Tillamook County

DEPARTMENT OF COMMUNITY DEVELOPMENT
BUILDING, PLANNING & ON-SITE SANITATION SECTIONS

1510 – B Third Street
Tillamook, Oregon 97141
www.tillamook.or.us
Building (503) 842-3407
Planning (503) 842-3408
Sanitation (503) 842-3409
FAX (503) 842-1819
Toll Free 1(800) 488-8280

Land of Cheese, Trees and Ocean Breeze

NOTICE TO MORTGAGEE, LIENHOLDER, VENDOR OR SELLER:
ORS 215 REQUIRES THAT IF YOU RECEIVE THIS NOTICE,
IT MUST BE PROMPTLY FORWARDED TO THE PURCHASER

NOTICE OF PUBLIC HEARINGS
TILLAMOOK COUNTY PLANNING COMMISSION
"SECOND ADDITION TO AVALON HEIGHTS SUBDIVISION"

Date of Notice: May 17, 2021

Public hearings will be held by the Tillamook County Planning Commission at 6:30p.m. on Thursday, June 10th, 2021 and at 6:30pm on Thursday, July 8th, 2021 in the Board of County Commissioners Meeting Rooms A & B of the Tillamook County Courthouse, 201 Laurel Avenue, Tillamook, OR 97141 to consider the following:

851-21-000095-PLNG: A request for preliminary subdivision plat approval of a 58-lot subdivision identified as "Second Addition to Avalon Heights" on a property located within the Unincorporated Community of Oceanside. The subject property is zoned Residential Oceanside (ROS) and is designated as Tax Lot 200 of Section 30DC, Township 1 South, Range 10 West of the Willamette Meridian, Tillamook County, Oregon. The Property Owner is Avalon Heights LLC. The Applicant is the Bill Hughes.

Notice of public hearing, a map of the request area, applicable specific request review criteria and a general explanation of the requirements for submission of testimony and the procedures for conduct of hearing has been mailed to all property owners within 250 feet of the exterior boundary of the subject property for which application has been made at least 10 days prior to the date of the hearing.

The applicable criteria include Tillamook County Land Division Ordinance (TCLDO) Section 070: Preliminary Plat Approval Criteria. Applicable development standards include TCLUO Section 3.310: Residential Oceanside Zone and TCLUO Section 4.130: Development requirements for Geologic Hazard areas. Only comments relevant to the approval criteria are considered relevant evidence.

Due to Governor Brown's Order limiting the number of persons allowed for public gatherings, the courthouse is not accessible to the public for these hearings. All hearings will take place virtually and will be livestreamed to ensure the public is able to participate. Oral testimony can be heard at the hearing on June 10, 2021. For instructions on how to provide oral testimony at the June 10, 2021 hearing, please visit the Tillamook County Community Development homepage at https://www.co.tillamook.or.us/commdev for instructions and protocol or email Allison Hinderer, DCD Office Specialist, at ahindere@co.tillamook.or.us. The livestream link will be provided at the DCD homepage address as well as a dial in number for those who wish to participate but are unable to participate virtually.

Written testimony may be submitted to the Tillamook County Department of Community Development, 1510-B Third Street, Tillamook, Oregon, 97141 prior to 4:00 p.m. on the date of the June 10, 2021 Planning Commission hearing. If submitted by 4:00 p.m. on June 1, 2021 the testimony will be included in the packet mailed to the Planning Commission the week prior to the June 10, 2021 hearing. Failure of an issue to be raised in a hearing, in person or by letter, or failure to provide sufficient specificity to afford the decision-maker an opportunity to respond to the issue precludes appeal to the Land Use Board of Appeals on that issue. Please contact Melissa Jenck, Project Planner, Tillamook County Department of Community Development, mjenck@co.tillamook.or.us as soon as possible if you wish to have your comments included in the staff report that will be presented to the Planning Commission.

The documents and submitted application are also available on the Tillamook County Department of Community Development website (https://www.co.tillamook.or.us/commdev/landuseapps) or at the Department of Community Development office located at 1510-B Third Street, Tillamook, Oregon 97141. A copy of the application and related materials may be purchased from the Department of Community Development at a cost of 25 cents per page. The staff report will be available for public inspection on June 3, 2021. Please contact Allison Hinderer for additional information ahindere@co.tillamook.or.us or call 1-800-488-8280 ext. 3423.

In addition to the specific applicable review criteria, the Tillamook County Land Use Ordinance, Tillamook County Land Division Ordinance, Tillamook County Comprehensive Plan, and Statewide Planning Goals which may contain additional regulations, policies, zones and standards that may apply to the request are also available for review at the Department of Community Development.

The Tillamook County Courthouse is handicapped accessible. If special accommodations are needed for persons with hearing, visual, or manual impairments who wish to participate in the hearing, please contact 1-800-488-8280 ext. 3303, at least 24 hours prior to the hearing in order that appropriate communications assistance can be arranged.

If you need additional information, please contact Allison Hinderer, DCD Office Specialist, at 1-800-488-8280 ext. 3423 or email ahindere@co.tillamook.or.us.

Sincerely,
Tillamook County Department of Community Development

Melissa Jenck

Melissa Jenck, CFM, Project Planner

Sarah Absher

Sarah Absher, CFM, Director

Enc. Applicable Ordinance Criteria (Already in Record)
Maps (Already in Record)
Second Addition to Avalon Heights Subdivision Preliminary Plat (Already in Record)
Tips for Citizen Testimony (Already in Record)
Procedures for conduct at a public hearing (Already in Record)

REVIEW CRITERIA & DEVELOPMENT STANDARDS

TILLAMOOK COUNTY LAND USE ORDINANCE
https://www.co.tillamook.or.us/commdev/page/land-use-ordinance-luo-zoning-ordinance

TCLUO Section 3.310: Residential Oceanside (ROS) Zone: TCLUO Section 3.310(4)

(a) The minimum lot size for permitted uses shall be 7,500 square feet where the slope averages less than 19 percent. Where the slope averages from 19 to 29 percent the minimum lot size shall be 10,000 square feet, and where the slope averages greater than 29 percent, the minimum lot size shall be 20,000 square feet, except that in both of theses sloped areas and in unsewered or geologic hazard areas, a larger minimum may be required. [Refer to Article V Exceptions for existing legally platted lots and parcels]
(b) The minimum lot width shall be 60 feet.
(c) The minimum lot depth shall be 75 feet.
...
(j) A property survey of the lot shall be performed including elevations, and all corners shall be monumented by a registered surveyor prior to land division and/or submittal of a permit for construction/location on lots containing less than 7,500 square feet. A copy of the survey shall be submitted with the application and other required material.
...
(l) New uses authorized within the community growth boundary shall not adversely affect farm or forest management practices conducted in accordance with federal and state laws. Authorization to create a parcel or construct a dwelling adjacent to land zoned for farm or forest use shall require a notarized declaratory statement signed by all current property owners who appear on the property deed or contract. This statement shall serve as a covenant that runs with the land binding heirs, assigns, lessees and successors. This covenant shall affirm that residents of the parcel may be subject to farm or forest management practices conducted in accordance with federal and state laws which ordinarily and necessarily produce noise, dust, smoke and other impacts. Those signing the statement acknowledge that they "do hereby accept the potential impacts from farm and forest practices as normal and necessary and part of the risk of establishing a dwelling in this area, and acknowledge the need to avoid activities that conflict with nearby farm or forest uses". The signed and notarized covenant must be approved by the County Planning Director and recorded with the Tillamook County Clerk.

TCLUO Section 4.130: Development Requirements for Geologic Hazard Areas: TCLUO Section 4.130 subsections (2) through (8) must be met.

TILLAMOOK COUNTY LAND DIVISION ORDINANCE
https://www.co.tillamook.or.us/sites/default/files/fileattachments/community_development/page/27173/final_land_division_ordinance.pdf

Section 060: Preliminary Plat Submission Requirements, including Section 060(1)(a), Section 060(1)(b)(i)(1) through (7), Section 060(1)(b)(ii)(1) through (8), (10) and (11), Section 060(1)(b)(iii)(1) and (3) through (12), Section 060(1)(c)(ii) through (v), (vii) and (viii). And Section 060(1)(d).

Section 070: Preliminary Plat Approval Criteria, specifically Section 070(1)(a) through (i) and Section 070(2).

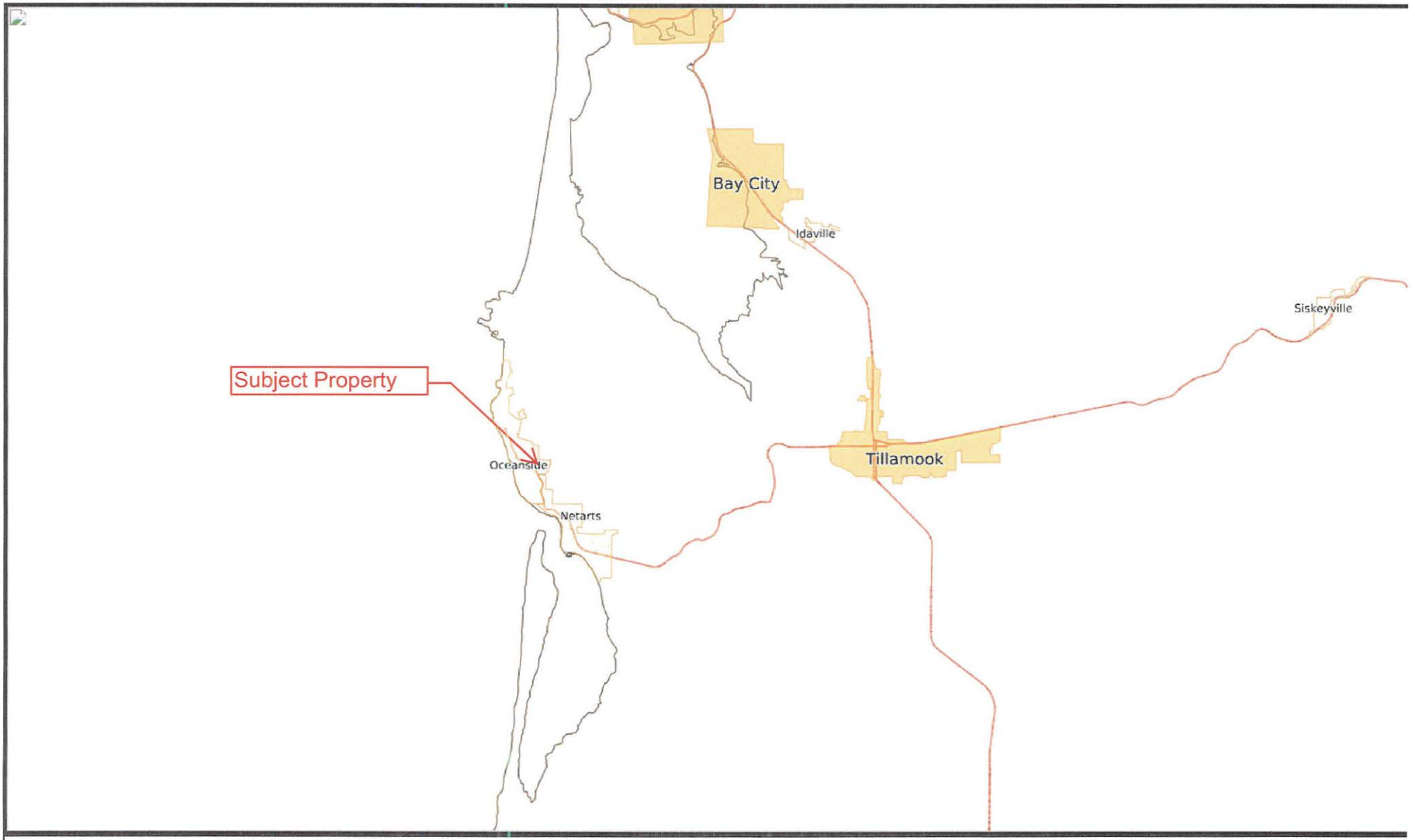
Section 150: Development Standards for Land Divisions, including Section 150(1) through (5), (7), (10) and (11).

Section 160: Street Improvements, including Section 160(1) through (3), (5), (7) and (8).

EXHIBIT A

Tillamook County GIS

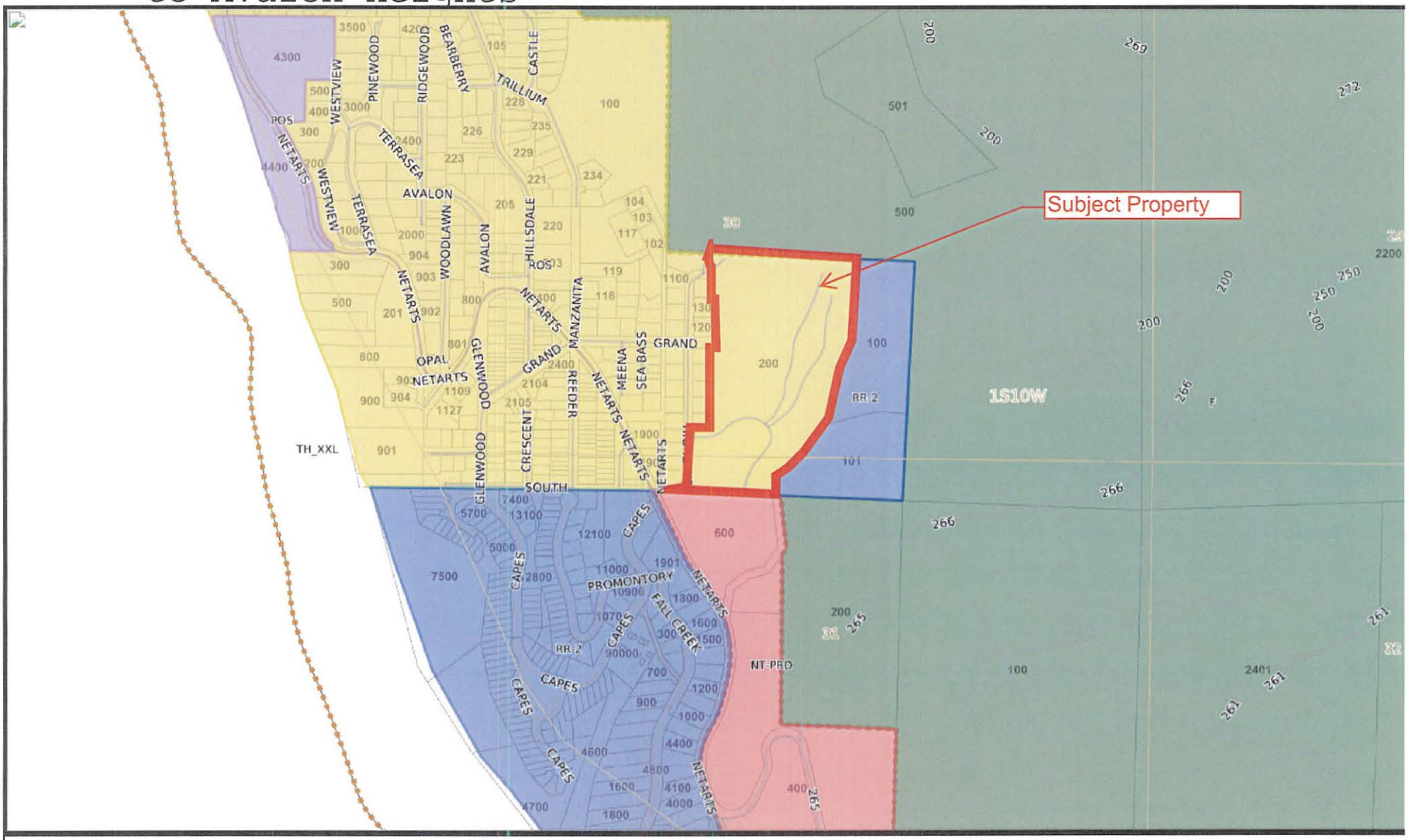
Vicinity Map: 851-21-000095-PLNG Subdivision Second Addition to Avalon Heights



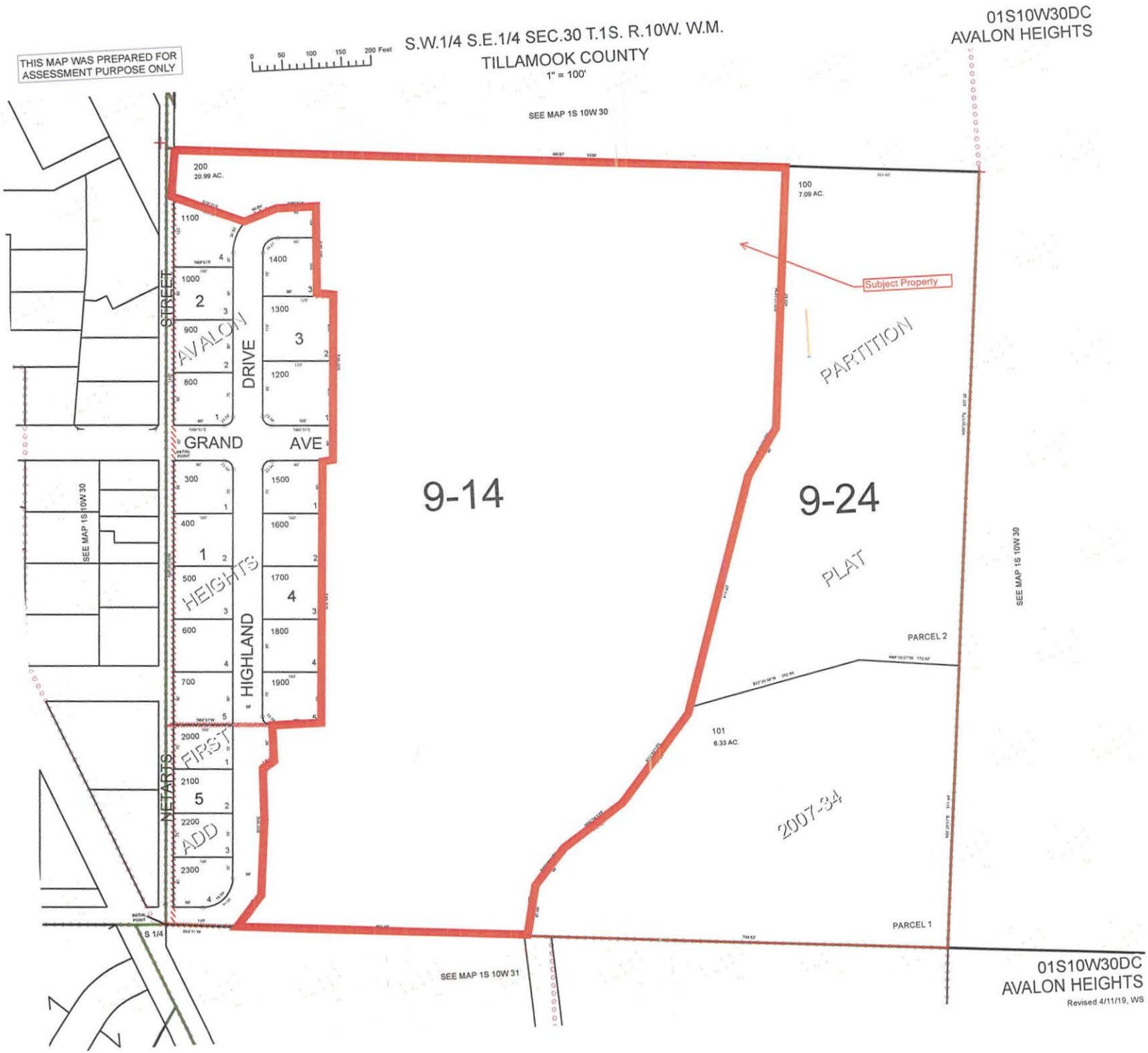
Created: Mon May 17 2021-12:26:10
Active Layers:County_Boundary, Fed_state_highways, citylimit, community_polygon, highlight, Road_Centerline
Extent:-13819034.267126, 5678909.6500876, -13757311.366794, 5710439.9242508

Tillamook County GIS

Zoning Map: 851-21-000095-PLNG Subdivision Second Addition to Avalon Heights



Created: Mon May 17 2021-12:25:19
Active Layers:County_Boundary, Fed_state_highways, citylimit, community_polygon, TaxlotOwner, highlight, Tillamook_County_Zoning, Township_Range_Section, Road_Centerline
Extent:-13800512.608554, 5691734.3390818, -13796654.927284, 5693704.981217


01S10W30DC
AVALON HEIGHTS
THIS MAP WAS PREPARED FOR ASSESSMENT PURPOSE ONLY
0 50 100 150 200 Feet
S.W.1/4 S.E.1/4 SEC.30 T.1S. R.10W. W.M.
TILLAMOOK COUNTY
1" = 100'
SEE MAP 1S 10W 30
200
20.99 AC.
100
7.09 AC.
Subject Property
AVALON DRIVE STREET
GRAND AVE
HIGHLAND
FIRST
ADD
HEIGHTS
NETARTS
1100
1000
900
800
1400
1300
1200
300
400
500
600
700
1500
1600
1700
1800
1900
2000
2100
2200
2300
9-14
9-24
PARTITION
PLAT
2007-34
PARCEL 2
PARCEL 1
101
6.33 AC.
SEE MAP 1S 10W 30
SEE MAP 1S 10W 30
SEE MAP 1S 10W 31
S 1/4
01S10W30DC
AVALON HEIGHTS
Revised 4/11/19, WS

TILLAMOOK County Assessor's Summary Report

Real Property Assessment Report

FOR ASSESSMENT YEAR 2020

May 17, 2021 12:27:53 pm

Account #	179176	**Tax Status**	ASSESSABLE
Map #	1S1030DC00200	**Acct Status**	ACTIVE
Code - Tax #	0935-179176	**Subtype**	NORMAL
Legal Descr	See Record		
Mailing Name	AVALON HEIGHTS LLC	**Deed Reference #**	2017-5253
Agent		**Sales Date/Price**	08-31-2017 / $300,000.00
In Care Of		**Appraiser**	EVA FLETCHER
Mailing Address	41901 OLD HWY 30 ASTORIA, OR 97103		

Prop Class	400	**MA**	**SA**	**NH**	**Unit**
RMV Class	400	08	OV	805	9965-1

Situs Address(s)	Situs City

Value Summary

Code Area		RMV	MAV	AV	RMV Exception	CPR %
0935	Land	302,640			Land 0	
	Impr.	0			Impr. 0	
Code Area Total		302,640	373,360	302,640	0	
Grand Total		302,640	373,360	302,640	0	

Land Breakdown

Code Area	ID#	RFPD	Ex	Plan Zone	Value Source	TD%	LS	Size	Land Class	Trended RMV
0935	0	☐		ROS	Market	97	A	21.00		302,640
						Grand Total		21.00		302,640

Improvement Breakdown

Code Area	ID#	Yr Built	Stat Class	Description	TD%	Total Sq. Ft.	Ex%	MS Acct #	Trended RMV
				Grand Total		0			0

Exemptions/Special Assessments/Potential Liability

Code Area	Type							
0935								
	FIRE PATROL:							
	■ FIRE PATROL NORTHWEST	**Amount**	21.88	**Acres**	21	**Year**	2020	

Comments:

2/27/12 Land reappraisal, tabled land, size change per cartographer, split FPNW w/U2.LM
8/1/17 - Updated FP values after PA conversion - changed to entered values. EJ.
02/22/18 Combined U2 account into U1 account. U1 account was retaxlotted into TL 200. Canceled U2 account.ef
06/11/19 Changed land back to trendable.ef

National Flood Hazard Layer FIRMette

FEMA

123°57'47"W 45°27'19"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

123°57'10"W 45°26'54"N

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Area of 1% annual chance flood with average depth less than one foot or with drainag areas of less than one square mile *Zone*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represe an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/17/2021 at 3:31 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

U.S. Fish and Wildlife Service

National Wetlands Inventory

Second Addition to Avalon Heights Subdiv

May 17, 2021

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

EXHIBIT B

Tillamook County Department of Community Development
1510-B Third Street. Tillamook, OR 97141 | Tel: 503-842-3408 Fax: 503-842-1819
www.co.tillamook.or.us

LAND DIVISION APPLICATION

OFFICE USE ONLY
Date Stamp
☐ Approved ☐ Denied
Received by: ES
Receipt #: 119681
Fees: 7731.00
Permit No: 851-21-000095-PLNG

Applicant ☐ *(Check Box if Same as Property Owner)*

Name: Bill Hughes Phone: 503-741-6706
Address: 41901 Old Highway 30
City: Astoria State: OR Zip: 97103
Email: bchexc@gmail.com

Property Owner

Name: Avalon Heights LLC Phone: (503) 741-6706
Address: 41901 Old Highway 30
City: Astoria State: OR Zip: 97103
Email: bchexc@gmail.com

Location:

Site Address: not yet assigned
Map Number: T1S R10W 30DC TL 200
Township Range Section Tax Lot(s)

Land Division Type: ☐ **Partition (Two or Three Lots, Type II)** ■ **Subdivision (Four or More Lots, Type III)**
■ **Preliminary Plat (Pages 1-2)** ☐ **Final Plat (Page 3)**

■ PRELIMINARY PLAT (LDO 060(1)(B))

General Information

- ■ For subdivisions, the proposed name.
- ■ Date, north arrow, scale of drawing.
- ■ Location of the development sufficient to development sufficient to define its location, boundaries, and a legal description of the site.
- ■ Parcel zoning and overlays
- ■ Title Block
- ■ Clear identification of the drawing as "Preliminary Plat" and date of preparation
- ■ Name and addresses of owner(s), developer, and engineer or surveyor
- ☐ Fifteen (15) legible "to scale" hard copies
- ■ One digital copy

Existing Conditions

- ■ Existing streets with names, right-of-way, pavement widths, access points.
- ■ Width, location and purpose of existing easements
- ■ The location and present use of all structures, and indication of any that will remain after platting.
- ■ Location and identity of all utilities on and abutting the site. If water mains and sewers are not on site, show distance to the nearest one and how they will be brought to standards
- ■ Location of all existing subsurface sewerage systems, including drainfields and associated easements
- ■ Ground elevations shown by contour lines at 2-foot vertical interval. Such ground elevations shall be related to some established benchmark or other datum approved by the County Surveyor
- ■ The location and elevation of the closest benchmark(s) within or adjacent to the site
- ■ Natural features such as drainage ways, rock outcroppings, aquifer recharge areas, wetlands, marshes, beaches, dunes and tide flats
- ■ For any plat that is 5 acres or larger, the Base Flood Elevation, per FEMA Flood Insurance Rate Maps
- ■ Other information:
  - Traffic Impact Statement
  - Geo-Hazard Assessment
  - Preliminary Stormwater Plan
  - Road Section Analysis

Proposed Development

- ■ Proposed lots, streets, tracts, open space and park land (if any); location, names, right-of-way dimensions, approximate radius of street curves; and approximate finished street center line grades. All streets and tracts that are being held for private use and all reservations and restrictions relating to private tracts identified
- ■ Location, width and purpose of all proposed easements
- ☐ Proposed deed restrictions, if any, in outline form
- ■ Approximate dimensions, area calculation (in square feet), and identification numbers for all proposed lots and tracts
- ■ Proposed uses of the property, including all areas proposed to be dedicated as public right-of-way or reserved as open space
- ■ On slopes exceeding an average grade of 10%, as shown on a submitted topographic survey, the preliminary location of development on lots demonstrating that future development can meet minimum required setbacks and applicable engineering design standards
- ■ Preliminary utility plans for sewer, water and storm drainage when these utilities are to be provided
- ■ The approximate location and identity of other utilities, including the locations of street lighting fixtures, as applicable
- ■ Evidence of compliance with applicable overlay zones, including but not limited to the Flood Hazard Overlay (FH) zone
- ■ Evidence of contact with the applicable road authority for proposed new street connections
- ■ Certificates or letters from utility companies or districts stating that they are capable of providing service to the proposed development

Additional Information Required for Subdivisions

- ■ Preliminary street layout of undivided portion of lot
- ■ Special studies of areas which appear to be hazardous due to local geologic conditions
- ■ Where the plat includes natural features subject to the conditions or requirements contained in the County's Land Use Ordinance, materials shall be provided to demonstrate that those conditions and/or requirements can be met
- ■ Approximate center line profiles of streets, including extensions for a reasonable distance beyond the limits of the proposed Subdivision, showing the proposed finished grades and the nature and extent of construction
- ■ Profiles of proposed drainage ways
- ☐ In areas subject to flooding, materials shall be submitted to demonstrate that the requirements of the Flood Hazard Overlay (FHO) zone of the County's Land Use Ordinance will be met
- ■ If lot areas are to be graded, a plan showing the nature of cuts and fills, and information on the character of the soil
- ☐ Proposed method of financing the construction of common improvements such as street, drainage ways, sewer lines and water supply lines

☐ **FINAL PLAT (LDO 090(1))**

- ☐ Date, scale, north arrow, legend, highways, and railroads contiguous to the plat perimeter
- ☐ Description of the plat perimeter
- ☐ The names and signatures of all interest holders in the land being platted, and the surveyor
- ☐ Monuments of existing surveys identified, related to the plat by distances and bearings, and referenced to a document of record
- ☐ Exact location and width of all streets, pedestrian ways, easements, and any other rights-of-way
- ☐ Easements shall be denoted by fine dotted lines, and clearly identified as to their purpose
- ☐ Provisions for access to and maintenance of off-right-of-way drainage
- ☐ Block and lot boundary lines, their bearings and lengths
- ☐ Block numbers
- ☐ Lot numbers
- ☐ The area, to the nearest hundredth of an acre, of each lot which is larger than one acre
- ☐ Identification of land parcels to be dedicated for any purpose, public or private, so as to be distinguishable from lots intended for sale

Certificates:

- ☐ Title interest & consent
- ☐ Dedication for public use
- ☐ Engineering/Survey
- ☐ Water
- ☐ Public Works

☐ Additional Information:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Authorization

This permit application does not assure permit approval. The applicant and/or property owner shall be responsible for obtaining any other necessary federal, state, and local permits. Within two (2) years of final review and approval, all final plats for land divisions shall be filed and recorded with the County Clerk, except as required otherwise for the filing of a plat to lawfully establish an unlawfully created unit of land. The applicant verifies that the information submitted is complete, accurate, and consistent with other information submitted with this application.

Property Owner (*Required) william C Hughes — Date 4-5-2021

Applicant Signature william C Hughes — Date 4-5-2021

eh@firwooddesign.com

From: BLAIR Keith P <Keith.P.BLAIR@odot.state.or.us>
Sent: Friday, July 10, 2020 8:29 AM
To: Melissa Webb; STRAUSS Karen A
Cc: Erik Hoovestol; Bill Hughes
Subject: RE: Draft - TIS for Second Avalon Heights Subdivision (Oceanside)

Karen and Melissa:

I have reviewed the draft traffic study and have one minor comment which I recommend be incorporated within a final version to be submitted with the application to the County:

- Page 18, "Performance Standards" section – The as the study intersection is located outside any urban growth boundary and within "Unincorporated Communities," the mobility target is actually 0.80 rather than 0.95.

Please let me know if you have any questions or if I may be of further assistance. Thanks!

Keith P. Blair, P.E.
Region Traffic Manager | ODOT Region 2
455 Airport Rd SE, Bldg. A | Salem, Oregon 97301
(503) 986-2656 | Keith.P.Blair@odot.state.or.us

ODOT's mission is to provide a safe and reliable multimodal transportation system that connects people and helps Oregon's communities and economy thrive.

From: Melissa Webb <melissa@lancastermobley.com>
Sent: Thursday, July 9, 2020 2:10 PM
To: BLAIR Keith P <Keith.P.BLAIR@odot.state.or.us>; STRAUSS Karen A <Karen.A.STRAUSS@odot.state.or.us>
Cc: Erik Hoovestol <eh@firwooddesign.com>; Bill Hughes <bchexc@gmail.com>
Subject: Draft - TIS for Second Avalon Heights Subdivision (Oceanside)

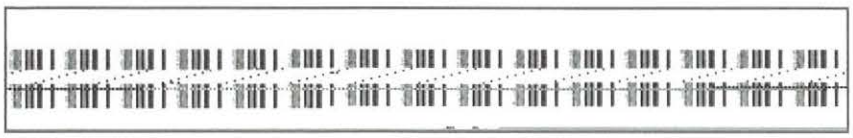
Hi Keith and Karen,

Per our conversation this morning, attached is a draft report of the traffic study for the Second Avalon Heights subdivision in Oceanside. Any comments you have that I can address/incorporate in the study prior to submission to the County would be appreciated.

Thank you again for your willingness to review the draft copy.

Melissa

--
Melissa Webb, PE
Transportation Analyst



321 SW 4th Avenue, Suite 400 | Portland, OR 97204
503-248-0313 x 402
lancastermobley.com
Portland, OR Bend, OR

Preliminary Plat Application Narrative
for
Second Addition to Avalon Heights

Mr. Bill Hughes as a member of Avalon Heights LLC has applied for preliminary plat approval for a 58-lot subdivision for the ultimate construction of single-family dwellings in the unincorporated community of Oceanside. The subject property is identified as Tax Lot 200 on Taxmap 01S10W30DC. The project would be developed in three phases. The property is zoned Residential Oceanside and a portion of the eastern side of the property is within a Geologic Hazard Overlay Zone.

The minimum lot size is 7,500 square feet for lots with average slopes less than 19 percent; 10,000 square feet where average slopes are between 19 percent and 29 percent; and 20,000 square feet where average slopes exceed 29 percent. See the notes on application Drawing Set Sheet 3 and the noted slopes and direction of fall on Sheet 6. The minimum lot width is 60 feet and minimum depth is 60 feet. Front yard setback is 20 feet; side yard setbacks are generally 5 feet but 15 feet on corner lots; and the minimum rear yard set back is generally 15 feet, but 5 feet on corner lots. Setback lines are illustrated on Sheet 6 together with conceptual building footprints.

<u>Submission Requirements (Section 060)</u>

(1) Applications for Preliminary Plat approval shall contain the following information:

Preliminary Plat Information. In addition to the general information described in Subsection (a) above, the Preliminary Plat application shall consist of drawings and supplementary material adequate to provide the following information, in quantities determined by the County Surveyor and Tillamook County Planning Commission.

I. General Information.

1.For subdivisions, the proposed name shall not duplicate or resemble the name of another land division in the County, and shall be approved by the County Surveyor.

2.Date, north arrow, scale of drawing.

3.Location of the development sufficient to define its location, boundaries, and a legal description of the site.

4.Zoning of parcel to be divided, including any overlay zones.
5.A title block including the names, addresses, and telephone numbers of the owners of the subject property and, as applicable, the name of the engineer and surveyor, and the date of the survey.

6.Clear identification of the drawing as a “Preliminary Plat” and date of preparation.

7.Name and addresses of the owner(s), developer, and the engineer or surveyor.

Applicant response: All of this information is included on one or more of the drawing set sheets as appropriate.

ii. Existing Conditions. Except where the Director deems certain information is not relevant, applications for Preliminary Plat approval shall contain all of the following information on existing conditions:

1.Existing streets or roads (public or private), including location, names, right-of-way and pavement widths on and abutting the site; and location of existing access point

Applicant Response: See Sheet 4

2.Width, location and purpose of all existing easements of record on and abutting the site;

Applicant Response: See Sheet 2.

3.The location and present use of all structures on the site and indication of which, if any structures are to remain after platting;

Applicant Response: See Sheet 2.

4.Location and identity of all utilities on and abutting the site. If water mains and sewers are not on or abutting the site, indicate the direction and distance to the nearest one and show how utilities will be brought to standards;

Applicant Response: See Sheet 4.

5.Location of all existing subsurface sewerage systems, including drain fields and associated easements on the site.

Applicant Response: There are no subsurface sewerage systems on site.

6.Ground elevations shown by contour lines at 2-foot vertical interval. Such ground elevations shall be related to some established benchmark or other datum approved by the County Surveyor; the Director may waive this standard for partitions when grades, on average, are less than 10 percent;

Applicant Response: See Sheets 2, 5 and 6.

7.The location and elevation of the closest benchmark(s) within or adjacent to the site (i.e., for surveying purposes);

Applicant Response: See Sheet 7. The benchmark is located in the southeasterly corner of the parcel.

8.Natural features such as drainage ways, rock outcroppings, aquifer recharge areas, wetlands, marshes, beaches, dunes and tide flats;

Applicant Response: See Sheet 2. There are no rock outcroppings, aquifer recharge areas, wetlands, marshes, beaches, dunes and tide flats on the site.

9.Any plat that is five (5) acres or larger, or proposes 50 lots or greater, shall include the Base Flood Elevation, per FEMA Flood Insurance Rate Maps,

The closest 100-year flood plain per FEMA is located on the coast of the Pacific Ocean with a Base Flood Elevation of 26.5 feet. The site is located approximately 0.3 miles from the coast with the lowest elevation of approximately 290 feet.

10.North arrow and scale; and

Applicant Response: North arrows and scales are included on each drawing of the plan set except the cover sheet.

11.Other information, as deemed necessary by the Planning Director for review of the application. The County may require studies or exhibits prepared by qualified professionals to address specific site features and code requirements.

Applicant Response: A Traffic Impact Analysis, Geohazard Analysis and a Preliminary Stormwater Plan are included in the application package.

iii. Proposed Development. Except where the Director deems certain information is not relevant, applications for Preliminary Plat approval shall contain all of the following information on the proposed development:

1.Proposed lots, streets, tracts, open space and park land (if any); location, names, right-of-way dimensions, approximate radius of street curves; and approximate finished street center line grades. All streets and tracts that are being held for private use and all reservations and restrictions relating to such private tracts shall be identified;

Applicant Response; See Sheets 8 through 12.

2.City boundary lines when crossing or adjoining the subdivision;

Applicant Response: Not applicable.

3.Easements: location, width and purpose of all proposed easements;

Applicant Response: See Sheet 4.

4.Proposed deed restrictions, if any, in outline form.

Applicant Response: A home owners association or road maintenance district will be formed to finance stormwater facility maintenance and road maintenance.

5.Lots and private tracts (e.g., private open space, common area, or street): approximate dimensions, area calculation (e.g., in square feet), and identification numbers for all proposed lots and tracts;

Applicant Response: See Sheet 4.

6.Proposed uses of the property, including all areas proposed to be dedicated as public right-of-way or reserved as open space for the purpose of surface water management, recreation, or other use;

Applicant Response: A stormwater infiltration pond will be located in an easement on Lots 1 through 7. Another easement for stormwater conveyance via a swale will be located on Lots 29 through 32 and Lot 38. A storm and water easement to the Netarts Water District is located on Lot 24. An access easement is located on the back of lots 88, 9, 10,, and Lot 58 to encompass an existing roadway which falls outside of the existing easement.

7.On slopes exceeding an average grade of 10%, as shown on a submitted topographic survey, the preliminary location of development on lots (e.g., building envelopes), demonstrating that future development can meet minimum required setbacks and applicable engineering design standards;

Applicant Response: See Sheet 6.

8.Preliminary utility plans for sewer, water and storm drainage when these utilities are to be provided. This information may be included on the preliminary plat map provided all information is legible.

Applicant Response: See Sheet 4.

9.The approximate location and identity of other utilities, including the locations of street lighting fixtures, as applicable;

Applicant Response: See Sheet 4.

10.Evidence of compliance with applicable overlay zones, including but not limited to the Flood Hazard Overlay (FH) zone;

Applicant Response: A geologic hazard analysis is attached to the application in compliance with the standards governing the geo-hazard overlay. A completed geotechnical report for the development is currently in progress and will be provided to the County with the construction permit plans.

11.Evidence of contact with the applicable road authority for proposed new street connections; and

The proposed development connects to NW Highland Drive which is a local road not maintained by the County but is within a County owned right-of-way. ODOT has reviewed the Traffic Impact Study and concurred that no improvements were warranted at the intersection of Highland Drive and ODOT Highway 131.

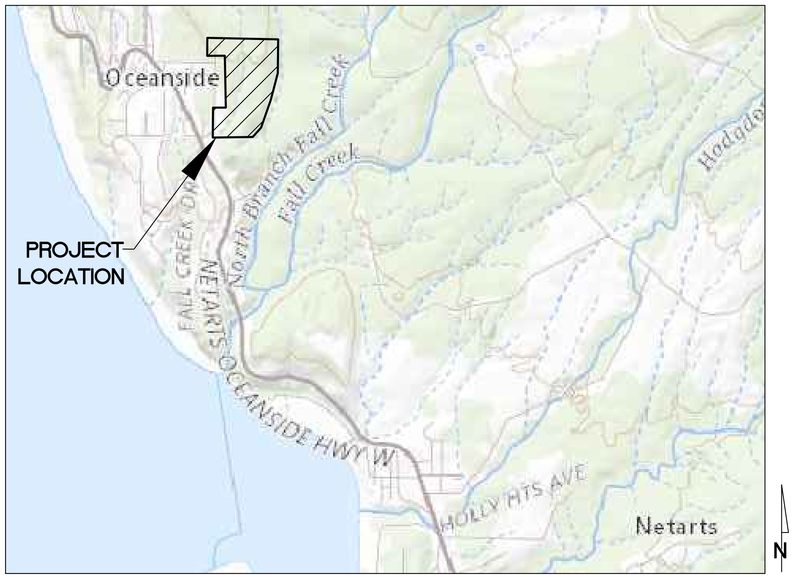
12.Certificates or letters from utility companies or districts stating that they are capable of providing service to the proposed development.

Applicant Response: See attached letter from the Netarts-Oceanside Sanitary District and certificate from the Netarts Water District.

SECOND ADDITION TO AVALON HEIGHTS SUBDIVISION

LAND USE PLANS

TAXMAP: 01S10W30DC TAXLOT: 200
LOCATED IN SE 1/4 OF SEC 30 T1S R10W W.M.
TILLAMOOK COUNTY, OREGON



VICINITY MAP
NTS

SHEET INDEX:

OWNER:

BILL HUGHES
AVALON HEIGHTS LLC
41901 OLD HIGHWAY 30
ASTORIA, OR 97103
503–741–6706

ENGINEER:

ERIK HOOVESTOL, PE
FIRWOOD DESIGN GROUP LLC
359 E. HISTORIC COLUMBIA RIVER DRIVE
TROUTDALE, OREGON 97060
(503) 668–3737

SURVEYOR:

JACK WHITE, PLS
S&F LAND SERVICES
1725 N ROOSEVELT DRIVE, SUITE B
SEASIDE, OR 97138
503–738–3425

VERTICAL DATUM: NAVD 88
COORDINATE SYSTEM: OREGON COAST ZONE

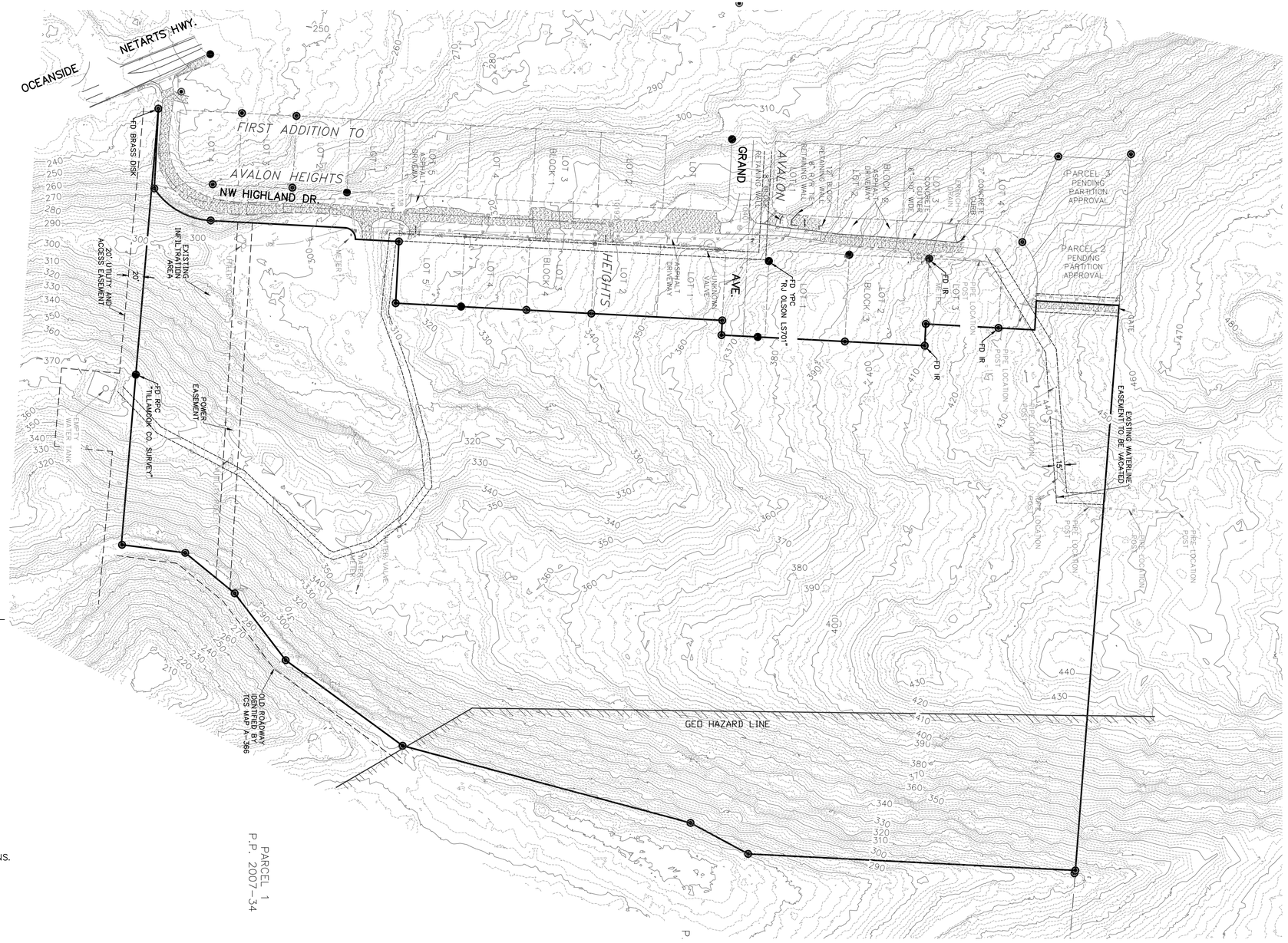
DATE:	NO.	REVISION

DRAWN: BD | DESIGNED: BD | CHECKED: EH
SCALE: AS SHOWN | DATE: MAR 31, 2021
PROJECT NO. E20–036

FIRWOOD DESIGN GROUP
Reliable Engineering Solutions
359 EAST HISTORIC COLUMBIA RIVER HIGHWAY
TROUTDALE, OREGON 97060
(503) 668-3737

AVALON HEIGHTS LLC - BILL HUGHES
41901 OLD HIGHWAY 30
ASTORIA, OREGON 97103

COVER SHEET
SECOND AVALON HEIGHTS SUBDIVISION
LAND USE PLANS



LEGEND

SANITARY MANHOLE
CLEANOUT
FIRE HYDRANT
WATER VALVE
WATER METER
COMMUNICATION RISER/BOX
ELECTRICAL RISER
UTILITY POLE
SIGN
GRAVEL SURFACE
SURVEY CONTROL POINT
FOUND MONUMENT

SANITARY SEWER LINE
WATERLINE
UNDERGROUND COMMUNICATION
UNDERGROUND ELECTRICAL
CHAINLINK FENCE
EDGE OF ASPHALT
EDGE OF GRAVEL
TOP/TOE SLOPE
STRIPE
MAJOR CONTOUR
MINOR CONTOUR

MANHOLE INVERTS

10138 SSMH
RIM 312.10'
IE IN N. =302.20'
IE OUT W. =300.80'

10192 SSMH
RIM 337.37'
IE IN E. =329.37'
IE IN W. =329.37'
IE OUT S. =329.57'

10401 SSMH
RIM 347.51'
IE IN SW. =340.11'
IE IN N. =340.16'
IE OUT W. =339.96'

TOPOGRAPHIC SURVEY:

FIRWOOD DESIGN GROUP LLC
359 E. HISTORIC COLUMBIA RIVER DRIVE
TROUTDALE, OREGON 97060
(503) 668-3737

BOUNDARY & PRELIMINARY PLAT:

JACK WHITE, PLS
S&F LAND SERVICES
1725 N ROOSEVELT DRIVE, SUITE B
SEASIDE, OR 97138
503-738-3425

NOTES:

1. UNDERGROUND UTILITY LOCATES WITHIN THE PUBLIC RIGHT-OF-WAYS WERE REQUESTED THROUGH THE ONE-CALL UTILITY NOTIFICATION CENTER.
2. THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND EXISTING DRAWINGS. FIRWOOD MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. FIRWOOD DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED. HOWEVER UTILITIES ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE.
3. THIS DRAWING IS NOT A RECORD OF SURVEY AND IS ONLY FOR DESIGN SHOWING EXISTING CONDITIONS.

DATUM:

VERTICAL DATUM: NAVD88 (OPUS SOLUTION, GEOID18B)

HORIZONTAL DATUM: STATE PLANE, OR-N

FDG FIELD WORK PERFORMED ON: NOVEMBER 9, 2020

LIDAR OBTAINED FROM NOAA DATASET 2009 OREGON DOGAMI, NAVD88 VERTICAL DATUM
LIDAR DATA UTILIZED OUTSIDE OF SURVEYED IMPROVEMENTS

BENCHMARK (PER S&F LAND SERVICES):

SOUTH-EAST PROPERTY CORNER
TOP OF YELLOW PLASTIC CAP
ELEVATION = 285.91' NAVD88

DATE:	NO.	REVISION	DRAWN: BD	DESIGNED: BD	CHECKED: EH
			SCALE: AS SHOWN	DATE: MAR 31, 2021	
			PROJECT NO. E20-036		

FIRWOOD DESIGN GROUP
Reliable Engineering Solutions

359 EAST HISTORIC COLUMBIA RIVER HIGHWAY
TROUTDALE, OREGON 97060
(503) 668-3737

AVALON HEIGHTS LLC - BILL HUGHES
41901 OLD HIGHWAY 30
ASTORIA, OREGON 97103

EXISTING CONDITIONS
SECOND AVALON HEIGHTS SUBDIVISION
LAND USE PLANS

2
14

SECOND ADDITION TO AVALON HEIGHTS SUBDIVISION

LOCATED IN SE 1/4 OF SE 1/4 OF SEC 30 T1S
R10W WILLAMETTE MERIDIAN
UNINCORPORATED TILLAMOOK COUNTY

OWNER:

BILL HUGHES
AVALON HEIGHTS LLC
41901 OLD HIGHWAY 30
ASTORIA, OR 97103
503-741-6706

SURVEYOR:

JACK WHITE, PLS
S&F LAND SERVICES
1725 N ROOSEVELT DRIVE, SUITE B
SEASIDE, OR 97138
503-738-3425

ENGINEER:

ERIK HOOVESTOL, PE
FIRWOOD DESIGN GROUP LLC
359 E. HISTORIC COLUMBIA RIVER DRIVE
TROUTDALE, OREGON 97060
(503) 668-3737

NOTES

1. PROJECT ZONING: RESIDENTIAL OCEANSIDE (ROS) (TCLUO 3.310)
   GEOLOGIC HAZARD AREA (TCLUO 4.070)
2. TCLUO 3.310(4) STANDARDS
   (A) MINIMUM LOT SIZE: 7,500 SQ FT WHERE SLOPE AVERAGES LESS THAN 19 PERCENT, 10,000 SQ FT WHERE SLOPE AVERAGES FROM 19 TO 29 PERCENT, 20,000 SQ FT WHERE SLOPE AVERAGES GREATER THAN 29 PERCENT. SEE SHEET 5 FOR ADDITIONAL INFORMATION ON LOT SLOPE.
   (B) MINIMUM LOT WIDTH: 60 FT
   (C) MINIMUM LOT DEPTH: 75 FT
   (D) MINIMUM FRONT YARD SETBACK: 20 FT
   (E) MINIMUM SIDE YARD SETBACK: 5 FT
   ON SIDE STREET OF A CORNER LOT: 15 FT
   (F) MINIMUM REAR YARD SETBACK: 20 FT
   ON A CORNER LOT: 5 FT
3. SEE SHEET 6 FOR SETBACKS AND CONCEPT BUILDING FOOTPRINTS.

