680

PROJECT

TITLE

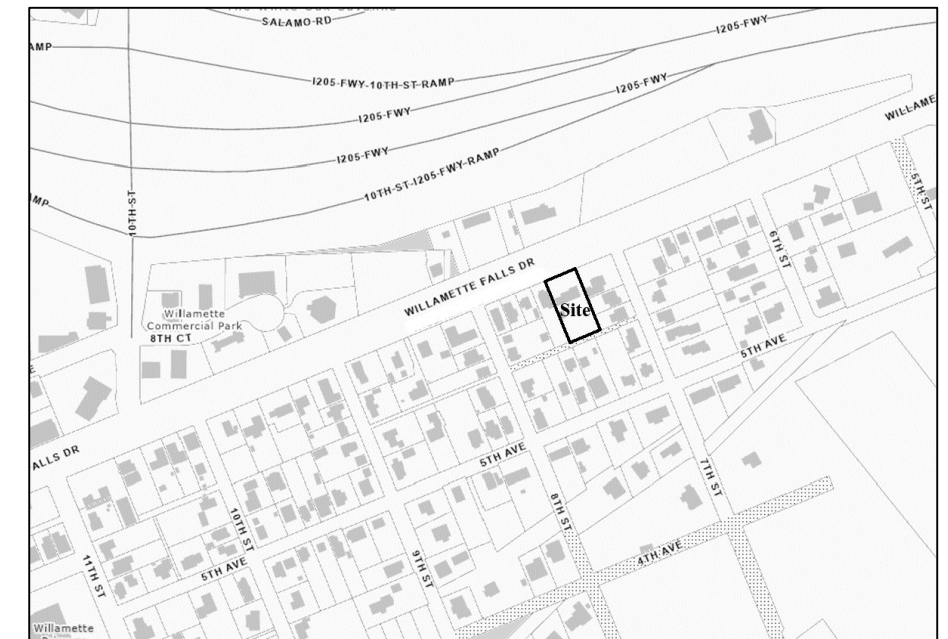
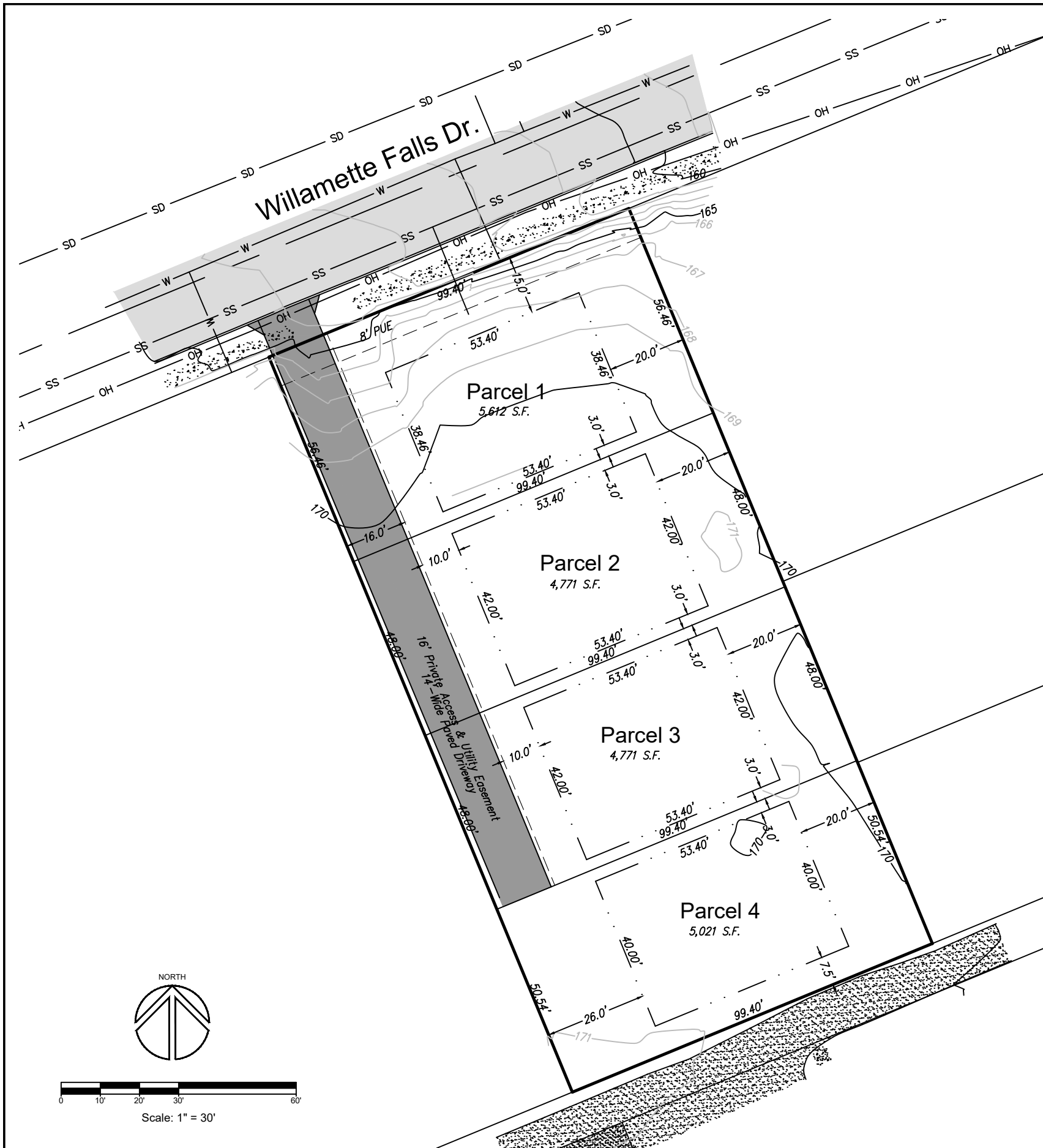
DATE