Curve Table

CURVE #	LENGTH	RADIUS	DELTA	LENGTH	CHORD BEARING	CHORD LENGTH
C1	47.00'	75.00'	35° 54' 09"	47.00'	N75° 04' 20"E	46.23'
C2	47.02'	75.00'	35° 55' 05"	47.02'	S75° 04' 48"W	46.25'
C3	34.12'	75.00'	26° 04' 09"	34.12'	N73° 55' 35"W	33.83'
C4	100.27'	75.00'	76° 35' 59"	100.27'	N80° 48' 30"E	92.97'
C5	27.65'	75.00'	21° 07' 25"	27.65'	N13° 36' 03"E	27.49'
C6	117.70'	75.00'	89° 54' 48"	117.70'	N41° 55' 04"W	105.99'
C7	33.83'	75.00'	25° 50' 31"	33.83'	N15° 57' 36"E	33.54'
C8	33.83'	75.00'	25° 50' 31"	33.83'	S15° 57' 36"W	33.54'

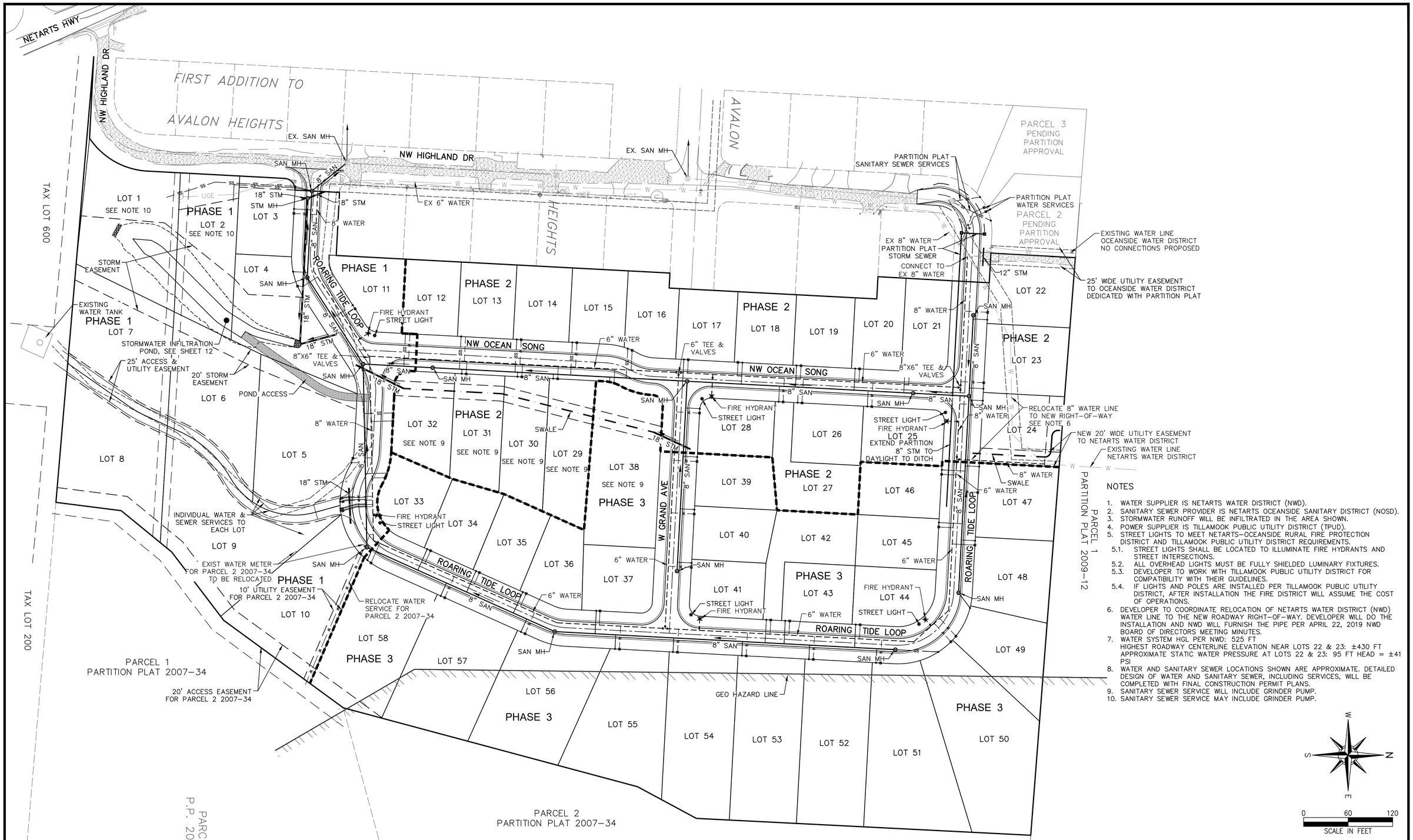
0 60 120
SCALE IN FEET

DATE:	NO.	REVISION	DRAWN: BD	DESIGNED: BD	CHECKED: EH
			SCALE: AS SHOWN	DATE: MAR 31, 2021	
			PROJECT NO. E20-036		

FIRWOOD DESIGN GROUP
Reliable Engineering Solutions
359 EAST HISTORIC COLUMBIA RIVER HIGHWAY
TROUTDALE, OREGON 97060
(503) 668-3737

AVALON HEIGHTS LLC - BILL HUGHES
41901 OLD HIGHWAY 30
ASTORIA, OREGON 97103

PRELIMINARY PLAT
SECOND AVALON HEIGHTS SUBDIVISION
LAND USE PLANS



NOTES

1. WATER SUPPLIER IS NETARTS WATER DISTRICT (NWD).
2. SANITARY SEWER PROVIDER IS NETARTS OCEANSIDE SANITARY DISTRICT (NOSD).
3. STORMWATER RUNOFF WILL BE INFILTRATED IN THE AREA SHOWN.
4. POWER SUPPLIER IS TILLAMOOK PUBLIC UTILITY DISTRICT (TPUD).
5. STREET LIGHTS TO MEET NETARTS-OCEANSIDE RURAL FIRE PROTECTION DISTRICT AND TILLAMOOK PUBLIC UTILITY DISTRICT REQUIREMENTS.
   - 5.1. STREET LIGHTS SHALL BE LOCATED TO ILLUMINATE FIRE HYDRANTS AND STREET INTERSECTIONS.
   - 5.2. ALL OVERHEAD LIGHTS MUST BE FULLY SHIELDED LUMINARY FIXTURES.
   - 5.3. DEVELOPER TO WORK WITH TILLAMOOK PUBLIC UTILITY DISTRICT FOR COMPATIBILITY WITH THEIR GUIDELINES.
   - 5.4. IF LIGHTS AND POLES ARE INSTALLED PER TILLAMOOK PUBLIC UTILITY DISTRICT, AFTER INSTALLATION THE FIRE DISTRICT WILL ASSUME THE COST OF OPERATIONS.
6. DEVELOPER TO COORDINATE RELOCATION OF NETARTS WATER DISTRICT (NWD) WATER LINE TO THE NEW ROADWAY RIGHT-OF-WAY. DEVELOPER WILL DO THE INSTALLATION AND NWD WILL FURNISH THE PIPE PER APRIL 22, 2019 NWD BOARD OF DIRECTORS MEETING MINUTES.
7. WATER SYSTEM HGL PER NWD: 525 FT
   HIGHEST ROADWAY CENTERLINE ELEVATION NEAR LOTS 22 & 23: ±430 FT
   APPROXIMATE STATIC WATER PRESSURE AT LOTS 22 & 23: 95 FT HEAD = ±41 PSI
8. WATER AND SANITARY SEWER LOCATIONS SHOWN ARE APPROXIMATE. DETAILED DESIGN OF WATER AND SANITARY SEWER, INCLUDING SERVICES, WILL BE COMPLETED WITH FINAL CONSTRUCTION PERMIT PLANS.
9. SANITARY SEWER SERVICE WILL INCLUDE GRINDER PUMP.
10. SANITARY SEWER SERVICE MAY INCLUDE GRINDER PUMP.

N W E S

0 60 120
SCALE IN FEET

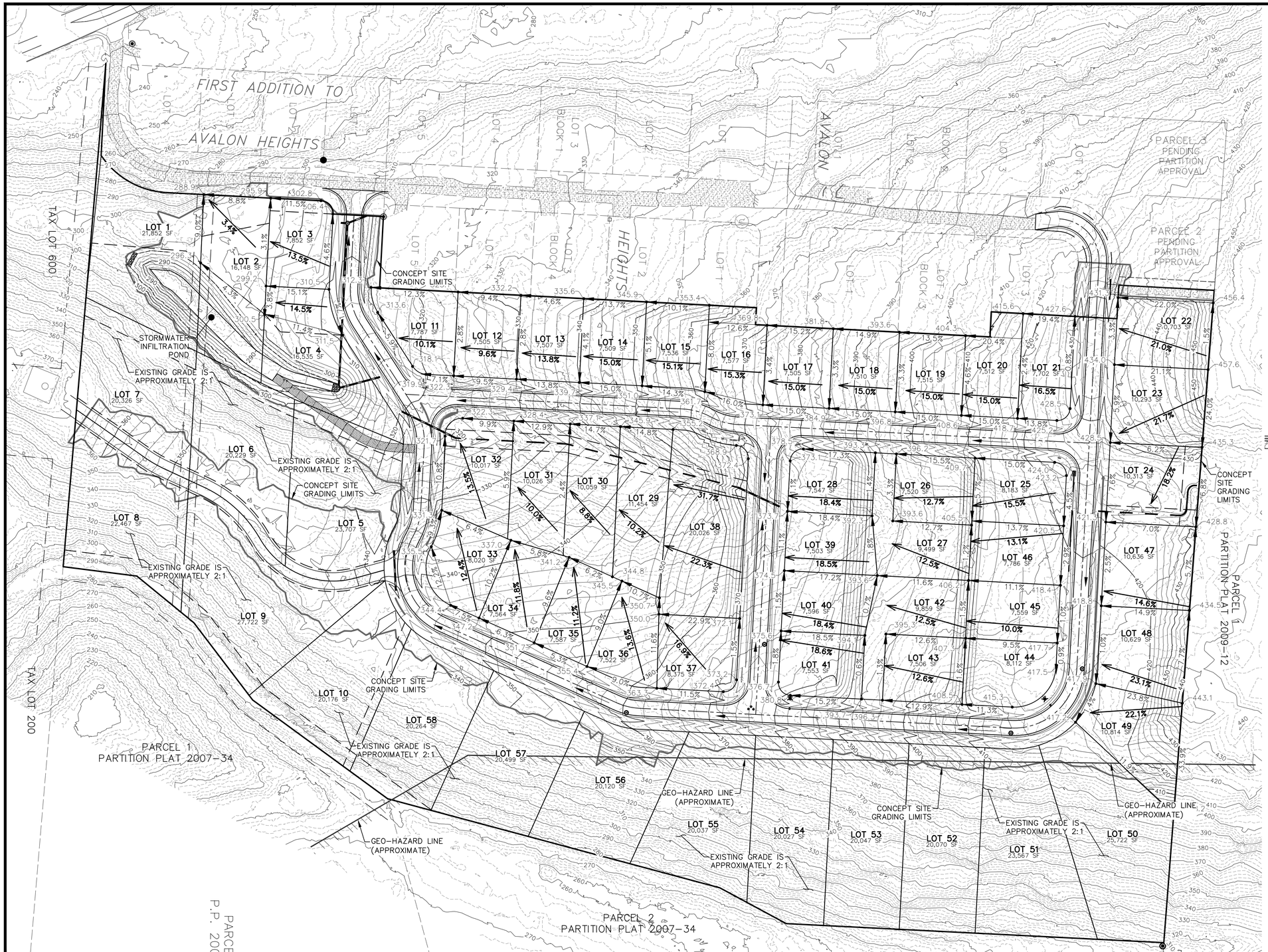
DATE:	NO.	REVISION

DRAWN: BD | DESIGNED: BD | CHECKED: EH
SCALE: AS SHOWN | DATE: MAR 31, 2021
PROJECT NO. E20-036

FIRWOOD DESIGN GROUP
Reliable Engineering Solutions
359 EAST HISTORIC COLUMBIA RIVER HIGHWAY
TROUTDALE, OREGON 97060
(503) 668-3737

AVALON HEIGHTS LLC - BILL HUGHES
41901 OLD HIGHWAY 30
ASTORIA, OREGON 97103

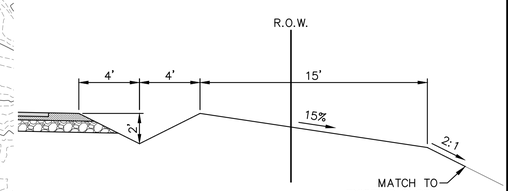
OVERALL CONCEPT UTILITY PLAN
SECOND AVALON HEIGHTS SUBDIVISION
LAND USE PLANS



SLOPE LABEL LEGEND

X.X% REPRESENTATIVE LOT SLOPE

X.X% LOT LINE SLOPE



LOTS 10 & 29-37
SCALE: N.T.S.

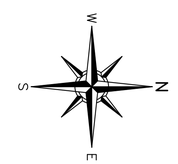
TCLUO 3.310 MINIMUM LOT SIZE

WHERE SLOPE AVERAGES LESS THAN 19%: 7,500 SF
WHERE SLOPE AVERAGES FROM 19% TO 29%: 10,000 SF
WHERE SLOPE AVERAGES GREATER THAN 29%: 20,000 SF

DETAILED LOT SLOPE DATA NOT PROVIDED ON THIS PLAN FOR LOTS OVER 20,000 SF

NOTES

1. PER TILLAMOOK COUNTY, THE PROJECT IS WITHIN AN AREA OF GEOLOGIC HAZARD. A GEOLOGIC HAZARD REPORT IS REQUIRED.
2. REFER TO THE GEOLOGIC HAZARD REPORT INCLUDED WITH THE LAND USE SUBMITTAL DOCUMENTS: "GEOHAZARD REPORT, PROPOSED AVALON HEIGHTS SUBDIVISION, OCEANSIDE, TILLAMOOK COUNTY, OREGON, T:1S, R:10W, SEC:30, TL:200. PREPARED BY ENVIRONMENTAL MANAGEMENT SYSTEMS, INC DATED APRIL 12, 2018.
3. BUILDING FOUNDATIONS WITHIN GEO-HAZARD AREA TO BE CONSTRUCTED PER GEOTECHNICAL ENGINEERING RECOMMENDATIONS.



0 60 120
SCALE IN FEET

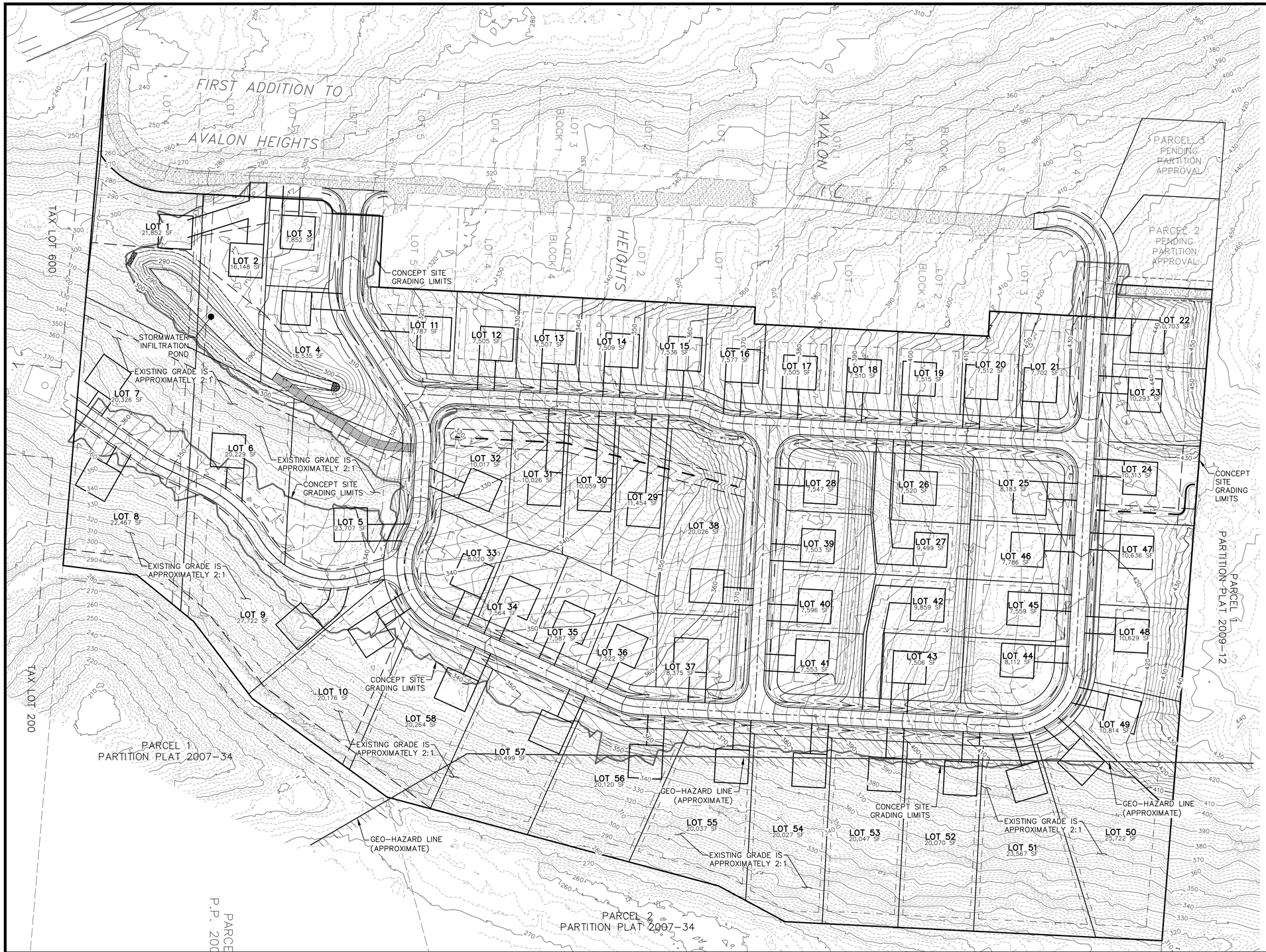
DATE:	NO.	REVISION

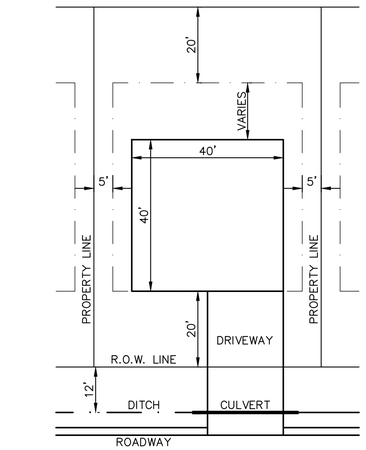
DRAWN: BD | DESIGNED: BD | CHECKED: EH
SCALE: AS SHOWN | DATE: MAR 31, 2021
PROJECT NO. E20-036

FIRWOOD DESIGN GROUP
Reliable Engineering Solutions
359 EAST HISTORIC COLUMBIA RIVER HIGHWAY
TROUTDALE, OREGON 97060
(503) 668-3737

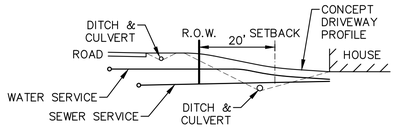
AVALON HEIGHTS LLC - BILL HUGHES
41901 OLD HIGHWAY 30
ASTORIA, OREGON 97103

CONCEPT GRADING & LOT SLOPE ANALYSIS
SECOND AVALON HEIGHTS SUBDIVISION
LAND USE PLANS

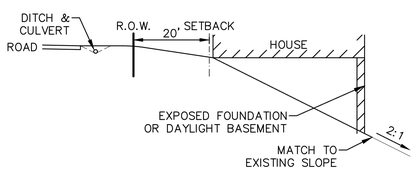




CONCEPT BUILDING FOOTPRINT & SETBACKS
SCALE: N.T.S.



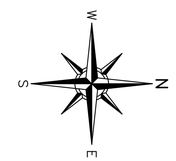
LOTS 29–31 SCHEMATIC
SCALE: N.T.S.



LOTS 10 & 50–58 SCHEMATIC
SCALE: N.T.S.

NOTES

1. PER TILLAMOOK COUNTY, THE PROJECT IS WITHIN AN AREA OF GEOLOGIC HAZARD. A GEOLOGIC HAZARD REPORT IS REQUIRED.
2. REFER TO THE GEOLOGIC HAZARD REPORT INCLUDED WITH THE LAND USE SUBMITTAL DOCUMENTS:
   "GEOHAZARD REPORT, PROPOSED AVALON HEIGHTS SUBDIVISION, OCEANSIDE, TILLAMOOK COUNTY, OREGON, T:1S, R:10W, SEC:30, TL:200. PREPARED BY ENVIRONMENTAL MANAGEMENT SYSTEMS, INC DATED APRIL 12, 2018.
3. BUILDING FOUNDATIONS WITHIN GEO-HAZARD AREA TO BE CONSTRUCTED PER GEOTECHNICAL ENGINEERING RECOMMENDATIONS.



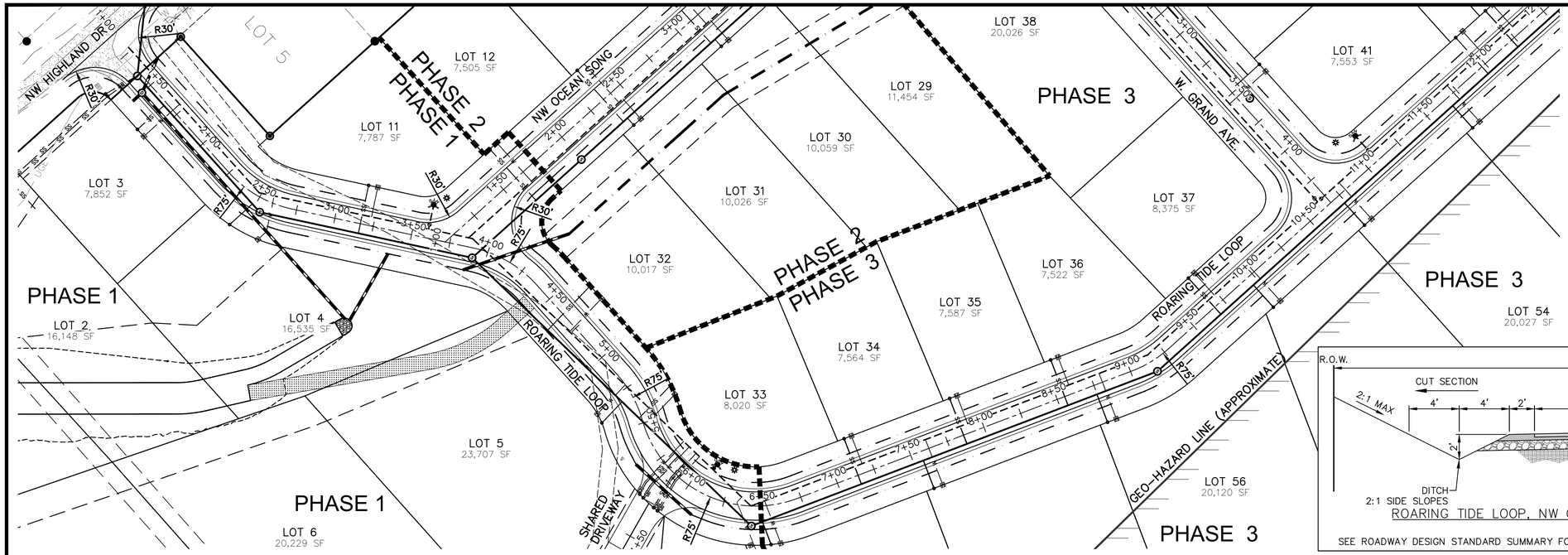
DATE:	NO.	REVISION

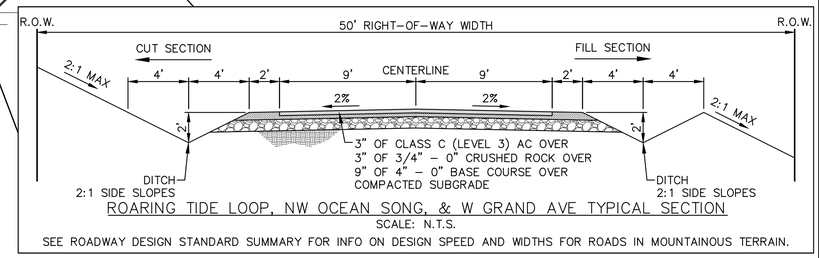
DRAWN: BD | DESIGNED: BD | CHECKED: EH
SCALE: AS SHOWN | DATE: MAR 31, 2021
PROJECT NO. E20-036

FIRWOOD DESIGN GROUP
Reliable Engineering Solutions
359 EAST HISTORIC COLUMBIA RIVER HIGHWAY
TROUTDALE, OREGON 97060
(503) 668-3737

AVALON HEIGHTS LLC - BILL HUGHES
41901 OLD HIGHWAY 30
ASTORIA, OREGON 97103

CONCEPT LOCATION OF LOT DEVELOPMENT
SECOND AVALON HEIGHTS SUBDIVISION
LAND USE PLANS





ROARING TIDE LOOP, NW OCEAN SONG, & W GRAND AVE TYPICAL SECTION

SCALE: N.T.S.

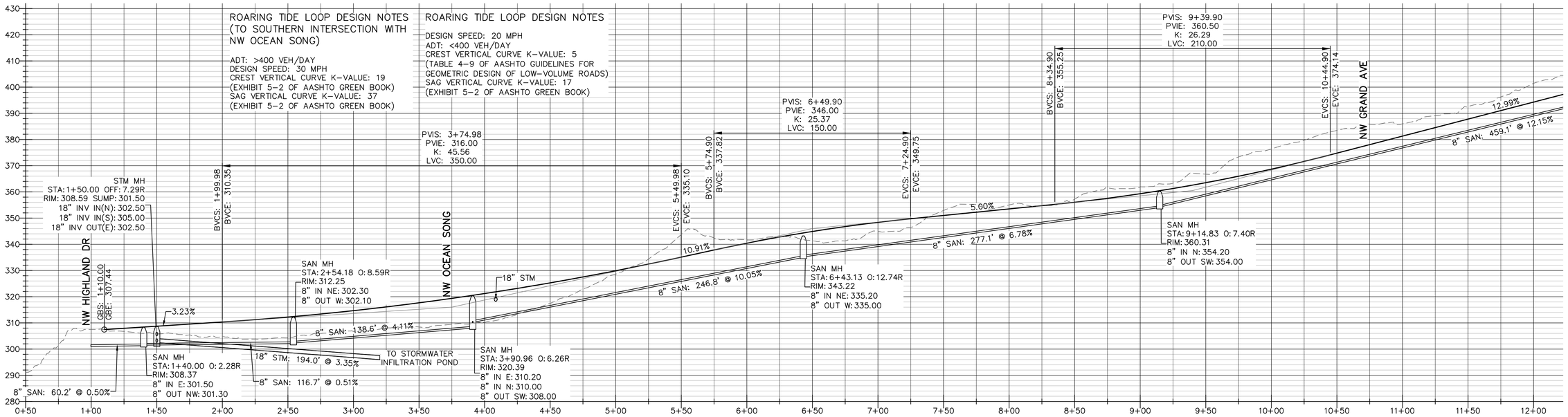
SEE ROADWAY DESIGN STANDARD SUMMARY FOR INFO ON DESIGN SPEED AND WIDTHS FOR ROADS IN MOUNTAINOUS TERRAIN.

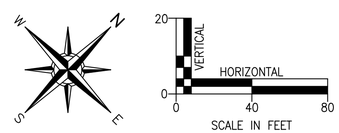
ROARING TIDE LOOP DESIGN NOTES (TO SOUTHERN INTERSECTION WITH NW OCEAN SONG)

ADT: >400 VEH/DAY
DESIGN SPEED: 30 MPH
CREST VERTICAL CURVE K-VALUE: 19
(EXHIBIT 5-2 OF AASHTO GREEN BOOK)
SAG VERTICAL CURVE K-VALUE: 37
(EXHIBIT 5-2 OF AASHTO GREEN BOOK)

ROARING TIDE LOOP DESIGN NOTES

DESIGN SPEED: 20 MPH
ADT: <400 VEH/DAY
CREST VERTICAL CURVE K-VALUE: 5
(TABLE 4-9 OF AASHTO GUIDELINES FOR GEOMETRIC DESIGN OF LOW-VOLUME ROADS)
SAG VERTICAL CURVE K-VALUE: 17
(EXHIBIT 5-2 OF AASHTO GREEN BOOK)





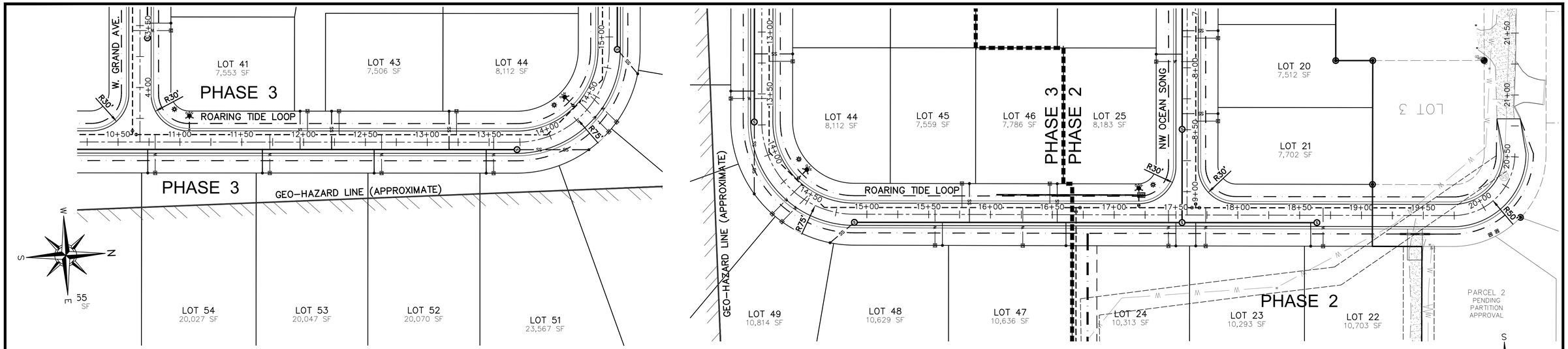
DATE:	NO.	REVISION

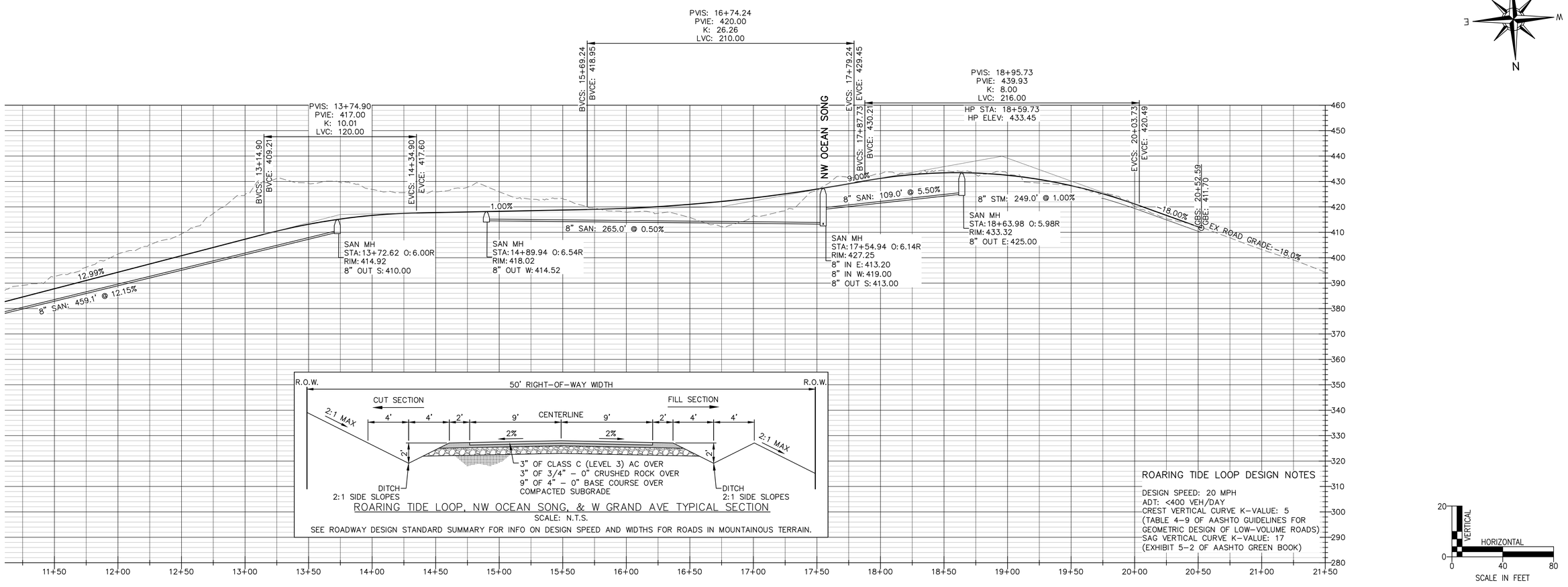
DRAWN: BD | DESIGNED: BD | CHECKED: EH
SCALE: AS SHOWN | DATE: MAR 31, 2021
PROJECT NO. E20-036

FIRWOOD DESIGN GROUP
Reliable Engineering Solutions
359 EAST HISTORIC COLUMBIA RIVER HIGHWAY
TROUTDALE, OREGON 97060
(503) 668-3737

AVALON HEIGHTS LLC - BILL HUGHES
41901 OLD HIGHWAY 30
ASTORIA, OREGON 97103

ROARING TIDE LOOP CONCEPT PROFILE
SECOND AVALON HEIGHTS SUBDIVISION
LAND USE PLANS





ROARING TIDE LOOP, NW OCEAN SONG, & W GRAND AVE TYPICAL SECTION

SCALE: N.T.S.

SEE ROADWAY DESIGN STANDARD SUMMARY FOR INFO ON DESIGN SPEED AND WIDTHS FOR ROADS IN MOUNTAINOUS TERRAIN.

ROARING TIDE LOOP DESIGN NOTES

DESIGN SPEED: 20 MPH
ADT: <400 VEH/DAY
CREST VERTICAL CURVE K-VALUE: 5
(TABLE 4-9 OF AASHTO GUIDELINES FOR GEOMETRIC DESIGN OF LOW-VOLUME ROADS)
SAG VERTICAL CURVE K-VALUE: 17
(EXHIBIT 5-2 OF AASHTO GREEN BOOK)

SCALE IN FEET

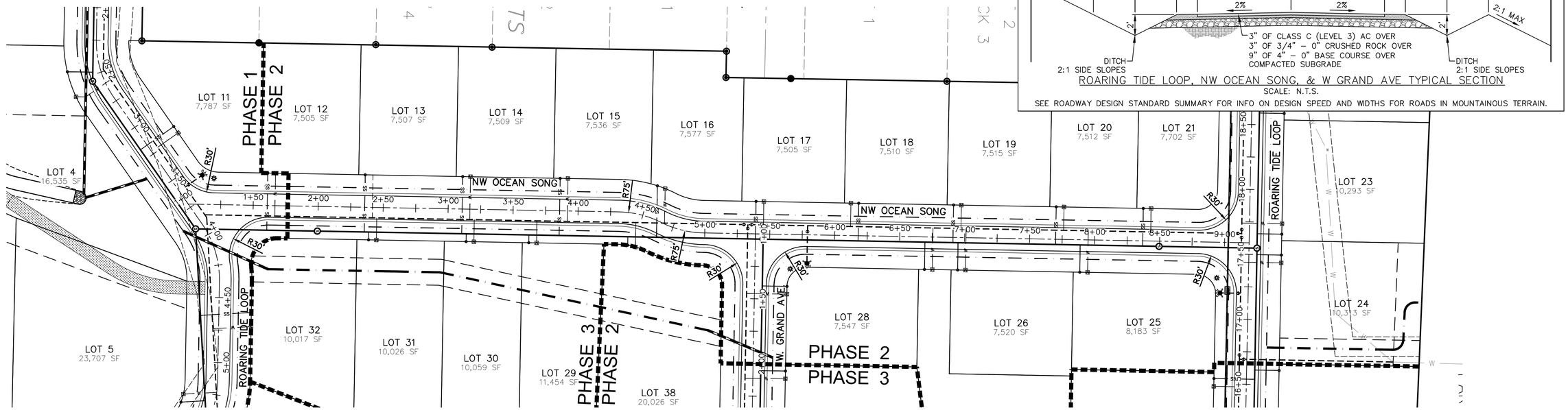
DATE:	NO.	REVISION

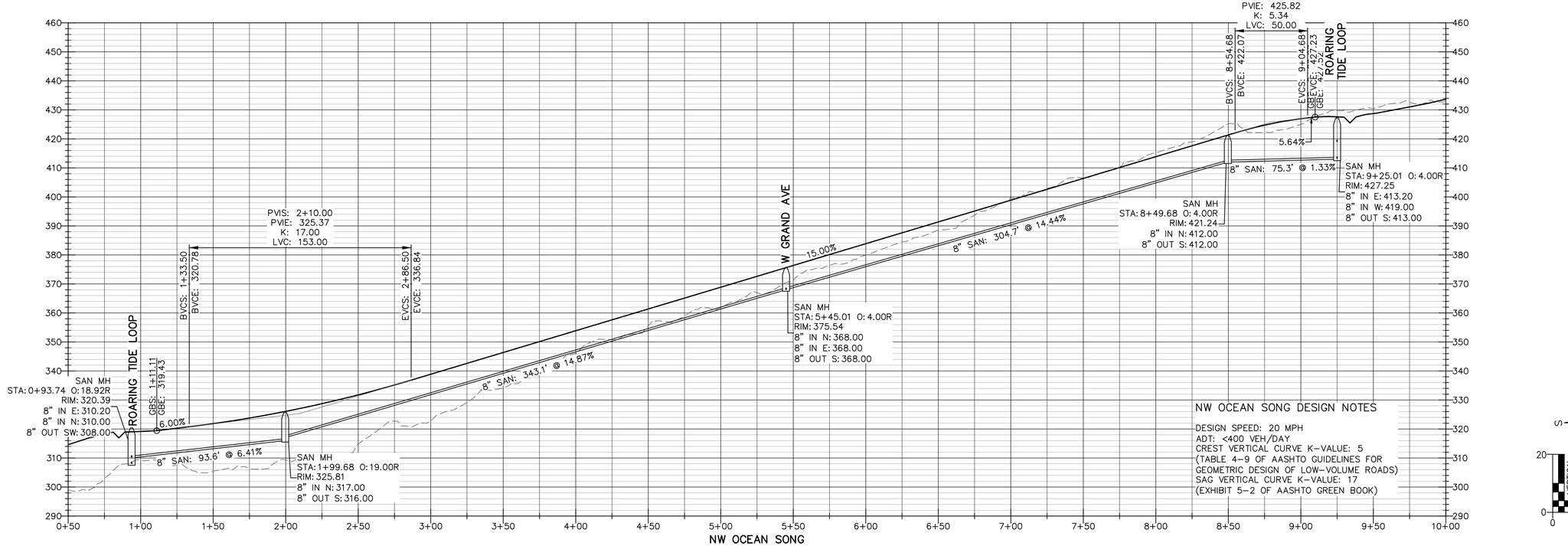
DRAWN: BD | DESIGNED: BD | CHECKED: EH
SCALE: AS SHOWN | DATE: MAR 31, 2021
PROJECT NO. E20-036

FIRWOOD DESIGN GROUP
Reliable Engineering Solutions
359 EAST HISTORIC COLUMBIA RIVER HIGHWAY
TROUTDALE, OREGON 97060
(503) 668-3737

AVALON HEIGHTS LLC - BILL HUGHES
41901 OLD HIGHWAY 30
ASTORIA, OREGON 97103

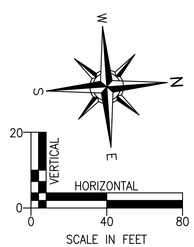
ROARING TIDE LOOP CONCEPT PROFILE
SECOND AVALON HEIGHTS SUBDIVISION
LAND USE PLANS





NW OCEAN SONG DESIGN NOTES

DESIGN SPEED: 20 MPH
ADT: <400 VEH/DAY
CREST VERTICAL CURVE K-VALUE: 5
(TABLE 4-9 OF AASHTO GUIDELINES FOR GEOMETRIC DESIGN OF LOW-VOLUME ROADS)
SAG VERTICAL CURVE K-VALUE: 17
(EXHIBIT 5-2 OF AASHTO GREEN BOOK)



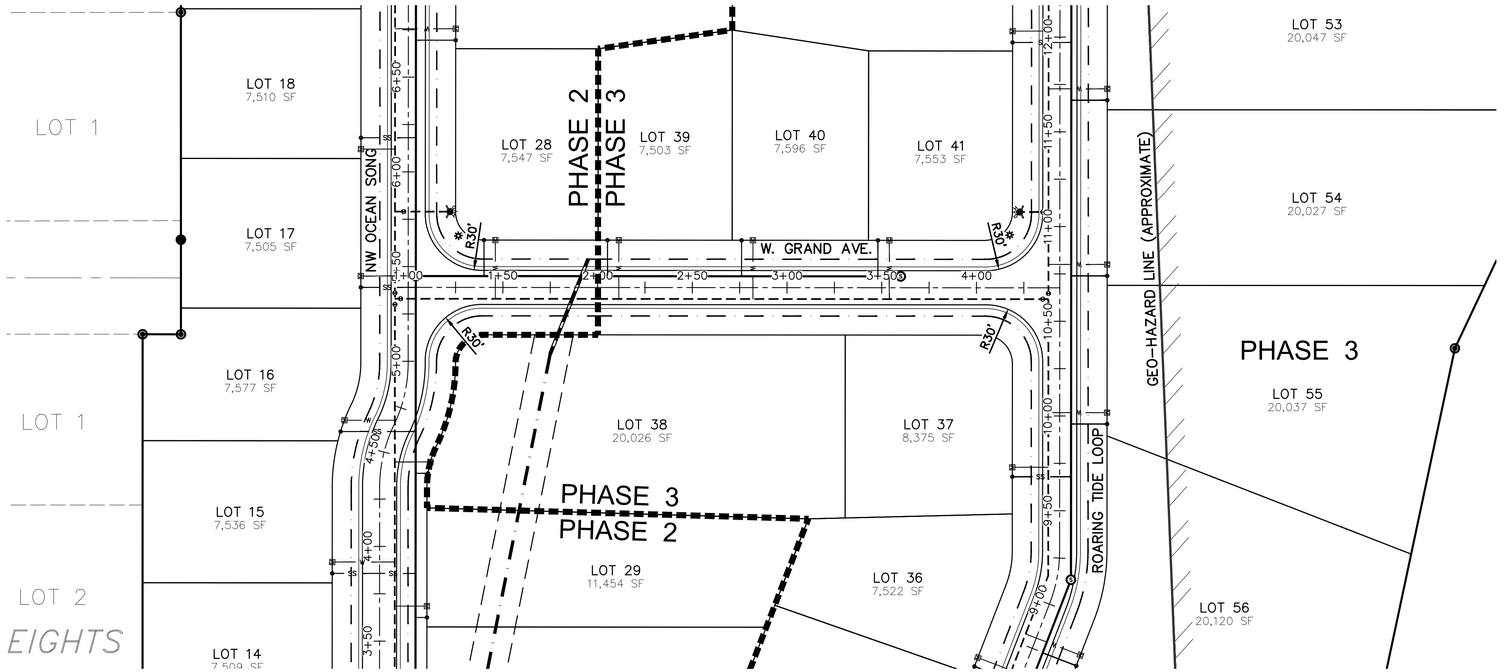
DATE:	NO.	REVISION

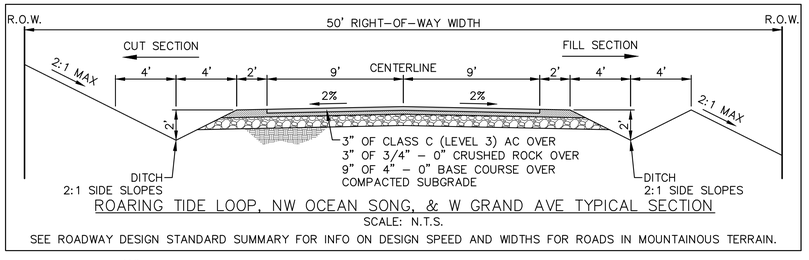
DRAWN: BD | DESIGNED: BD | CHECKED: EH
SCALE: AS SHOWN | DATE: MAR 31, 2021
PROJECT NO. E20-036

FIRWOOD DESIGN GROUP
Reliable Engineering Solutions
359 EAST HISTORIC COLUMBIA RIVER HIGHWAY
TROUTDALE, OREGON 97060
(503) 668-3737

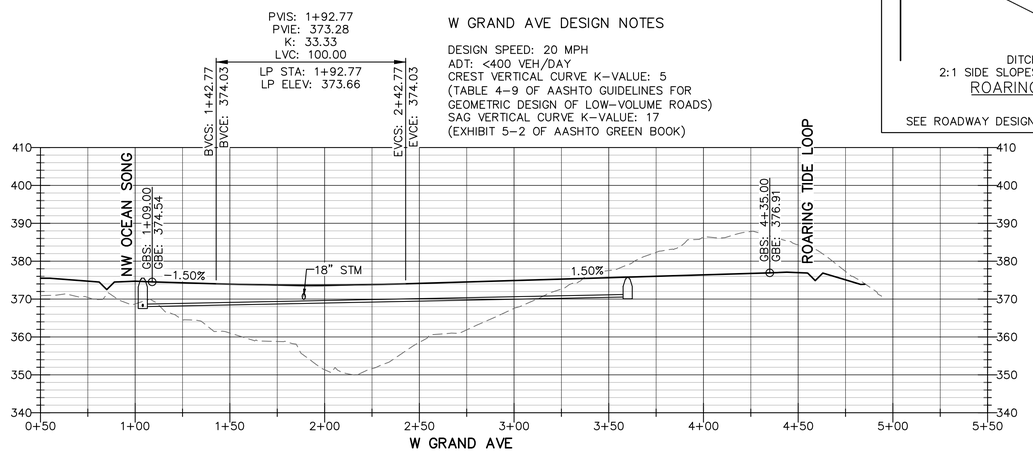
AVALON HEIGHTS LLC - BILL HUGHES
41901 OLD HIGHWAY 30
ASTORIA, OREGON 97103

NW OCEAN SONG CONCEPT PROFILE
SECOND AVALON HEIGHTS SUBDIVISION
LAND USE PLANS



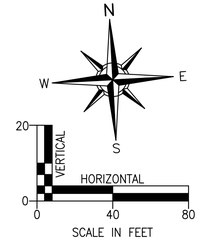


ROARING TIDE LOOP, NW OCEAN SONG, & W GRAND AVE TYPICAL SECTION
SCALE: N.T.S.
SEE ROADWAY DESIGN STANDARD SUMMARY FOR INFO ON DESIGN SPEED AND WIDTHS FOR ROADS IN MOUNTAINOUS TERRAIN.



W GRAND AVE DESIGN NOTES

DESIGN SPEED: 20 MPH
ADT: <400 VEH/DAY
CREST VERTICAL CURVE K-VALUE: 5
(TABLE 4-9 OF AASHTO GUIDELINES FOR GEOMETRIC DESIGN OF LOW-VOLUME ROADS)
SAG VERTICAL CURVE K-VALUE: 17
(EXHIBIT 5-2 OF AASHTO GREEN BOOK)



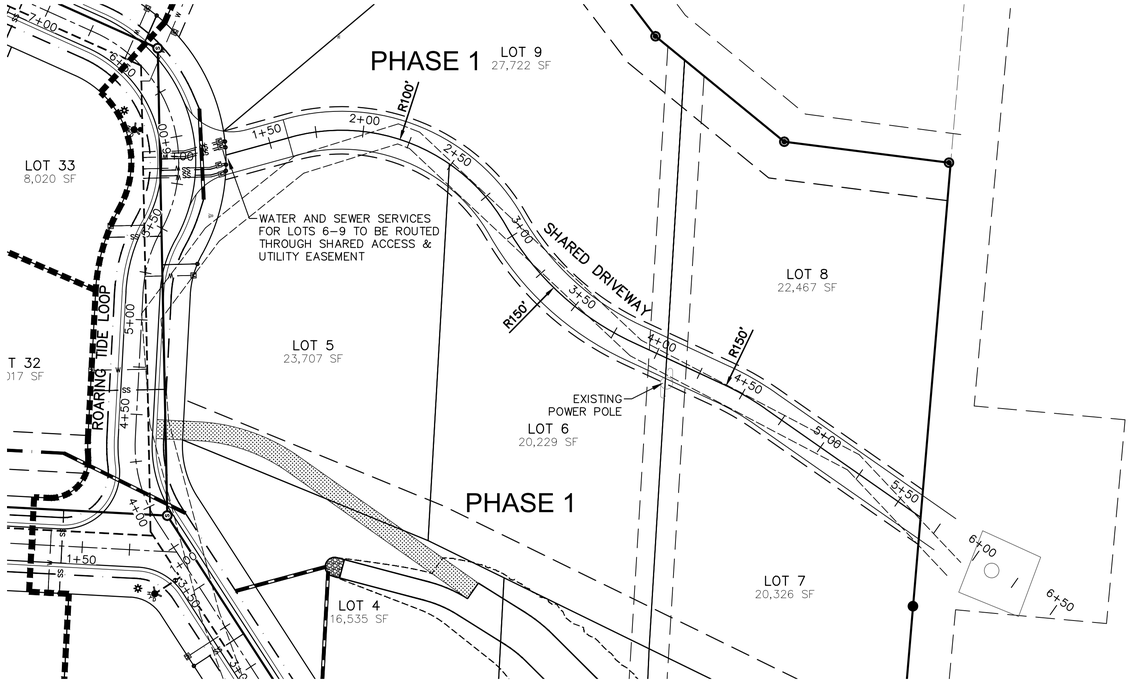
DATE:	NO.	REVISION

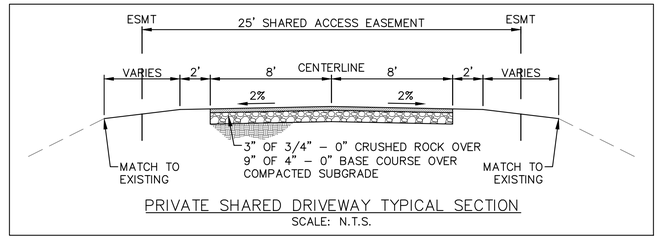
DRAWN: BD | DESIGNED: BD | CHECKED: EH
SCALE: AS SHOWN | DATE: MAR 31, 2021
PROJECT NO. E20-036

FIRWOOD DESIGN GROUP
Reliable Engineering Solutions
359 EAST HISTORIC COLUMBIA RIVER HIGHWAY
TROUTDALE, OREGON 97060
(503) 668-3737

AVALON HEIGHTS LLC - BILL HUGHES
41901 OLD HIGHWAY 30
ASTORIA, OREGON 97103

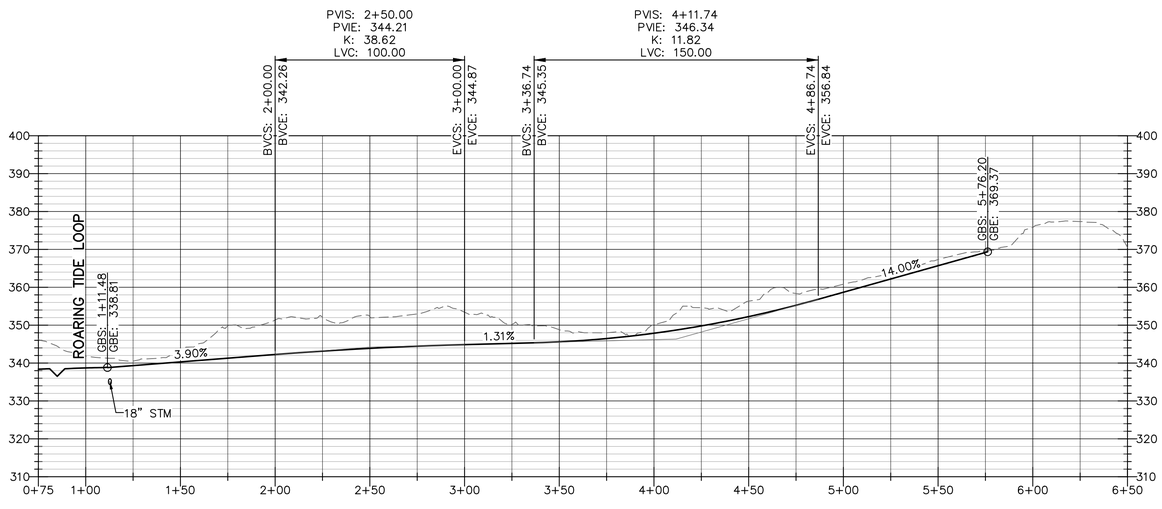
W GRAND AVE CONCEPT PROFILE
SECOND AVALON HEIGHTS SUBDIVISION
LAND USE PLANS

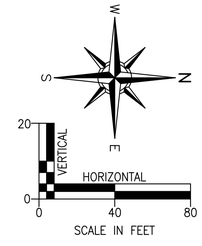




PRIVATE SHARED DRIVEWAY TYPICAL SECTION

SCALE: N.T.S.





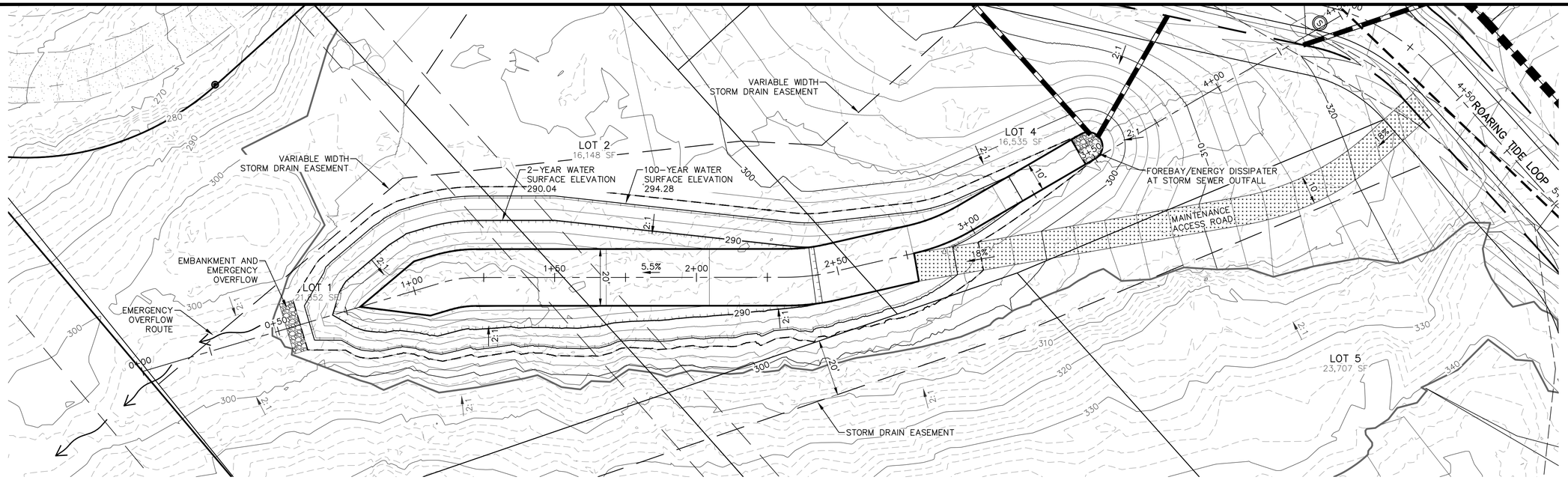
DATE:	NO.	REVISION

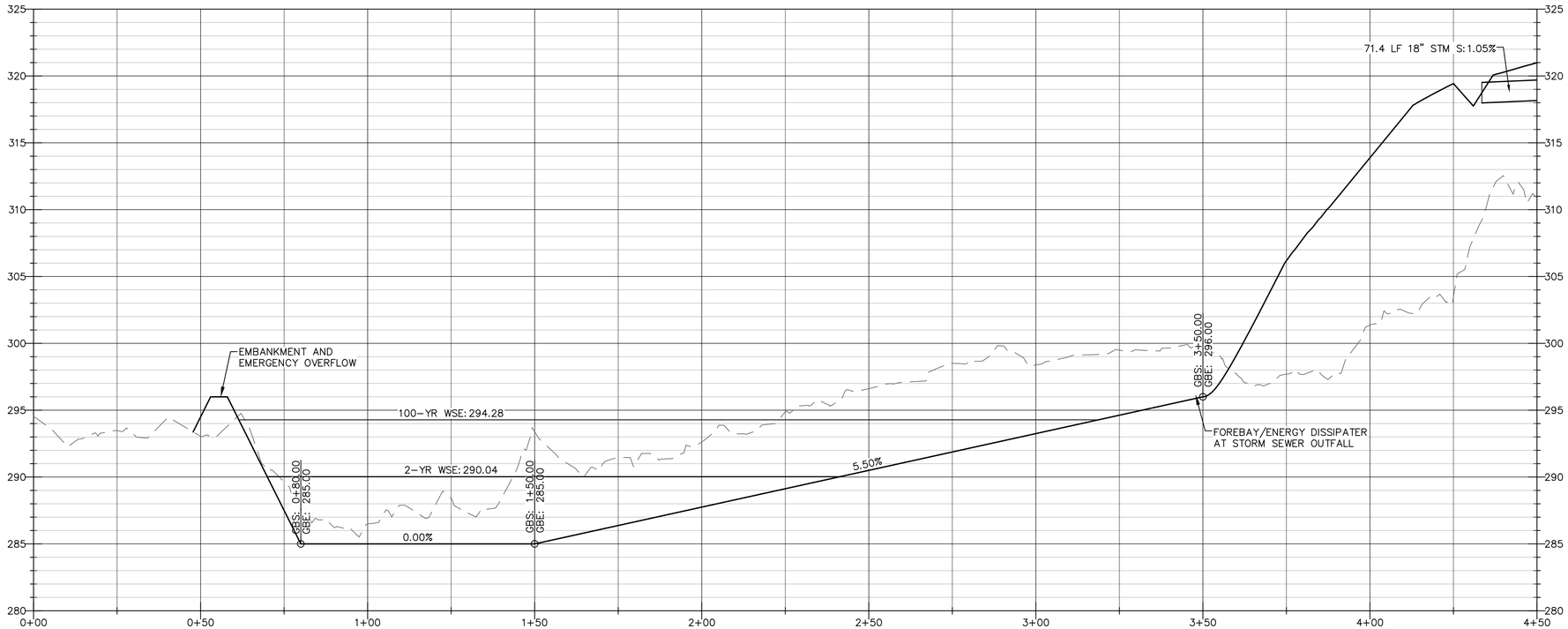
DRAWN: BD | DESIGNED: BD | CHECKED: EH
SCALE: AS SHOWN | DATE: MAR 31, 2021
PROJECT NO. E20-036

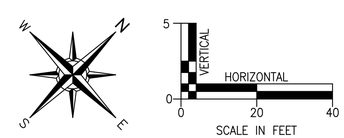
FIRWOOD DESIGN GROUP
Reliable Engineering Solutions
359 EAST HISTORIC COLUMBIA RIVER HIGHWAY
TROUTDALE, OREGON 97060
(503) 668-3737

AVALON HEIGHTS LLC - BILL HUGHES
41901 OLD HIGHWAY 30
ASTORIA, OREGON 97103

SHARED DRIVEWAY CONCEPT PROFILE
SECOND AVALON HEIGHTS SUBDIVISION
LAND USE PLANS







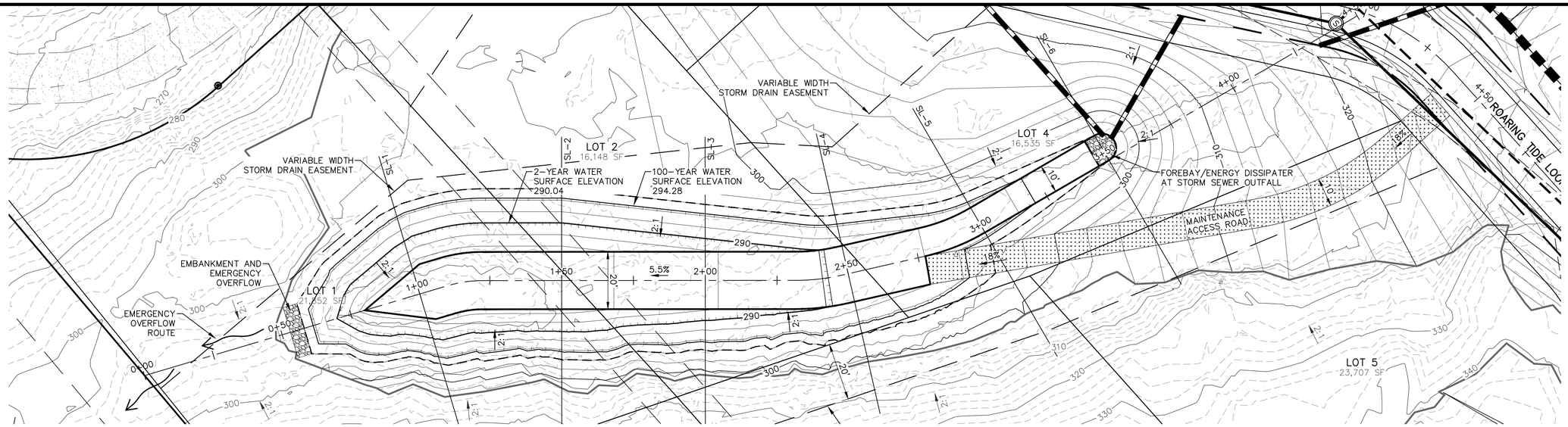
DATE:	NO.	REVISION

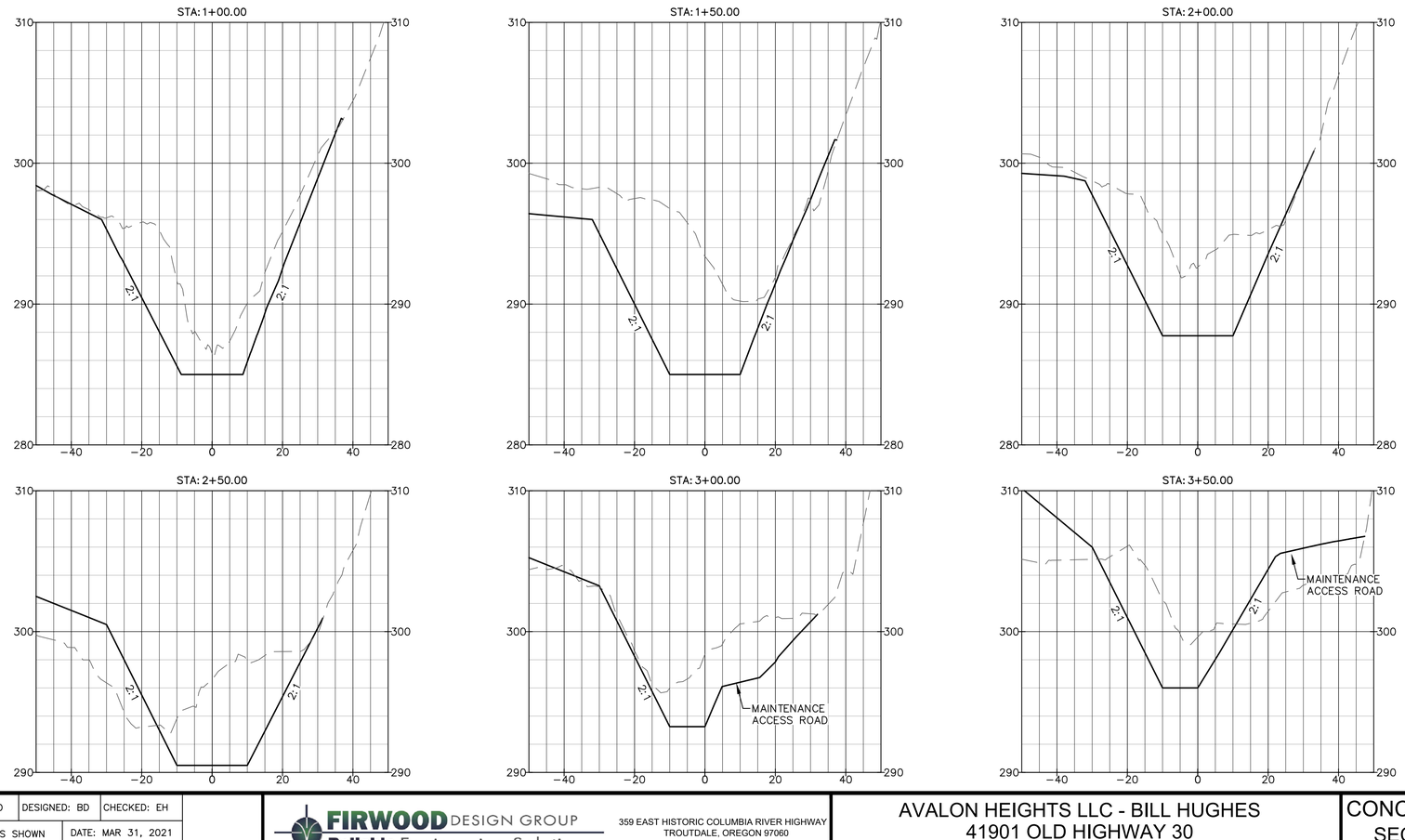
DRAWN: BD | DESIGNED: BD | CHECKED: EH
SCALE: AS SHOWN | DATE: MAR 31, 2021
PROJECT NO. E20-036

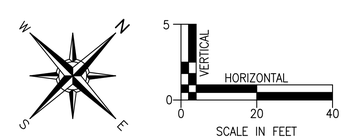
FIRWOOD DESIGN GROUP
Reliable Engineering Solutions
359 EAST HISTORIC COLUMBIA RIVER HIGHWAY
TROUTDALE, OREGON 97060
(503) 668-3737

AVALON HEIGHTS LLC - BILL HUGHES
41901 OLD HIGHWAY 30
ASTORIA, OREGON 97103

CONCEPT INFILTRATION POND PLAN
SECOND AVALON HEIGHTS SUBDIVISION
LAND USE PLANS







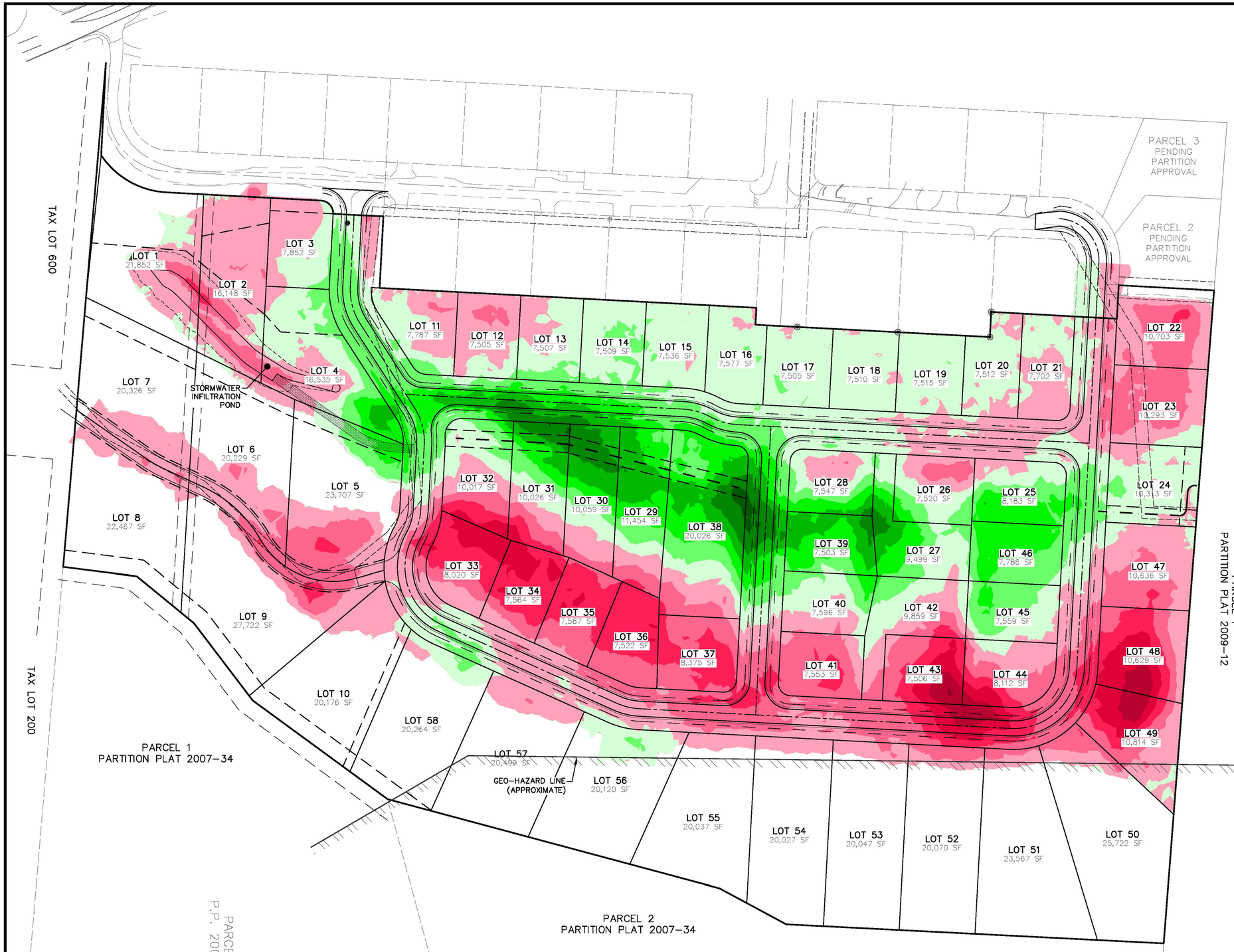
DATE:	NO.	REVISION

DRAWN: BD | DESIGNED: BD | CHECKED: EH
SCALE: AS SHOWN | DATE: MAR 31, 2021
PROJECT NO. E20-036

FIRWOOD DESIGN GROUP
Reliable Engineering Solutions
359 EAST HISTORIC COLUMBIA RIVER HIGHWAY
TROUTDALE, OREGON 97060
(503) 668-3737

AVALON HEIGHTS LLC - BILL HUGHES
41901 OLD HIGHWAY 30
ASTORIA, OREGON 97103

CONCEPT INFILTRATION POND SECTIONS
SECOND AVALON HEIGHTS SUBDIVISION
LAND USE PLANS



CUT-FILL				
#	MIN RANGE	MAX RANGE	COLOR	
1	-30	-25		CUT
2	-25	-20		
3	-20	-15		
4	-15	-10		
5	-10	-5		
6	-5	0		
7	0	5		FILL
8	5	10		
9	10	15		
10	15	20		
11	20	25		
12	25	30		

NOTES

1. PRELIMINARY ESTIMATED EARTHWORK:
   CUT: 70,000 CY
   FILL: 68,000 CY
   PRELIMINARY ESTIMATE IS EXISTING GRADE TO FINISH GRADE IN THE LIMITS OF GRADING SHOWN. TOPSOIL STRIPPING, IMPORTED ROAD/UTILITY TRENCH MATERIAL, ETC IS NOT ACCOUNTED FOR. FINAL DESIGN GRADING VOLUMES WILL LIKELY DIFFER SIGNIFICANTLY. IT IS EXPECTED THAT GRADING WILL BALANCE ON-SITE.
3. EXISTING TOPOGRAPHY IS FROM 2009 USACE LIDAR DATA. ACTUAL CONDITIONS (AND THEREFORE CUT AND FILL VOLUMES) MAY VARY.

DATE:	NO.	REVISION

DRAWN: BD | DESIGNED: BD | CHECKED: EH
SCALE: AS SHOWN | DATE: MAR 31, 2021
PROJECT NO. E20-036

FIRWOOD DESIGN GROUP
Reliable Engineering Solutions
359 EAST HISTORIC COLUMBIA RIVER HIGHWAY
TROUTDALE, OREGON 97060
(503) 668-3737

AVALON HEIGHTS LLC - BILL HUGHES
41901 OLD HIGHWAY 30
ASTORIA, OREGON 97103

CUT-FILL MAP
SECOND AVALON HEIGHTS SUBDIVISION
LAND USE PLANS

PRELIMINARY STORMWATER REPORT

Second Avalon Heights Subdivision
Located in SE ¼ of SE ¼ of Sec 30 T1S R10W W.M.
Taxlot 200
Tillamook County, OR

March 31, 2021

Prepared By:

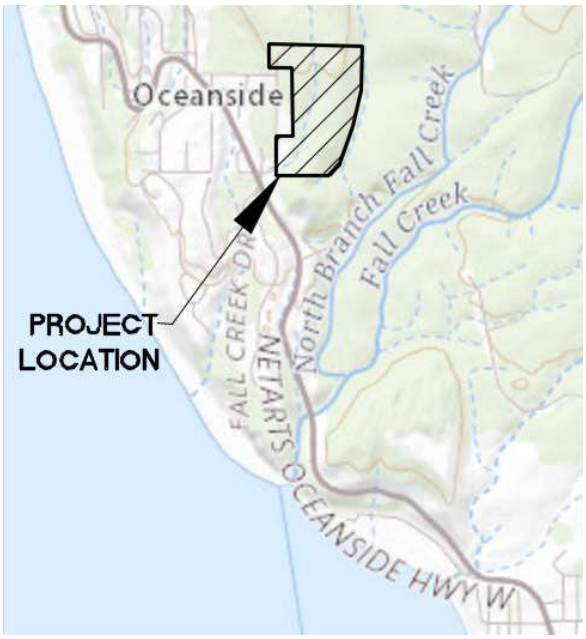
FDG
Firwood Design Group, LLC
SURVEYING • ENGINEERING • PLANNING

359 E. Historic Columbia River Highway
Troutdale, OR 97060
503.668.3737- fax 503.668.3788

TABLE OF CONTENTS

I. PROJECT DESCRIPTION & OBJECTIVE

The proposed project is a single-family residential subdivision encompassing approximately 21 acres of unincorporated Tillamook County near Oceanside. The project location is shown on the map below.



Currently, much of the project site drains to a large existing on-site depression or basin located at the south west corner of the site where runoff infiltrates into native soils. Post-development, the subdivision will drain to and be infiltrated in the same location. The objective of this preliminary stormwater report is to demonstrate feasibility of the conceptual stormwater management plan for the land use phase of this project. Final detailed design and plans will be provided for construction permitting.

Site Rainfall Data

Rainfall data for the site was obtained from the NOAA Atlas 2 Precipitation Frequency Estimate tool: NOAA Atlas 2 Precipitation Frequency Estimates (weather.gov)

Precipitation Frequency Data Output

NOAA Atlas 2

Oregon 45.45°N 123.95°W
Site-specific Estimates

Map	Precipitation (inches)	Precipitation Intensity (in/hr)
2-year 6-hour	1.51	0.25
2-year 24-hour	3.05	0.13
100-year 6-hour	3.00	0.50
100-year 24-hour	6.50	0.27

Go to PFDS
Go to NA2

Hydrometeorological Design Studies Center - NOAA/National Weather Service
1325 East-West Highway - Silver Spring, MD 20910 - (301) 713-1669
Mon Jan 11 17:23:53 2021

The 6.5-inch 100-year 24-hour design storm will be used for this project.

Site Soils

Soil data for the site was obtained from the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Web Soil Survey. The soil resource report is included in the appendix for reference. The site, especially areas tributary to the infiltration area, consists primarily of Netarts fine sandy loam, a Type A hydrologic group soil with a Ksat (capacity of most limiting layer to transmit water) of 1.98 to 5.95 inches per hour.

Environmental Management Systems Inc (EMS) performed an infiltration test in the approximate location of the proposed infiltration pond. The report is included in the appendix for reference. Two falling-head infiltration tests were performed; the second infiltration test result (19.5 inches per hour) was slightly lower than the first test and is therefore used for design. A safety factor of two is applied, so the design infiltration rate used is 9.75 inches per hour.

III. RUNOFF, CONVEYANCE, AND INFILTRATION

Runoff

A basin map and HydroCAD model were developed for concept-level hydrological and infiltration calculations; both are included in the appendix for reference. As part of developing the basin map, assumptions were made for impervious surfaces at full build-out; lots are assumed to average approximately 4,000 square feet of impervious per lot, which equates to a 50'x50' house and a 75'x20' driveway. Roadway impervious areas were calculated from the concept design drawings.

The HydroCAD model uses the Santa Barbara Urban Hydrograph (SBUH) with a Type 1A rainfall distribution methodology. The time of concentration for the basin was calculated using the basin map and the HydroCAD time of concentration calculation tool for the most hydraulically distant point of the drainage basin.

The Curve Numbers (CN) used in hydrological calculations are:
Impervious (pavement, gravel, driveways, and houses): 98
On-site pervious (lawns, roadside ditches, stormwater easement, Type A soil): 49
Off-site pervious (woods): 36

Calculated peak runoff rates from the 100-year, 24-hour design storm entering the infiltration basin is tabulated below.

Basin 1	Basin 2	Total
6.34 cfs	2.99 cfs	9.33 cfs

Conveyance

The capacity of roadside ditches and culverts was calculated with Manning's Equation using HydraFlow Express, an extension for AutoCAD Civil3D. Manning's coefficients used are from the ODOT Hydraulics Manual, Chapter 8, Appendix A – Hydraulic Roughness (Manning's n) Values of Conduits and Channels. The HydraFlow calculations and an excerpt of the ODOT tables are included in the appendix of this report.

Maximum capacity of stormwater conveyance facilities:
Roadside ditch with 0" freeboard at 1.00% slope: 13.79 cfs
18" smooth plastic at 1.00% slope: 13.35 cfs
12" smooth plastic at 1.00% slope: 4.53 cfs
12" smooth plastic at 2.00% slope: 6.40 cfs

As the minimum proposed road grade is 1%, roadside ditch and pipe capacity at 1% slope was checked against the peak runoff flow rates from the 100-year design storm for Basin 1. As shown, all roadside ditches and 18" smooth plastic storm lines have sufficient capacity to convey peak flow rates. At 1% minimum grade, 12" smooth plastic storm lines do not have sufficient capacity to convey the peak flow rate; the minimum slope required for capacity was calculated to be 2.00%. As most of the proposed roadway grade

is steeper than this minimum, most individual lot driveway culverts can be 12" diameter. On any driveway approaches where conveyance capacity cannot be met with 12" diameter culverts, an 18" culvert may be installed. Therefore, the concept design of roadside ditches and culverts is feasible.

Infiltration

Currently, much of the project property drains to an existing on-site low point. After development, most of the project property and some off-site areas will drain to this low point. As proposed development will create a significant amount of impervious surface, the existing infiltration location will have to be enlarged. As discussed in Section II of the report, the design infiltration rate for this basin is 9.75 inches per hour.

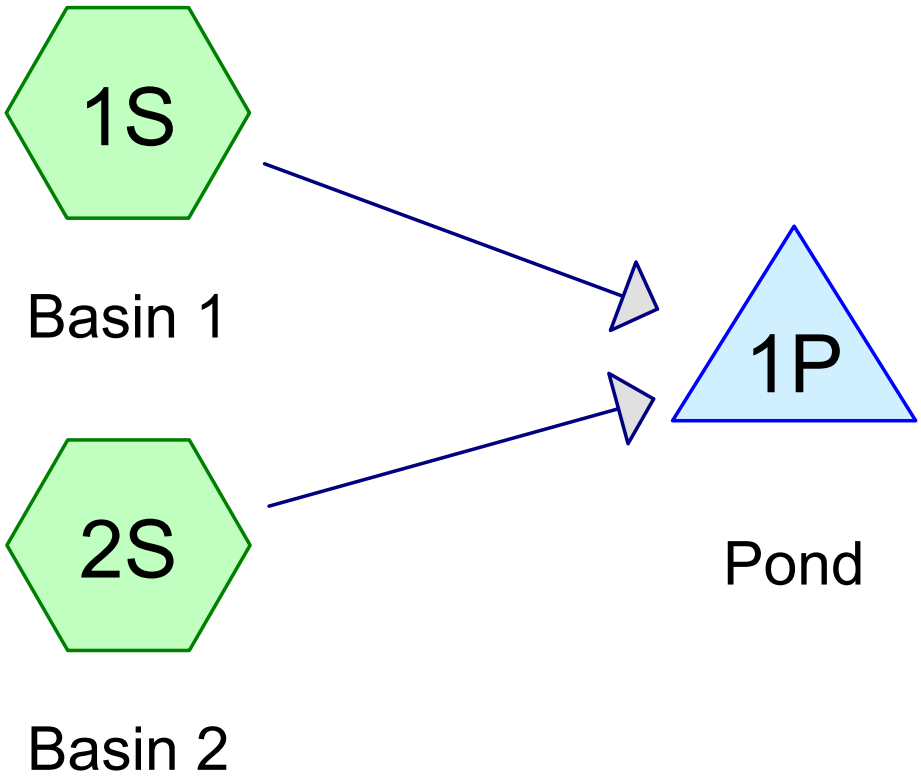
The basin is situated at the bottom of a large hill; its geometry is designed to roughly fit the existing hill topography. The concept basin was sized using stage storage with HydroCAD and AutoCAD Civil3D modeling. Tributary runoff hydrograph, basin stage storage volume, and exfiltration from the basin was calculated/modeled using HydroCAD. Refer to the concept infiltration pond plan for additional information on the configuration of the pond and maintenance access road.

Additional considerations to be addressed with final design:

- Lots adjacent to the infiltration basin should have a building finish floor elevation above the infiltration basin emergency overflow elevation.
- Basin side-slopes, especially portions located along the existing hill, may need stabilization measures such as riprap, erosion control blankets, or vegetation.
- Erosion protection and sediment/trash capture to protect the basin from erosion and excessive sedimentation, such as a forebay, riprap protection, or other design measures, may be required.
- The size of the drainage basin tributary to the infiltration basin, and therefore the size of the infiltration basin, may be reduced by utilizing strategically placed drywells. This alternative design approach will considered during the value engineering phase of this project.
- Infiltration of stormwater in the roadside ditches is not analyzed separately in the preliminary design for two reasons. First, infiltration of rainfall in the ditches is generally accounted for by including the ditches in the Curve Number calculations as pervious area. Second, significant lengths of the roadside ditches will be piped at full build-out by driveway culverts, reducing the length of ditch where any additional infiltration may occur. Final design of roadside ditch may include rock check dams or other facilities to increase hydraulic residence time and therefore increased infiltration in roadside ditches.

APPENDIX A

Calculations



Subcat Reach Pond Link

Routing Diagram for E20-036 Avalon Prelim HydroCAD 4
Prepared by Blake Davis @ FDG, Printed 3/31/2021

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Basin 1 Runoff Area=640,000 sf 31.02% Impervious Runoff Depth=0.89"
Flow Length=1,880' Tc=15.4 min CN=44/98 Runoff=2.87 cfs 1.086 af

Subcatchment 2S: Basin 2 Runoff Area=180,000 sf 48.61% Impervious Runoff Depth=1.41"
Flow Length=760' Tc=14.5 min CN=49/98 Runoff=1.28 cfs 0.486 af

Pond 1P: Pond Peak Elev=290.04' Storage=15,358 cf Inflow=4.15 cfs 1.573 af
Discarded=1.31 cfs 1.573 af Primary=0.00 cfs 0.000 af Outflow=1.31 cfs 1.573 af

Total Runoff Area = 18.825 ac Runoff Volume = 1.573 af Average Runoff Depth = 1.00"
65.12% Pervious = 12.259 ac 34.88% Impervious = 6.566 ac

Summary for Subcatchment 1S: Basin 1

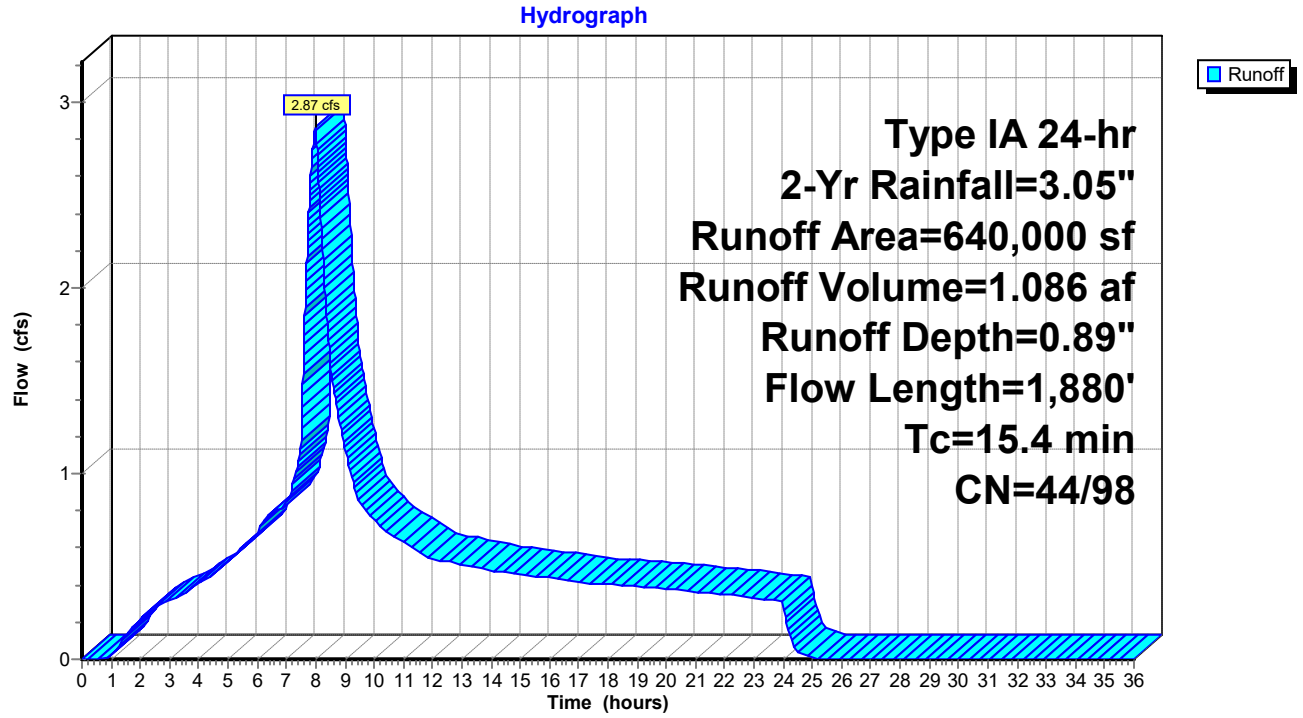
Runoff = 2.87 cfs @ 8.00 hrs, Volume= 1.086 af, Depth= 0.89"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-Yr Rainfall=3.05"

	Area (sf)	CN	Description
*	62,500	98	Roads & Shared Driveway
*	136,000	98	On-Site Houses & Driveways (34)
*	285,500	49	Pervious - 50-75% Grass cover, Fair, HSG A
*	156,000	36	Offsite - Woods, Fair, HSG A
	640,000	61	Weighted Average
	441,500	44	68.98% Pervious Area
	198,500	98	31.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	110	0.3500	0.24		**Sheet Flow, Sheet - Offsite Woods** Woods: Light underbrush n= 0.400 P2= 3.05"
3.8	300	0.0700	1.32		**Shallow Concentrated Flow, Offsite Woods** Woodland Kv= 5.0 fps
4.0	1,470	0.0720	6.06	48.46	**Channel Flow, Swale/Ditch** Area= 8.0 sf Perim= 26.0' r= 0.31' n= 0.030 Earth, grassed & winding
15.4	1,880	Total			

Subcatchment 1S: Basin 1



Summary for Subcatchment 2S: Basin 2

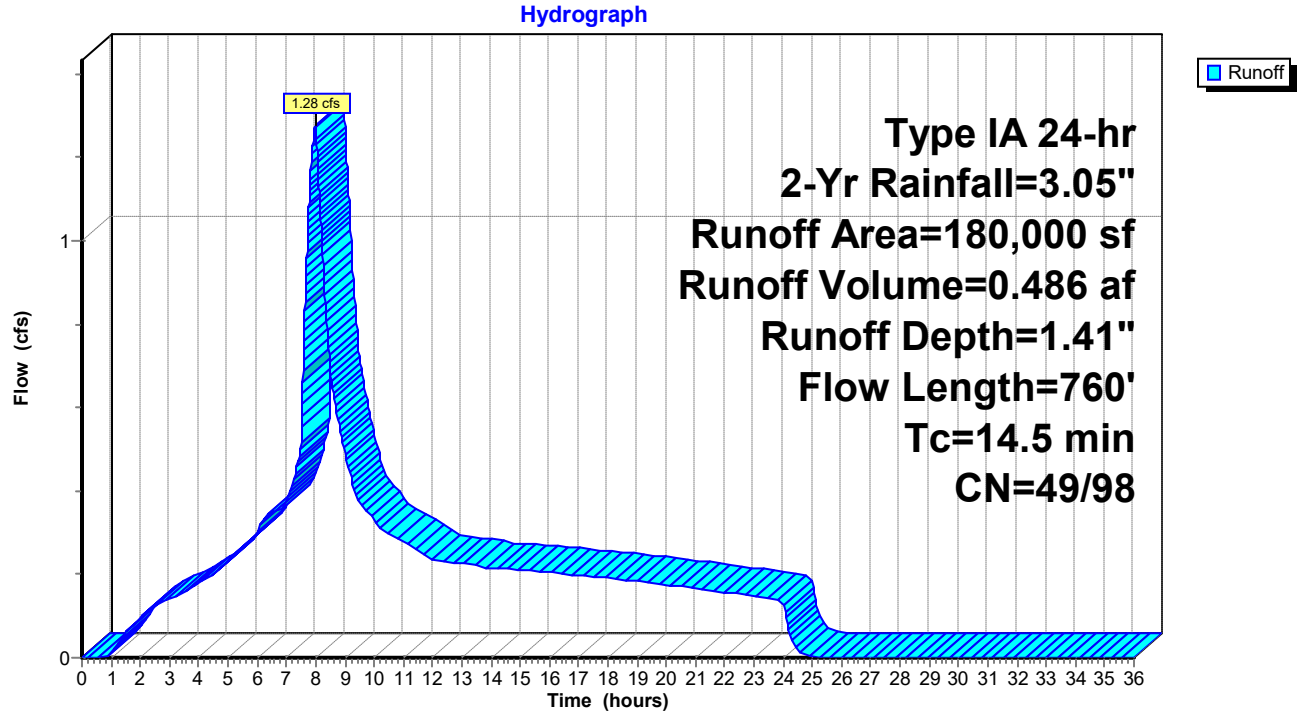
Runoff = 1.28 cfs @ 8.00 hrs, Volume= 0.486 af, Depth= 1.41"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-Yr Rainfall=3.05"

	Area (sf)	CN	Description
*	15,500	98	On-Site Roads
*	44,000	98	On-Site Houses & Driveways (11)
*	20,000	98	Off-Site Houses & Driveways
*	92,500	49	Pervious - 50-75% Grass cover, Fair, HSG A
*	8,000	98	Off-Site - Future Highland Road
	180,000	73	Weighted Average
	92,500	49	51.39% Pervious Area
	87,500	98	48.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	280	0.2000	0.35		**Sheet Flow, Sheet - Lot Yards** Grass: Dense n= 0.240 P2= 3.05"
1.2	480	0.0900	6.77	54.18	**Channel Flow, Future Road Ditch** Area= 8.0 sf Perim= 26.0' r= 0.31' n= 0.030 Earth, grassed & winding
14.5	760	Total			

Subcatchment 2S: Basin 2



Summary for Pond 1P: Pond

Inflow Area = 18.825 ac, 34.88% Impervious, Inflow Depth = 1.00" for 2-Yr event
Inflow = 4.15 cfs @ 8.00 hrs, Volume= 1.573 af
Outflow = 1.31 cfs @ 9.36 hrs, Volume= 1.573 af, Atten= 68%, Lag= 81.8 min
Discarded = 1.31 cfs @ 9.36 hrs, Volume= 1.573 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 290.04' @ 9.36 hrs Surf.Area= 5,254 sf Storage= 15,358 cf

Plug-Flow detention time= 139.5 min calculated for 1.572 af (100% of inflow)
Center-of-Mass det. time= 139.5 min (827.3 - 687.8)

Volume	Invert	Avail.Storage	Storage Description
#1	285.00'	66,728 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

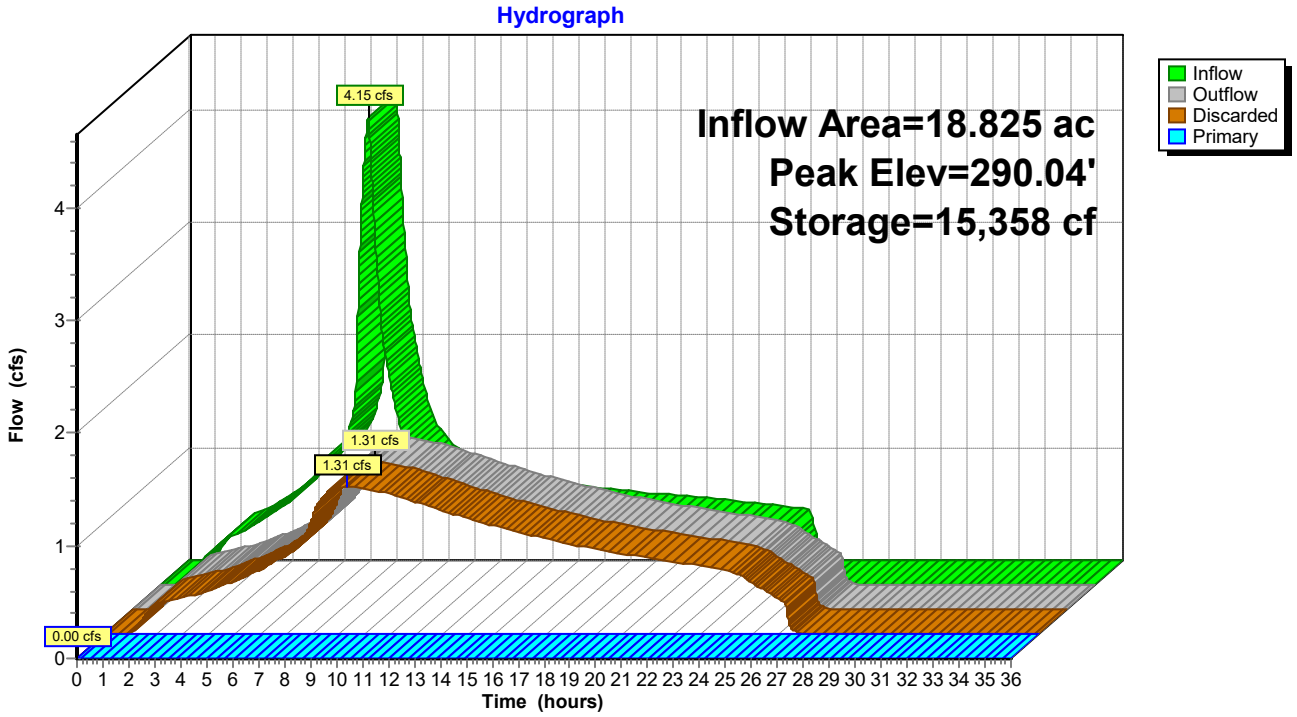
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
285.00	1,171	0	0	1,171
286.00	1,823	1,485	1,485	1,837
287.00	2,553	2,178	3,663	2,586
288.00	3,360	2,947	6,610	3,415
289.00	4,245	3,794	10,404	4,327
290.00	5,209	4,719	15,123	5,321
291.00	6,256	5,725	20,847	6,402
292.00	7,397	6,819	27,666	7,580
293.00	8,493	7,939	35,605	8,720
294.00	9,684	9,082	44,686	9,958
295.00	10,981	10,326	55,012	11,304
296.00	12,467	11,716	66,728	12,839

Device	Routing	Invert	Outlet Devices
#1	Discarded	285.00'	**9.750 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 250.00'
#2	Primary	295.00'	**25.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

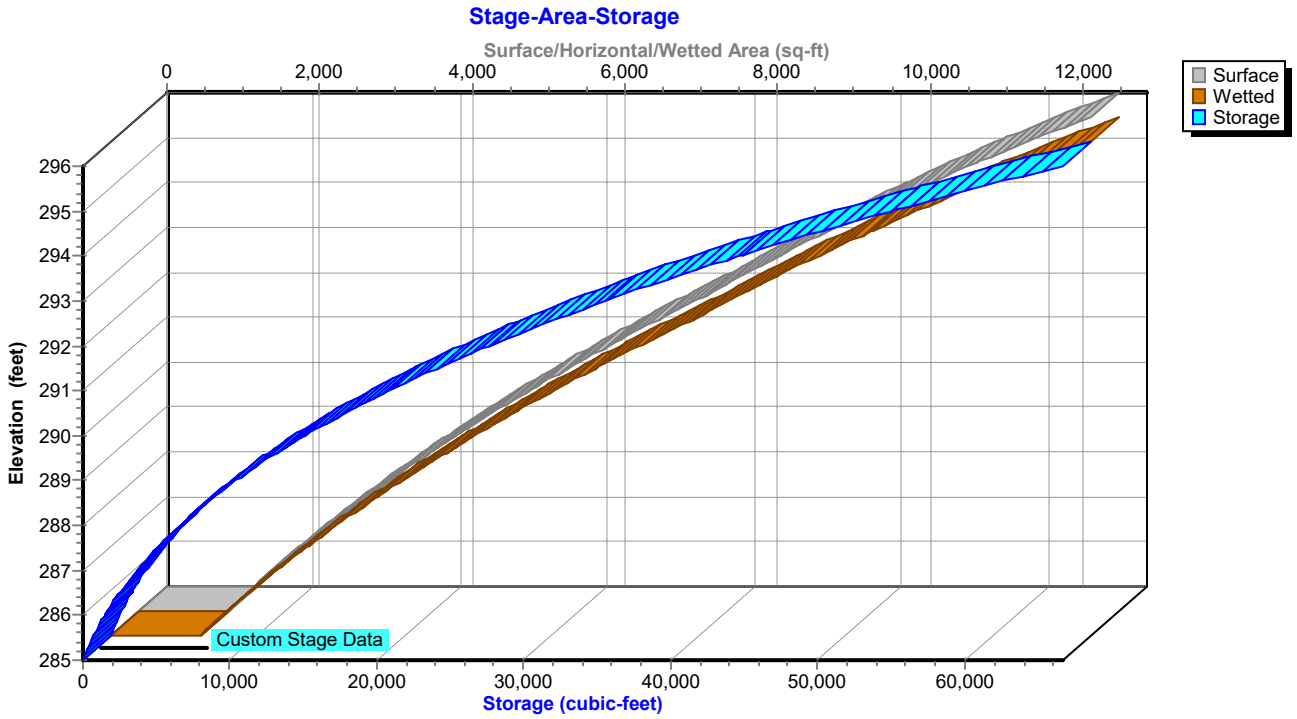
Discarded OutFlow Max=1.31 cfs @ 9.36 hrs HW=290.04' (Free Discharge)
↑—**1=Exfiltration** (Controls 1.31 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=285.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Pond



Pond 1P: Pond



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Basin 1 Runoff Area=640,000 sf 31.02% Impervious Runoff Depth=2.59"
Flow Length=1,880' Tc=15.4 min CN=44/98 Runoff=6.34 cfs 3.170 af

Subcatchment 2S: Basin 2 Runoff Area=180,000 sf 48.61% Impervious Runoff Depth=3.72"
Flow Length=760' Tc=14.5 min CN=49/98 Runoff=2.99 cfs 1.281 af

Pond 1P: Pond Peak Elev=294.28' Storage=47,458 cf Inflow=9.33 cfs 4.451 af
Discarded=2.62 cfs 4.451 af Primary=0.00 cfs 0.000 af Outflow=2.62 cfs 4.451 af

Total Runoff Area = 18.825 ac Runoff Volume = 4.451 af Average Runoff Depth = 2.84"
65.12% Pervious = 12.259 ac 34.88% Impervious = 6.566 ac

Summary for Subcatchment 1S: Basin 1

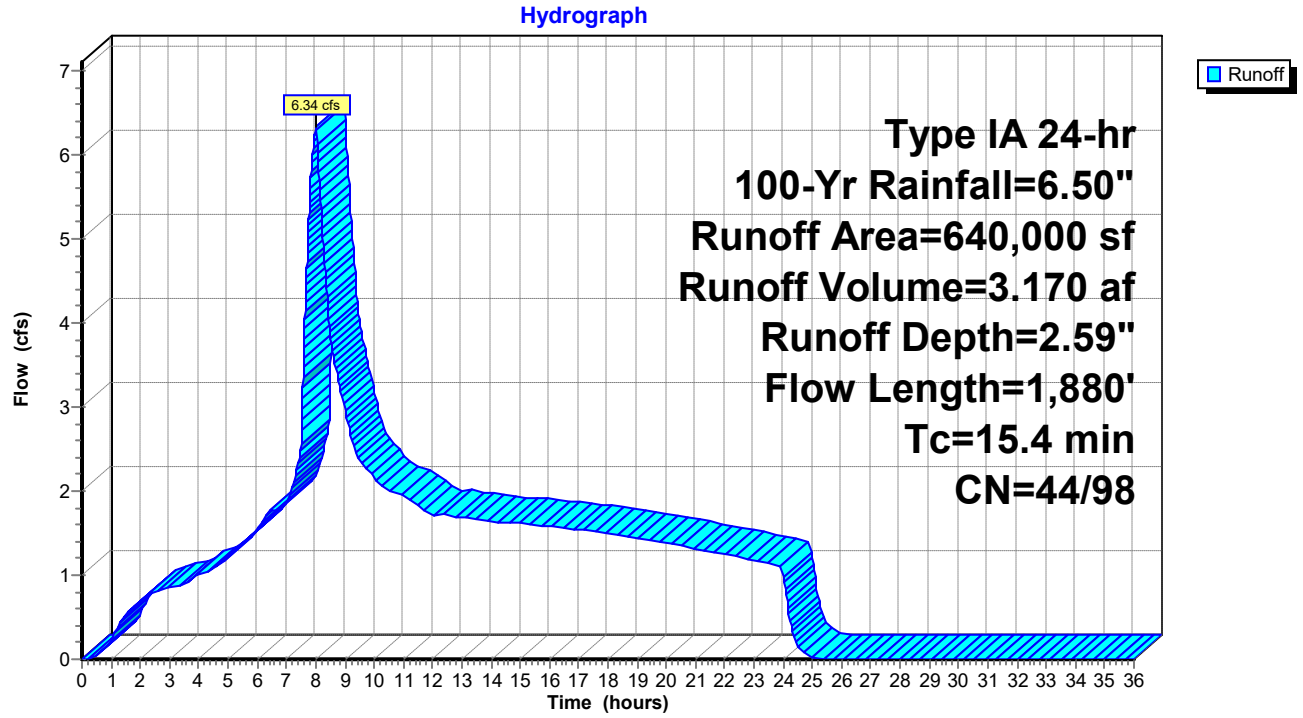
Runoff = 6.34 cfs @ 8.00 hrs, Volume= 3.170 af, Depth= 2.59"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type IA 24-hr 100-Yr Rainfall=6.50"