PROJECT NO.

DRAWN BY

SHEET NO.

PAGE NO.



Vicinity Map

Fire Flow:
Fire flow testing has been deferred. Fire flow documentation shall be provided to TVF&R prior to issuance of the building permit, in accordance with OFC B105.1.

UACS / Sprinkler Requirement:
The proposed plat for Parcels 3 and 4 is subject to Uniform Alternate Construction Standards (UACS) review in accordance with OFC D108.1. Due to fire apparatus access road width limitations, all new single-family dwellings shall be protected by an approved automatic fire sprinkler system, as approved by the Building Official.

Fire Lane Signage:
Fire lane signage is required, in accordance with OFC D103.6.



APPROVED PLANS

APPROVAL OF PLANS IS NOT AN APPROVAL OF OMISSIONS OR OVERSIGHTS.

Jason A. [Signature]
Deputy Fire Marshal II

TVF&R Permit# 26-0090

Owner/Applicant:
Icon Construction & Development, LLC
1969 Willamette Falls Dr., Suite 260
West Linn, OR 97068
PH: (503) 657-0406

Legal: 31E02AB00400

Address: 2355 Willamette Falls Dr.

Water: City of West Linn

Sewer: City of West Linn

Contours: Site Survey

Site Area: 20,174 S.F.

Surveyor:
Centerline Concepts, Inc.
19376 Molalla Ave., Suite 120
Oregon City, OR 97045
PH: (503) 650-0188

Zoning: R-10

DESIGNED:	R.E.G.			
DRAWN:	R.E.G.			
SCALE:	1" = 30'			
DATE:	3-31-2026			
FILE:	26-ICN-100	DATE	NO.	REVISION

Richard E. Givens, Planning Consultant
7669 SW Emery Circle
Wilsonville, OR 97070
PH: (503) 351-8204

APPLICANT: Icon Construction & Development, LLC
1969 Willamette Falls Dr., Suite 260
West Linn, OR 97068
PH: (503) 657-0406

Tentative Plan MHL D
4 Lot Detached Quadplex

SHEET:
1/1