	Area (sf)	CN	Description
*	62,500	98	Roads & Shared Driveway
*	136,000	98	On-Site Houses & Driveways (34)
*	285,500	49	Pervious - 50-75% Grass cover, Fair, HSG A
*	156,000	36	Offsite - Woods, Fair, HSG A
	640,000	61	Weighted Average
	441,500	44	68.98% Pervious Area
	198,500	98	31.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	110	0.3500	0.24		**Sheet Flow, Sheet - Offsite Woods** Woods: Light underbrush n= 0.400 P2= 3.05"
3.8	300	0.0700	1.32		**Shallow Concentrated Flow, Offsite Woods** Woodland Kv= 5.0 fps
4.0	1,470	0.0720	6.06	48.46	**Channel Flow, Swale/Ditch** Area= 8.0 sf Perim= 26.0' r= 0.31' n= 0.030 Earth, grassed & winding
15.4	1,880	Total			

Subcatchment 1S: Basin 1



Summary for Subcatchment 2S: Basin 2

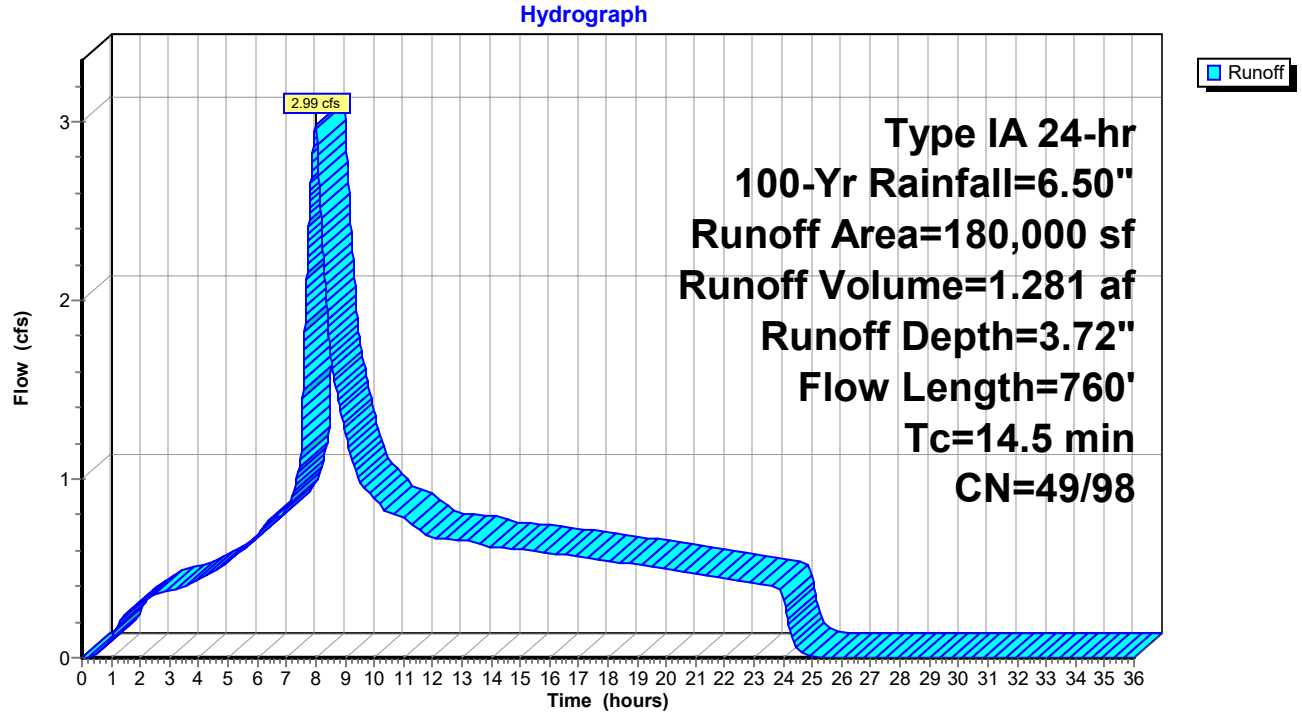
Runoff = 2.99 cfs @ 8.00 hrs, Volume= 1.281 af, Depth= 3.72"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type IA 24-hr 100-Yr Rainfall=6.50"

	Area (sf)	CN	Description
*	15,500	98	On-Site Roads
*	44,000	98	On-Site Houses & Driveways (11)
*	20,000	98	Off-Site Houses & Driveways
*	92,500	49	Pervious - 50-75% Grass cover, Fair, HSG A
*	8,000	98	Off-Site - Future Highland Road
	180,000	73	Weighted Average
	92,500	49	51.39% Pervious Area
	87,500	98	48.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	280	0.2000	0.35		**Sheet Flow, Sheet - Lot Yards** Grass: Dense n= 0.240 P2= 3.05"
1.2	480	0.0900	6.77	54.18	**Channel Flow, Future Road Ditch** Area= 8.0 sf Perim= 26.0' r= 0.31' n= 0.030 Earth, grassed & winding
14.5	760	Total			

Subcatchment 2S: Basin 2



Summary for Pond 1P: Pond

Inflow Area = 18.825 ac, 34.88% Impervious, Inflow Depth = 2.84" for 100-Yr event
Inflow = 9.33 cfs @ 8.00 hrs, Volume= 4.451 af
Outflow = 2.62 cfs @ 11.34 hrs, Volume= 4.451 af, Atten= 72%, Lag= 200.4 min
Discarded = 2.62 cfs @ 11.34 hrs, Volume= 4.451 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 294.28' @ 11.34 hrs Surf.Area= 10,040 sf Storage= 47,458 cf

Plug-Flow detention time= 255.4 min calculated for 4.449 af (100% of inflow)
Center-of-Mass det. time= 255.5 min (986.9 - 731.5)

Volume	Invert	Avail.Storage	Storage Description
#1	285.00'	66,728 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

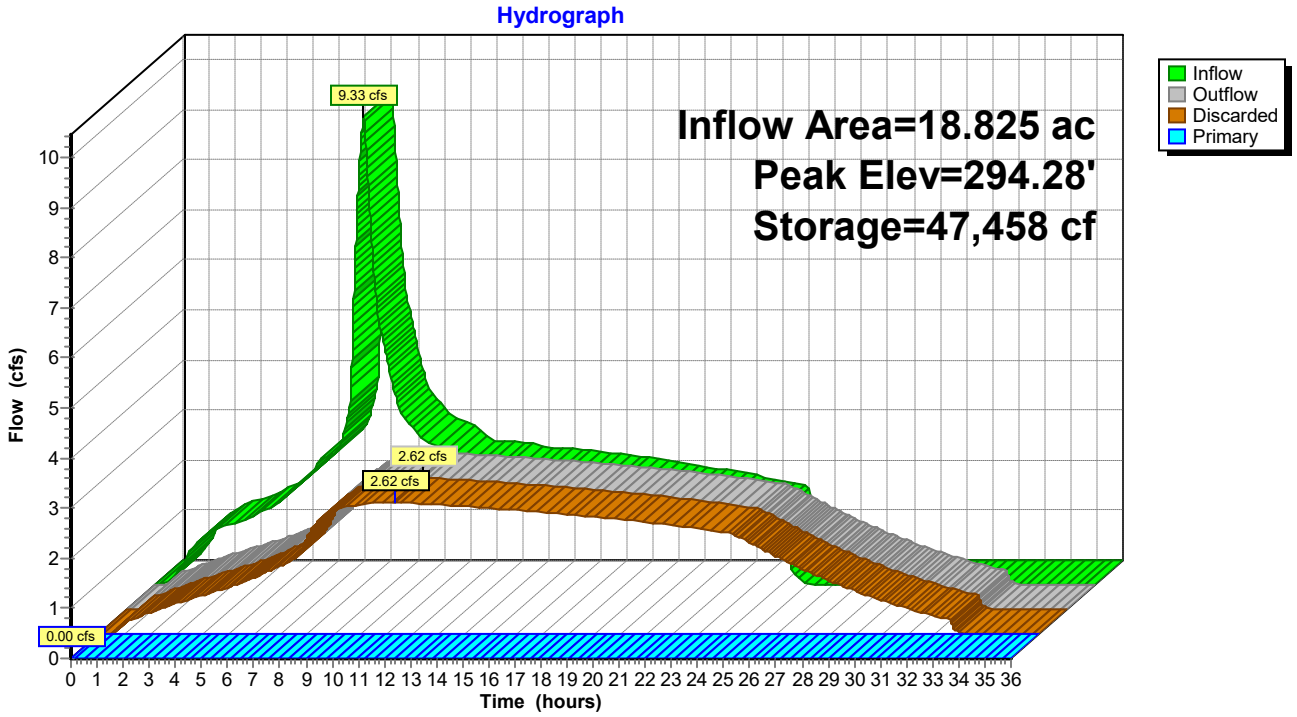
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
285.00	1,171	0	0	1,171
286.00	1,823	1,485	1,485	1,837
287.00	2,553	2,178	3,663	2,586
288.00	3,360	2,947	6,610	3,415
289.00	4,245	3,794	10,404	4,327
290.00	5,209	4,719	15,123	5,321
291.00	6,256	5,725	20,847	6,402
292.00	7,397	6,819	27,666	7,580
293.00	8,493	7,939	35,605	8,720
294.00	9,684	9,082	44,686	9,958
295.00	10,981	10,326	55,012	11,304
296.00	12,467	11,716	66,728	12,839

Device	Routing	Invert	Outlet Devices
#1	Discarded	285.00'	**9.750 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 250.00'
#2	Primary	295.00'	**25.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

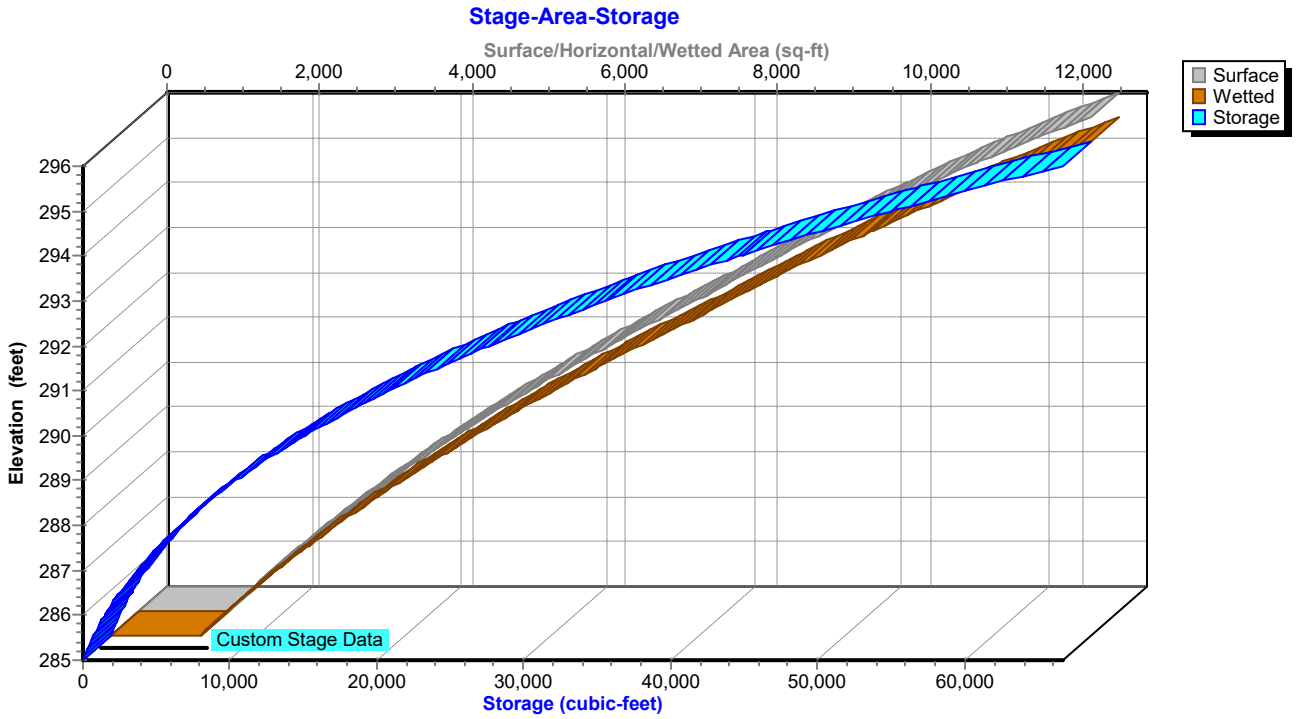
Discarded OutFlow Max=2.62 cfs @ 11.34 hrs HW=294.28' (Free Discharge)
↑—**1=Exfiltration** (Controls 2.62 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=285.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Pond



Pond 1P: Pond



Channel Report

Max Capacity - Ditch at 1.00%

Triangular

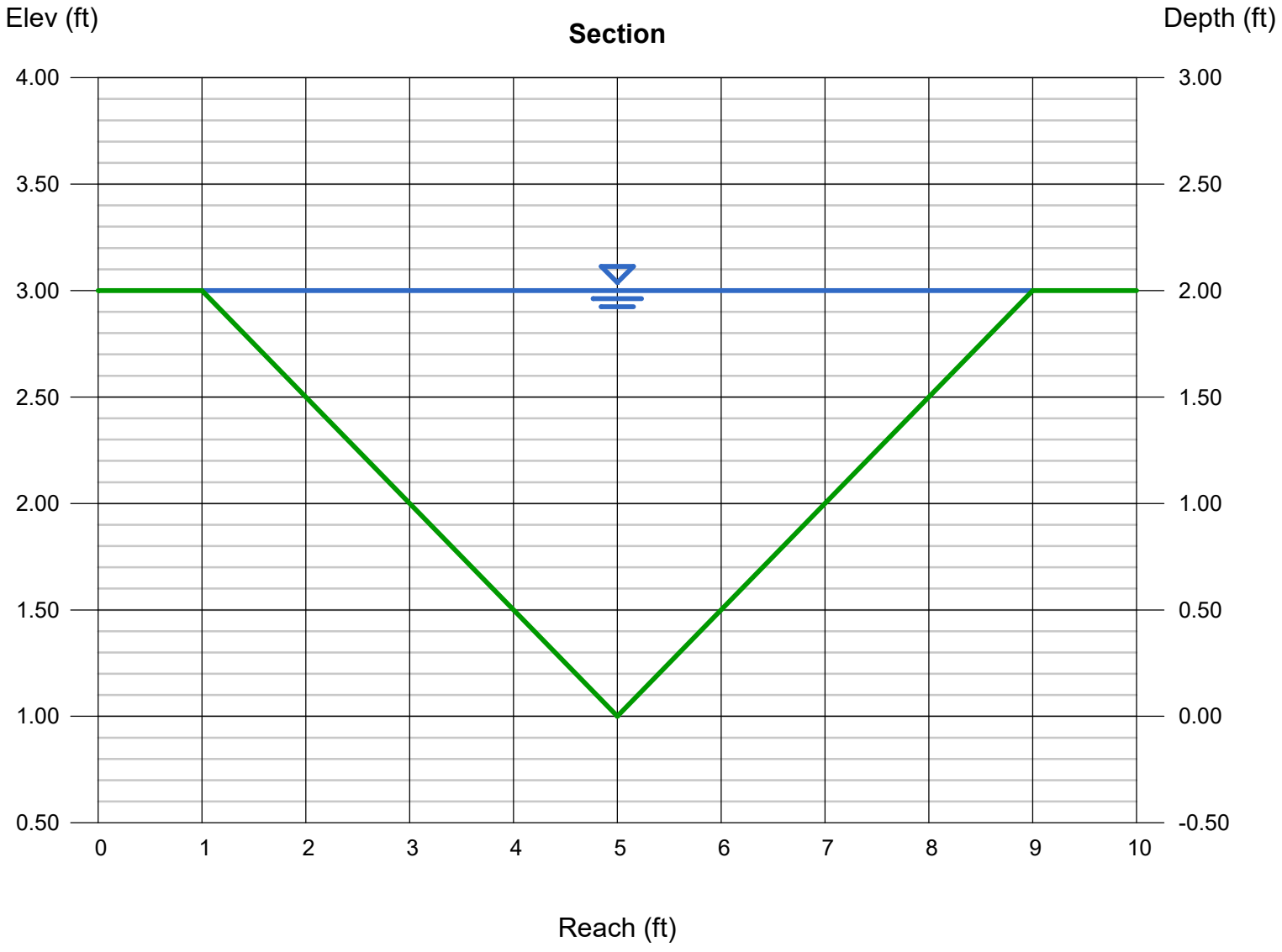
Side Slopes (z:1)	= 2.00, 2.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 1.00
Slope (%)	= 1.00
N-Value	= 0.080

Calculations

Compute by:	Known Depth
Known Depth (ft)	= 2.00

Highlighted

Depth (ft)	= 2.00
Q (cfs)	= 13.79
Area (sqft)	= 8.00
Velocity (ft/s)	= 1.72
Wetted Perim (ft)	= 8.94
Crit Depth, Yc (ft)	= 1.25
Top Width (ft)	= 8.00
EGL (ft)	= 2.05



Depth	Q	Area	Veloc	Wp
(ft)	(cfs)	(sqft)	(ft/s)	(ft)
0.10	0.005	0.020	0.23	0.45
0.20	0.030	0.080	0.37	0.89
0.30	0.088	0.180	0.49	1.34
0.40	0.189	0.320	0.59	1.79
0.50	0.342	0.500	0.68	2.24
0.60	0.556	0.720	0.77	2.68
0.70	0.839	0.980	0.86	3.13
0.80	1.198	1.280	0.94	3.58
0.90	1.640	1.620	1.01	4.02
1.00	2.172	2.000	1.09	4.47
1.10	2.801	2.420	1.16	4.92
1.20	3.532	2.880	1.23	5.37
1.30	4.373	3.380	1.29	5.81
1.40	5.328	3.920	1.36	6.26
1.50	6.405	4.500	1.42	6.71
1.60	7.607	5.120	1.49	7.16
1.70	8.943	5.780	1.55	7.60
1.80	10.42	6.480	1.61	8.05
1.90	12.03	7.220	1.67	8.50
2.00	13.79	8.000	1.72	8.94

Yc	TopWidth	Energy
(ft)	(ft)	(ft)
0.06	0.40	0.10
0.11	0.80	0.20
0.17	1.20	0.30
0.23	1.60	0.41
0.29	2.00	0.51
0.35	2.40	0.61
0.41	2.80	0.71
0.47	3.20	0.81
0.53	3.60	0.92
0.60	4.00	1.02
0.66	4.40	1.12
0.73	4.80	1.22
0.79	5.20	1.33
0.85	5.60	1.43
0.92	6.00	1.53
0.98	6.40	1.63
1.05	6.80	1.74
1.12	7.20	1.84
1.18	7.60	1.94
1.25	8.00	2.05

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Jan 11 2021

Max Capacity - 18in at 1.00%

Circular

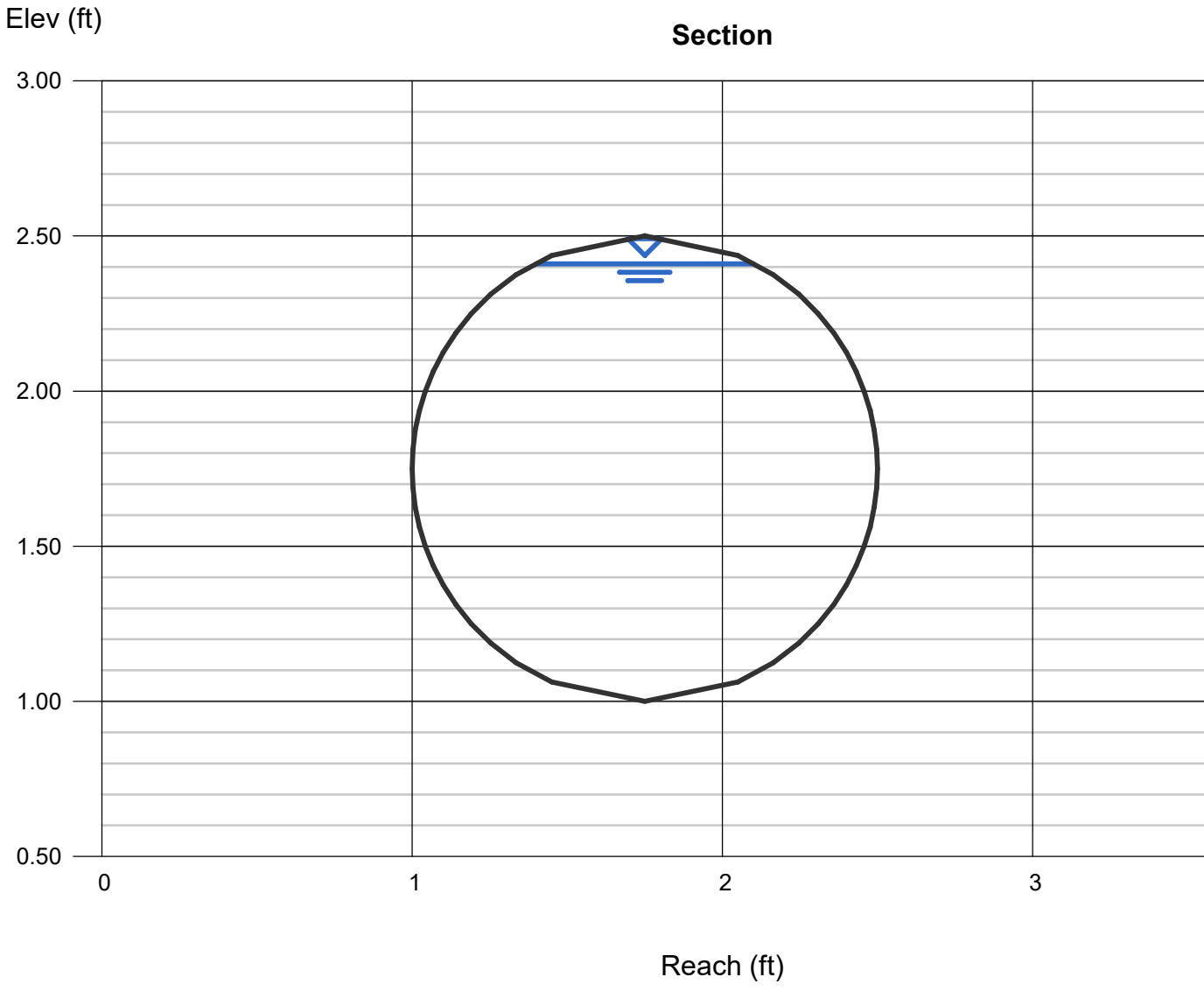
Diameter (ft)	= 1.50
Invert Elev (ft)	= 1.00
Slope (%)	= 1.00
N-Value	= 0.011

Calculations

Compute by:	Known Depth
Known Depth (ft)	= 1.41

Highlighted

Depth (ft)	= 1.41
Q (cfs)	= 13.35
Area (sqft)	= 1.72
Velocity (ft/s)	= 7.74
Wetted Perim (ft)	= 3.98
Crit Depth, Yc (ft)	= 1.37
Top Width (ft)	= 0.71
EGL (ft)	= 2.34



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Tuesday, Jan 12 2021

Max Capacity - 12in at 1.00%

Circular

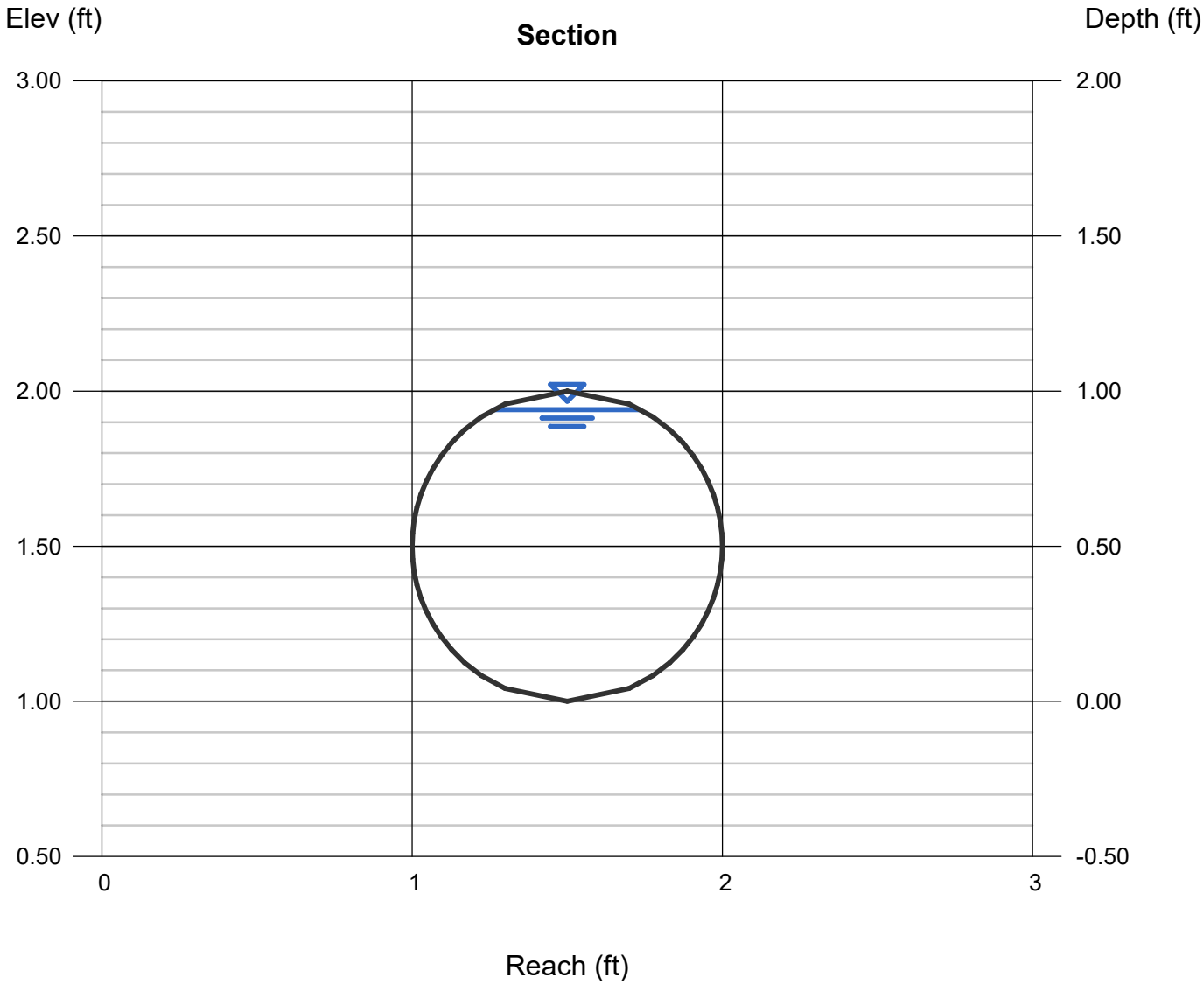
Diameter (ft)	= 1.00
Invert Elev (ft)	= 1.00
Slope (%)	= 1.00
N-Value	= 0.011

Calculations

Compute by:	Known Depth
Known Depth (ft)	= 0.94

Highlighted

Depth (ft)	= 0.94
Q (cfs)	= 4.527
Area (sqft)	= 0.77
Velocity (ft/s)	= 5.91
Wetted Perim (ft)	= 2.65
Crit Depth, Yc (ft)	= 0.89
Top Width (ft)	= 0.47
EGL (ft)	= 1.48



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Wednesday, Mar 31 2021

Max Capacity - 12in at 2.00%

Circular

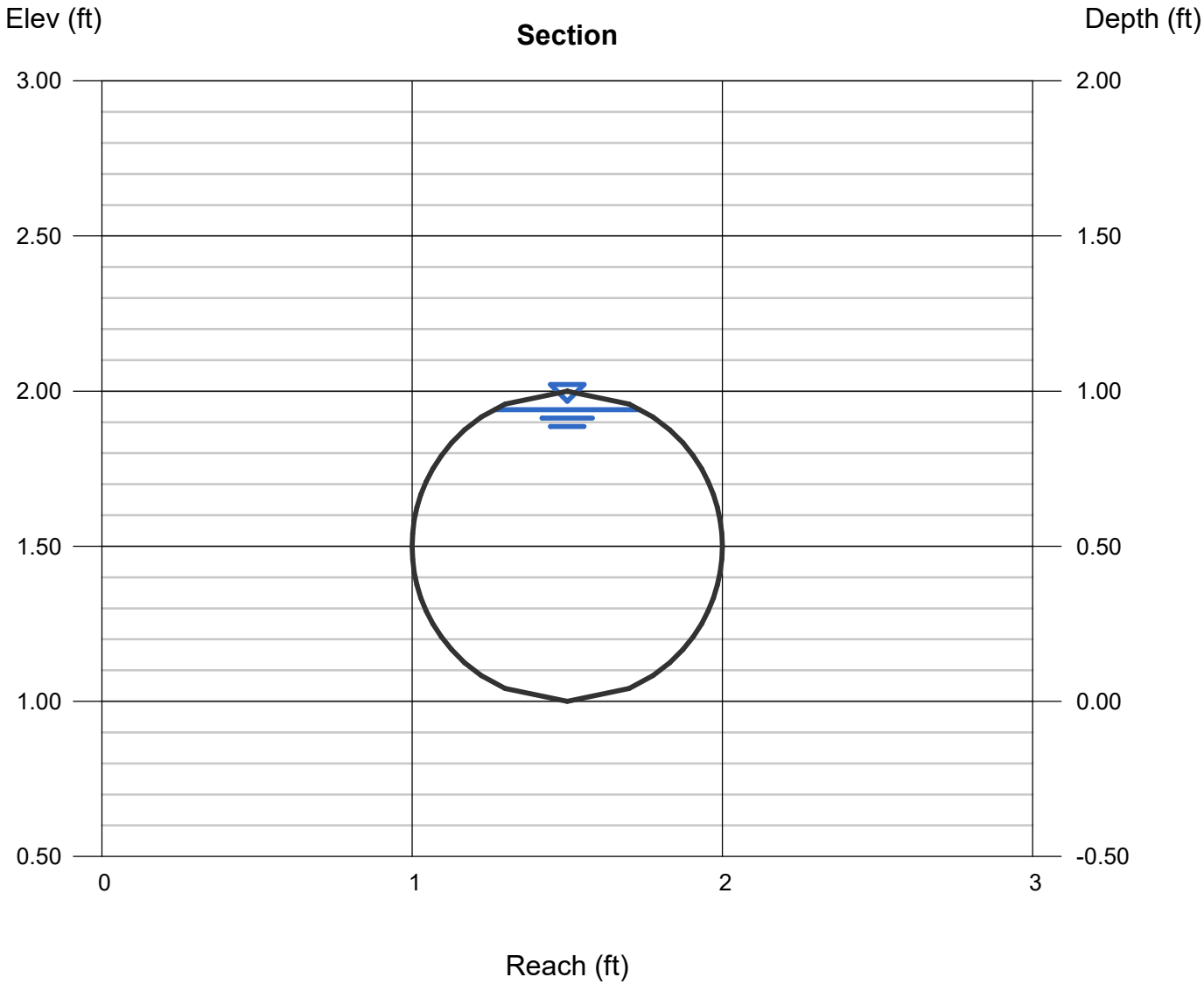
Diameter (ft)	= 1.00
Invert Elev (ft)	= 1.00
Slope (%)	= 2.00
N-Value	= 0.011

Calculations

Compute by:	Known Depth
Known Depth (ft)	= 0.94

Highlighted

Depth (ft)	= 0.94
Q (cfs)	= 6.402
Area (sqft)	= 0.77
Velocity (ft/s)	= 8.35
Wetted Perim (ft)	= 2.65
Crit Depth, Yc (ft)	= 0.97
Top Width (ft)	= 0.47
EGL (ft)	= 2.02



APPENDIX B

Referenced Data

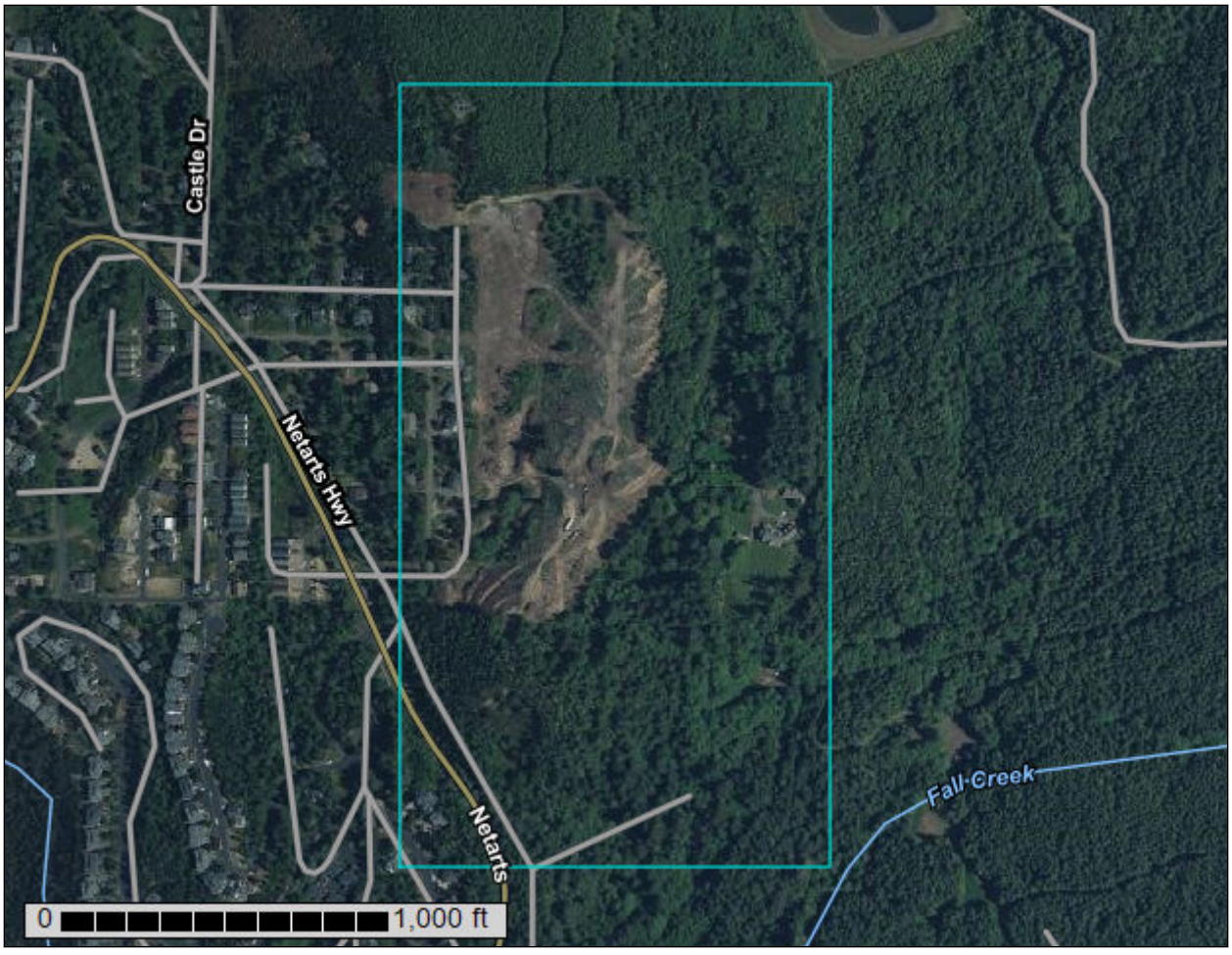
United States Department of Agriculture

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 Tillamook County, Oregon



November 25, 2020

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.

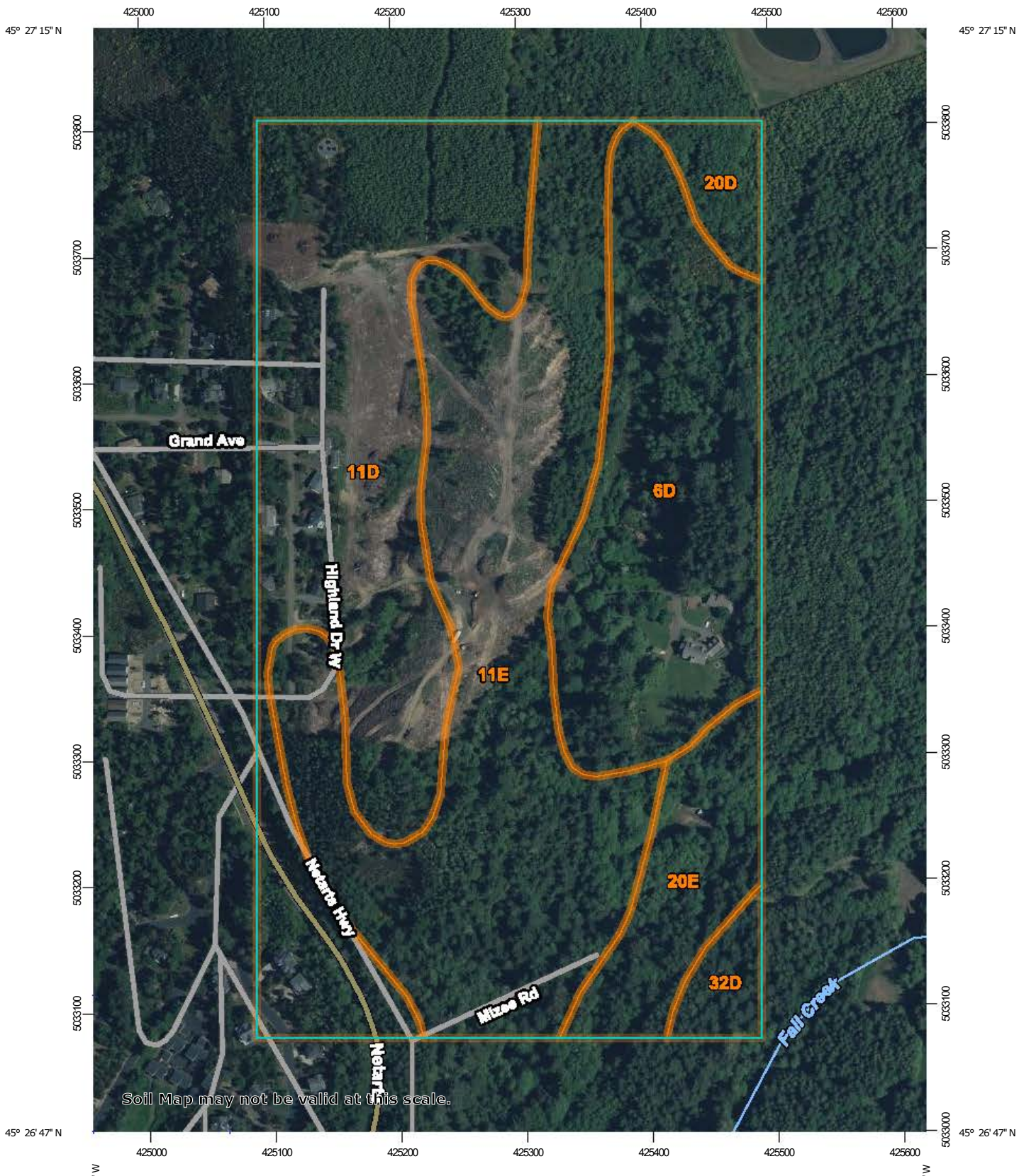
The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political 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

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.



Map Scale: 1:4,260 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 50 100 200 300

Feet
0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

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 1:24,000.

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: Tillamook County, Oregon
Survey Area Data: Version 12, Jun 11, 2020

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

Date(s) aerial images were photographed: May 28, 2020—Jun 22, 2020

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
6D	Horseprairie-Ferrelo complex, 3 to 20 percent slopes	15.3	21.0%
11D	Netarts fine sandy loam, 5 to 30 percent slopes	23.5	32.4%
11E	Netarts fine sandy loam, 30 to 60 percent slopes	25.5	35.2%
20D	Klootchie-Necanicum complex, 5 to 30 percent slopes	1.8	2.4%
20E	Klootchie-Necanicum complex, 30 to 60 percent slopes	5.1	7.0%
32D	Munsoncreek-Flowerpot complex, 5 to 30 percent slopes	1.4	1.9%
Totals for Area of Interest		**72.5**	**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.

Tillamook County, Oregon

6D—Horseprairie-Ferrelo complex, 3 to 20 percent slopes

Map Unit Setting

National map unit symbol: 280k
Elevation: 100 to 300 feet
Mean annual precipitation: 80 to 100 inches
Mean annual air temperature: 49 to 52 degrees F
Frost-free period: 180 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Horseprairie and similar soils: 65 percent
Ferrelo and similar soils: 25 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Horseprairie

Setting

Landform: Marine terraces
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian and/or marine deposits

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 11 inches: medial loam
Bw1 - 11 to 28 inches: loam
Bw2 - 28 to 45 inches: loam
2C - 45 to 62 inches: loamy sand

Properties and qualities

Slope: 3 to 20 percent
Depth to restrictive feature: More than 80 inches
Drainage class: 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 10.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Forage suitability group: Well Drained <15% Slopes (G004AY014OR)
Other vegetative classification: Well Drained <15% Slopes (G004AY014OR), Sitka spruce/oxalis, swordfern-moist (902)
Hydric soil rating: No

Description of Ferrelo

Setting

Landform: Marine terraces
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Eolian and/or marine deposits

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 19 inches: loam
Bw - 19 to 37 inches: loam
2C1 - 37 to 55 inches: loamy fine sand
2C2 - 55 to 89 inches: fine sand

Properties and qualities

Slope: 3 to 20 percent
Depth to restrictive feature: More than 80 inches
Drainage class: 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Forage suitability group: Well Drained <15% Slopes (G004AY014OR)
Other vegetative classification: Well Drained <15% Slopes (G004AY014OR), Sitka spruce/oxalis, swordfern-moist (902)
Hydric soil rating: No

Minor Components

Depoe

Percent of map unit: 5 percent
Landform: Depressions on marine terraces
Hydric soil rating: Yes

11D—Netarts fine sandy loam, 5 to 30 percent slopes

Map Unit Setting

National map unit symbol: 27w3
Elevation: 20 to 300 feet
Mean annual precipitation: 80 to 100 inches

Mean annual air temperature: 49 to 52 degrees F
Frost-free period: 180 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Netarts and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Netarts

Setting
Landform: Dunes on marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear, concave
Across-slope shape: Linear
Parent material: Eolian sands

Typical profile
Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 5 inches: fine sandy loam
E - 5 to 9 inches: loamy fine sand
ABs - 9 to 15 inches: loamy fine sand
Bs1 - 15 to 19 inches: fine sand
Bs2 - 19 to 37 inches: fine sand
BCs - 37 to 54 inches: fine sand
C - 54 to 67 inches: fine sand

Properties and qualities
Slope: 5 to 30 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.4 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Other vegetative classification: Sitka spruce/salal-mesic (901)
Hydric soil rating: No

11E—Netarts fine sandy loam, 30 to 60 percent slopes

Map Unit Setting
National map unit symbol: 280q
Elevation: 20 to 300 feet
Mean annual precipitation: 80 to 100 inches
Mean annual air temperature: 49 to 52 degrees F

Frost-free period: 180 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition
Netarts and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Netarts

Setting
Landform: Dunes on marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear, concave
Across-slope shape: Linear
Parent material: Eolian sands

Typical profile
Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 5 inches: fine sandy loam
E - 5 to 9 inches: loamy fine sand
ABs - 9 to 15 inches: loamy fine sand
Bs1 - 15 to 19 inches: fine sand
Bs2 - 19 to 37 inches: fine sand
BCs - 37 to 54 inches: fine sand
C - 54 to 67 inches: fine sand

Properties and qualities
Slope: 30 to 60 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.4 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Other vegetative classification: Sitka spruce/salal-mesic (901)
Hydric soil rating: No

20D—Klootchie-Necanicum complex, 5 to 30 percent slopes

Map Unit Setting
National map unit symbol: 27xq
Elevation: 50 to 1,800 feet
Mean annual precipitation: 80 to 110 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 120 to 210 days

Farmland classification: Not prime farmland

Map Unit Composition

Klootchie and similar soils: 60 percent
Necanicum and similar soils: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Klootchie

Setting

Landform: Mountain slopes
Landform position (two-dimensional): Summit, toeslope
Landform position (three-dimensional): Mountaintop, mountainbase
Down-slope shape: Concave
Across-slope shape: Concave, linear
Parent material: Colluvium and residuum derived from igneous rock and tuff

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A1 - 1 to 9 inches: medial silt loam
A2 - 9 to 19 inches: medial silt loam
Bw1 - 19 to 44 inches: medial silty clay loam
Bw2 - 44 to 68 inches: medial silty clay loam

Properties and qualities

Slope: 5 to 30 percent
Depth to restrictive feature: More than 80 inches
Drainage class: 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very high (about 19.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Other vegetative classification: Sitka spruce/salmonberry-wet (903)
Hydric soil rating: No

Description of Necanicum

Setting

Landform: Mountain slopes
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Mountaintop, mountainbase
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Colluvium derived from igneous rock and tuff

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A1 - 1 to 10 inches: very gravelly medial loam
A2 - 10 to 18 inches: very gravelly medial loam
Bw1 - 18 to 27 inches: very gravelly medial loam

Bw2 - 27 to 49 inches: extremely cobbly medial loam
Bw3 - 49 to 71 inches: extremely cobbly medial loam

Properties and qualities

Slope: 5 to 30 percent
Depth to restrictive feature: More than 80 inches
Drainage class: 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Other vegetative classification: Sitka spruce/salmonberry-wet (903)
Hydric soil rating: No

20E—Klootchie-Necanicum complex, 30 to 60 percent slopes

Map Unit Setting

National map unit symbol: 27x3
Elevation: 50 to 1,800 feet
Mean annual precipitation: 80 to 110 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 120 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Klootchie and similar soils: 55 percent
Necanicum and similar soils: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Klootchie

Setting

Landform: Mountain slopes
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Center third of mountainflank, lower third of mountainflank
Down-slope shape: Concave
Across-slope shape: Concave, linear
Parent material: Colluvium and residuum derived from igneous rock and tuff

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A1 - 1 to 9 inches: medial silt loam
A2 - 9 to 19 inches: medial silt loam

Bw1 - 19 to 44 inches: medial silty clay loam
Bw2 - 44 to 68 inches: medial silty clay loam

Properties and qualities

Slope: 30 to 60 percent
Depth to restrictive feature: More than 80 inches
Drainage class: 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very high (about 19.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Other vegetative classification: Sitka spruce/oxalis, swordfern-moist (902)
Hydric soil rating: No

Description of Necanicum

Setting

Landform: Mountain slopes
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Upper third of mountainflank, lower third of mountainflank
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Parent material: Colluvium derived from igneous rock and tuff

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A1 - 1 to 10 inches: very gravelly medial loam
A2 - 10 to 18 inches: very gravelly medial loam
Bw1 - 18 to 27 inches: very gravelly medial loam
Bw2 - 27 to 49 inches: extremely cobbly medial loam
Bw3 - 49 to 71 inches: extremely cobbly medial loam

Properties and qualities

Slope: 30 to 60 percent
Depth to restrictive feature: More than 80 inches
Drainage class: 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Other vegetative classification: Sitka spruce/oxalis, swordfern-moist (902)
Hydric soil rating: No

32D—Munsoncreek-Flowerpot complex, 5 to 30 percent slopes

Map Unit Setting

National map unit symbol: 27zw
Elevation: 50 to 1,800 feet
Mean annual precipitation: 80 to 110 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 120 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Munsoncreek and similar soils: 65 percent
Flowerpot and similar soils: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Munsoncreek

Setting

Landform: Hillslopes, mountain slopes
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Mountainbase, mountaintop, base slope, interfluve
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Parent material: Colluvium and residuum derived from sedimentary rock

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 10 inches: medial silt loam
AB - 10 to 18 inches: silty clay loam
Bw1 - 18 to 28 inches: silty clay loam
Bw2 - 28 to 41 inches: silty clay loam
Bw3 - 41 to 58 inches: extremely paragravelly silty clay loam
Cr - 58 to 68 inches: weathered bedrock

Properties and qualities

Slope: 5 to 30 percent
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 11.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C

Other vegetative classification: Sitka spruce/salmonberry-wet (903)
Hydric soil rating: No

Description of Flowerpot

Setting

Landform: Hillslopes, mountain slopes
Landform position (two-dimensional): Toeslope, summit
Landform position (three-dimensional): Mountainbase, mountaintop, interfluve, base slope
Down-slope shape: Concave
Across-slope shape: Concave, linear
Parent material: Colluvium and residuum derived from sedimentary rock

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A1 - 1 to 8 inches: medial silty clay loam
A2 - 8 to 14 inches: silty clay loam
AB - 14 to 22 inches: silty clay loam
Bw - 22 to 30 inches: silty clay loam
Bg - 30 to 52 inches: silty clay loam
BC - 52 to 60 inches: silty clay loam

Properties and qualities

Slope: 5 to 30 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: About 14 to 22 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very high (about 13.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C/D
Other vegetative classification: Sitka spruce/salmonberry-wet (903)
Hydric soil rating: No

APPENDIX A - HYDRAULIC ROUGHNESS (MANNING'S n) VALUES OF CONDUITS AND CHANNELS

This appendix lists Manning's roughness (n) values for various conduits and channels, as follows:

Sources:
- Chow, Ven Te, "Open-Channel Hydraulics," 1959
- FHWA, "Design of Urban Highway Drainage, The State of the Art," 1979
- FHWA, "Hydraulic Design Series No. 3, Design Charts for Open-Channel Flow," 1961
- FHWA, "Hydraulic Engineering Circular No. 15, Design of Roadside Channels with Flexible Linings," 1988
- FHWA, "Hydraulic Engineering Circular No. 22, Urban Drainage Design Manual," 1996
- ODOT, "Memo to Designers, Helical Corrugated Pipe," 1992

TABLE 1: CONDUITS

Conduit	HYDRAULIC ROUGHNESS (MANNING'S n) VALUES		
	Minimum	**Normal**	**Maximum**
A. Concrete or asbestos-cement pipe	0.011	0.013	0.015
B. Metal pipe or pipe-arch with annular corrugations			
1. 2-2/3-inch x ½-inch corrugations			
a. Plain or fully coated	.....	0.024	.....
b. Paved invert (range represents 25 and 50 percent of circumference paved, with larger n value representing 25 percent paved)			
1. Full flow depth	0.018	.....	0.021
2. Flow 80 percent of depth	0.016	.....	0.021
3. Flow 60 percent of depth	0.013	.....	0.019
2. 3-inch x 1-inch corrugations	.....	0.027	.....
3. 6-inch x 2-inch corrugations	.....	0.032	.....
C. Smooth walled helical spiral rib pipe	0.012	.....	0.013
D. Corrugated metal subdrain	0.017	0.019	0.021
E. Plastic pipe USE n=0.011 FOR NEW CULVERTS			
1. Smooth	0.011	.....	0.015
2. Corrugated	.....	0.024	.....
F. Metal pipe or pipe arch with helically wound corrugations			
1. Smaller pipes			
12 inch	.....	0.013	.....
15 inch	.....	0.014	.....
18 *inch*	.....	0.015	.....

TABLE 5: EXCAVATED ARTIFICIAL CHANNELS

Channel	HYDRAULIC ROUGHNESS (MANNING'S n) VALUES		
	Minimum	**Normal**	**Maximum**
A. Earth, straight and uniform			
1. Clean, recently completed	0.016	0.018	0.020
2. Clean, after weathering	0.018	0.022	0.025
3. Gravel, uniform section, clean	0.022	0.025	0.030
4. With short grass, few weeds	0.022	0.027	0.033
B. Earth, winding and sluggish			
1. No vegetation	0.023	0.025	0.030
2. Grass, some weeds	0.025	0.030	0.033
3. Dense weeds or aquatic plants in deep channels	0.030	0.035	0.040
4. Earth bottom and rubble sides	0.028	0.030	0.035
5. Stony bottom and weedy banks	0.025	0.035	0.040
6. Cobble bottom and clean sides	0.030	0.040	0.050
C. Dragline-excavated or dredged			
1. No vegetation	0.025	0.028	0.033
2. Light brush on banks	0.035	0.050	0.060
D. Rock cuts			
1. Smooth and uniform	0.025	0.035	0.040
2. Jagged and irregular	0.035	0.040	0.050
E. Channels not maintained, weeds and brush uncut			
1. Dense weeds, high as flow depth	0.050	0.080	0.120
2. Clean bottom, brush on sides	0.040	0.050	0.080

ROADSIDE DITCH - ASSUME n=0.080

ENVIRONMENTAL
MANAGEMENT
SYSTEMS, INC.

OR: 503-353-9691
OREGON COAST: 503-322-2700
FAX: 503-353-9695
WA: 360-735-1109
www.envmgtsys.com
4080 SE International Way
Suite B112
Milwaukie, OR 97222

February 12th, 2021
Report # 21-0008

Bill Hughes
Avalon Heights LLC
41901 Old Highway 30
Astoria, OR 97103

REGARDING: Stormwater Infiltration Test, Avalon Heights, Netarts-Oceanside, Oregon
T: 1S, R: 10W, SW ¼ SE ¼ Section 30, TL 200

Dear Mr. Hughes,

As requested, Environmental Management Systems Inc. (EMS) has performed the following services and provides this report for your use.

PROJECT DESCRIPTION:
The purpose of this report is to document the results of soil infiltration testing and to determine the potential for onsite stormwater disposal. The subject property is a 21.20-acre lot located near Oceanside, Oregon. A 56-lot subdivision is planned for the property and must be developed in accordance with Tillamook County Development Standards. On February 5th, 2020, EMS conducted a soil infiltration test in the proposed stormwater infiltration area near the south end of the property. This report describes existing site conditions, methods used, and results.

SUMMARY:
Onsite stormwater infiltration appears feasible. The average infiltration rate was 21.45 inches per house. No cementation or restrictive layers were observed in the test pit which was dug to a depth of 30". The stormwater infiltration facility should be engineered in manner that prevents erosion and does not cause instability of the steep slopes on the site.

LIMITATIONS:
Findings and recommendations in this report are based infiltration testing performed in one location. Conditions encountered during the test are believed to be representative of the site conditions, however subsurface conditions may vary across the site. If there

are changes to the plan that involve infiltrating stormwater elsewhere onsite, additional testing may be required.

SITE CONDITIONS:

Existing Uses for the Property
The site is currently undeveloped but was logged within the last couple of years.

Topography
The site is an irregularly shaped lot that sits on top of a large hill (stable dune) at elevations ranging between 300 and 430 feet above sea level. The terrain is rolling hills with an overall southward facing slope. Slopes are variable across the site with the majority western part of the site being less than 20%. A broad gulley-like depression runs through the center of the property from north to south that serves as a seasonal drainageway or infiltration swale (see photos 1 and 2, below). The southern end of this gulley is topographically the lowest area on the site and is proposed to be used for infiltrating stormwater runoff for the subdivision.

Photo 1 The gulley-like drainageway, facing north.

Photo 2 The drainageway, facing south. The infiltration test hole is shown in the lower center of frame.

Site Stability

The site is mapped as a moderate to high landslide hazard area by Oregon Department of Geology and Mineral Industries (DOGAMI)[1]. According to DOGAMI Statewide Landslide Information Layer for Oregon (SLIDO)[2] there is a large area of landslide topography near the east property line that extends to the east. No instability or landslide activity was observed during the site visit. See Geological Hazard Report prepared by EMS on April 12th, 2018 for more details.

Vegetation

Most of the site has been logged, but previously the vegetation on site consisted of a mix of conifers including Douglas-fir (*Pseudotsuga menziesii*), Sitka spruce (*Picea sitchensis*), and western hemlock (*Tsuga heterophylla*). The drainage swale is still

---

[1] Oregon Department of Geology and Mineral Industries. Oregon HazVu: Statewide Geohazards Viewer. https://gis.dogami.oregon.gov/maps/hazvu/

[2] Oregon Department of Geology and Mineral Industries. Statewide Landslide Information Database for Oregon (SLIDO). http://gis.dogami.oregon.gov/slido/

vegetated predominantly with red alder (*Alnus* rubra), sword fern (*Polystichum munitum*), salal (*Gaultheria shallon*), and huckleberry (*Vaccinium spp.*).

Soils
Soils on site are mapped as 11D and 11E – Netarts fine sandy loam (5-30 percent slopes and 30-60 percent slopes respectively) by the Natural Resource Conservation Service (NRCS)[3]. The typical setting for this soil type is dunes on marine terraces with a parent material of eolin sands. This unit is described as well drained with the depth to restrictive feature being more than 80 inches. According to NRCS, the typical soil profile is as follows:

0 to 2 inches: slightly decomposed plant material
2 to 5 inches: fine sandy loam
5 to 15 inches: loamy fine sand
15 to 67 inches: fine sand

For the soil infiltration test, one 24" by 36" test pit was dug to a depth of 30" and the soil profile was evaluated prior to conducted the test. One inch of slightly decomposed plant material was observed at the soil surface. 1 inch to 30 inches from the soil surface is somewhat silty fine sand. No cementation or restrictive layers were observed. Medium roots were common and extended to the bottom of the pit.

Wetlands / Surface Water
No surface water was observed during the site assessment. No wetlands are mapped on the site by the National Wetland Inventory (US Fish & Wildlife). There is no local wetland inventory available for the Oceanside-Netarts area. Obligate wetland vegetation was not observed in the stormwater infiltration area.

METHODS:
One 24" by 36" test pit was dug to a depth of 30" near the bottom of the proposed infiltration facility. Water for the infiltration test was provided by Netarts-Oceanside Fire district. Precipitation data was obtained from a nearby weather station (TILLAMOOK 6.9 SSE, OR). The month of January had received 19.02 inches of precipitation which is approximately 140% of normal[1] for that month. The vicinity had received approximately 3.5 inches of rain over the 4 days prior to the test. Therefore, the pit was not presoaked.

An open-pit falling-head test was conducted twice. The falling head test was prepared by filling the pit to a known depth (15" from the bottom) and measuring the time it took to recede to the bottom of the pit using a stopwatch. Between tests #1 and #2, the constant head flow rate was measured using a 5-gallon bucket and stopwatch and determined to be 5.43 gallons per minute.

---

[3] Natural Resource Conservation Service. Web Soil Survey. https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

RESULTS:
Results of the infiltration tests are shown in Table 1, below. The average infiltration rate is 21.45 inches per hour.

Table 1. Infiltration Test Results

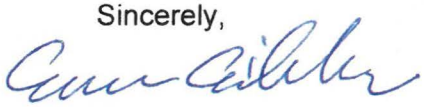
Test	Measured Infiltration Rate	Inches per Hour
#1	15" / 39 minutes	23.4
#2	15" / 46.3 minutes	19.5

CONCLUSION:
Infiltration in the area of the drainage swale is fairly rapid, therefore onsite infiltration of stormwater for the proposed subdivision appears feasible. The stormwater facility will need to be sized appropriately to manage stormwater for all new impervious surfaces created by the project and will need to be constructed in a manner that will not cause erosion and instability at the bottom of the slope.

DISCLOSURE: The information and statements in this report are true and accurate to the best of our knowledge. Neither Environmental Management Systems, Inc., nor the undersigned have any economic interests in the project.

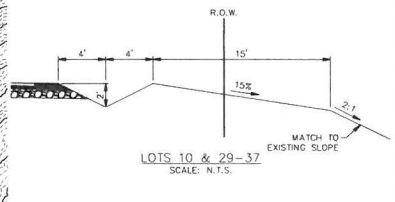
Thank you for your business, and we look forward to assisting you to achieve your development objectives. If you have any questions, please contact me at 503-353-9691.

Sincerely,



Emma Eichhorn, REHS
Environmental Health Specialist
ENVIRONMENTAL MANAGEMENT SYSTEMS, Inc.

Enclosed:
Site plan



LOTS 10 & 29–37
SCALE: N.T.S.

NOTES

1. PER TILLAMOOK COUNTY, THE PROJECT IS WITHIN AN AREA OF GEOLOGIC HAZARD. A GEOLOGIC HAZARD REPORT IS REQUIRED.
2. REFER TO THE GEOLOGIC HAZARD REPORT INCLUDED WITH THE LAND USE SUBMITTAL DOCUMENTS:
"GEOHAZARD REPORT, PROPOSED AVALON HEIGHTS SUBDIVISION, OCEANSIDE, TILLAMOOK COUNTY, OREGON, T:1S, R:10W, SEC:30, TL:200. PREPARED BY ENVIRONMENTAL MANAGEMENT SYSTEMS, INC DATED APRIL 12, 2018.

0 60 120
SCALE IN FEET

DATE	NO	REVISION

DRAWN: BD | DESIGNED: BD | CHECKED: EH
SCALE: AS SHOWN | DATE: JAN 12, 2021
PROJECT NO. E20-036

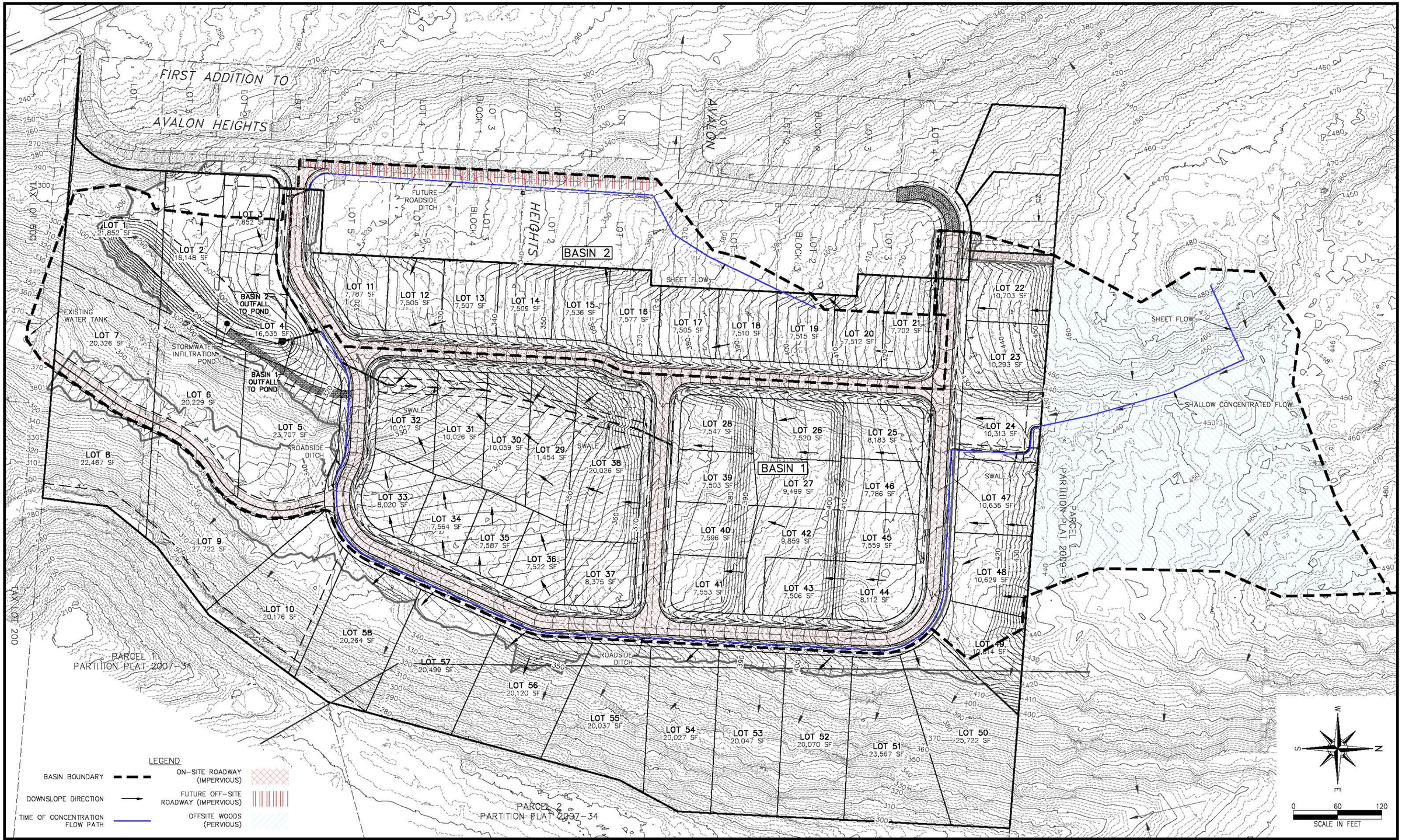
FDG
Firwood Design Group, LLC
SURVEYING ✦ ENGINEERING ✦ PLANNING
359 E. HISTORIC COLUMBIA RIVER HWY
TROUTDALE, OREGON 97060
BUS (503) 668-3737 ✦ FAX (503) 668-3788

AVALON HEIGHTS LLC - BILL HUGHES
41901 OLD HIGHWAY 30
ASTORIA, OREGON 97103

OVERALL CONCEPT GRADING PLAN
SECOND AVALON HEIGHTS SUBDIVISION
LAND USE PLANS

APPENDIX C

Basin Map



DATE:	NO.	REVISION

DRAWN: BD | DESIGNED: BD | CHECKED: EH
SCALE: AS SHOWN | DATE: MAR 31, 2021
PROJECT NO. E20-036

FDG
Firwood Design Group, LLC
SURVEYING + ENGINEERING + PLANNING
359 E. HISTORIC COLUMBIA RIVER HWY
TROUTDALE, OREGON 97060
BUS: (503) 668-3737 + FAX: (503) 668-3788

AVALON HEIGHTS LLC - BILL HUGHES
41901 OLD HIGHWAY 30
ASTORIA, OREGON 97103

CONCEPT STORMWATER BASIN MAP
SECOND AVALON HEIGHTS SUBDIVISION
LAND USE PLANS

1/1

AVALON HEIGHTS SUBDIVISION

December 8, 2005

PROCESS TO DEVELOP DESIGN STANDARDS
Using AASHTO Manual

Reference Documents:

"A POLICY on GEOMETRIC DESIGN of HIGHWAYS and STREETS - 2001" by American Association of State Highway and Transportation Officials (AASHTO Manual). As the AASHTO Manual is updated the most current edition applies as appropriate.

"TILLAMOOK FIRE DISTRICT UNIFORM FIRE CODE", Appendix III-E (Fire Department Access). **This document was updated by the Fire Defense Board on 4/21/05. Some section numbering and standards were updated accordingly.**

This handout is meant to provide clarification of procedures used to determine road standards when applying the AASHTO Manual (see below). This handout is not designed to replace actual use and reference of the AASHTO Manual. Note that if other County Ordinances or the local fire departments have higher standards than AASHTO, those other standards apply.

The purpose of this analysis is to develop the design features for a "Local" rural road functional classification. This type of road is consistent with "Major Local" and "Minor Local" roads. For design features for "Minimum Local" roads (i.e. a street accessing 4 or less residences), see Page 3 of this handout.

DEFINITIONS FOR TERRAIN (Page 235 of AASHTO Manual)

"Level" terrain is where highway sight distances, as governed by both horizontal and vertical restrictions, are generally long or could be made to be so without construction difficulty or major expense.

"Rolling" terrain is where the natural slopes consistently rise above and fall below the road grade and where occasional steep slopes offer some restriction to normal horizontal and vertical roadway alignment.

"Mountainous" terrain is where longitudinal and transverse changes in the elevation of the ground with respect to the road are abrupt and where benching and side hill excavations are frequently required to obtain acceptable horizontal and vertical alignment.

DEVELOPMENT OF DESIGN STANDARDS for
"MAJOR LOCAL" AND "MINOR LOCAL" ROADS

1. Determine the design Average Daily Traffic (ADT).
   a. For most developments this will be the existing ADT plus additional ADT for the developments being considered which are causing the needed improvements.
   b. When considering land development as a cause of increased ADT, the increased ADT should assume the maximum density allowed by the zoning.
   c. For residential developments the ADT is assumed to be 10 vehicles per day per residence.

2. Determine the Design Speed.
   a. Use Table 5-1 (Page 385).
   b. Use Terrain definitions listed above.

3. Determine Stopping Sight Distance and "K" Values for Vertical Curves: Use Table 5-2 (Page 385).

4. No sections with passing sight distances are required with typical subdivision or major partition roads.

5. Determine Maximum Grade: Use Table 5-4 (Page 386).

6. Roadway Cross Slope. (Use 2% crown unless otherwise needed for curve superelevation or alternate engineered design)

7. Determine Superelevation and Maximum Degree of Curve.
   a. Maximum superelevation is 12% (Page 387).
   b. Use Tables 3-21 through 3-25 (Pages 157-165) horizontal curvature design. If an applicant proposes a curve radius inconsistent with these tables, they need to provide engineered design details subject to approval by the Director of Public Works.

8. Determine Minimum Width of Traveled Way (paved road): Use Table 5-5 (Page 388).

9. Determine Width of Graded Shoulder (each side).
   a. Use Table 5-5 (Page 388).
   b. In Mountainous Terrain shoulder in roadway cuts may be deceased by 2 feet, but only if:
      (1) the total roadway width is not less than 18 feet, and
      (2) the cut is not on the inside of a minimum radius curve, and
      (3) stopping sight distance is not impaired by the roadway cut.

Type of terrain	Metric: Design speed (km/h) for specified design volume (veh/day)						US Customary: Design speed (mph) for specified design volume (veh/day)					
	under 50	50 to 250	250 to 400	400 to 1500	1500 to 2000	2000 and over	under 50	50 to 250	250 to 400	400 to 1500	1500 to 2000	2000 and over
Level	50	50	60	80	80	80	30	30	40	50	50	50
Rolling	30	50	50	60	60	60	20	30	30	40	40	40
Mountainous	30	30	30	50	50	50	20	20	20	30	30	30

Exhibit 5-1. Minimum Design Speeds for Local Rural Roads

Metric				US Customary			
Initial speed (km/h)	Design stopping sight distance (m)	Rate of vertical curvature, K[a] (m/%)		Initial speed (mph)	Design stopping sight distance (ft)	Rate of vertical curvature, K[a] (ft/%)	
		Crest	Sag			Crest	Sag
20	20	1	3	15	80	3	10
30	35	2	6	20	115	7	17
40	50	4	9	25	155	12	26
50	65	7	13	30	200	19	37
60	85	11	18	35	250	29	49
70	105	17	23	40	305	44	64
80	130	26	30	45	360	61	79
90	160	39	38	50	425	84	96
100	185	52	45	55	495	114	115
				60	570	151	136

[a] Rate of vertical curvature, K, is the length of curve per percent algebraic difference in the intersecting grades (i.e., K = L/A). (See Chapter 3 for details.)

Exhibit 5-2. Design Controls for Stopping Sight Distance and for Crest and Sag Vertical Curves

= ROARING TIDE LOOP BETWEEN HIGHLAND & OCEAN SONG

= ALL OTHER PROPOSED ROADS

Metric			US Customary		
Design speed (km/h)	Design passing sight distance (m)	Rate of vertical curvature, K[a] (m/%)	Design speed (mph)	Design passing sight distance (ft)	Rate of vertical curvature, K[a] (ft/%)
30	200	46	20	710	180
40	270	84	25	900	289
50	345	138	30	1090	424
60	410	195	35	1280	585
70	485	272	40	1470	772
80	540	338	45	1625	943
90	615	438	50	1835	1203
100	670	520	55	1985	1407
			60	2135	1628

[a] Rate of vertical curvature, K, is the length of curve per percent algebraic difference in the intersecting grades (i.e., K = L/A). (See Chapter 3 for details.)

Exhibit 5-3. Design Controls for Crest Vertical Curves Based on Passing Sight Distance

Grades

Suggested maximum grades for local rural roads are shown in Exhibit 5-4.

	Metric									US Customary								
	Maximum grade (%) for specified design speed (km/h)									Maximum grade (%) for specified design speed (mph)								
Type of terrain	20	30	40	50	60	70	80	90	100	15	20	25	30	40	45	50	55	60
Level	9	8	7	7	7	7	6	6	5	9	8	7	7	7	7	6	6	5
Rolling	12	11	11	10	10	9	8	7	6	12	11	11	10	10	9	8	7	6
Mountainous	17	16	15	14	13	12	10	10	–	17	16	15	14	13	12	10	10	–

Exhibit 5-4. Maximum Grades for Local Rural Roads

Alignment

Alignment between control points should be designed to be as favorable as possible consistent with the environmental impact, topography, terrain, design traffic volume, and the amount of reasonably obtainable right-of-way. Sudden changes between curves of widely different radii or between long tangents and sharp curves should be avoided. Where practical, the design should include passing opportunities. Where crest vertical curves and horizontal curves occur together, there should be greater than minimum sight distance to ensure that the horizontal curves are visible to approaching drivers.

Metric					US Customary				
	Minimum width of traveled way (m) for specified design volume (veh/day)					Minimum width of traveled way (ft) for specified design volume (veh/day)			
Design speed (km/h)	under 400	400 to 1500	1500 to 2000	over 2000	Design speed (mph)	under 400	400 to 1500	1500 to 2000	over 2000
20	5.4	6.0[a]	6.0	6.6	15	18	20[a]	20	22
30	5.4	6.0[a]	6.6	7.2[c]	20	18	20[a]	22	24[c]
40	5.4	6.0[a]	6.6	7.2[c]	25	18	20[a]	22	24[c]
50	5.4	6.0[a]	6.6	7.2[c]	30	18	20[a]	22	24[c]
60	5.4	6.0[a]	6.6	7.2[c]	40	18	20[a]	22	24[c]
70	6.0	6.6	6.6	7.2[c]	45	20	22	22	24[c]
80	6.0	6.6	6.6	7.2[c]	50	20	22	22	24[c]
90	6.6	6.6	7.2[c]	7.2[c]	55	22	22	24[c]	24[c]
100	6.6	6.6	7.2[c]	7.2[c]	60	22	22	24[c]	24[c]
	Width of graded shoulder on each side of the road (m)					Width of graded shoulder on each side of the road (ft)			
All speeds	0.6	1.5[a,b]	1.8	2.4	All speeds	2	5[a,b]	6	8

[a] For roads in mountainous terrain with design volume of 400 to 600 veh/day, use 5.4-m [18-ft] traveled way width and 0.6-m [2-ft] shoulder width.

[b] May be adjusted to achieve a minimum roadway width of 9 m [30 ft] for design speeds greater than 60 km/h [40 mph].

[c] Where the width of the traveled way is shown as 7.2 m [24 ft], the width may remain at 6.6 m [22 ft] on reconstructed highways where alignment and safety records are satisfactory.

See text for roadside barrier and offtracking considerations.

Exhibit 5-5. Minimum Width of Traveled Way and Shoulders

ROARING TIDE LOOP BETWEEN HIGHLAND AND OCEAN SONG:
18' TRAVELED WAY + 2' SHOULDERS

ALL OTHER PROPOSED ROADS:
18' TRAVELED WAY + 2' SHOULDERS

From: Melissa Jenck
Sent: Wednesday, April 10, 2019 2:08 PM
To: DEBLASI Michael; 'mark@meadeng.com'; 'bchexc@gmail.com'
Cc: Sarah Absher
Subject: RE: Avalon Heights 2nd Addition

Michael,

Thank you for the update!

Melissa Jenck

From: DEBLASI Michael <michael.deblasi@state.or.us>
Sent: Wednesday, April 10, 2019 1:44 PM
To: 'mark@meadeng.com' <mark@meadeng.com>; 'bchexc@gmail.com' <bchexc@gmail.com>; Melissa Jenck <mjenck@co.tillamook.or.us>
Subject: Avalon Heights 2nd Addition

Melissa,
I visited the site on April 5th to determine if there were any jurisdictional Waters of the State. During my inspection of the site, I did not determine any portion of the waterway or adjacent lands to be jurisdictional to the Department of State Lands. The waterway is ephemeral and no wetlands were observed where the project impacts are proposed to occur.

Michael De Blasi
Aquatic Resources Coordinator
Marion, Polk, Tillamook & Yamhill Counties

Oregon Department of State Lands
775 Summer St NE, Suite 100
Salem, Ore 97303
503.986.5226
http://www.oregon.gov/DSL/Pages/index.aspx

ENVIRONMENTAL
MANAGEMENT
SYSTEMS, INC.

OR: 503-353-9691
OREGON COAST: 503-322-2700
FAX: 503-353-9695
WA: 360-735-1109
www.envmgtsys.com
4080 SE International Way
Suite B112
Milwaukie, OR 97222

April 12th, 2018
EMS Report #18-0005

Bill Hughes
Avalon Heights LLC
41901 Old Highway 30
Astoria, OR 97103

REGARDING: Geohazard Report, Proposed Avalon Heights Subdivision, Oceanside, Tillamook County, Oregon, T: 1S, R: 10W, Sec: 30, TL:200.

Project Description

Environmental Management Systems, Inc. (EMS) has prepared this Geological Hazard Report for the proposed residential subdivision to be developed on the 21.20-acre tax lot listed above. This report has been prepared to satisfy Tillamook County Land Use Ordinance Article IV, Section 4.130. EMS reviewed aerial photographs, Oregon Department of Geology and Mineral Industries (DOGAMI) LIDAR imagery, geologic hazard maps, landslide inventory data, US Geological Survey (USGS) geologic maps, Natural Resource Conservation Service (NRCS) soil maps, and a previous geohazard report prepared by EMS in 2005. On February 3rd, 2018 EMS conducted an onsite geologic hazard reconnaissance to visually evaluate surface conditions at the project site. The attached Figures 1 through 10 are maps of the site and vicinity including: 1) Tax Lot Map, 2) 2017 Aerial Map, 3) USGS Topographic Map, 4) USGS Geology Map, 5) NRCS Soil Map, 6) LIDAR Map, 7) SLIDO Landslide Map, 8) Coastal Dune Hazard Map, 9) Existing Conditions and 10) Conceptual Site Plan. Selected photographs showing site features are also attached. Conditions during the site reconnaissance were cloudy with light precipitation and temperatures around 55 degrees Fahrenheit.

The subject property, referred to in this report as the "site" is a 21.20-acre lot located near the unincorporated town of Oceanside, Oregon. It is identified as Tax Lot 200 in Section 30DC, Township 1 South and Range 10 West in Tillamook County (see Figure 1 – Tax Lot Map).

The site is currently undeveloped, but a 67-lot subdivision is proposed. See Figure 10 – Conceptual Site Plan. The subject property is zoned as ROS – Residential Oceanside Zone, which permits single-family dwellings, public parks, and on-site manufactured homes. Lot sizes are dictated by Tillamook County Zoning ordinance and depend on existing grades. Lots with average slopes of less than 19% must be at least 7,500 square feet; lots with slopes 20-29% must be at least 10,000 square feet; lots with slopes greater than 29% must be at least 20,000 square feet. Public sanitary sewer, water and electric utilities are available.

Landscape Setting and Land Use

As mentioned above, the site is undeveloped but has been used for timber cultivation and harvest as recently as 2007. The site is situated less than a mile southeast of Oceanside's town

center and about 1-mile northwest of Netarts. Neighboring lots along the site's western property line are all developed with single family residences, but areas to the north, east, and west are mostly undeveloped forestland. There is one large single-family residence to the east that is accessed by a private road that runs through the lot. The Netarts-Oceanside Sanitary District wastewater treatment plant is approximately 0.25 miles northeast of the site. Directly south of the southwest portion of the parcel are remnant foundation supports for a large above ground water storage tank, on top of which is a new smaller tank. The Oceanside Water District water tower is directly north of the site near Highland Drive and is accessed via an easement through the site. Both tanks can be seen in the Figure 2 – Aerial Map. A Netarts Water District water line runs across the northern part of the site (see Image 1).

The site is in Land Resource Region 4A-Sitka Spruce Belt which is typically dominated by Sitka spruce, western hemlock, western red cedar, Douglas-fir, salal, huckleberry, and swordfern[1]. The average annual precipitation is 52 – 60 inches which is evenly distributed throughout the fall, winter and spring, in contrast to a relatively dry summer. The average annual temperature is 45 – 55 degrees Fahrenheit. This site is covered by Scotch Broom, heavy brush, and stands of mixed evergreen trees. The site was logged sometime around 2007 so trees are < 24" diameter.

The elevation for the subject parcel varies between 300 and 430 feet above sea level with higher elevations in the north part of the parcel. Most of the site is made up of rolling, gentle to moderate slopes aside from the far eastern part of the lot which is much steeper ranging between approximately 40 and 60 percent and descending down to perennial stream. According to the USGS Topo map for the Netarts Quadrangle, this stream appears to be a tributary of Fall Creek which runs along the east property line from northeast to southwest and drains into the Pacific Ocean. An unnamed, intermittent drainageway runs through the center of the lot from north to south. Topographic features including nearby waterways can be seen in Figure 3 – Topographic Map. Figure 9 – Site Plan depicts the topographic survey of the property from 2005.

Analysis

Bedrock and soils

The gentle to moderately sloped terrain that extends about a mile inland from the coast is primarily underlain by unconsolidated Quaternary-age beach, dune, marine terrace and river deposits of variable thickness of up to over 100 feet. These deposits in the site region are mapped by Schlicker and others (1972)[2] as being a stable sand dune formation. Later mapping of the region by Wells and others (1995)[3] identifies the area as beach and dune deposits (map unit Qb; Figure 4 – USGS Geology Map). This unit is described as unconsolidated moderately well sorted, fine to medium grained beach sand and well sorted, cross bedded fine grained sand comprising active and inactive dune ridges; locally includes basalt gravel and boulder deposits derived from rocky headlands and fine fluvial and lacustrine mud behind coastal dune ridges.

The Quaternary deposits overly Miocene age sedimentary and volcanic bedrock in the site region. Bedrock units include the Grande Ronde Basalt flows mapped north and east from the site as well as in isolated cliff-forming areas along the coast west from the site (map unit Tgr; Figure 4 0 USGS Geology Map). Miocene-age sedimentary rock units include the Astoria

---

[1] 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

[2]Schlicker, H.G., Deacon, R.J., Beaulieu, J.D. and G.W. Olcott, 1972, Engineering Hazard Map of the Nehalem Quadrangle, Oregon, Scale 1:62,500 in: Environmental Geology of the Coastal Region of Tillamook and Clatsop Counties, Oregon, Oregon Department of Geology and Mineral Industries, Bulletin 74.

[3] Wells, R. E., Snavely, P. D., MacLeod, N. S., Kelly, M. M., Parker, M. J., Fenton, J. S., and Felger, T. J., 1995, Geologic map of the Tillamook Highlands, northwest Oregon Coast Range; a digital database: Reston, Va., U.S. Geological Survey Open-File Report 95-670, scale 1:48,000.

Formation (map unit Tac) to the southeast and Sandstone of Cape Mears (map unit Tcm) to the northeast. Review of the geologic map by Wells and others (1995) suggest bedrock beneath the Quaternary deposits at the site is more likely to be basalt flows, however marine sedimentary rocks may be present (see Figure 4). The dune sand may also overly old marine terrace deposits that have been uplifted and formed on the eroded bedrock surface. The thickness of the dune deposits and depth to bedrock is not known at this time. Subsurface explorations are recommended to evaluate soil and bedrock conditions across the site.

The Wells and others (1995) geologic map shows bedrock faults are present in the region and provides some altitudes of bedding in the sedimentary rocks and joints or interflow zones in the basalt lava flows. Bedding in the Astoria Formation is generally dipping westerly between 10 and 25 degrees and generally northerly dips of between 8 and 15 degrees in the Sandstone of Cape Mears and the basalt flows (Figure 4)

According to USDA Natural Resource Conservation Service, soils on the subject property are Netarts fine sandy loam[4] – 5-30 percent slopes in the western half of the lot, and 30-60 percent slopes in the eastern half of the lot (see map units 11D and 11E in Figure 6 – NRCS Soils Map). The landform for Netarts fine sandy loam is dunes on marine terraces. It is not rated as hydric and is in hydrological soil Group A. NRCS describes Netarts fine sand as being well drained with depth to restrictive feature or water table being more than 80 inches from the surface.

The typical soil profile for the Netarts fine sandy loam is as follows:

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 5 inches: fine sandy loam
E - 5 to 9 inches: loamy fine sand
ABs - 9 to 15 inches: loamy fine sand
Bs1 - 15 to 19 inches: fine sand
Bs2 - 19 to 37 inches: fine sand
BCs - 37 to 54 inches: fine sand
C - 54 to 67 inches: fine sand

During a site reconnaissance in November 2005, a 3-inch diameter, 60-inch-long AMS soil auger was used to excavate and expose the soils to maximum depth of the soil auger. Four excavations were completed within the boundary limits of the parcels. No restrictive layer or water table was reached down to 60 inches (maximum depth of the auger). Borings 1 and 2 were found to be fine sand down to 56" which weak to moderate structure and slight to moderate cementation. 16-40" was slightly restrictive to groundwater percolation with a non-restrictive layer beneath. Borings 3 and 4 were silt loam from 0" to 30" and 0" to 32", respectively, followed by silty clay to 60". The structure was weak, friable, and slightly plastic in the silt loam layer and moderate to strong blocky and not restrictive in the silty clay layer. Data from that investigation including boring locations are attached at the end of this report.

No subsurface explorations were made during this recent site assessment, but surface conditions appeared unchanged since 2005. 1 to 2 feet of soil (fine sand) was exposed at a road cut near the east side of the property (see Image 2). Discontinuous iron-cemented sand also observed in some places (see Image 3). Iron cemented layers may be laterally extensive where seasonal or perennial perched water tables may form. Perched groundwater may also be present where silty clay soils are present. As noted later in this report we recommend

[4] Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at: https://websoilsurvey.sc.egov.usda.gov/

subsurface explorations and testing to provide geotechnical data to further evaluate grading plans (cuts and fills), compaction, storm water systems, and slope stability, for example.

Slope and water drainage patterns
Figure 9 shows existing topographic contours. Slopes generally descend from north to south and include broad north to south oriented ridges and swales. The majority upper, western part of the site is fairly flat but with rolling hill topography (see Images 4 and 5). Approximately 100 feet from the east property line slopes increase to 45-60% (see Image 4). According to the USGS Topographic Map for the area, a perennial stream is at the bottom of this steep slope which extends off site.

Based on LIDAR imagery (Figure 6) and on-site observations of site topography, water appears to flow from northeast to southwest toward the Pacific Ocean and Netarts Bay. The USGS Topo 7.5-minute map for Netarts, Oregon indicates the presence of an unnamed stream or creek runs that through the center of the subject property from north to south. A broad north-south oriented valley-like depression or seasonal swale was observed there during the site assessment but no water present. Another unnamed creek is mapped at the foot of the slope just east of the property. This appears to be a tributary of the north branch of Fall Creek which drains into the Pacific Ocean to the southwest. No standing or flowing water was observed anywhere on site during the site assessment. The National Flood Insurance program maps this area "undetermined by possible flood hazard"[5]. The site does not appear to be prone to flooding.

Landslide inventory and identification of visible landslide activity in the immediate area
According to DOGAMI Statewide Landslide Information Layer for Oregon (SLIDO[6]) and mapping by Schlicker and others[7] (1972), a large area of landslide topography is present at the eastern edge of the property (See Figure 7 – Landslide Map). No landslide topography or obvious indications of slope instability or landslide activity was observed during the site reconnaissance. Conifer trees were dominantly straight throughout the site and the ground did not appear to be slumping. No scarps from recent landslide activity were observed. No cracks were observed in the foundation of neighboring properties from Highland Drive.

History of dune erosion
Based on review of the Oregon HazVu: Statewide Geohazards Viewer (DOGAMI, https://gis.dogami.oregon.gov/hazvu/), this site is not located in a coastal erosion hazard area. No evidence of dune erosion was identified on the site, but coastal erosion is rated between low and very high closer to the ocean west of the site[8]. Figure 8 – Coastal Erosion Hazard Map shows the risk of coastal erosion for the area.

During the winter of 1997-1998, an active beach margin was eroded at the base of the dune complex where the nearby Capes Subdivision is located west of the site. According to Wes Greenwood's 2005 geologic hazard report[9], the erosion allowed storm generated waves to

---

[5] National Flood Insurance Program, Federal Emergency Management Agency. 1978. Flood Insurance Rate Map for Tillamook County, Oregon (Unincorporated Areas) Community Panel Number 410196 0165 A.
[6] Oregon Department of Geology and Mineral Industries. SLIDO: Statewide Landslide Information Layer for Oregon. Web. Retrieved from: https://gis.dogami.oregon.gov/slido/
[7] Schlicker, H.G., Deacon, R.J., Beaulieu, J.D. and G.W. Olcott, 1972, Engineering Hazard Map of the Nehalem Quadrangle, Oregon, Scale 1:62,500 in: Environmental Geology of the Coastal Region of Tillamook and Clatsop Counties, Oregon, Oregon Department of Geology and Mineral Industries, Bulletin 74.
[8] Oregon Department of Geology and Mineral Industries. Oregon HazVu: Statewide Geohazards Viewer. Web. Retrieved from: https://gis.dogami.oregon.gov/hazvu/
[9] Greenwood, W. 2005. Preliminary Geologic Report for a Proposed 85 Lot Subdivision. Environmental Management Systems, Inc. Milwaukie, OR

erode a foredune that was located at the base of the large, upslope dune complex. A large, slow moving landslide mass approximately 500 feet wide and 900 feet long resulted and imperiled homes constructed on the upper, west portion of the dune complex, located directly upslope from the landslide scarp. Engineering measures such as soil pins have been placed along the scarp to stabilize the existing dwellings. However, the toe of the landslide has not been protected and future storms may further erode the beach margin and activate another landslide.

Recommended development standards

Development density
Development density should be consistent with Tillamook County's Zoning Ordinance for Residential Oceanside Zone.

Locations for structures and roads
Setback of home structures from roads, property lines, and other structures should abide by Tillamook County's Zoning Ordinance for the ROS zone (Section 3.310(4)(d-g)). Figure 10 – Conceptual Site Plan shows the proposed limits of the 67 lots and street locations. Buildings should be set back at least 50 feet from the steep slope break in the eastern part of the site. Development on slopes greater than 50% should be avoided.

Land grading practices, including standards for cuts and fills
Grading on the upper, western part of the lot is proposed to reduce slopes if necessary for development. A topographic survey should be done to verify current slope conditions across the site prior to the development of a grading plan. Figure 10 – Conceptual Site Plan shows proposed topographic contours and is based on the prior survey. Engineered retaining wall(s) along the eastern steep slope or elsewhere may be necessary for development. Specifications for grading including cuts and fills, soil compaction and drainage, will be provided in a geotechnical report following recommended subsurface explorations across the site.

Vegetation removal and re-vegetation practices
Vegetation should be maintained as much as possible where construction is proposed. Clearing of the easternmost part of the lot where the steepest slopes are located should be avoided and reserved as an open space.

Foundation design
Home structures can be placed on typical spread footings where excavated subgrade should consist of medium stiff to hard soil or weathered bedrock and including removal of organic topsoil and undocumented fill if present. Significantly deeper footings or foundation supported on piles may be necessary in steeper slope (> 29%) areas.

Road design
Road design should be consistent with Tillamook County Development Standards.

Management of storm water run-off during and after construction
Runoff and erosion should be controlled during and after construction to prevent erosion or create unstable soil conditions at the site. During construction, silt fences should be placed around the construction area, and wattles should be placed at the base of slopes to treat runoff. Exposed soil should be covered with straw during construction and immediately replanted afterward to prevent sheet and rill erosion. Storm water management recommendations for runoff from roof, driveways, and other impervious surface on each lot and the new streets will be evaluated following additional geotechnical investigations that are recommended. The conceptual storm water plan shown on Figure 10 assumes that stormwater conveyance pipes

will be installed under new roads and directed to a stormwater attenuation pond in the southern portion of the site.

Geotechnical report
Geotechnical investigations are recommended to provide additional information needed for final design. The results will be included in a future geotechnical report for submittal to Tillamook County. The investigations will include a detailed topographic map of the site that will be used to refine the grading plan. Subsurface explorations and testing should be completed to characterize soil, bedrock and groundwater conditions across the site. This information is needed to further evaluate seismic design criteria, slope stability, grading plans, specifications for cuts and fills, retaining wall design, groundwater and storm water management plans.

Summary findings and conclusions

The following addresses each of the summary findings and conclusions required by TCLUO Section 4.130(8):

a. Type of proposed use and adverse effects it might have on the surrounding areas
b. Hazards to life, public and private property, and the natural environment that may be caused by the proposed use
c. Methods for protecting the surrounding area from adverse effects of the development
d. Temporary and permanent stabilization programs and the planned maintenance of new and existing vegetation
e. The proposed development is adequately protected from any reasonably foreseeable hazards including but not limited to geologic hazards, wind erosion, undercutting and flooding
f. The proposed development is designed to minimize adverse environmental effects

The subject property is located on an undeveloped “stable dune” hillside dominated by a mix of young conifers and dense understory brush. The site is about 0.5 miles east of the Pacific Ocean and is not within the coastal erosion hazard zone or tsunami inundation zone. Evidence that the site is unstable was not observed during the site assessment, although development on the steepest slopes will require proper design and construction to maintain slope stability.

Both a topographic survey and professional land survey should be conducted prior to construction to accurately delineate setbacks and steep slope breaks. Geotechnical investigations and a geotechnical report are recommended to provide information needed to further evaluate grading plans, lot and street layout, slope stability, storm water management, and site specific standards for design and construction. The future scope of work will include review of subsurface data and reports from the Capes Subdivision, nearby water tanks, as well as geotechnical hole, monitoring well, and water well reports available from the Oregon Department of Water Resources.

It is my opinion that a 67-lot subdivision can safely be developed. Additional recommendations and site specific standards will be provided in the geotechnical report that incorporates the recommendations summarized above and will further address relevant geologic hazards, storm water and vegetation management.

Limitations

The opinions and recommendations contained in this report are not intended as a warranty but are offered to assist you in the planning and design process. The report is based on field observations and background review only. Subsurface explorations, soils testing, and geologic

and engineering analysis may be necessary to confirm our interpretation of subsurface conditions and more fully develop the required level of detail and engineering for design and construction of a home structure.

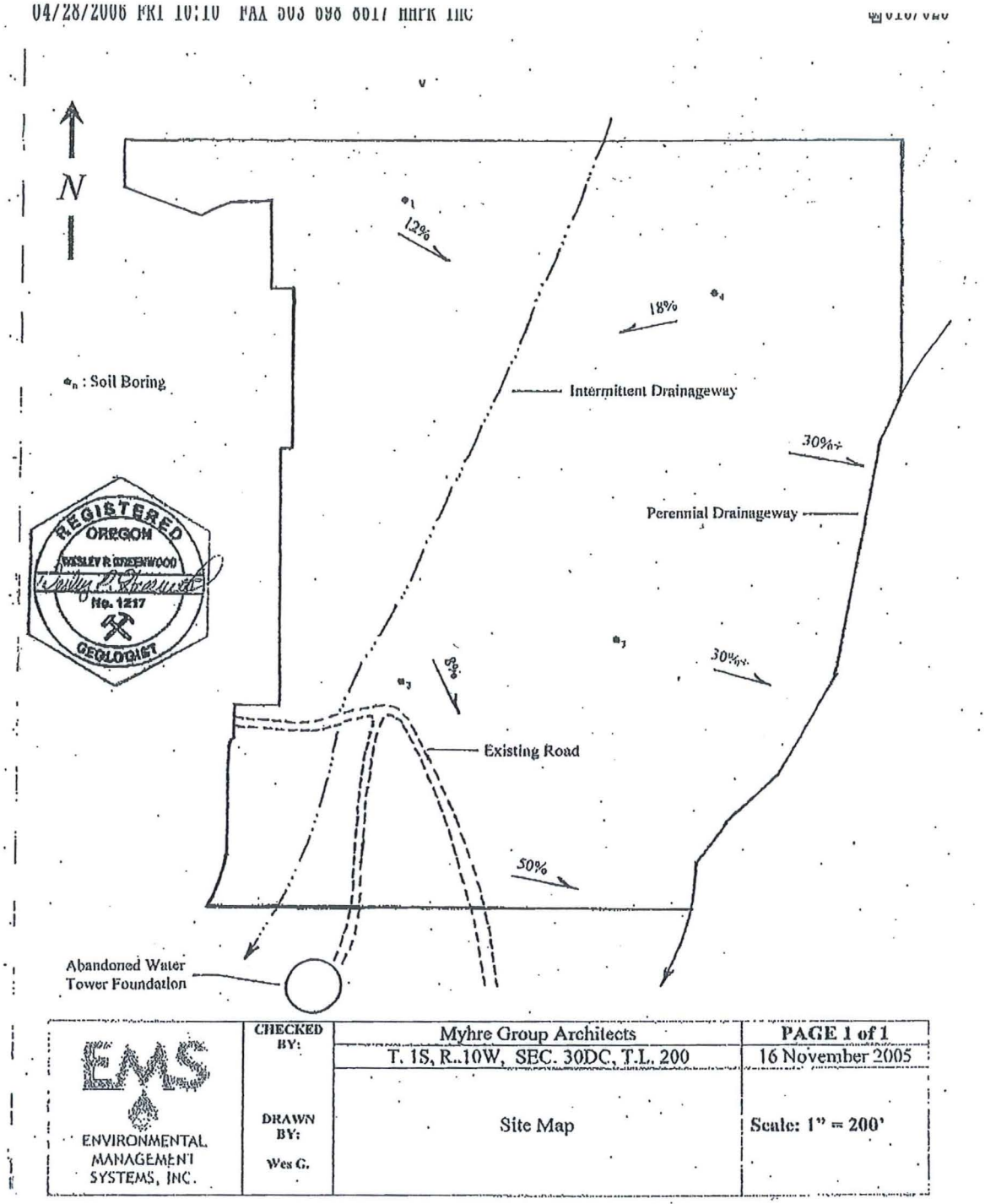
DISCLOSURE: The information and statements in this report are true and accurate to the best of our knowledge. Neither Environmental Management Systems, Inc., nor the undersigned have any economic interests in the project.

Thank you for your business, and we look forward to assisting you to achieve your development objectives.

Sincerely,

John Jenkins, CEG
Oregon Certified Engineering Geologist No. E1119

Enclosed:
2005 Boring Log Data
Ground Level Color Photographs
Figure 1 - Tax Lot Map
Figure 2 – 2017 Aerial Map
Figure 3 – USGS Topographic Map
Figure 4 - USGS Geology Map
Figure 5 – NRCS Soils Map
Figure 6 - Lidar Map
Figure 7 - Landslide Map
Figure 8 - Coast Dune Map
Figure 9 - Existing Conditions
Figure 10 – Conceptual Site Plan



Measured slopes and soil boring locations (1-4) from the 2005 geologic hazard assessment

Boring logs (page 1 of 2) from the 2005 geologic hazard assessment

ENVIRONMENTAL MANAGEMENT SYSTEMS, INC. – SOILS BORING DATA

(Milwaukie, OR Office) 4080 SE International Way, Suite #B-112, Milwaukie, OR 97222-8867 Phone: (503) 353-9691 FAX: (503) 353-9695
(Bay City, OR Office) 7304 Baseline Road, Bay City, OR 97107 Phone: (503)-812-9655 FAX: (503) 377-0324

APPLICANT: Myhre Group Architects PREVIOUS EVALUATION: ( ) Yes (X) No WORK I.D. #: 05-5072

ADDRESS OF SITE: Undeveloped Parcel, Oceanside, OR SUBDIVISION: _____ Date: 9 November 2005
16 November 2005

LEGAL DESCRIPTION: TOWNSHIP: 1S, RANGE: 10W, SECTION: 30DC, TAX LOT: 200, OTHER: _____

SOIL PROFILES

			Redoximorphic Features					
Test Hole	Depth (In.)	Texture	Matrix Color	Concentration Color	Depletion Color	Coarse Fragments	Roots	Structure & Other Comments
#1	0 – 16"	fS	10YR 7/3				Many fine	Weak, granular; small laminar lenses of Fe_2O_3 (5YR4/6); slight cementation; Not Restrictive
Evaluated 9 November 2005	16" – 40"	fS	5YR 4/6				Many fine	Moderate, granular; moderate cementation; Slight restriction to groundwater percolation
	40" – 56"	fS	10YR 7/4				Few fine	Weak, granular; slight cementation; Not Restrictive to groundwater percolation
Slope: 12%	ESD ≥ 56" No Temp. Perching H_2O → 56"							
#2	0 – 16"	fS	10YR 7/3				Many fine	Weak, granular; small laminar lenses of Fe_2O_3 (5YR4/6); slight cementation; Not Restrictive
Evaluated 9 November 2005	16" – 38"	fS	5YR 4/6				Many fine	Moderate, granular; moderate cementation; Slight restriction to groundwater percolation
	38" – 56"	fS	10YR 7/4				Few fine	Weak, granular; slight cementation; Not Restrictive to groundwater percolation
Slope: 8%	ESD ≥ 56" No Temp. Perching H_2O → 56"							
#3	0 – 30"	SI	10YR4/3				Many coarse & fine	Weak, friable; Slightly plastic; Common organic inclusions at surface; fine S throughout soil matrix
Evaluated 16 November 2005	30" - 60"	SiCl	10YR6/4				Many → Few coarse & fine	Moderate to Strong Blocky; Slight to moderate plasticity; Strong clay films; Not restrictive to groundwater percolation
Slope: 20%	ESD ≥ 60" No Temp. Perching H_2O → 60"							
#4	0 – 32"	SI	10YR4/3				Many coarse & fine	Weak, friable; Slightly plastic; Common organic inclusions at surface; fine S throughout soil matrix
Evaluated 16 November 2005	32" - 60"	SiCl	10YR6/4				Many → Few coarse & fine	Moderate to Strong Blocky; Slight to moderate plasticity; Strong clay films; Not restrictive to groundwater percolation
Slope: 18%	ESD ≥ 60" No Temp. Perching H_2O → 60							

ENVIRONMENTAL MANAGEMENT SYSTEMS, INC. – SOILS BORING DATA

(Milwaukie, OR Office) 4080 SE International Way, Suite #B-112, Milwaukie, OR 97222-8867 Phone: (503) 353-9691 FAX: (503) 353-9695
(Bay City, OR Office) 7304 Baseline Road, Bay City, OR 97107 Phone: (503) 812-9655 FAX: (503) 377-0324

Weather Conditions: (X) Clear ( ) Cloudy ( ) Precipitation ( ) Extreme Dryness ( ) Other:	
Landforms: ( ) Floodplain ( ) Terrace (x) Upland (x) Side slope ( ) Open ( ) Other:	Effective Soil Depth: > 56"
Vegetation: ( ) Pasture (X) Forest ( ) Cleared ( ) Wetland ( ) Other:	
Major Limiting Factors: ( ) Water Table ( ) Soil Suitability ( ) Setbacks ( ) Lot Size (X) None	
Soil Type: Active Dune Land (West P.O. Parcel) and Hembre Soils (East P.O. Parcel)	Other: N/A
Additional Comments: N/A	

Evaluator's Name: Wesley P. Greenwood Evaluator's Signature: *Wesley P. Greenwood* Date: 16 November 2005

REGISTERED OREGON WESLEY P. GREENWOOD No. 1217 GEOLOGIST

Image 1 Sewer and water are available for the site. A Netarts water district water line runs through the northern part of the site.

Image 2: 1-2 feet of soil was exposed at a roadcut approximately in the middle north of the site. Soil on the site is deep, fine sand with slight to moderate cementation.

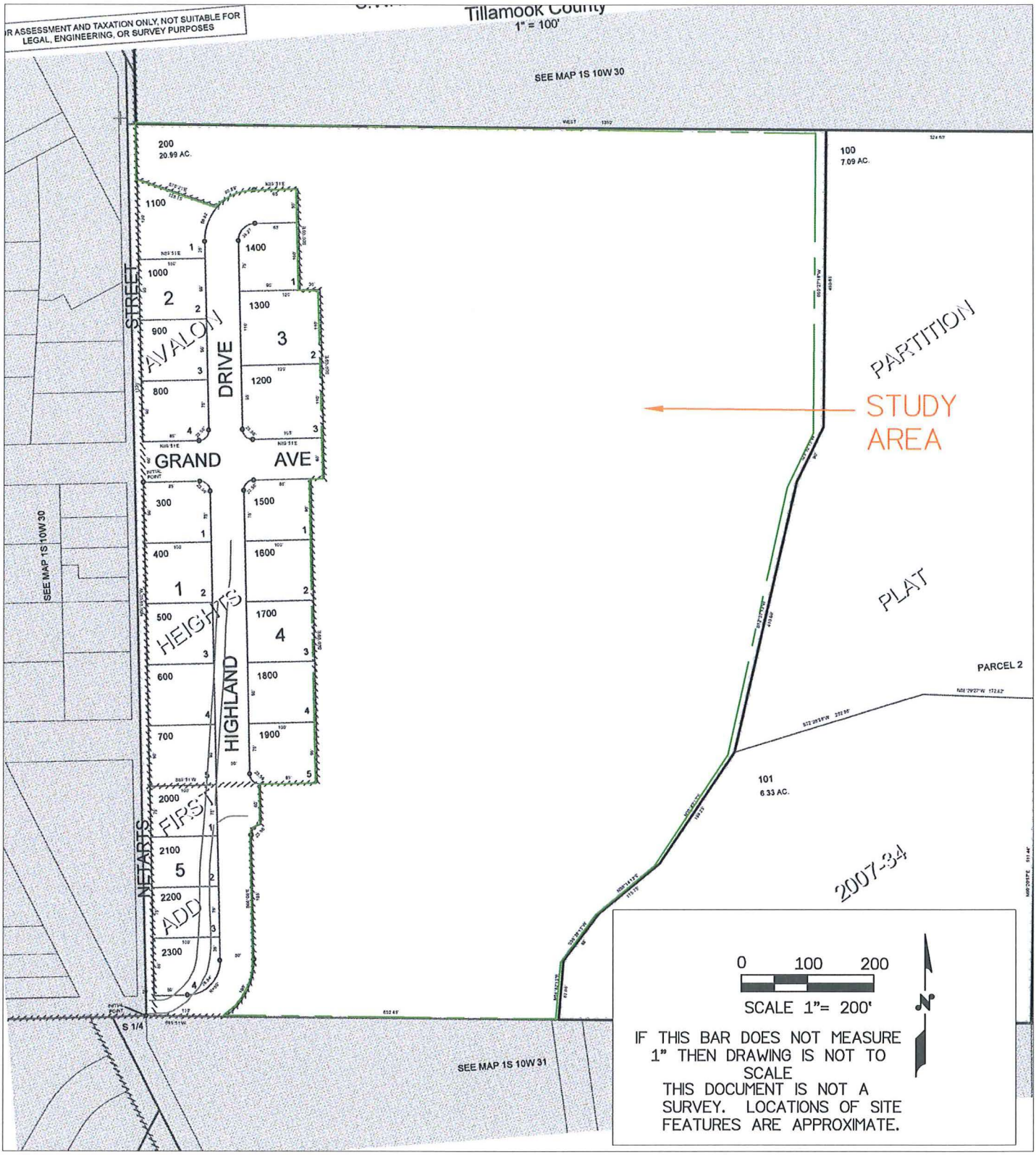
Image 3: Iron cemented sand was observed in some places. This photo was taken facing west near the top of the steep slope in the eastern part of the site.

Image 4: Most of site is fairly flat (<19%) but with variable slopes and rolling hill topography.

Image5: Most of site is fairly flat (<19%) but with variable slopes and rolling hill topography.

Image 6: A view of the site facing east. This photo was taken from the top of the steep slope in the eastern part of the site.

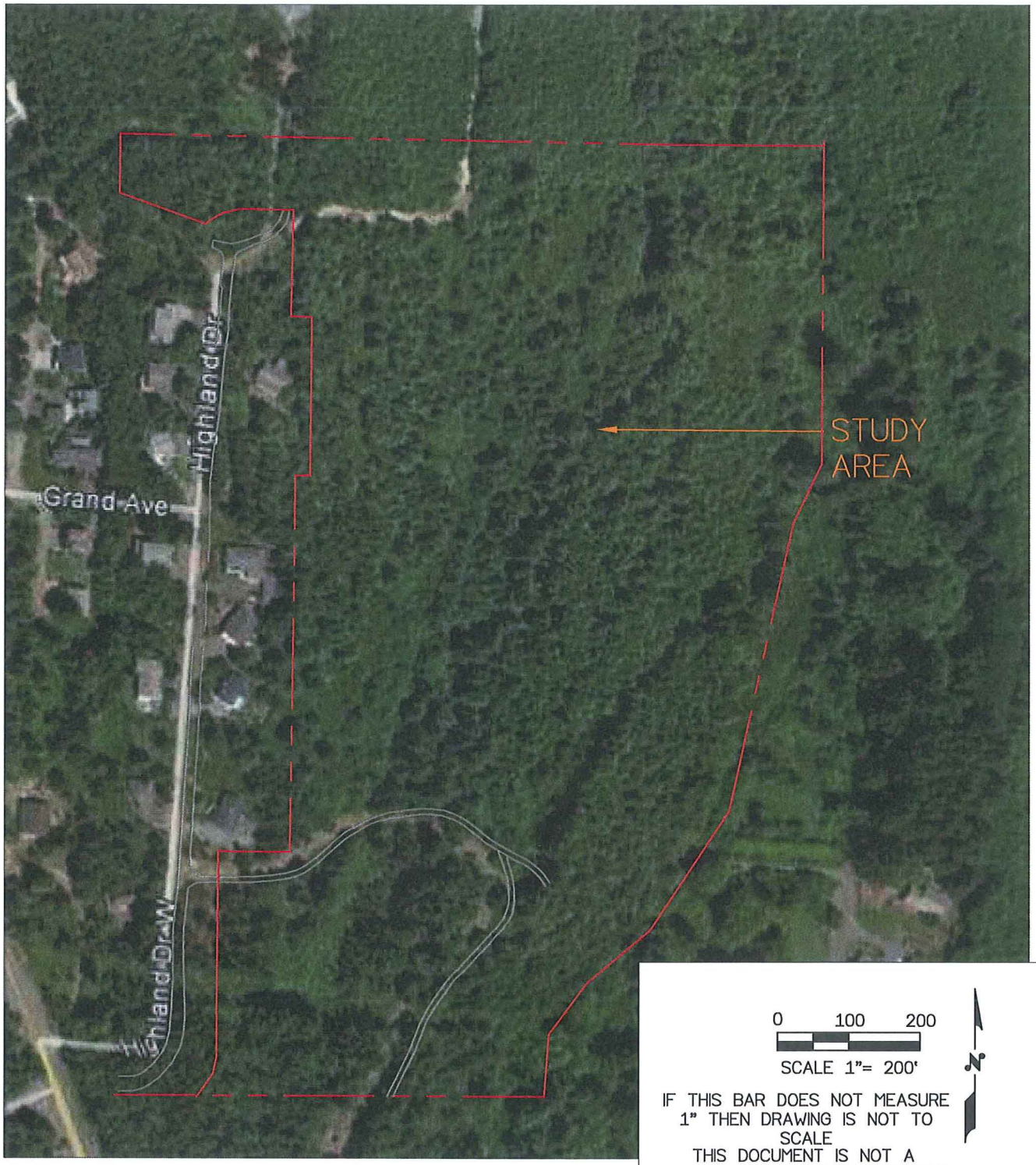
TAX LOT 200
OCEANSIDE, OR



EMS
503-353-9691
360-735-1109
www.envmgtsys.com
4080 SE International Way
Suite B112
Milwaukie, OR 97222
ENVIRONMENTAL MANAGEMENT SYSTEMS, INC

CHECKED:	AVALON HEIGHTS LLC	SCALE: 1"=200'
DRAWN:	T: 1S, R:10W, S: 30 TL:200	10 APR 2018
	TAX LOT MAP	PAGE 1 OF 10

TAX LOT 200
OCEANSIDE, OR



0 100 200

SCALE 1"= 200'

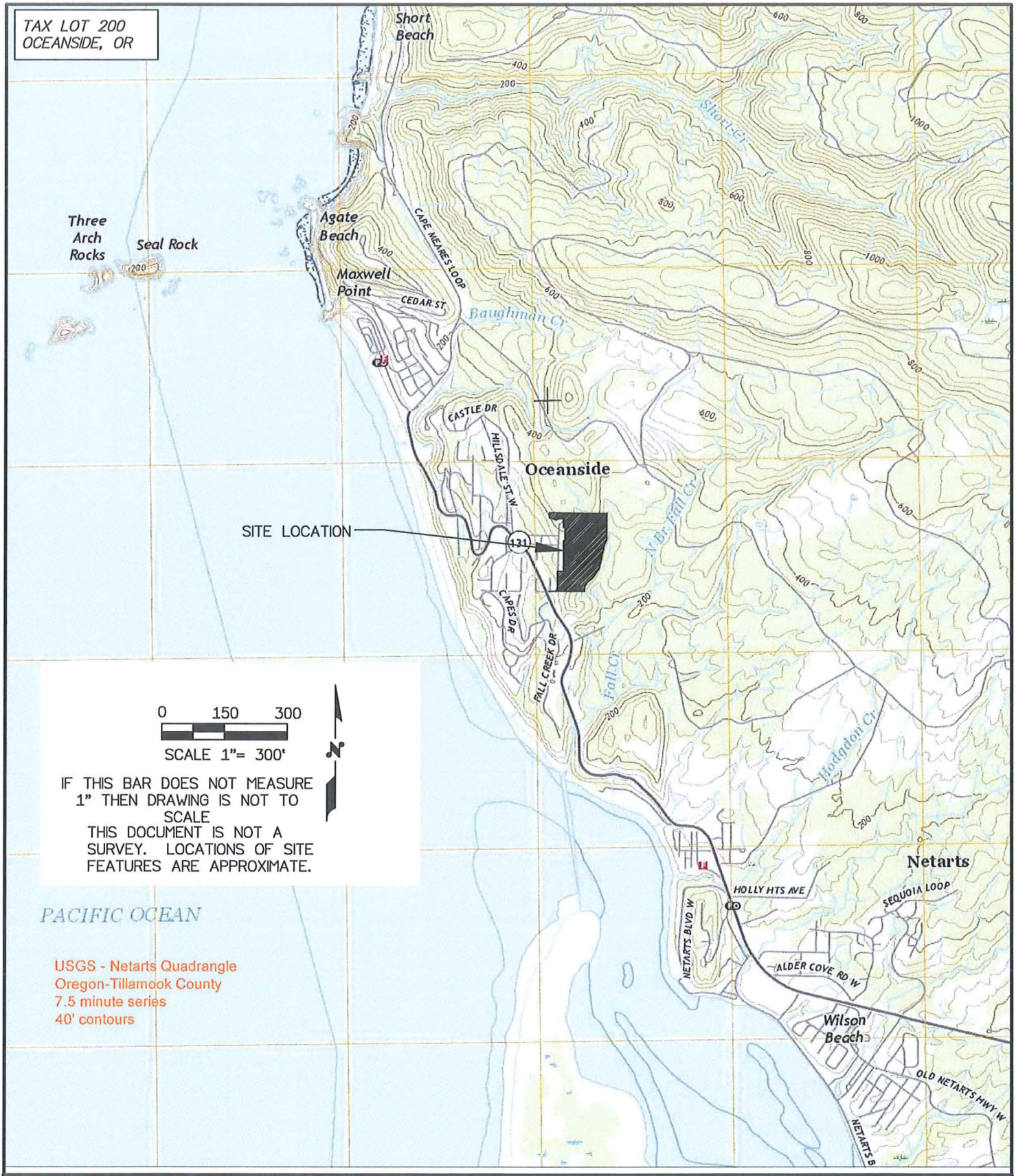
N

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

THIS DOCUMENT IS NOT A SURVEY. LOCATIONS OF SITE FEATURES ARE APPROXIMATE.

EMS
503-353-9691
360-735-1109
www.envmgtsys.com
4080 SE International Way
Suite B112
Milwaukie, OR 97222
ENVIRONMENTAL MANAGEMENT SYSTEMS, INC

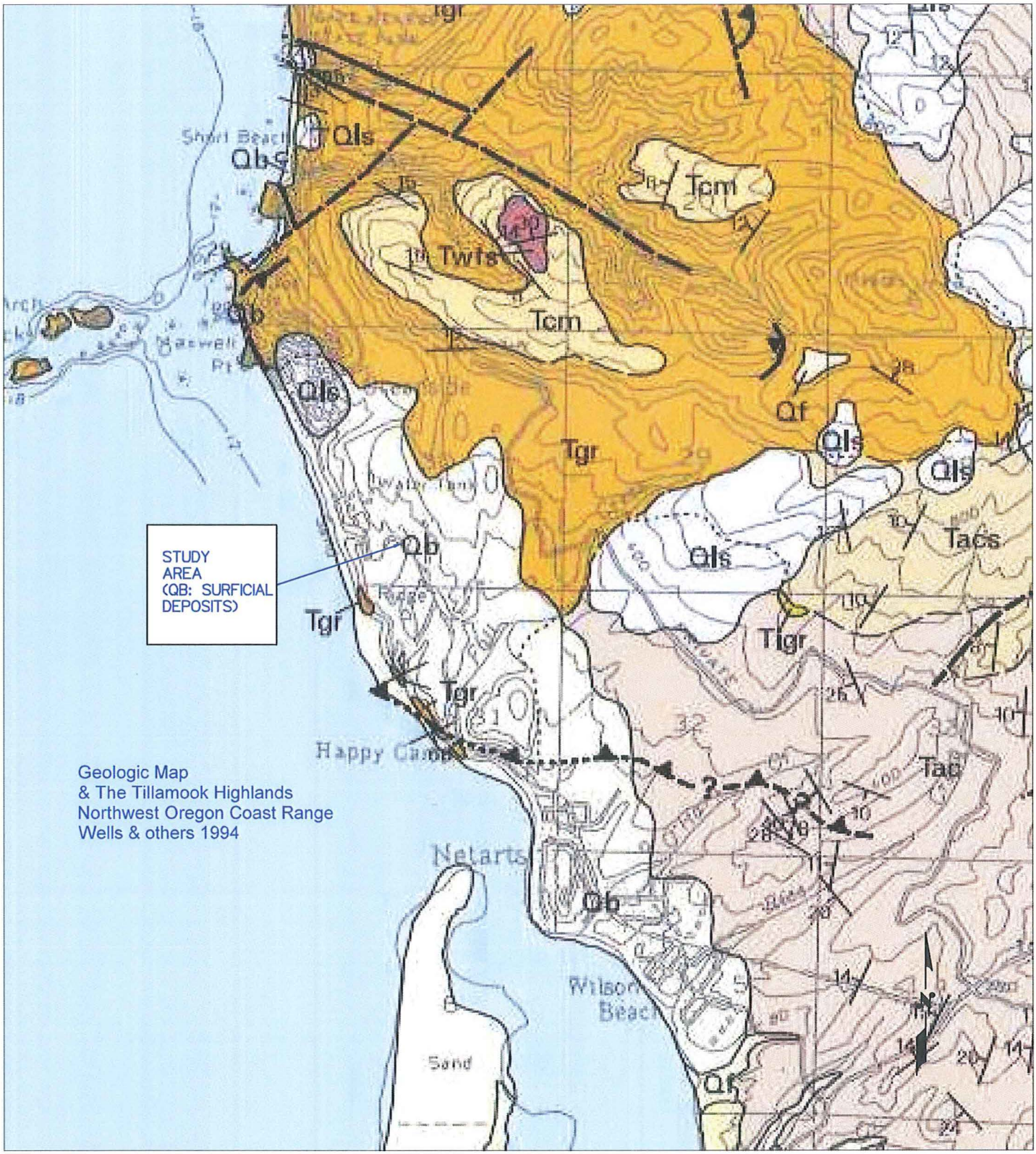
CHECKED:	AVALON HEIGHTS LLC	SCALE: 1"=200'
DRAWN:	T: 1S, R:10W, S: 30 TL:200	10 APR 2018
	2017 AERIAL MAP	PAGE 2 OF 10



EMS
503-353-9691
360-735-1109
www.envmgtsys.com
4080 SE International Way
Suite B112
Milwaukie, OR 97222
ENVIRONMENTAL MANAGEMENT SYSTEMS, INC

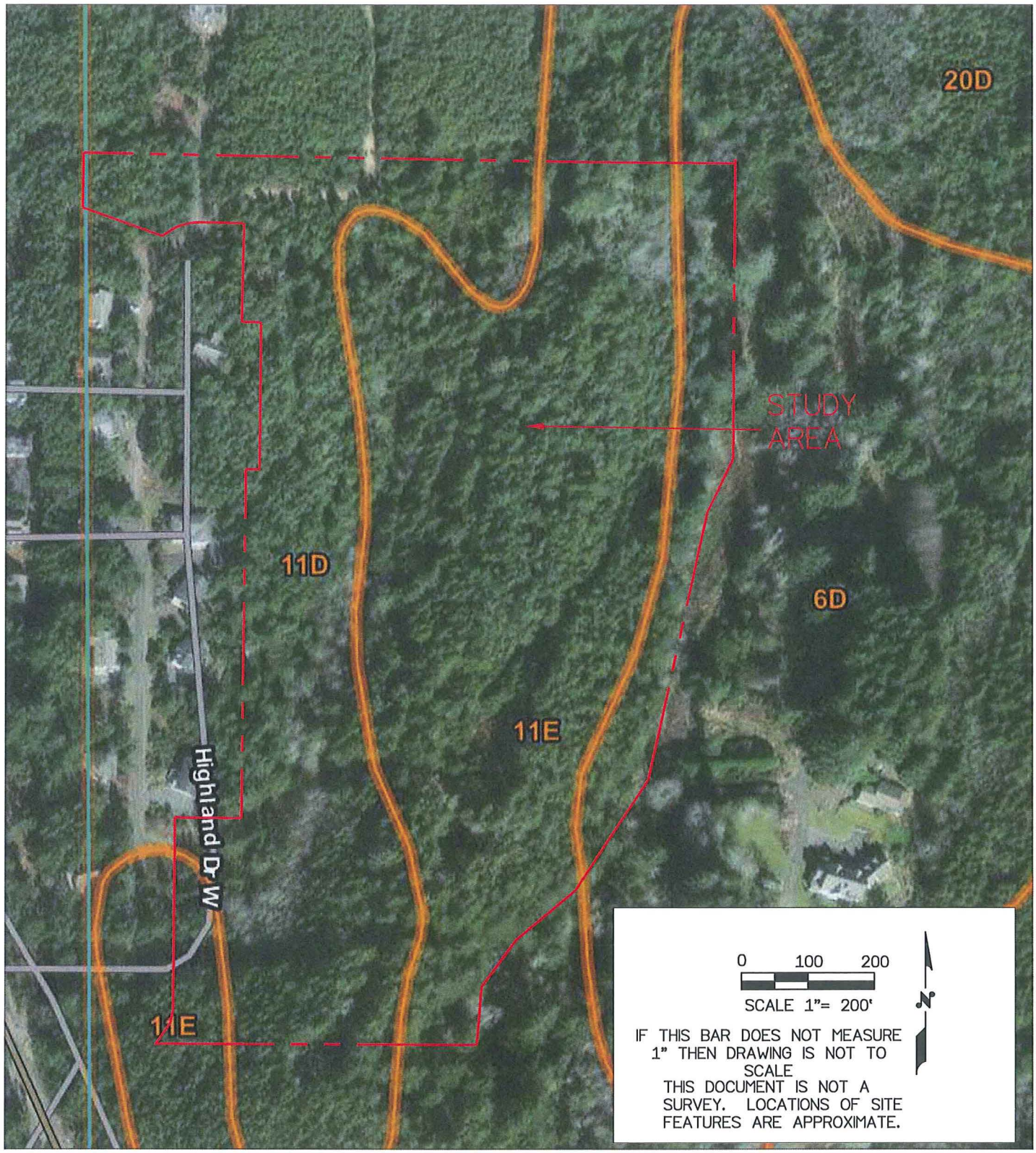
CHECKED:	AVALON HEIGHTS LLC	SCALE: 1"=300'
DRAWN:	T: 1S, R:10W, S: 30 TL:200	10 APR 2018
	USGS TOPOGRAPHIC MAP	PAGE 3 OF 10

TAX LOT 200
OCEANSIDE, OR



EMS 503-353-9691 360-735-1109 www.envmgtsys.com 4080 SE International Way Suite B112 Milwaukie, OR 97222 ENVIRONMENTAL MANAGEMENT SYSTEMS, INC	CHECKED: DRAWN:	AVALON HEIGHTS LLC T: 1S, R:10W, S: 30 TL:200 USGS GEOLOGY MAP	SCALE: NTS 10 APR 2018 PAGE 4 OF 10

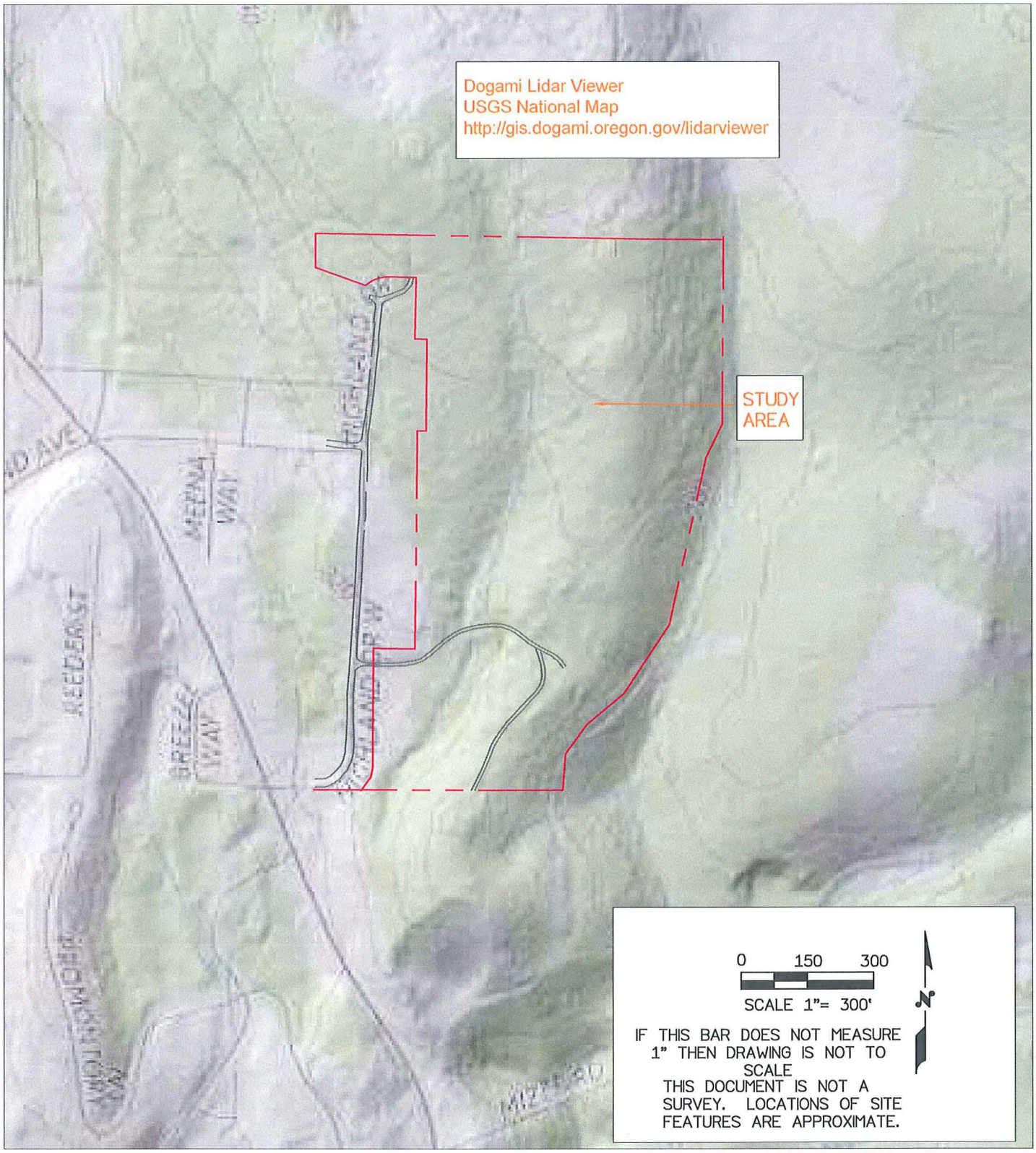
TAX LOT 200
OCEANSIDE, OR



EMS
503-353-9691
360-735-1109
www.envmgtsys.com
4080 SE International Way
Suite B112
Milwaukie, OR 97222
ENVIRONMENTAL MANAGEMENT SYSTEMS, INC

CHECKED:	AVALON HEIGHTS LLC	SCALE: 1"=200'
DRAWN:	T: 1S, R:10W, S: 30 TL:200	10 APR 2018
	NRCS SOILS MAP	PAGE 5 OF 10

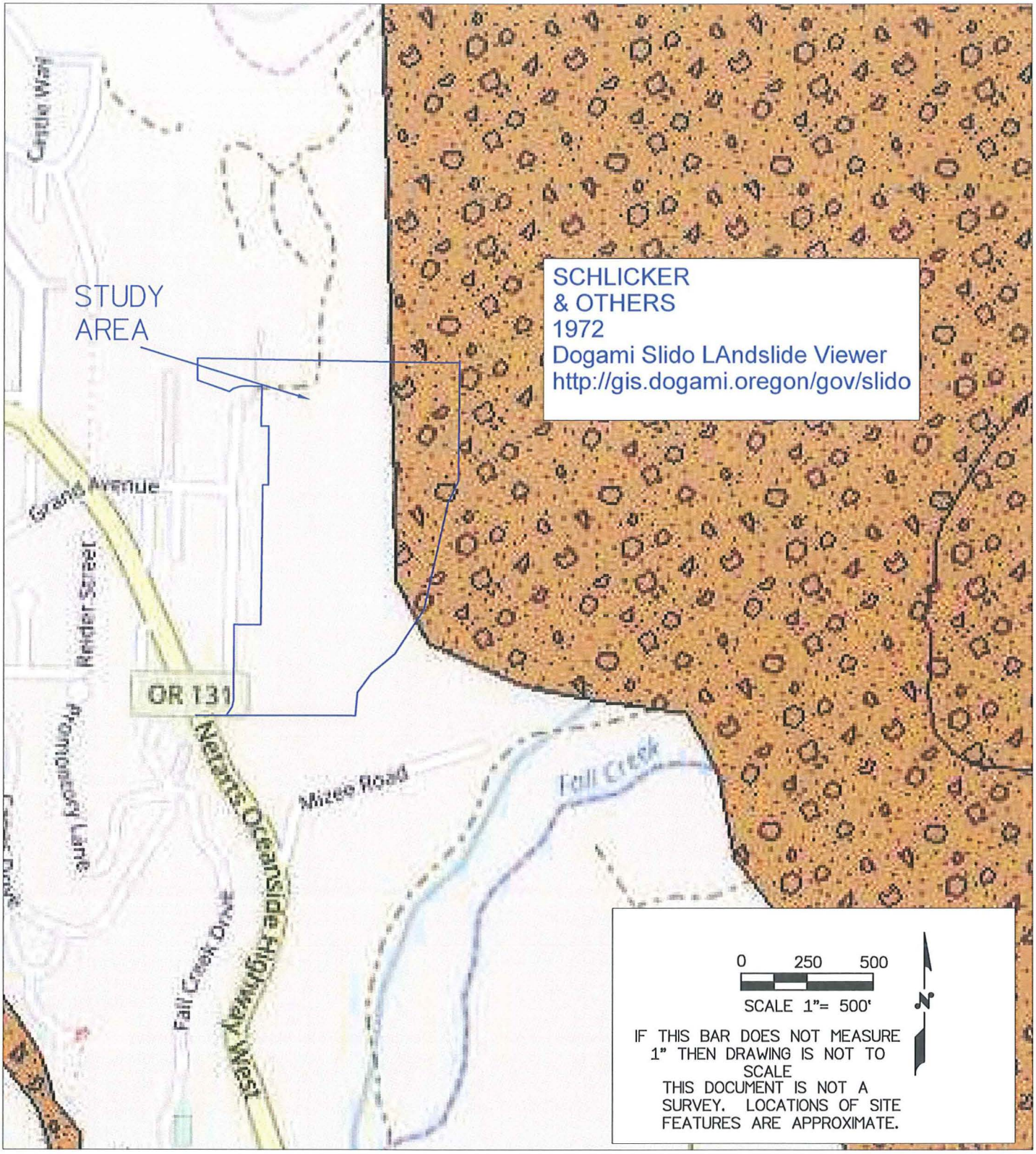
TAX LOT 200
OCEANSIDE, OR



EMS
503-353-9691
360-735-1109
www.envmgtsys.com
4080 SE International Way
Suite B112
Milwaukie, OR 97222
ENVIRONMENTAL
MANAGEMENT SYSTEMS, INC

CHECKED:	AVALON HEIGHTS LLC	SCALE: 1"=300'
DRAWN:	T: 1S, R:10W, S: 30 TL:200	10 APR 2018
	LIDAR MAP	PAGE 6 OF 10

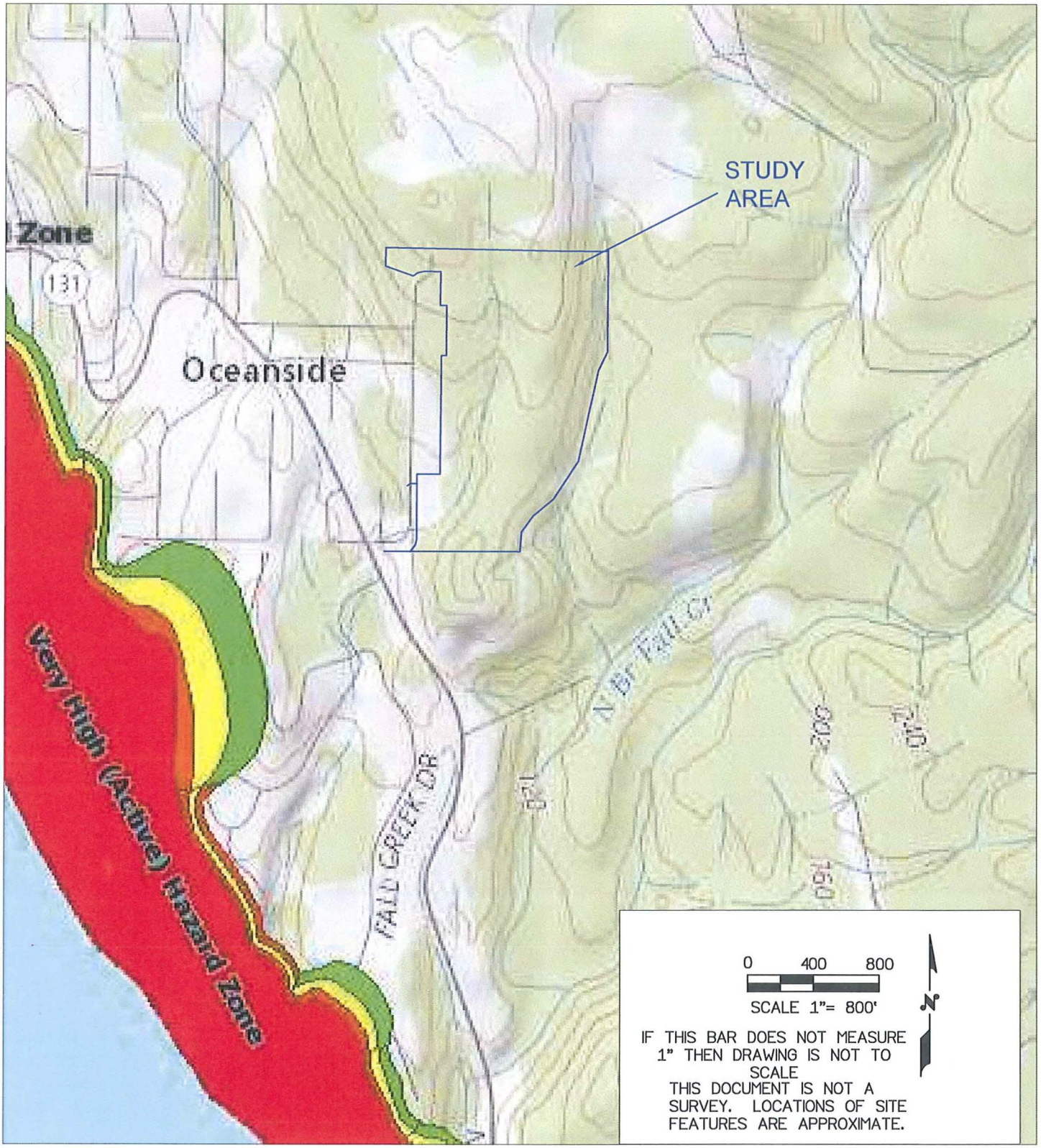
TAX LOT 200
OCEANSIDE, OR



EMS
503-353-9691
360-735-1109
www.envmgtsys.com
4080 SE International Way
Suite B112
Milwaukie, OR 97222
ENVIRONMENTAL MANAGEMENT SYSTEMS, INC

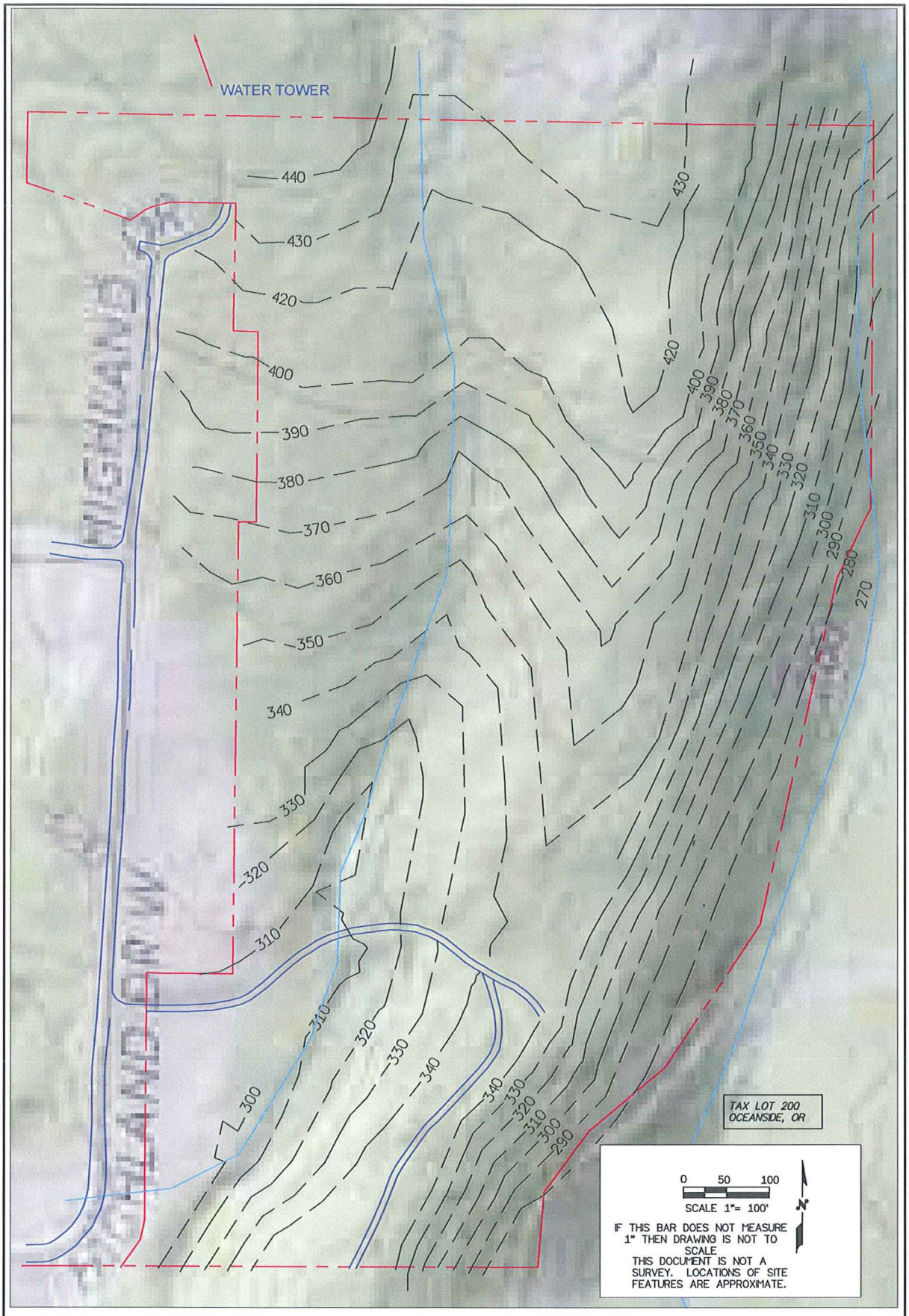
CHECKED:	AVALON HEIGHTS LLC	SCALE: 1"=500'
DRAWN:	T: 1S, R:10W, S: 30 TL:200	10 APR 2018
	LANDSLIDE MAP	PAGE 7 OF 10

TAX LOT 200
OCEANSIDE, OR



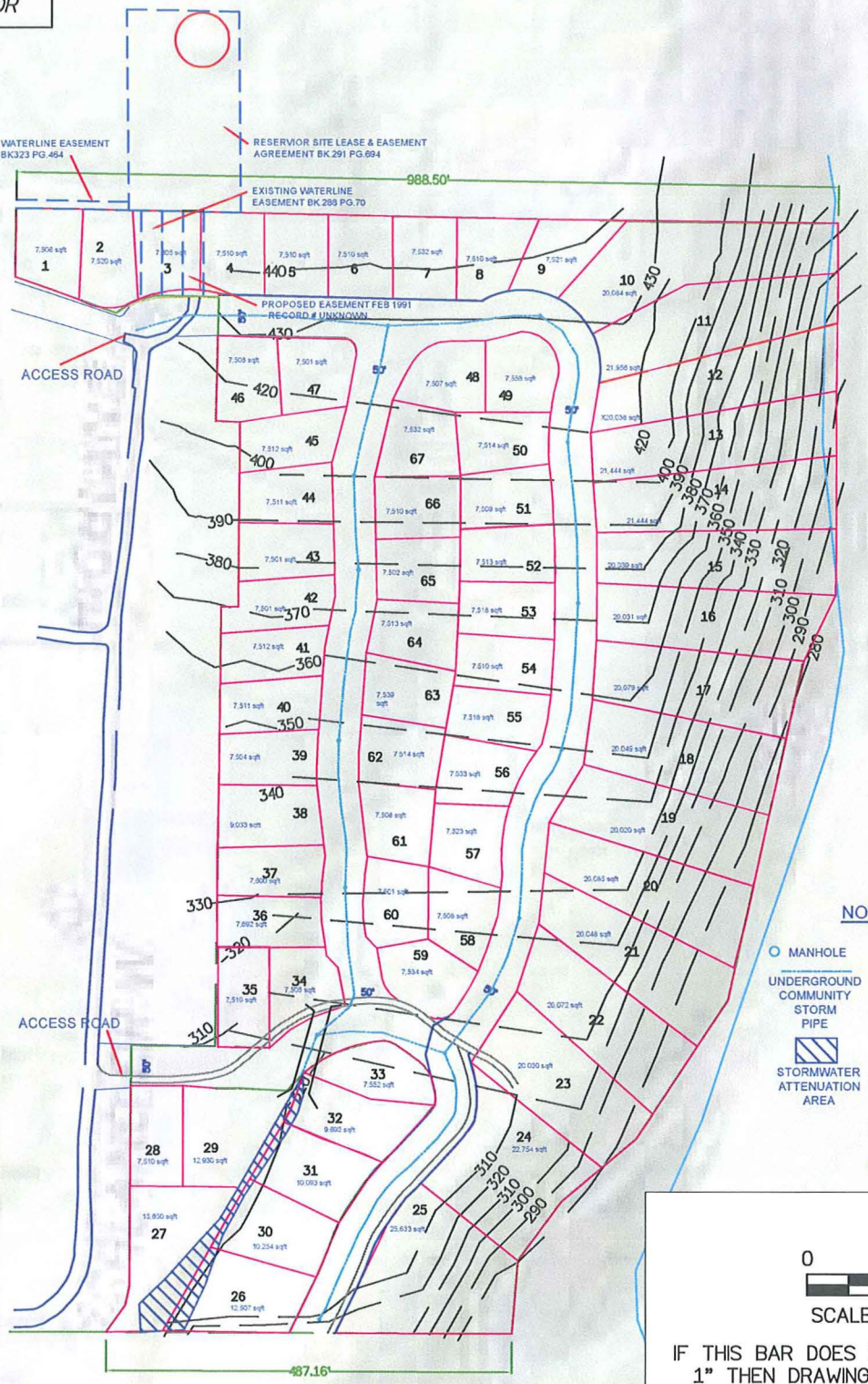
EMS
503-353-9691
360-735-1109
www.envmgtsys.com
4080 SE International Way
Suite B112
Milwaukie, OR 97222
ENVIRONMENTAL
MANAGEMENT SYSTEMS, INC

CHECKED:	AVALON HEIGHTS LLC	SCALE: 1"=800'
DRAWN:	T: 1S, R:10W, S: 30 TL:200	10 APR 2018
	COASTAL DUNE HAZARD MAP	PAGE 8 OF 10



EMS 503-353-9691 360-735-1109 www.envmgtsys.com 4080 SE International Way Suite B112 Milwaukie, OR 97222 ENVIRONMENTAL MANAGEMENT SYSTEMS, INC	CHECKED: DRAWN:	AVALON HEIGHTS LLC	SCALE: 1"=100'
		T:1S, R:10W, S:30, TL:200	22 FEB 2018
		EXISTING CONDITIONS	PAGE 9 OF 10

TAX LOT 200
OCEANSIDE, OR



NOTES:

- MANHOLE
- UNDERGROUND COMMUNITY STORM PIPE
- STORMWATER ATTENUATION AREA

STORMWATER COLLECTED VIA CROWN & DITCH AND PIPED UNDERGROUND TO ATTENUATION POND. THE PONDS ARE CREATED USING THE NATURAL DRAINAGEWAY PROVIDED BY TOPOGRAPHY

TOPOGRAPHY BASED ON HARPER HOUF PETERSON RIGHELLIS INC CONCEPT PLAN

0 100 200

SCALE 1"= 200'

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

THIS DOCUMENT IS NOT A SURVEY. LOCATIONS OF SITE FEATURES ARE APPROXIMATE.

EMS
503-353-9691
360-735-1109
www.envmgtsys.com
4080 SE International Way
Suite B112
Milwaukie, OR 97222
ENVIRONMENTAL MANAGEMENT SYSTEMS, INC

CHECKED:	AVALON HEIGHTS LLC	SCALE: 1"=200'
DRAWN:	T: 1S, R:10W, S: 30 TL:200	10 APR 2018
	CONCEPTUAL SITE PLAN	PAGE 10 OF 10

Tillamook County

DEPARTMENT OF COMMUNITY DEVELOPMENT

BUILDING, PLANNING & ON-SITE SANITATION SECTIONS

201 Laurel Av
Tillamook, Oregon 9

Land of Cheese, Trees and Ocean Breeze

Building (503) 842-
Planning (503) 842-
On-Site Sanitation (503) 842-
FAX (503) 842-
Toll Free 1-(800) 488-

DATE: January 21, 2021

TO: Tillamook County One-Stop Permit Counter

FROM: NETARTS WATER DISTRICT

RE: ~~Sewer~~/Water Availability (Circle)

WATER AVAILABILITY VALID FOR SIX MONTHS

Dear Sir:

I confirm that ~~Sewer~~/Water is available to the following lot(s) within our district:

Township: 1S Range 10W Section 30 DC Tax Lot 00200

According to our records, the legal owner is: AVALON HEIGHTS LLC

41901 OLD HWY 30, ASTORIA OR 97103

COMMENTS: Tax Lot 200 is part of the Netarts Water District. Water is available. SDC's and fees are required.

This letter shall not create a liability on the part of Tillamook County, or by an officer, or employee thereof, for the ~~services~~ described above.

Patricia Penney Business Manager

Signature and Title of Authorized Representative

(503) 842-9405
Phone

(503) 842-9380 FAX

cc: Property Owner

G:\Planning\Forms\Sewer-Water.Ltr

Preliminary Plat Application Narrative Supplement
for
Second Addition to Avalon Heights

The initial application narrative either explained how the application met the preliminary plat submission requirements by describing how the various facets or design features were consistent with the criteria and/or standards, or referred the reader to the appropriate drawing sheet in the application drawing set where an illustration and labeled dimension would be more effective. This supplement addresses the preliminary plat approval criteria of land division ordinance Section 070.

SECTION 070: PRELIMINARY PLAT APPROVAL CRITERIA

(1) Approval Criteria. The Approval Authority (Director for partitions and Planning Commission for subdivisions) may approve, approve with conditions or deny a preliminary plat. The Approval Authority decision shall be based on findings of compliance with all of the following approval criteria:

(a)The land division application shall conform to the requirements of this ordinance;

Applicant Response: The initial narrative demonstrated that all required items of Section 060 are included on the preliminary plat drawings or otherwise attached to the application package. These include lot sizes, block lengths, utility sizes and locations, fire hydrants and street lights, road widths, required setbacks and conceptual building foot prints, etc. We believe these items make the application conform to the ordinance requirements.

(b)All proposed lots, blocks, and proposed land uses shall conform to the applicable provisions of the Land Use Ordinance – Article 3 Zone Regulations and the standards in Section 150 of this ordinance;

Applicant response: The proposed development is to accommodate the construction of single family dwellings and the subject property is zoned Residential Oceanside where such structures are permitted outright. Lot sizes vary from near the minimum area size to over 20,000 square feet as required my Tillamook County Land Use Ordinance 3.310 to accommodate the site slopes.

(c)Access to individual lots, and public improvements necessary to serve the development, including but not limited to water, sewer and streets, shall conform to the standards in Sections 150 and 160 of this ordinance;

Applicant Response: All proposed lots will be accessed by private roads or shared driveways to be constructed by the applicant. All utilities will be located within the right-of-way/easement

with stubs to every lot. A separate series of easements will provide for storm water conveyance and infiltration. Please see Sheet 4.

(d)The proposed plat name is not already recorded for another subdivision, does not bear a name similar to or pronounced the same as the name of any other subdivision within the County, unless the land platted is contiguous to and platted by the same party that platted the subdivision bearing that name or unless the party files and records the consent of the party that platted the contiguous subdivision bearing that name;

Applicant Response: Because of the original Avalon Heights subdivision is abuts the subject property to the west, this proposal is named "Second Addition to Avalon Heights" which has been suggested previously by the county surveyor.

(e)The proposed streets, utilities, and surface water drainage facilities conform to Tillamook County's adopted master plans and applicable engineering standards and, within Unincorporated Community Boundaries, allow for transitions to existing and potential future development on adjacent lands. The preliminary plat shall identify all proposed public improvements and dedications;

Applicant Response: Review of the preliminary plat drawing set all roads are designed to county standards, but will remain privately maintained, as will the storm water management system. Water and sewer facilities will be dedicated to the Netarts Water District and the Netarts-Oceanside Sanitary District, respectively. See attached letter and certificate. An access easement will be granted to provide access to Tax Lots 100 and 101 to the east. All other adjacent property is zoned Forestry.

(f)All proposed private common areas and improvements, if any, are identified on the preliminary plat and maintenance of such areas is assured through appropriate legal instrument;

Applicant Response: A Home Owners Association or similar organization will be formed and its responsibilities and authorities documented and recorded to provide a mechanism and financial resources to maintain the private storm water system and roads.

(g)Provisions for access to and maintenance of off-right-of-way drainage, if any;

Applicant Response: Access to the conveyance swale and infiltration facility is provided by W Grand Avenue and Roaring Tide Loop. See Sheet 4.

(h)Evidence that any required State and Federal permits, as applicable, have been obtained or can reasonably be obtained prior to development; and

Applicant Response: There are no portions of the site that would require federal or state permits. Please see the letter from the Department of State Lands attached to this document.

i)Evidence that improvements or conditions required by the road authority, Tillamook County, special districts, utilities, and/or other service providers, as applicable to the project, have been or can be met, including but not limited to: (i) Water Department/Utility District Letter which states that the partition or subdivision is either entirely excluded from the district or is included within the district for purposes of receiving services and subjecting the partition or subdivision to the fees and other charges of the district

Applicant Response: The attached letter and certificate from the Netarts-Oceanside Sanitary District and the Netarts Water District demonstrate that water and sewer facilities can be installed and serve the proposed development. The power company was contacted by the applicant and they indicated that they would prefer to receive the application directly from the County, review the proposal, and make its determination at that time.

(ii) Subsurface sewage permit(s) or site evaluation approval(s) from the appropriate agency.

Applicant Response: This requirement does not apply because the development will be served by public sewer.

lancaster mobley

Second Avalon Heights Subdivision

Transportation Impact Study

Oceanside, Oregon

Date:
April 1, 2021

Prepared for:
Bill Hughes

Prepared by:
Melissa Webb, PE
Todd Mobley, PE

Table of Contents

Table of Figures

Table of Tables

Executive Summary

1. The proposed Second Avalon Heights subdivision is located east of Highland Drive W in Oceanside, Oregon. The development will include the construction of 60 single-family housing units on currently undeveloped land.
2. The trip generation calculations show that the proposed development is projected to generate up to 59 additional site trips during the evening peak hour and up to 618 additional site trips on a typical weekday.
3. Based on the most recent five years of crash data, no significant trends or crash patterns were identified at the study intersection that are indicative of safety concerns. Accordingly, no safety mitigation is recommended per the crash data analysis.
4. Adequate sight distance is available, or can be made available (with proper maintenance or removal of roadside vegetation along Highland Drive W), to ensure safe operation for northbound and southbound approaching vehicles at the site access intersection.
5. Due to insufficient traffic volumes, preliminary traffic signal warrants are not projected to be met at the unsignalized intersection of OR-131 at Highland Drive W under any of the analysis scenarios. In addition, left-turn lane warrants and right-turn lane warrants are not projected to be met at the study intersection under any of the analysis scenarios.
6. All study intersections are currently operating acceptably per ODOT standards and are projected to continue operating acceptably through the 2023 buildout year, regardless of the potential increase in site trip generation upon development of the site. No operational mitigation is necessary or recommended at these intersections.

Project Description

Introduction

The proposed Second Avalon Heights will include the subdivision of a property on tax lot 200 in Oceanside, Oregon. The project will include the construction of 60 single-family housing units on currently undeveloped land. This report addresses the impacts of the proposed subdivision on the nearby street system. Based on correspondence with Tillamook County and ODOT staff, the report conducts safety and capacity/level of service analyses at the following intersections:

1. OR-131 at Highland Drive W

The purpose of this study is to provide an analysis of potential traffic impacts of the proposed Second Avalon Heights subdivision on the surrounding transportation system and to recommend any required mitigative measures. Detailed information on traffic counts, trip generation calculations, safety analyses, and level of service calculations are included in the appendix to this report.

Location Description

The project site is located northeast of the intersection of OR-131 at Highland Drive W in Oceanside, Oregon. The existing tax lot (tax lot 200) is currently undeveloped. The proposed ±21-acre development will include the construction of 60 single-family housing units. The development will take vehicular access via a proposed access point along Highland Drive W as well as an extension of Highland Drive W. The project site is shown in Figure 1.

Figure 1: Project Location (image from Google Earth)

Vicinity Roadways

The proposed development is expected to impact two roadways near the site. Table 1 provides a description of each of the vicinity roadways.

Table 1: Vicinity Roadway Descriptions

Street Name	Functional Classification	Cross-Section	Speed (MPH)	Curbs & Sidewalks	On-Street Parking	Bicycle Facilities
OR-131	District Highway	2-3 Lanes	35 Posted	None	Not Permitted	None
Highland Drive W	Local Road	2 Lanes	20 Statutory*	None	Permitted Both Sides	None

Table Notes: Functional Classification provided by the Oregon Transportation Map[1] for Tillamook County and Oregon Highway Plan
**Highland Drive W is an existing unpaved gravel road through a residential area. Applicant plans to pave the roadway as part of the proposed development.*

Study Intersections

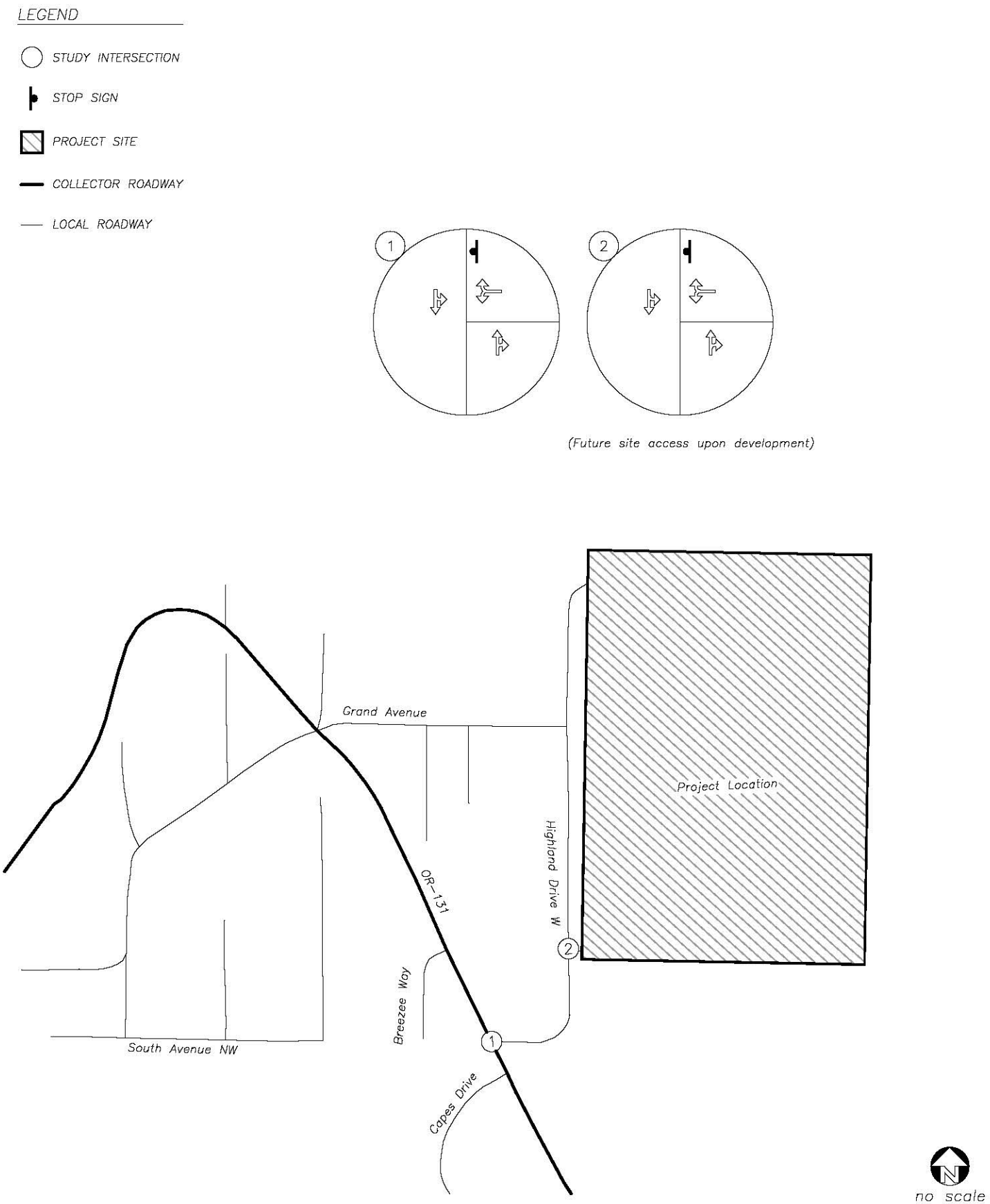
Based on the location of the subject property, preliminary calculations of trip generation, and coordination with Tillamook County and ODOT, the intersection of OR-131 at Highland Drive W was identified for analysis. A summarized description of the study intersection is provided in Table 2.

Table 2: Study Intersection Descriptions

Number	Intersection	Geometry	Traffic Control	Phasing/Stopped Approaches
1	OR-131 at Highland Drive W	Three-Legged	Stop-Controlled	WB Stop-Controlled

A vicinity map showing the project site, vicinity streets, and study intersection configurations is shown in Figure 2.

[1] Oregon Department of Transportation Geographic Information Services. *Tillamook County*. Map. 2011 https://digital.osl.state.or.us/islandora/object/osl%3A69512



lancaster mobley

VICINITY MAP

Figure 2
Second Avalon Heights Subdivision
1/29/2021

Site Trips

Trip Generation

The proposed Second Avalon Heights will include the construction of a residential subdivision, consisting of 60 single-family housing units. The site is currently undeveloped.

To estimate the number of trips that will be generated by the proposed development, trip equations from the *Trip Generation Manual* [2] were used. Data for land use code 210, *Single-Family Detached Housing*, was used to estimate the proposed development's trip generation based on the number of dwelling units.

Based on demographic information provided by the Tillamook County Planning Department, as well as correspondence with ODOT and Tillamook County staff, a "rental rate" reduction in trip generation was applied. According to the *2018 Oceanside Community Plan*[3], approximately 10% of residential lots are licensed as vacation rental units and are typically not occupied year-round. When rental units are empty, there would be no vehicle trips applied to the transportation system. While rental units are likely to be fully booked and occupied on weekends, it was assumed that rentals would be only half-booked on weekdays. As a result, a 5% reduction in trip generation volumes was applied to adjust for rental units which are not occupied during the weekday, and thus not contributing vehicle trips to the transportation system.

The trip generation calculations show that the proposed development is projected to generate up to 59 additional site trips during the evening peak hour and up to 618 additional site trips on a typical weekday. The trip generation calculations are summarized in Table 3 and detailed calculation worksheets are provided in the appendix.

Table 3: Trip Generation Summary

Land Use	ITE Code	Size	Evening Peak Hour			Weekday
			In	Out	Total	Total
Single-Family Detached Housing	210	60 units	39	23	62	650
Rental Rate Reduction (5%)			*2*	*1*	*3*	*32*
Net Increase			37	22	59	618

Trip Distribution

The directional distribution of site trips to and from the proposed site was estimated based on the locations of likely trip origins and destinations, was well as locations of major transportation facilities in the site vicinity. The following trip distribution was estimated and used for analysis:

- Approximately 50 percent of site trips will travel to/from the north along OR-131;
- Approximately 50 percent of site trips will travel to/from the south along OR-131;

[2] Institute of Transportation Engineers, *Trip Generation Manual*, 10th Edition, 2017.
[3] Oceanside Neighborhood Association, *Oceanside Community Plan*, 2018.

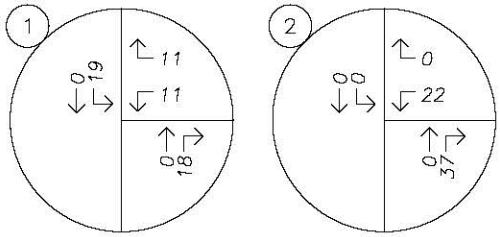
While some site trips coming to and from the north could potentially use Grand Avenue to access the proposed subdivision, Grand Avenue has deteriorated due to small creeks of water carving their way throughout the road. Highland Drive W, while an unpaved gravel roadway, is shorter and offers a smoother ride. In addition, the applicant plans to pave Highland Drive W as part of the proposed development. Based on these observed roadway characteristics, it was assumed that all site trips would use Highland Drive W as the main roadway to access the Second Avalon Heights subdivision.

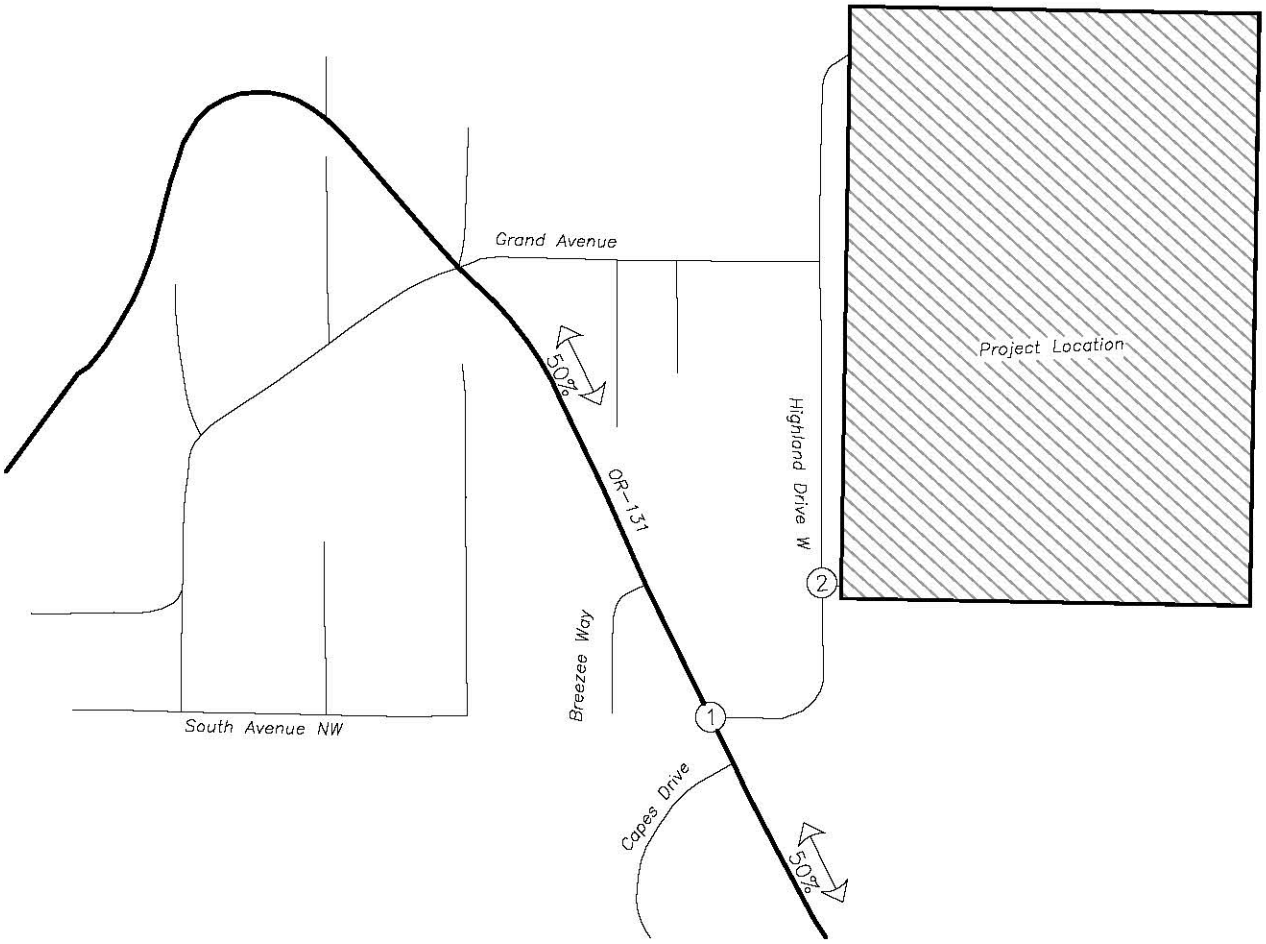
The trip distribution and assignment for the net site trips generated during the evening peak hour are shown in Figure 3.

LEGEND

XX% PERCENT OF PROJECT TRIPS

NET TRIP GENERATION			
	IN	OUT	TOTAL
PM	37	22	59





no scale

SITE TRIP DISTRIBUTION & ASSIGNMENT

Proposed Development Plan - Net Site Trips
PM Peak Hour

Figure 3
Second Avalon Heights Subdivision
3/25/2021

Traffic Volumes

Existing Conditions

Traffic counts were conducted at the study intersection on Tuesday, June 9, 2020, from 3:00 PM to 6:00 PM. The intersection of OR-131 at Highland Drive W is a three-legged intersection; however, Capes Drive is located across and offset from Highland Drive W. Traffic associated with Capes Drive was included as part of the traffic count due to the proximity of the intersection. Turning movements and volumes were separated between the two intersections to determine the existing volumes at the study intersection.

The traffic counts at the study intersection were collected after the COVID-19 viral pandemic had become a public health concern throughout the state of Oregon. As a result, there has been a noticeable decline in traffic volumes on the transportation system that are atypical of normal conditions. In order to reflect normal traffic conditions without the impacts of the COVID-19 viral pandemic, traffic counts were adjusted.

With guidance from Tillamook County and ODOT staff, two methods were used to develop the 2021 existing 30th highest hour turn movement volumes. The turn movement volumes from each method were compared and the highest turn movement volumes were used for a conservative analysis. The following methodology was used:

- Method 1: Counts taken on Saturday, July 15, 2006, were adjusted to bring the counts to 2021 existing 30th highest hour turn movement volumes. At the request of ODOT staff, a linear growth rate of one percent per year was applied to the through movements along OR-131 over a 15-year period to determine year 2021 existing volumes. For all other turning movements, a linear growth rate of one-half percent per year was applied to the 2006 traffic volumes over a 15-year period to determine year 2021 existing volumes (refer to the *Background Conditions* section regarding the methodology used for determining traffic growth). In addition, ODOT staff requested that a seasonal adjustment factor (SAF) not be applied to the 2006 counts.
- Method 2:
    - Existing Counts: As described above, traffic counts were collected at the study intersection of OR-131 at Highland Drive W on Tuesday, June 9, 2020. A linear growth rate of one percent per year was applied to the through movements along OR-131 over a one-year period to determine year 2021 existing volumes. For all other turning movements, a linear growth rate of one-half percent per year was applied to the traffic volumes over a one-year period to determine year 2021 existing volumes
    - COVID-19 Adjustment Factor: A COVID-19 adjustment factor was calculated by comparing 2019 and 2020 traffic counts collected at the Rockaway ATR 29-001 and Port Orford ATR 08-009. Based on the average difference in volumes, an adjustment factor of 1.45 was applied to all turning movements to bring the existing June 2020 counts to pre-COVID conditions.
    - Seasonal Adjustment Factor: Since OR-131 is under the jurisdiction of ODOT, procedures described in ODOT's *Analysis Procedures Manual* [4] (APM) were used to seasonally adjust existing traffic

[4] Oregon Department of Transportation, *Analysis Procedures Manual Version 2*, December 2019.

volumes to reflect the 30th-highest hour in a typical year. Using a map of seasonal trends, this portion of OR-131 was determined to show a Coastal Destination Route trend. A seasonal adjustment factor (SAF) of 1.2576 was subsequently calculated and applied to the June 2020 COVID-adjusted through volumes along OR-131.

After comparing adjusted counts using the two methods outlined above, Method 1 produced the highest turn movement volumes. Therefore, these turning movements were used for a conservative analysis.

The existing adjusted evening peak hour traffic volumes at the study intersection is shown in Figure 4 .

Background Conditions

To provide analysis of the impact of the proposed development, an estimate of future traffic volumes is required. A growth rate must be applied to COVID-adjusted traffic volumes in order to calculate year 2023 background volumes.

Growth rates for through traffic on OR-131 were derived using ODOT's 2038 Future Volume Table. Data corresponding to Milepost 2.14 (ODOT Highway 131) was used for the intersection of OR-131 at Highland Drive W.

A growth factor of 1.0059 was applied to OR-131 through volumes over a two-year period to determine year 2023 background volumes.

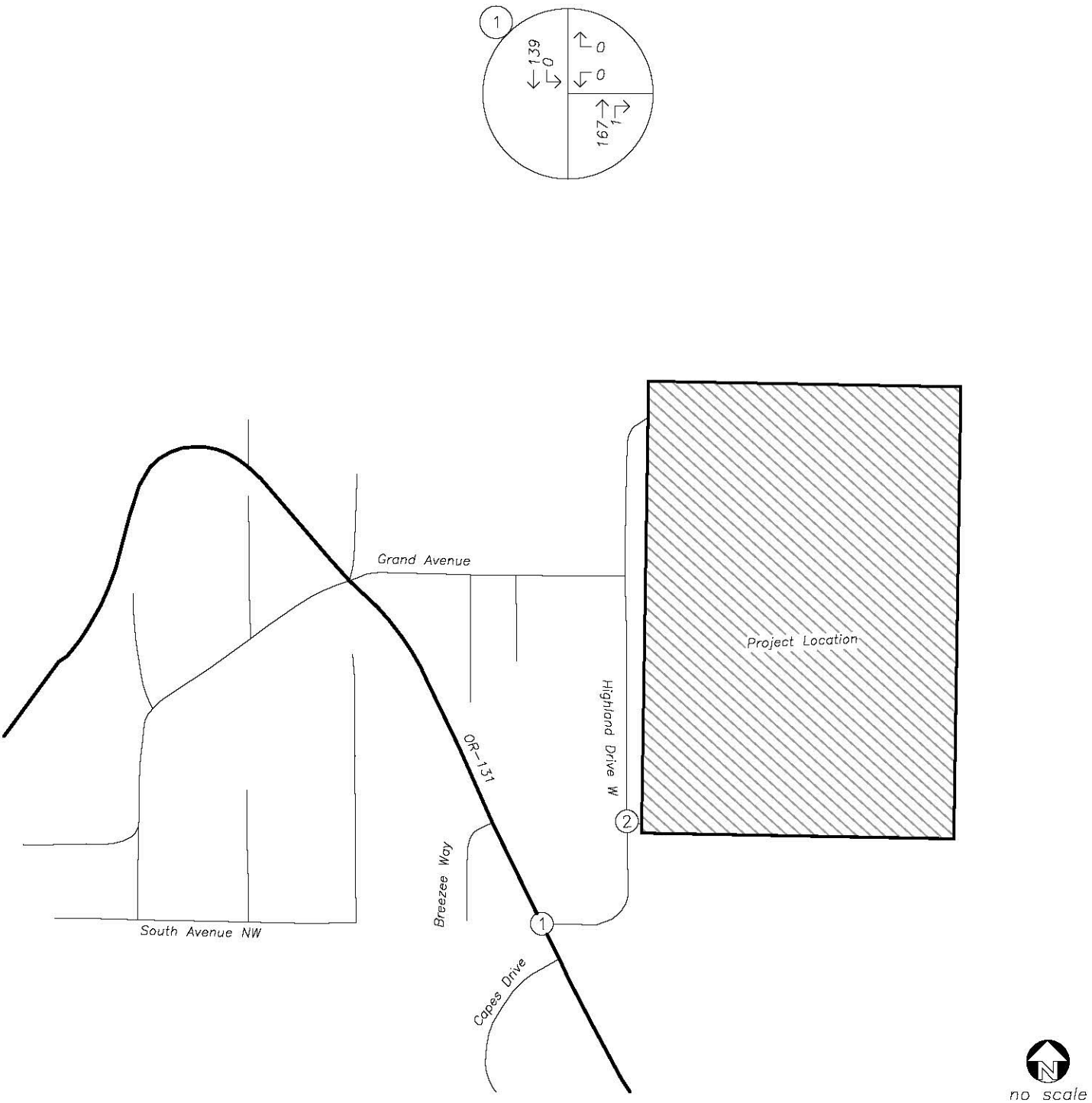
For non-ODOT facilities, a growth rate of one-half percent per year was applied to the existing traffic volumes over a two-year period to determine year 2023 background volumes.

Figure **5** shows the projected year 2023 background traffic volumes at the study intersections during the evening peak hour.

Buildout Conditions

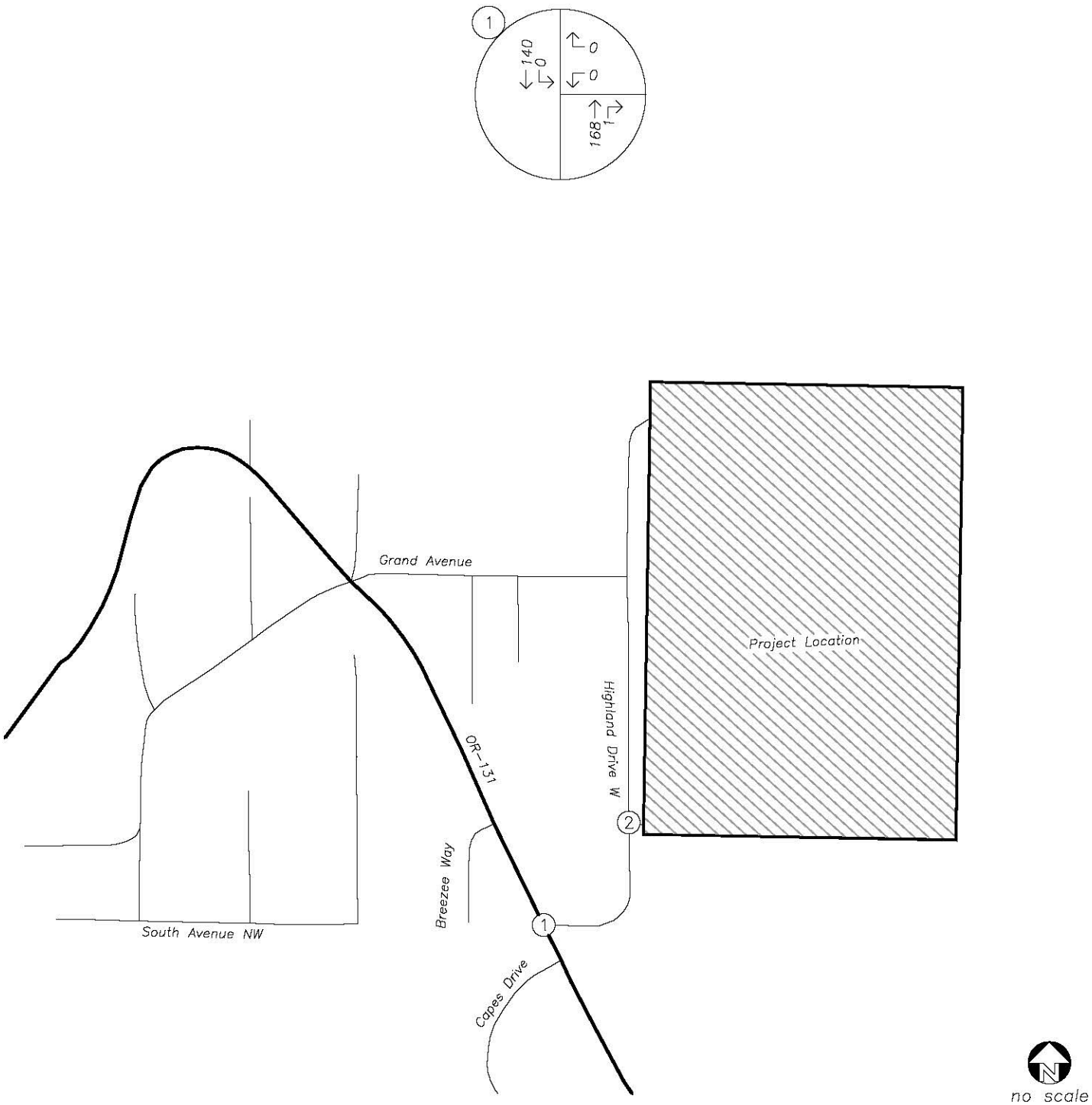
Peak hour trips calculated to be generated by the proposed development, as described earlier within the *Site Trips* section, were added to the projected year 2023 background traffic volumes to obtain the expected year 2023 site buildout volumes.

Figure 6 shows year 2023 buildout traffic volumes at the study intersections during the evening peak hour.



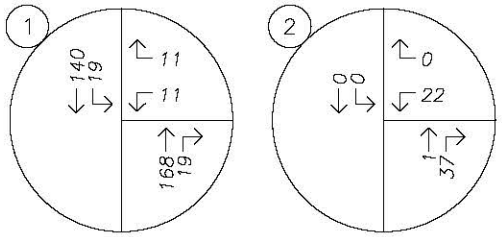
TRAFFIC VOLUMES
Year 2021 Existing Adjusted Conditions
PM Peak Hour

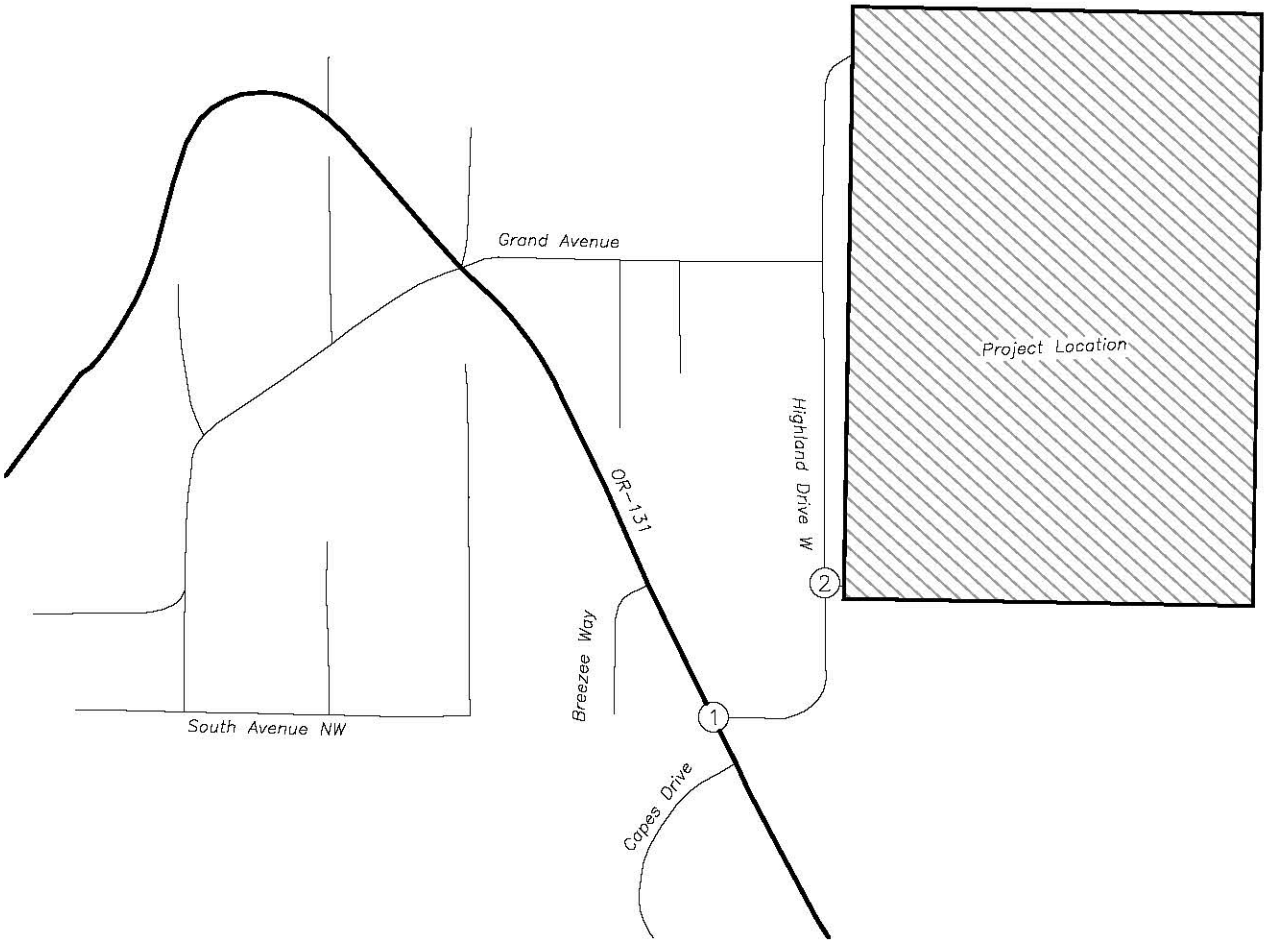
Figure 4
Second Avalon Heights Subdivision
2/1/2021



TRAFFIC VOLUMES
Year 2023 Background Conditions
PM Peak Hour

Figure 5
Second Avalon Heights Subdivision
2/1/2021





lancaster mobley

TRAFFIC VOLUMES

Year 2023 Buildout Conditions

PM Peak Hour

Figure 6

Second Avalon Heights Subdivision

3/25/2021

Safety Analysis

Crash History Review

Using data obtained from ODOT's Crash Data System, a review of approximately five years of the most recent available crash history (January 2014 through December 2018) was performed at the study intersection. The crash data was evaluated based on the number of crashes, the type of collisions, and the severity of the collisions.

The intersection of OR-131 at Highland Drive W had no reported crashes during the analysis period, whereby no significant trends or crash patterns were identified at the study intersection that are indicative of safety concerns. Accordingly, no safety mitigation is recommended per the crash data analysis.

Warrant Analysis

Left-turn lane warrants, right-turn lane warrants, and preliminary traffic signal warrants were examined for the intersection of OR-131 at Highland Drive W.

Left-Turn Lane Warrants

A left-turn refuge lane is primarily a safety consideration for the major street, removing left-turning vehicles from the through traffic stream. The left-turn lane warrants were examined using methodologies provided in the ODOT's *Analysis Procedures Manual* (APM). Left-turn lane warrants were evaluated based on the number of advancing and opposing vehicles, number of turning vehicles, travel speed, and the number of through lanes.

Due to insufficient traffic volumes, left-turn lane warrants are not projected to be met at the intersection of OR-131 at Highland Drive W under any of the analysis scenarios.

Right-Turn Lane Warrants

Due to insufficient traffic volumes, right-turn lane warrants are not projected to be met at the intersection of OR-131 at Highland Drive W under any of the analysis scenarios.

Preliminary Traffic Signal Warrants

Preliminary traffic signal warrants were examined for the unsignalized intersection of OR-131 at Highland Drive W to determine whether the installation of a new traffic signal will be warranted at the intersection upon completion of the proposed development:

Due to insufficient traffic volumes, traffic signal warrants are not projected to be met at the intersection of OR-131 at Highland Drive W under any of the analysis scenarios.

Sight Distance Evaluation

Intersection sight distance was examined for the proposed site access intersection of Highland Drive W at Roaring Tide Loop. Sight distance was measured and evaluated in accordance with standards established in *A Policy of Geometric Design of Highways and Streets*.[5] According to AASHTO, the driver's eye is assumed to be 15

[5] American Association of State Highway and Transportation Officials (AASHTO), *A Policy on Geometric Design of Highways and Streets*, 6th Edition, 2011.

feet from the near edge of the nearest travel lane of the intersecting street and at a height of 3.5 feet above the minor-street approach pavement. The vehicle driver's eye-height along the major-street approach is assumed to be 3.5 feet above the cross-street pavement.

Stopping sight distance is considered the minimum requirement to ensure safe operation of the site access. This distance allows the driver of a vehicle traveling on the major-street to react to a turning vehicle or other object in the roadway and come to a complete stop to avoid a collision. To ensure safe operation of a site access, the extent of available intersection sight distance must at least equal the minimum stopping sight distance.

Based on an assumed statutory speed of 20 mph for an unpaved gravel roadway in a residential area, the minimum recommended intersection sight distance at the site access location is 225 feet, while the required minimum stopping sight distance to ensure safe operation of the access is 115 feet. Sight distances at the access location were measured to be in excess of 350 feet to the north, and approximately 120 feet to the south (limited by vegetation and vertical curve). If vegetation is cleared, sight distance can be improved to approximately 140 feet to the south.

Provided that the development maintains the minimum acceptable intersection sight distance triangles, including the removal and/or proper maintenance of obstructing roadside vegetation along Highland Drive W, adequate sight distance can be provided to allow safe operation of the site access intersection. Thus, no other sight distance mitigation is necessary or recommended.

Operational Analysis

A capacity and delay analysis were conducted for each of the study intersections per the unsignalized intersection analysis methodologies in the *Highway Capacity Manual* (HCM)[6]. Intersections are generally evaluated based on the average control delay experienced by vehicles and are assigned a grade according to their operation. The level of service (LOS) of an intersection can range from LOS A, which indicates very little or no delay experienced by vehicles, to LOS F, which indicates a high degree of congestion and delay. The volume-to-capacity (v/c) ratio is a measure that compares the traffic volumes (demand) against the available capacity of an intersection.

Performance Standards

The study intersection of OR-131 at Highland Drive W is under the jurisdiction of ODOT. The applicable minimum operation standard for this facility is established under the *Oregon Highway Plan*[7] and is based on the v/c ratio of the intersection. According to the *Oregon Highway Plan*, OR-131 is a district route located outside any urban growth boundaries and within an unincorporated community and has a maximum allowable v/c ratio of 0.80. The above-mentioned intersection along OR-131 was analyzed according to this standard.

[6] Transportation Research Board, *Highway Capacity Manual 6th Edition*, 2016.
[7] Oregon Department of Transportation, *1999 Oregon Highway Plan: Including amendments November 1999 through May 2015*, 1999

Delay & Capacity Analysis

The LOS, delay, and v/c results of the capacity analysis are shown in Table 4 for the evening peak period. Detailed calculations as well as tables showing the relationship between delay and LOS are included in the appendix to this report.

Table 4: Capacity Analysis Summary

	Evening Peak Hour		
	LOS	Delay (s)	v / c
1. OR-131 at Highland Drive W			
2021 Existing Conditions	B	10	0.00
2023 Background Conditions	B	10	0.00
2023 Buildout Conditions	B	11	0.05
2. Highland Drive W at Roaring Tide Loop (site access)			
2021 Existing Conditions	-	-	-
2023 Background Conditions	-	-	-
2023 Buildout Conditions	A	9	0.03

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. ***BOLDED*** *results indicate operation above acceptable jurisdictional standards*

All study intersections are currently operating acceptably per ODOT standards and are projected to continue operating acceptably though the 2023 buildout year, regardless of the potential increase in site trip generation upon development of the site. No operational mitigation is necessary or recommended at these intersections.

Conclusions

Based on the most recent five years of crash data, no significant trends or crash patterns were identified at the intersection of OR-131 at Highland Drive W that are indicative of safety concerns. Accordingly, no safety mitigation is recommended per the crash data analysis.

Adequate sight distance is available or can be made available (with proper maintenance or removal of roadside vegetation along Highland Drive W), to ensure safe operation for northbound and southbound approaching vehicles at the site access intersection.

Due to insufficient traffic volumes, preliminary traffic signal warrants are not projected to be met at the unsignalized intersection of OR-131 at Highland Drive W under any of the analysis scenarios. In addition, left-turn lane warrants and right-turn lane warrants are not projected to be met at the study intersection under any of the analysis scenarios.

All study intersections are currently operating acceptably per ODOT standards and are projected to continue operating acceptably through the 2023 buildout year, regardless of the potential increase in site trip generation upon development of the site. No operational mitigation is necessary or recommended at these intersections.

Appendix

TRIP GENERATION CALCULATIONS

Land Use: Single-Family Detached Housing
Land Use Code: 210
Setting/Location General Urban/Suburban
Variable: Dwelling Units
Variable Value: 60

AM PEAK HOUR

Trip Equation: T = 0.71(X) +4.80

	Enter	Exit	Total
Directional Distribution	25%	75%	
Trip Ends	**12**	**35**	**47**

PM PEAK HOUR

Trip Equation: Ln(T)=0.96Ln(X)+0.20

	Enter	Exit	Total
Directional Distribution	63%	37%	
Trip Ends	**39**	**23**	**62**

WEEKDAY

Trip Equation: Ln(T)=0.92Ln(X)+2.71

	Enter	Exit	Total
Directional Distribution	50%	50%	
Trip Ends	**325**	**325**	**650**

SATURDAY

Trip Equation: Ln(T)=0.94Ln(X)+2.56

	Enter	Exit	Total
Directional Distribution	50%	50%	
Trip Ends	**304**	**304**	**608**

Source: Trip Generation Manual, Tenth Edition

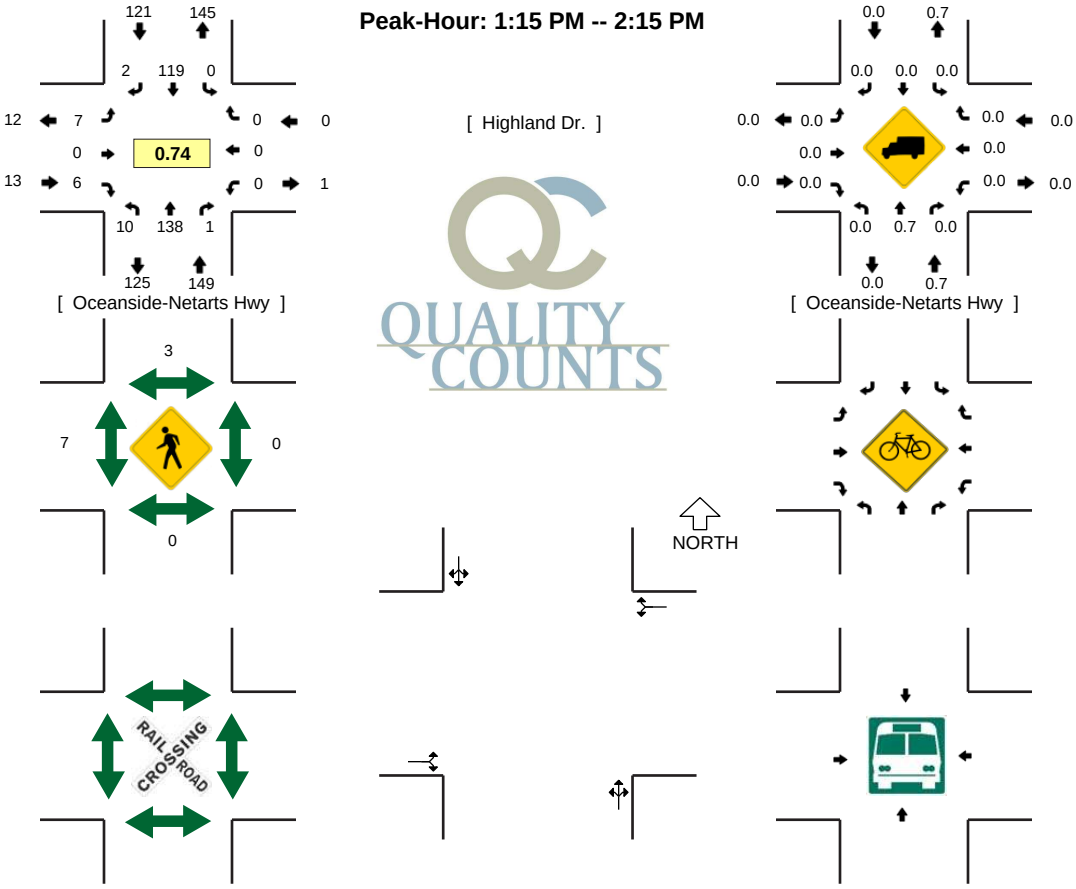
Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

INTERSECTION: Oceanside-Netarts Hwy--Highland Dr.
WEATHER:

QC JOB #: 10181101
DATE: 7/15/2006

Peak-Hour: 1:15 PM -- 2:15 PM



*SEE LEGEND SHEET

5-MIN COUNT PERIOD BEGINNING AT	Oceanside-Netarts... (Northbound)				Oceanside-Netarts... (Southbound)				Highland Dr. (Eastbound)				Highland Dr. (Westbound)				TOTAL	HOURLY TOTALS
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
12:45 PM	1	11	0		0	6	0		0	0	0		0	0	0		18	
12:50 PM	0	7	1		0	3	3		0	0	0		0	0	0		14	
12:55 PM	0	12	0		0	6	0		0	0	0		0	0	0		18	222
1:00 PM	0	9	0		0	2	2		0	0	0		0	0	0		13	223
1:05 PM	0	15	0		0	10	0		1	0	2		0	0	0		28	229
1:10 PM	0	8	0		0	8	1		1	0	0		0	0	0		18	229
1:15 PM	1	7	0		0	2	0		2	0	2		0	0	0		14	224
1:20 PM	0	13	0		0	17	0		1	0	0		0	0	0		31	239
1:25 PM	3	12	0		0	14	0		0	0	1		0	0	0		30	245
1:30 PM	1	19	0		0	6	1		1	0	1		0	0	0		29	261
1:35 PM	1	19	1		0	15	0		0	0	0		0	0	0		36	272
1:40 PM	0	11	0		0	12	1		0	0	0		0	0	0		24	273
1:45 PM	1	9	0		0	7	0		1	0	0		0	0	0		18	273
1:50 PM	0	6	0		0	10	0		0	0	0		0	0	0		16	275
1:55 PM	0	9	0		0	4	0		0	0	2		0	0	0		15	272
2:00 PM	1	11	0		0	7	0		1	0	0		0	0	0		20	279
2:05 PM	2	10	0		0	8	0		0	0	0		0	0	0		20	271
2:10 PM	0	12	0		0	17	0		1	0	0		0	0	0		30	283
2:15 PM	0	5	0		0	3	0		3	0	0		0	0	0		11	280
2:20 PM	1	8	0		0	7	0		0	0	0		0	0	0		16	265
2:25 PM	1	9	0		0	11	1		1	0	0		0	0	0		23	258
2:30 PM	0	9	0		0	8	0		2	0	1		0	0	0		20	249
2:35 PM	2	6	0		0	15	0		0	0	1		0	0	1		25	238
2:40 PM	0	12	0		0	11	0		0	0	0		0	0	0		23	237

PEAK 15-MIN FLOW RATES	Northbound				Southbound				Eastbound				Westbound				TOTAL
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	20	200	4		0	140	4		4	0	8		0	0	0		380
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	0	0		0
Pedestrians		0				0				0				0			0
Bicycles																	
Railroad																	
Stopped Buses																	

Counter Comments:

Report generated on 7/27/2006

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Gary's Traffic Data

310 Pitney Lane, Unit 39
Junction City, OR 97448

Fast, Accurate, High Quality Counts

Weather: Cloudy, showers
53 degrees F.
Collected By: G.Mc.

File Name : OCNSD Hwy. 131 @ Highland connection
Site Code : Ocnsd.
Start Date : 6/9/2020
Page No : 1

Groups Printed- Unshifted

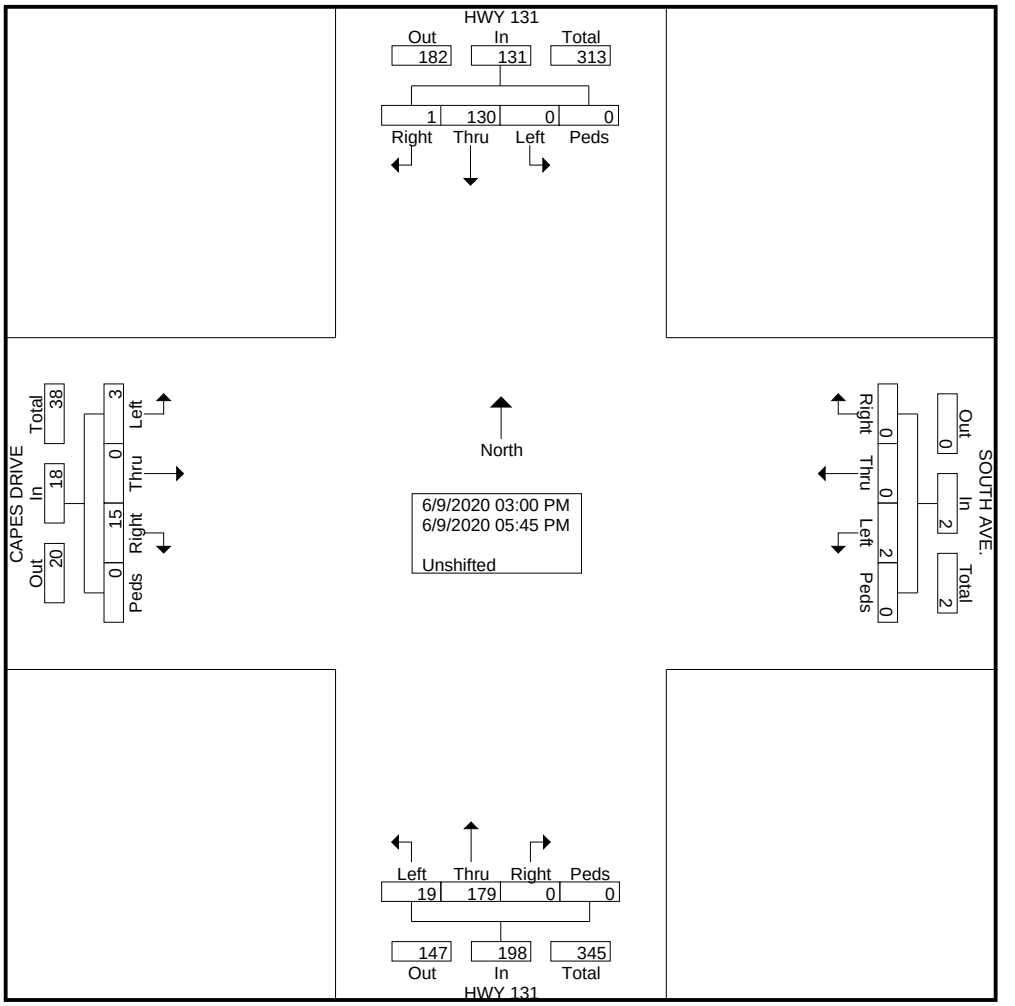
	HWY 131 From North					SOUTH AVE. From East					HWY 131 From South					CAPES DRIVE From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
03:00 PM	0	9	1	0	10	1	0	0	0	1	3	17	0	0	20	1	0	0	0	1	32
03:15 PM	0	13	0	0	13	0	0	0	0	0	3	17	0	0	20	1	0	2	0	3	36
03:30 PM	0	11	0	0	11	1	0	0	0	1	3	8	0	0	11	0	0	1	0	1	24
03:45 PM	0	11	0	0	11	0	0	0	0	0	0	15	0	0	15	0	0	1	0	1	27
Total	0	44	1	0	45	2	0	0	0	2	9	57	0	0	66	2	0	4	0	6	119
04:00 PM	0	17	0	0	17	0	0	0	0	0	0	14	0	0	14	0	0	3	0	3	34
04:15 PM	0	13	0	0	13	0	0	0	0	0	1	19	0	0	20	0	0	1	0	1	34
04:30 PM	0	12	0	0	12	0	0	0	0	0	1	10	0	0	11	0	0	2	0	2	25
04:45 PM	0	12	0	0	12	0	0	0	0	0	3	12	0	0	15	1	0	2	0	3	30
Total	0	54	0	0	54	0	0	0	0	0	5	55	0	0	60	1	0	8	0	9	123
05:00 PM	0	11	0	0	11	0	0	0	0	0	0	13	0	0	13	0	0	1	0	1	25
05:15 PM	0	10	0	0	10	0	0	0	0	0	2	18	0	0	20	0	0	1	0	1	31
05:30 PM	0	8	0	0	8	0	0	0	0	0	0	17	0	0	17	0	0	0	0	0	25
05:45 PM	0	3	0	0	3	0	0	0	0	0	3	19	0	0	22	0	0	1	0	1	26
Total	0	32	0	0	32	0	0	0	0	0	5	67	0	0	72	0	0	3	0	3	107
Grand Total	0	130	1	0	131	2	0	0	0	2	19	179	0	0	198	3	0	15	0	18	349
Apprch %	0	99.2	0.8	0		100	0	0	0		9.6	90.4	0	0		16.7	0	83.3	0		
Total %	0	37.2	0.3	0	37.5	0.6	0	0	0	0.6	5.4	51.3	0	0	56.7	0.9	0	4.3	0	5.2	

Gary's Traffic Data

310 Pitney Lane, Unit 39
Junction City, OR 97448
Fast, Accurate, High Quality Counts

Weather: Cloudy, showers
53 degrees F.
Collected By: G.Mc.

File Name : OCNSD Hwy. 131 @ Highland connection
Site Code : Ocnsd.
Start Date : 6/9/2020

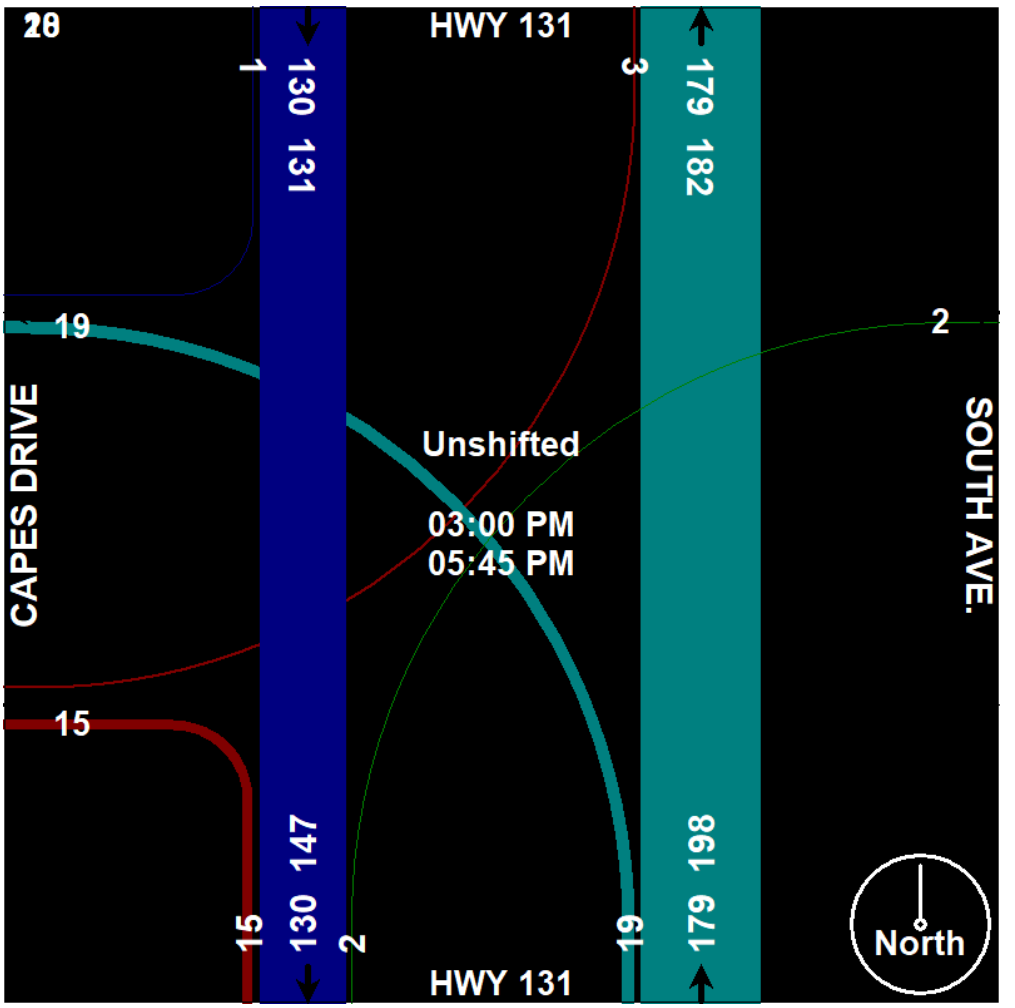


Gary's Traffic Data

310 Pitney Lane, Unit 39
Junction City, OR 97448
Fast, Accurate, High Quality Counts

Weather: Cloudy, showers
53 degrees F.
Collected By: G.Mc.

File Name : OCNSD Hwy. 131 @ Highland connection
Site Code : Ocnsd.
Start Date : 6/9/2020
Page No : 3



Gary's Traffic Data

310 Pitney Lane, Unit 39

Junction City, OR 97448

Fast, Accurate, High Quality Counts

Weather: Cloudy, showers
53 degrees F.
Collected By: G.Mc.

File Name : OCNSD Hwy. 131 @ Highland connection
Site Code : Ocnsd.
Start Date : 6/9/2020
Page No : 4

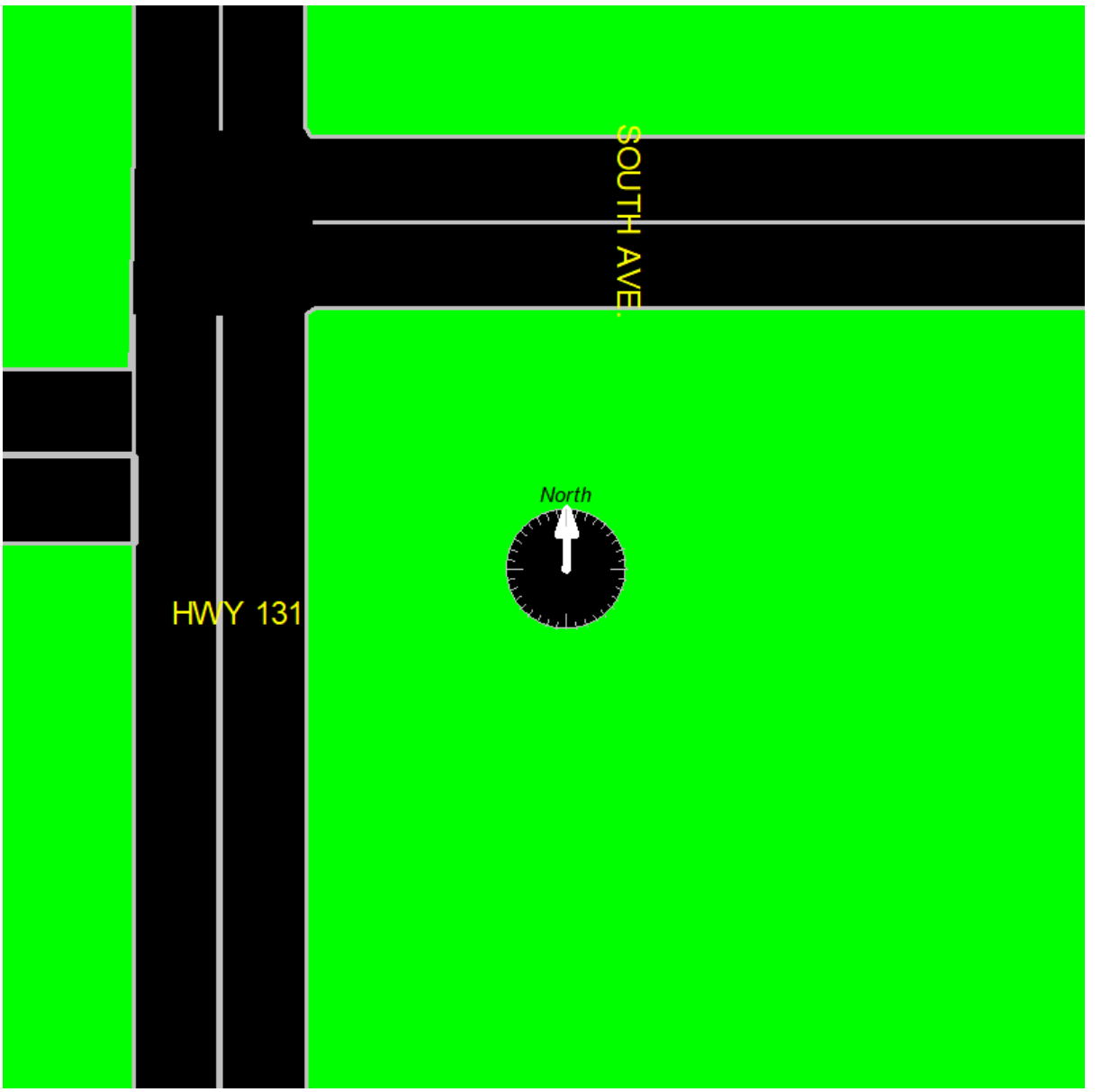
	HWY 131 From North					SOUTH AVE. From East					HWY 131 From South					CAPES DRIVE From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Each Approach Begins at:																					
	04:00 PM					03:00 PM					05:00 PM					04:00 PM					
+0 mins.	0	**17**	0	0	**17**	**1**	0	0	0	**1**	0	13	0	0	13	0	0	**3**	0	**3**	
+15 mins.	0	13	0	0	13	0	0	0	0	0	2	18	0	0	20	0	0	1	0	1	
+30 mins.	0	12	0	0	12	1	0	0	0	1	0	17	0	0	17	0	0	2	0	2	
+45 mins.	0	12	0	0	12	0	0	0	0	0	**3**	**19**	0	0	**22**	**1**	0	2	0	3	
Total Volume	0	54	0	0	54	2	0	0	0	2	5	67	0	0	72	1	0	8	0	9	
% App. Total	0	100	0	0		100	0	0	0		6.9	93.1	0	0		11.1	0	88.9	0		
PHF	.000	.794	.000	.000	.794	.500	.000	.000	.000	.500	.417	.882	.000	.000	.818	.250	.000	.667	.000	.750	

Gary's Traffic Data

310 Pitney Lane, Unit 39
Junction City, OR 97448
Fast, Accurate, High Quality Counts

Weather: Cloudy, showers
53 degrees F.
Collected By: G.Mc.

File Name : OCNSD Hwy. 131 @ Highland connection
Site Code : Ocnsd.
Start Date : 6/9/2020
Page No : 5



TILLAMOOK COUNTY

HIGHLAND DR (AVALON), MP -99 to 99, 01/01/2014 to 12/31/2018

SER# / INVEST / RD DPT / UNLOC?	S P E D	A L C	D R U G S	M J I N V	S C H L	W O R K	DATE / DAY / TIME / LAT	MILEPNT / DIST FROM / INTERSECT / LONG	COUNTY ROADS / FIRST STREET / SECOND STREET / LRS	RD CHAR / DIRECT / LOCTN	INT-TYPE (MEDIAN) / LEGS / (#LANES)	INT-REL / TRAF- / CONTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH / COLL / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / TYPE	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	A G E	S E X	LICNS RES	PED LOC	ERROR	ACT	EVENT	CAUSE

131: NETARTS

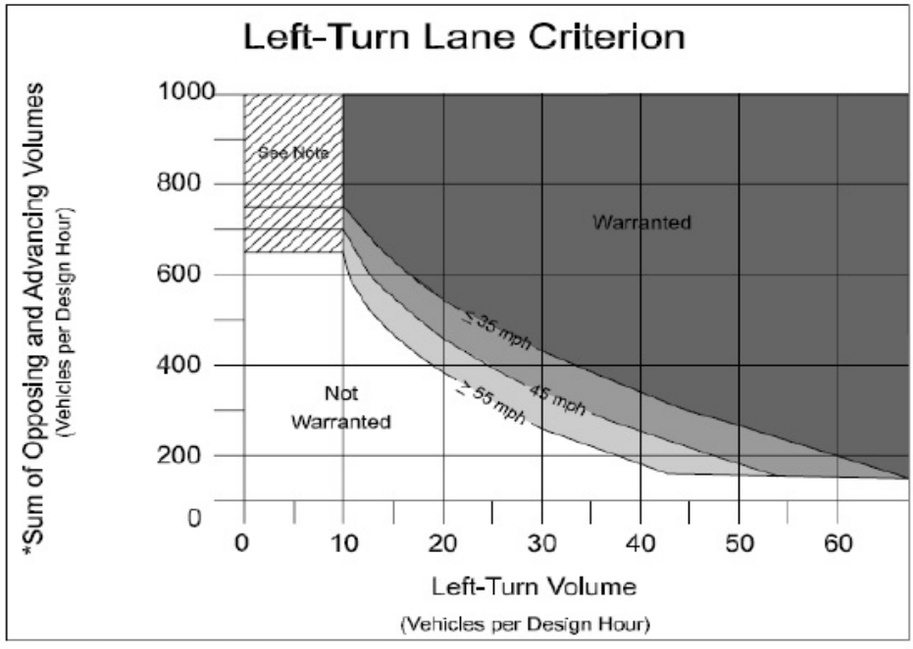
Highway 131 ALL ROAD TYPES, MP 1.16 to 1.18 01/01/2014 to 12/31/2018, Both Add and Non-Add mileage

SER# / INVEST / RD DPT / UNLOC?	S P E E D	A L C	D R U G S	M J U I N V	S C H L	W O R K	DATE / DAY / TIME / LAT	LONG	RD# FC / COMPNT / MLG TYP / MILEPNT	FIRST STREET / SECOND STREET / LRS	RD CHAR / DIRECT / LOCTN	INT-TYPE / (MEDIAN) / LEGS / (#LANES)	INT-REL / TRAF- / CONTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH / COLL / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / TYPE	MOVE / FROM / TO	P#	PRTC / TYPE	INJ / SVRTY	A G E	S E X	LICNS / RES	PED / LOC	ERROR	ACT	EVENT	CAUSE

Project: 20082 Second Avalon Heights Subdivision
Intersection: OR-131 at Highland Drive W
Date: 3/25/2021
Scenario: 2023 Buildout Conditions

Speed? 35 mph

AM Peak Hour		**PM Peak Hour**	
Left-Turn Volume		Left-Turn Volume	19
Approaching DHV		Approaching DHV	159
# of Advancing Through Lanes		# of Advancing Through Lanes	1
Opposing DHV		Opposing DHV	187
# of Opposing Through Lanes		# of Opposing Through Lanes	1
O+A DHV		**O+A DHV**	**346**
Lane Needed?		Lane Needed?	**No**



Source: Oregon DOT Analysis Procedures Manual 2008

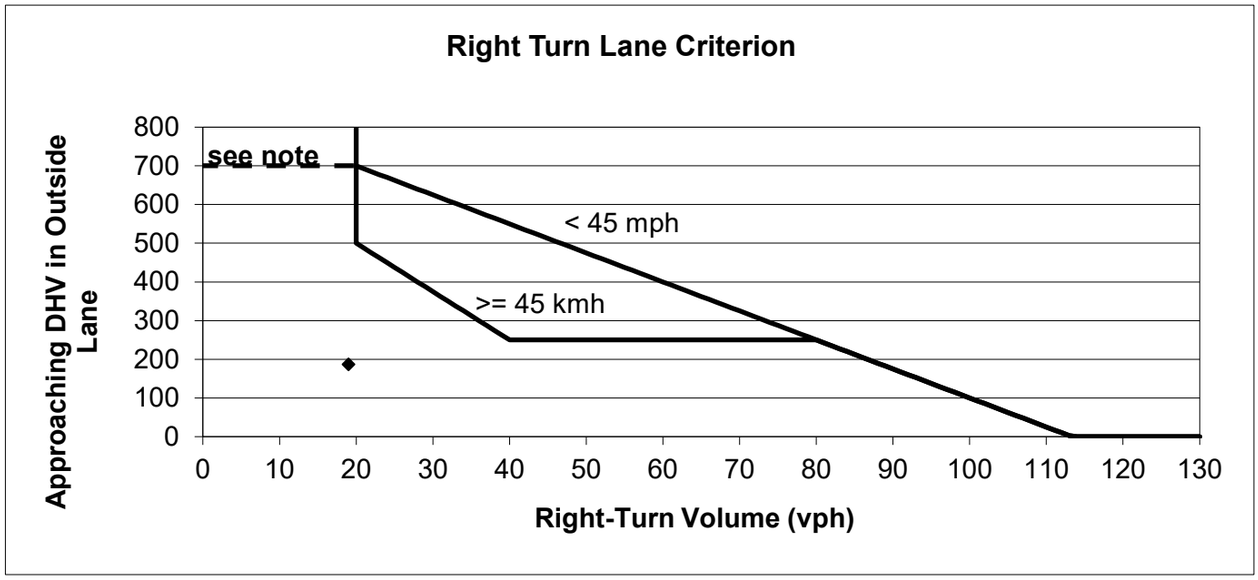
*(Advancing Vol/ # of Advancing Through Lanes)+
(Opposing Vol/ # of Opposing Through Lanes)

Note: The criterion is not met from zero to ten left turn vehicles per hour, but careful consideration should be given to installing a left turn lane due to the increased potential for accidents in the through lanes. While the turn volumes are low, the adverse safety and operational impacts may require installation of a left turn. The final determination will be based on a field study.

Project: 20082 Second Avalon Heights Subdivision
Date: 3/25/2021
Scenario: 2023 Buildout Conditions

Speed? 35 mph 56 kmh

AM Peak Hour		PM Peak Hour	
Right-Turn Volume		Right-Turn Volume	19
Approaching DHV		Approaching DHV	187
Lane Needed?		Lane Needed?	No



Note: If there is no right turn lane, a shoulder needs to be provided.
If this intersection is in a rural area and is a connection to a public street, a right turn lane is needed.

Traffic Signal Warrant Analysis

Project: 20082 Second Avalon Heights Subdivision
Date: 3/25/2021
Scenario: 2023 Buildout Conditions

	Major Street:	Minor Street:
Number of Lanes:	1	1
PM Peak Hour Volumes:	346	11

Warrant Used:

_____ 100 percent of standard warrants used
x 70 percent of standard warrants used due to 85th percentile speed in excess of 40 mph or isolated community with population less than 10,000.

Number of Lanes for Moving Traffic on Each Approach:		ADT on Major St. (total of both approaches)		ADT on Minor St. (higher-volume approach)	
WARRANT 1, CONDITION A		100%	70%	100%	70%
Major St.	Minor St.	Warrants	Warrants	Warrants	Warrants
1	1	8,850	6,200	2,650	1,850
2 or more	1	10,600	7,400	2,650	1,850
2 or more	2 or more	10,600	7,400	3,550	2,500
1	2 or more	8,850	6,200	3,550	2,500
WARRANT 1, CONDITION B					
1	1	13,300	9,300	1,350	950
2 or more	1	15,900	11,100	1,350	950
2 or more	2 or more	15,900	11,100	1,750	1,250
1	2 or more	13,300	9,300	1,750	1,250

Note: ADT volumes assume 8th highest hour is 5.6% of the daily volume

	Approach Volumes	Minimum Volumes	Is Signal Warrant Met?
Warrant 1			
Condition A: Minimum Vehicular Volume			
Major Street	3,460	6,200	
Minor Street*	110	1,850	**No**
Condition B: Interruption of Continuous Traffic			
Major Street	3,460	9,300	
Minor Street*	110	950	**No**
Combination Warrant			
Major Street	3,460	7,440	
Minor Street*	110	1,480	**No**

* Minor street right-turning traffic volumes reduced by 85% of the right-turn capacity

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	1	1	167	1	1	139
Future Vol, veh/h	1	1	167	1	1	139
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	74	74	74	74	74	74
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1	1	226	1	1	188

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	417	227	0	0	227	0
Stage 1	227	-	-	-	-	-
Stage 2	190	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	596	817	-	-	1353	-
Stage 1	815	-	-	-	-	-
Stage 2	847	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	595	817	-	-	1353	-
Mov Cap-2 Maneuver	595	-	-	-	-	-
Stage 1	815	-	-	-	-	-
Stage 2	846	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.2	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	689	1353	-
HCM Lane V/C Ratio	-	-	0.004	0.001	-
HCM Control Delay (s)	-	-	10.2	7.7	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0	0	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	1	1	168	1	1	140
Future Vol, veh/h	1	1	168	1	1	140
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	74	74	74	74	74	74
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1	1	227	1	1	189

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	419	228	0	0	228	0
Stage 1	228	-	-	-	-	-
Stage 2	191	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	595	816	-	-	1352	-
Stage 1	815	-	-	-	-	-
Stage 2	846	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	594	816	-	-	1352	-
Mov Cap-2 Maneuver	594	-	-	-	-	-
Stage 1	815	-	-	-	-	-
Stage 2	845	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.3	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	688	1352	-
HCM Lane V/C Ratio	-	-	0.004	0.001	-
HCM Control Delay (s)	-	-	10.3	7.7	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0	0	-

Intersection	
Int Delay, s/veh	1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	11	11	168	19	19	140
Future Vol, veh/h	11	11	168	19	19	140
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	74	74	74	74	74	74
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	15	15	227	26	26	189

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	481	240	0	0	253	0
Stage 1	240	-	-	-	-	-
Stage 2	241	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	548	804	-	-	1324	-
Stage 1	805	-	-	-	-	-
Stage 2	804	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	536	804	-	-	1324	-
Mov Cap-2 Maneuver	536	-	-	-	-	-
Stage 1	805	-	-	-	-	-
Stage 2	786	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.9	0	0.9
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	643	1324	-
HCM Lane V/C Ratio	-	-	0.046	0.019	-
HCM Control Delay (s)	-	-	10.9	7.8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1	-

Intersection	
Int Delay, s/veh	3.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	22	1	1	37	1	1
Future Vol, veh/h	22	1	1	37	1	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	24	1	1	40	1	1

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	24	21	0	0	41	0
Stage 1	21	-	-	-	-	-
Stage 2	3	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	992	1056	-	-	1568	-
Stage 1	1002	-	-	-	-	-
Stage 2	1020	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	991	1056	-	-	1568	-
Mov Cap-2 Maneuver	991	-	-	-	-	-
Stage 1	1002	-	-	-	-	-
Stage 2	1019	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.7	0	3.6
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	994	1568	-
HCM Lane V/C Ratio	-	-	0.025	0.001	-
HCM Control Delay (s)	-	-	8.7	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

NETARTS-OCEANSIDE SANITARY DISTRICT
1755 CAPE MEARES LP. RD. W.
TILLAMOOK, OR. 97141
PHONE (503)842-8231
FAX (503)842-3759

Tillamook Co. Department
of Community Development
1510 Third St., Suite B
Tillamook, OR. 97141
(503) 842-3408

DATE: January 21, 2021

TO: **TILLAMOOK COUNTY ONE-STOP PERMIT COUNTER**

RE: **SEWER AVAILABILITY**

I confirm that sanitary sewer service is available to the following lot(s) within our District:
Tax Lot 1S10 30DC 00200

Availability letter is void after 12 months from the date of issuance.

According to our records, the legal owner is: Avalon Heights, LLC. Bill Hughes, 41901 Old Hwy. 30 Astoria, OR. 97103.

Sanitary Sewer service is available to the above Tax Lot, but the District does not guarantee that a stub is provided. However, according to the District As-Built map, a stub should be provided.

If the service lateral is to be installed, all at the property owner's expense, the District will require the following:

(a) Secure a permit for utility work in a public road right-of-way.
(b) Minimum 24-hour notice prior to start of work.
(c) Representative of Sanitary District present to inspect installation of the new service lateral.
(d) Notification of all emergency services if road is closed or blocked during installation of the new main service lateral.
(e) Coordinate work with any effected neighboring property owners, so as to minimize inconvenience if road is closed or blocked.
(f) The use of 4" diameter PVC ASTM-3034 pipe for the new service lateral.
(g) The use of a Romac Sanitary Sewer Saddle. Attached, please find Cut-sheet #418 from our Design Standards, in regards to service saddle connection to existing sewers.

For the lateral from the house to the **new stub**, the following applies:

1. District requires that property owner/contractor follow APWA Specifications.
2. District requires a Clean-out on the property line, using Schedule 3034 ASTM Pipe with a **screw on cap.** The Clean-out shall be permanently identified. Attached, please find Cut-sheet #416.
3. District requires a protective cover if in driveway or a parking zone.
4. It is the responsibility of the property owner to ensure that a copy of the Sewer Availability letter is given to the Contractor.
5. Inspection and testing of the installation shall be done by the Tillamook County Plumbing Inspector in accordance with County requirements.
6. Contractor is responsible for contacting the Tillamook County Inspector to inspect the service lateral.
7. **Contractor is responsible for notifying the District to inspect the service lateral connection prior to backfilling. An Inspection Fee will be billed to the property owner at that time.**
8. **Contractor is responsible for notifying the District office within 5 working days of the service lateral inspection (that is done by Tillamook County Inspector). Failure to notify the District in the allotted time will result in a $10.00 per working day fine on the Contractor.**

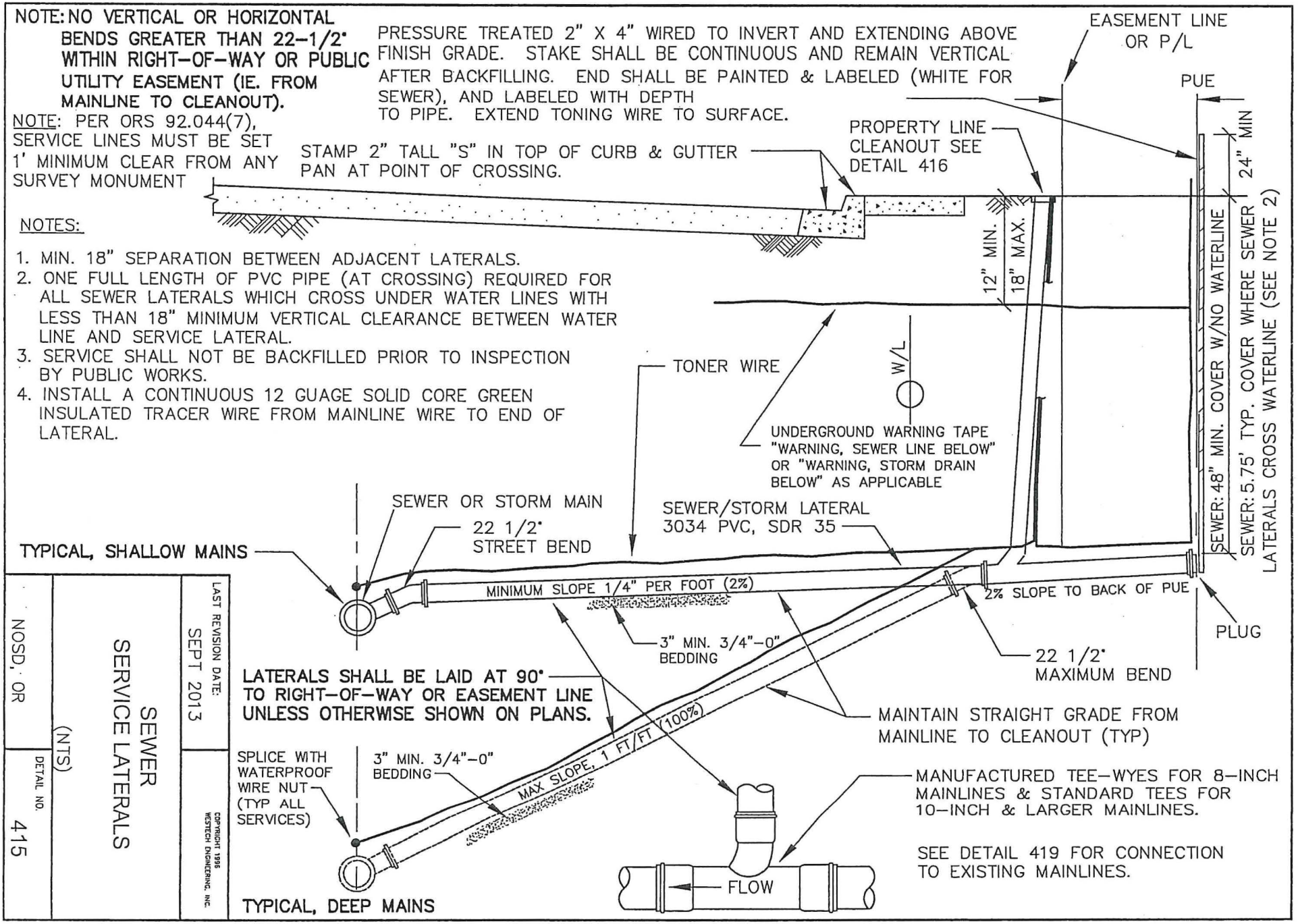
Failure to notify the District for an inspection of the connection, prior to backfilling, will result in one or all of the following fines and/or fees, per District Ordinances:

- **$500.00 Fine for Illegal Connection to the sanitary sewer system.**
- **$10.00 per working day fine on the Contractor (as stated up above).**
- **A regular User Fee shall be charged to the account plus an amount equal to the regular User Fee, so that the total amount will be double the current established charge for the type of service provided. This charge shall be effective on the date of connection to the public sewer system and shall continue until such time as the account is brought current.**

The current System Development Charge fee of $9,869.00 per Single Family Dwelling will be **due to the Netarts-Oceanside Sanitary District upon issuance of an approved Building Permit** by the Tillamook County Departement of Community Development. The District requires that a copy of the approved building permit be sent to the Netarts-Oceanside Sanitary District.

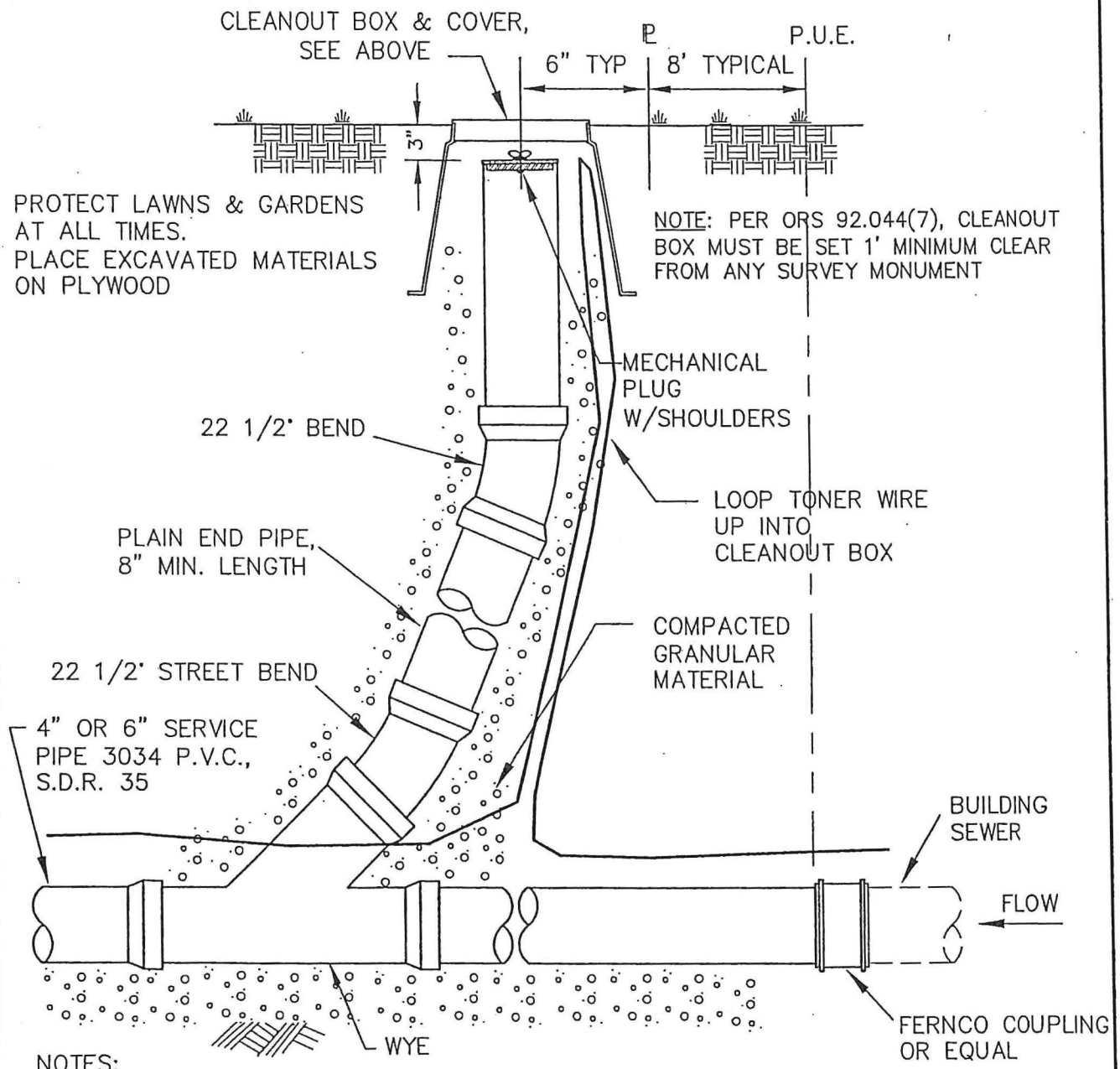
This letter shall not create a liability on the part of Tillamook County, or by an officer, or employee thereof, for the services described above.

Daniel A. Mello, District Superintendent
cc: Property Owner


NOTE: NO VERTICAL OR HORIZONTAL BENDS GREATER THAN 22-1/2° WITHIN RIGHT-OF-WAY OR PUBLIC UTILITY EASEMENT (IE. FROM MAINLINE TO CLEANOUT).
NOTE: PER ORS 92.044(7), SERVICE LINES MUST BE SET 1' MINIMUM CLEAR FROM ANY SURVEY MONUMENT
PRESSURE TREATED 2" X 4" WIRED TO INVERT AND EXTENDING ABOVE FINISH GRADE. STAKE SHALL BE CONTINUOUS AND REMAIN VERTICAL AFTER BACKFILLING. END SHALL BE PAINTED & LABELED (WHITE FOR SEWER), AND LABELED WITH DEPTH TO PIPE. EXTEND TONING WIRE TO SURFACE.
EASEMENT LINE OR P/L
PUE
PROPERTY LINE CLEANOUT SEE DETAIL 416
STAMP 2" TALL "S" IN TOP OF CURB & GUTTER PAN AT POINT OF CROSSING.
24" MIN
12" MIN.
18" MAX.
SEWER: 48" MIN. COVER W/NO WATERLINE
SEWER: 5.75' TYP. COVER WHERE SEWER LATERALS CROSS WATERLINE (SEE NOTE 2)
NOTES:
1. MIN. 18" SEPARATION BETWEEN ADJACENT LATERALS.
2. ONE FULL LENGTH OF PVC PIPE (AT CROSSING) REQUIRED FOR ALL SEWER LATERALS WHICH CROSS UNDER WATER LINES WITH LESS THAN 18" MINIMUM VERTICAL CLEARANCE BETWEEN WATER LINE AND SERVICE LATERAL.
3. SERVICE SHALL NOT BE BACKFILLED PRIOR TO INSPECTION BY PUBLIC WORKS.
4. INSTALL A CONTINUOUS 12 GUAGE SOLID CORE GREEN INSULATED TRACER WIRE FROM MAINLINE WIRE TO END OF LATERAL.
TONER WIRE
W/L
UNDERGROUND WARNING TAPE "WARNING, SEWER LINE BELOW" OR "WARNING, STORM DRAIN BELOW" AS APPLICABLE
SEWER OR STORM MAIN
22 1/2° STREET BEND
SEWER/STORM LATERAL 3034 PVC, SDR 35
TYPICAL, SHALLOW MAINS
MINIMUM SLOPE 1/4" PER FOOT (2%)
2% SLOPE TO BACK OF PUE
PLUG
3" MIN. 3/4"-0" BEDDING
22 1/2° MAXIMUM BEND
LATERALS SHALL BE LAID AT 90° TO RIGHT-OF-WAY OR EASEMENT LINE UNLESS OTHERWISE SHOWN ON PLANS.
MAINTAIN STRAIGHT GRADE FROM MAINLINE TO CLEANOUT (TYP)
SPLICE WITH WATERPROOF WIRE NUT (TYP ALL SERVICES)
3" MIN. 3/4"-0" BEDDING
MAX SLOPE, 1 FT/FT (100%)
MANUFACTURED TEE-WYES FOR 8-INCH MAINLINES & STANDARD TEES FOR 10-INCH & LARGER MAINLINES.
SEE DETAIL 419 FOR CONNECTION TO EXISTING MAINLINES.
FLOW
TYPICAL, DEEP MAINS
NOSD. OR
SEWER SERVICE LATERALS
(NTS)
DETAIL NO. 415
LAST REVISION DATE: SEPT 2013
COPYRIGHT 1996 WESTECH ENGINEERING, INC.

CLEANOUT COVERS: ALL SEWER CLEANOUT LIDS TO READ "SEWER"

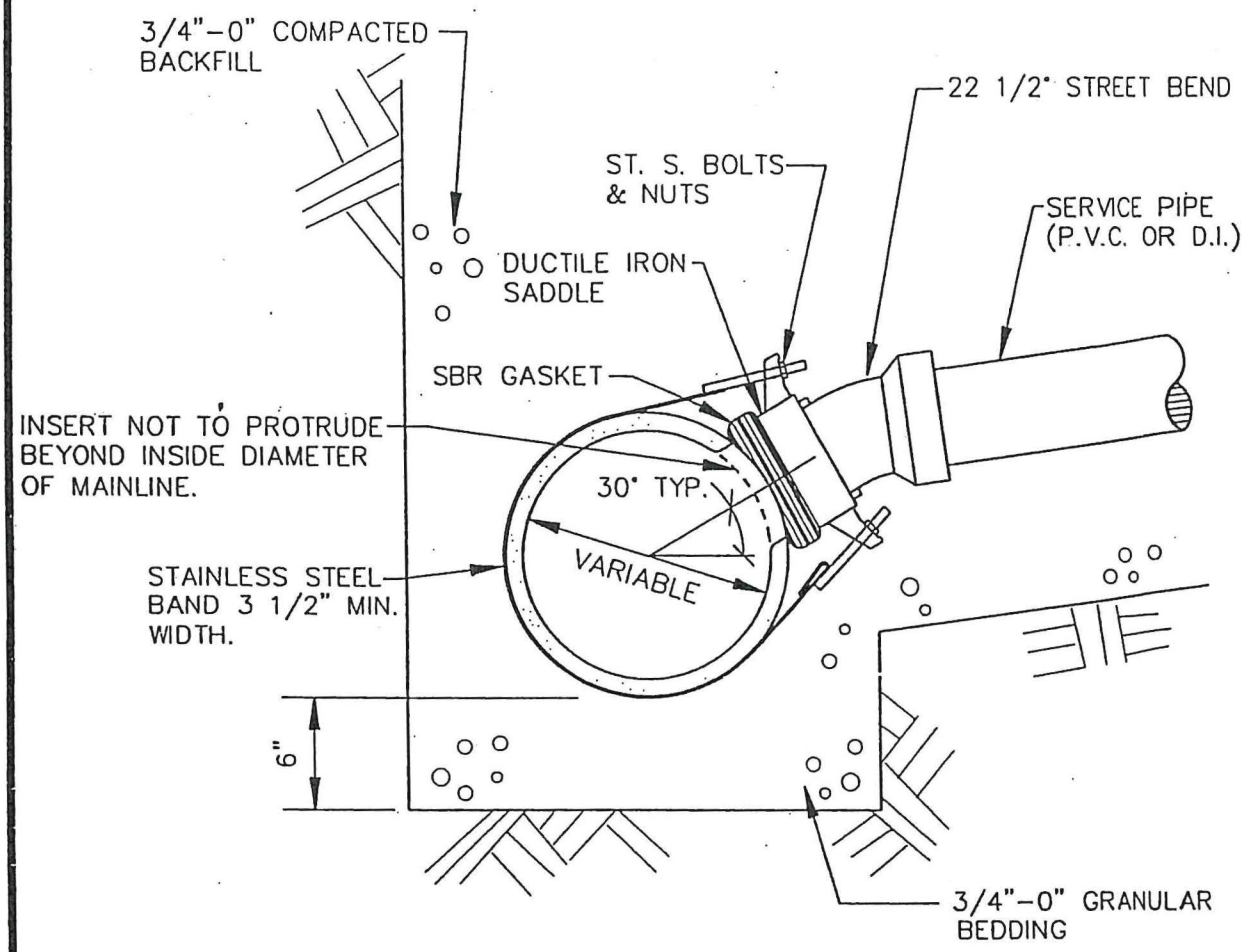
1. NON-TRAFFIC AREAS:
   CARSON MODEL 910 T-COVER OR EQUAL (GREEN FOR SEWER, GREY FOR STORM).
2. TRAFFIC AREAS, INCLUDING DRIVEWAYS:
   8" X 4" CAST IRON FRAME & COVER, OLYMPIC M1007 OR EQUAL.



NOTES:

1. CLEANOUT RISER SHALL BE SAME SIZE AND MATERIAL AS LATERAL PIPE.
2. PROVIDE CASTING FOR CLEANOUTS LOCATED IN DRIVEWAYS.
3. CLEANOUT PIPE SHALL BE LEFT A MINIMUM OF 18" ABOVE EXISTING GRADE UNTIL ALL CURBING IS INSTALLED AND ALL PRIVATE UTILITY TRENCHES ARE BACKFILLED. CLEANOUTS SHALL THEN BE SET FLUSH WITH FINISH GRADE.

LAST REVISION DATE: MAR 2008	
STANDARD SERVICE LATERAL CLEANOUT (NTS)	
NOSD, OR	DETAIL NO. 416



NOTES:

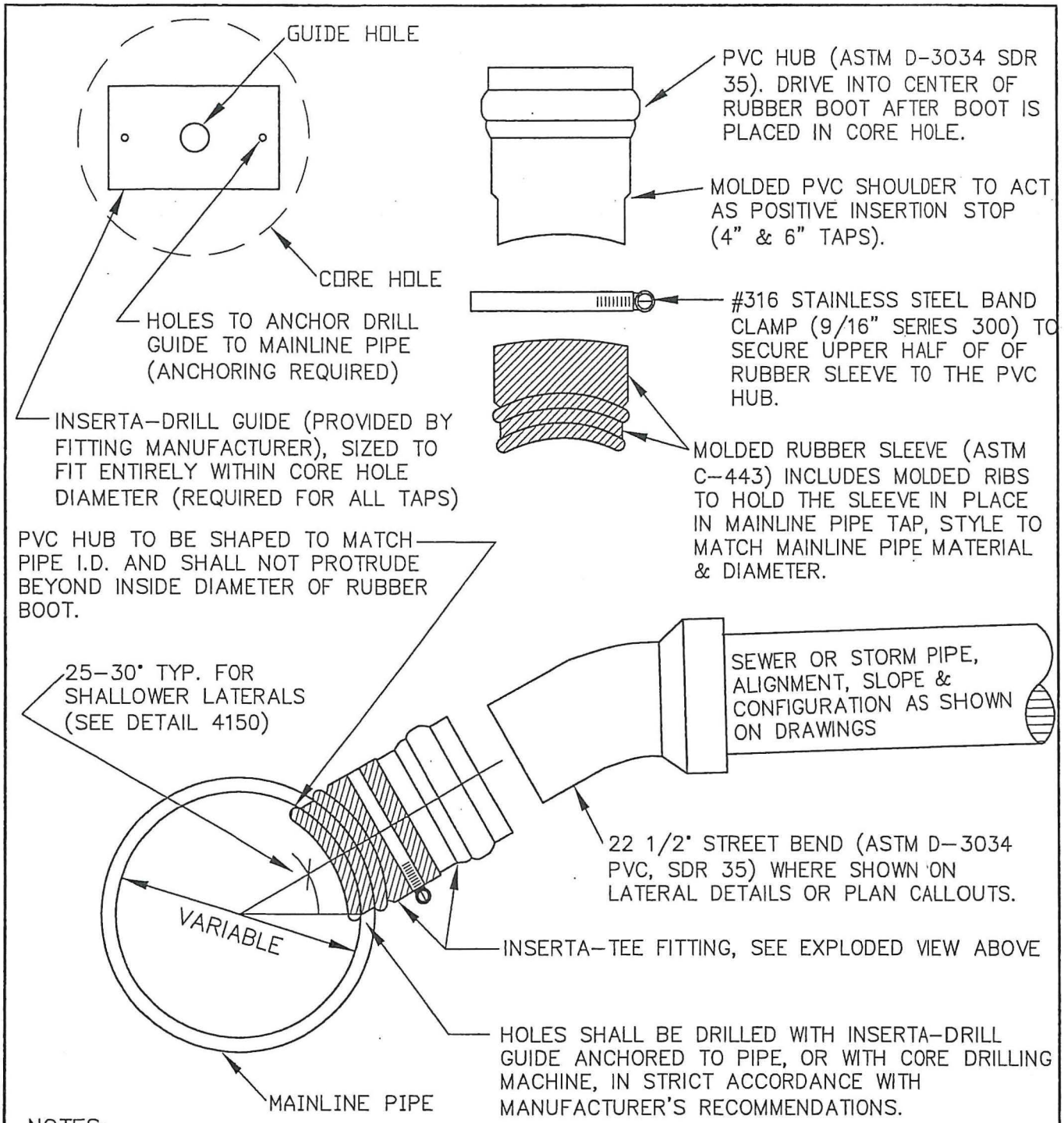
1. SERVICE SADDLES ALLOWED ON EXISTING SEWER MAINS ONLY. MANUFACTURED TEE-WEES FITTINGS SHALL BE USED ON ALL NEW MAINLINES.
2. THE TAP SHALL NOT BE MADE EXCEPT IN THE PRESENCE OF A DISTRICT INSPECTOR; NOR SHALL ANY CONNECTION BE MADE WITHOUT DISTRICT APPROVAL.
3. SERVICE SADDLES SHALL BE ROMAC STYLE "CB" OR EQUAL W/ VIRGIN SBR GASKET PER ASTM D2000 MBA 710.
4. HOLE IN MAIN SHALL BE CORE DRILLED.
5. ℄ OF TAP SHALL BE ABOVE SPRINGLINE.

LAST REVISION DATE: FEBRUARY 1997

SERVICE SADDLE CONNECTION TO EXISTING SEWERS

CITY: NOSD, OR

DRAWING NO. 418



NOTES:

1. SANITARY SEWERS – INSERTA-TEES ALLOWED ON EXISTING PVC OR DUCTILE IRON SEWER MAINS. USE ON OTHER PIPE TYPES IS SUBJECT TO CITY APPROVAL AND ACCEPTABLE PIPE CONDITION. MANUFACTURED TEE-WYE FITTINGS SHALL BE USED ON ALL NEW SEWER MAINLINES.
2. THE TAP SHALL NOT BE MADE EXCEPT IN THE PRESENCE OF A NOSD INSPECTOR; NOR SHALL ANY CONNECTION BE MADE WITHOUT NOSD APPROVAL.
3. CENTERLINE OF TAP SHALL BE ABOVE SPRINGLINE.

INSERTA-TEE "FATBOY" FITTING SHALL BE USED FOR ALL 4" & 6" TAPS, IN ORDER TO ALLOW 95% MANDREL TESTING OF MAINLINES.

LAST REVISION DATE: DEC 2012	JO # STANDARD
INSERTA-TEE CONNECTION TO EXISTING SEWER (NTS)	
NOSD, OR	DETAIL NO. 419

TICOR TITLE™
Company of Oregon

PUBLIC RECORD REPORT FOR NEW SUBDIVISION OR LAND PARTITION

THIS REPORT IS ISSUED BY THE ABOVE-NAMED COMPANY ("THE COMPANY") FOR THE EXCLUSIVE USE OF THE FOLLOWING CUSTOMER:

S&F Land Services
Phone No.:

Date Prepared: December 19, 2020
Effective Date: December 17, 2020 / 08:00 AM
Charge: $300.00
Order No.: 360420009017
Reference:

The information contained in this report is furnished to the Customer by Ticor Title Company of Oregon (the "Company") as an information service based on the records and indices maintained by the Company for the county identified below. This report is not title insurance, is not a preliminary title report for title insurance, and is not a commitment for title insurance. No examination has been made of the Company's records, other than as specifically set forth in this report ("the Report"). Liability for any loss arising from errors and/or omissions is limited to the lesser of the fee paid or the actual loss to the Customer, and the Company will have no greater liability by reason of this report. This report is subject to the Definitions, Conditions and Stipulations contained in it.

REPORT

A. The Land referred to in this report is located in the County of Tillamook, State of Oregon, and is described as follows:

As fully set forth on Exhibit "A" attached hereto and by this reference made a part hereof.

B. As of the Effective Date, the tax account and map references pertinent to the Land are as follows:

As fully set forth on Exhibit "B" attached hereto and by this reference made a part hereof.

C. As of the Effective Date and according to the Public Records, we find title to the land apparently vested in:

As fully set forth on Exhibit "C" attached hereto and by this reference made a part hereof.

D. As of the Effective Date and according to the Public Records, the Land is subject to the following liens and encumbrances, which are not necessarily shown in the order of priority:

As fully set forth on Exhibit "D" attached hereto and by this reference made a part hereof.

EXHIBIT "A"
(Land Description)

The Southwest quarter of the Southeast quarter of Section 30, Township 1 South, Range 10 West of the Willamette Meridian, in the County of Tillamook, State of Oregon.

EXCEPTING THEREFROM the Plat of Avalon, and the Plat of First Addition to Avalon Heights.

ALSO EXCEPTING THEREFROM that tract conveyed to Carlton Nursery Company, Incorporated by Deed recorded June 29, 1953 in Book 139, page 130, Tillamook County Records.

EXHIBIT "B"
(Tax Account and Map)

APN/Parcel ID(s) 179176 as well as Tax/Map ID(s) 1S1030DC00200

EXHIBIT "C"
(Vesting)

Avalon Heights LLC, an Oregon limited liability company, which acquired title as Avalon Heights, LLC, an Oregon limited liability company

EXHIBIT "D"
(Liens and Encumbrances)

1. Regulations, levies, liens, assessments, rights of way and easements of Netarts-Oceanside Sanitary District.

2. Regulations, levies, liens, assessments, rights of way and easements of Netarts Water District.

3. Rights of the public to any portion of the Land lying within the area commonly known as streets, roads, and highways.

4. Easement(s) for the purpose(s) shown below and rights incidental thereto, as granted in a document:

Granted to:	John Aschim and Henry Morris
Purpose:	Water pipeline
Recording Date:	September 11, 1909
Recording No:	Book 10, page 410
Affects:	Reference is hereby made to said document for full particulars

5. Easement(s) for the purpose(s) shown below and rights incidental thereto, as granted in a document:

Granted to:	Netarts Water District
Purpose:	Public utilities
Recording Date:	November 19, 1973
Recording No:	Book 234, page 509
Affects:	Reference is hereby made to said document for full particulars

6. Easement(s) for the purpose(s) shown below and rights incidental thereto, as granted in a document:

Granted to:	Oceanside Water District
Purpose:	Public utilities
Recording Date:	July 14, 1983
Recording No:	Book 288, page 70
Affects:	Reference is hereby made to said document for full particulars

7. Easement(s) for the purpose(s) shown below and rights incidental thereto, as granted in a document:

Granted to:	Netarts Water District
Purpose:	Public utilities
Recording Date:	June 20, 2012
Recording No:	2012-003343
Affects:	Reference is hereby made to said document for full particulars

EXHIBIT "D"
(Liens and Encumbrances)
(continued)

8. A deed of trust to secure an indebtedness in the amount shown below,

Amount:	$195,000.00
Dated:	August 22, 2017
Trustor/Grantor:	Avalon Heights, LLC
Trustee:	Ticor Title Insurance Company
Beneficiary:	Wauna Federal Credit Union
Recording Date:	September 1, 2017
Recording No.:	2017-05254

An agreement to modify the terms and provisions of said deed of trust as therein provided

Executed by:	Avalon Heights, LLC and Wauna Credit Union (formerly known as Wauna Federal Credit Union)
Recording Date:	November 5, 2018
Recording No:	2018-06592

An agreement to modify the terms and provisions of said deed of trust as therein provided

Executed by:	Avalon Heights, LLC and Wauna Credit Union (formerly known as Wauna Federal Credit Union)
Recording Date:	July 29, 2019
Recording No:	2019-04407

An agreement to modify the terms and provisions of said deed of trust as therein provided

Executed by:	Avalon Heights, LLC and Wauna Credit Union (formerly known as Wauna Federal Credit Union)
Recording Date:	July 21, 2020
Recording No:	2020-04531

END OF EXCEPTIONS

Note: Property taxes for the fiscal year shown below are paid in full.

Fiscal Year:	2020-2021
Amount:	$3,337.42
Levy Code:	0935
Account No.:	179176
Map No.:	1S1030DC00200

EXHIBIT "D"
(Liens and Encumbrances)
(continued)

BOUNDARY DEEDS:

First Addition to Avalon Heights, Plat Book 3, Page 37
Avalon Heights, Plat Book 3, Page 12
Property Line Adjustment Deed, Document No. 2017-007247
Warranty Deed, Document No. 2011-005156
Quitclaim Deed, Document No. 2019-007699

Ticor Title Company of Oregon
Public Record Report for New Subdivision or Land Partition
Order No. 360420009017

DEFINITIONS, CONDITIONS AND STIPULATIONS

1. **Definitions.** The following terms have the stated meaning when used in this report:
   (a) "Customer": The person or persons named or shown as the addressee of this report.
   (b) "Effective Date": The effective date stated in this report.
   (c) "Land": The land specifically described in this report and improvements affixed thereto which by law constitute real property.
   (d) "Public Records": Those records which by the laws of the state of Oregon impart constructive notice of matters relating to the Land.
2. **Liability of Company.**
   (a) This is not a commitment to issue title insurance and does not constitute a policy of title insurance.
   (b) The liability of the Company for errors or omissions in this public record report is limited to the amount of the charge paid by the Customer, provided, however, that the Company has no liability in the event of no actual loss to the Customer.
   (c) No costs (including without limitation attorney fees and other expenses) of defense, or prosecution of any action, is afforded to the Customer.
   (d) In any event, the Company assumes no liability for loss or damage by reason of the following:
      (1) Taxes or assessments which are not shown as existing liens by the records of any taxing authority that levies taxes or assessments on real property or by the Public Records.
      (2) Any facts, rights, interests or claims which are not shown by the Public Records but which could be ascertained by an inspection of the land or by making inquiry of persons in possession thereof.
      (3) Easements, liens or encumbrances, or claims thereof, which are not shown by the Public Records.
      (4) Discrepancies, encroachments, shortage in area, conflicts in boundary lines or any other facts which a survey would disclose.
      (5) (i) Unpatented mining claims; (ii) reservations or exceptions in patents or in Acts authorizing the issuance thereof; (iii) water rights or claims or title to water.
      (6) Any right, title, interest, estate or easement in land beyond the lines of the area specifically described or referred to in this report, or in abutting streets, roads, avenues, alleys, lanes, ways or waterways.
      (7) Any law, ordinance or governmental regulation (including but not limited to building and zoning laws, ordinances or regulations) restricting, regulating, prohibiting or relating to (i) the occupancy, use or enjoyment of the land; (ii) the character, dimensions or location of any improvement now or hereafter erected on the land; (iii) a separation in ownership or a change in the dimensions or area of the land or any parcel of which the land is or was a part; or (iv) environmental protection, or the effect of any violation of these laws, ordinances or governmental regulations, except to the extent that a notice of the enforcement thereof or a notice of a defect, lien or encumbrance resulting from a violation or alleged violation affecting the land has been recorded in the Public Records at the effective date hereof.
      (8) Any governmental police power not excluded by 2(d)(7) above, except to the extent that notice of the exercise thereof or a notice of a defect, lien or encumbrance resulting from a violation or alleged violation affecting the land has been recorded in the Public Records at the effective date hereof.
      (9) Defects, liens, encumbrances, adverse claims or other matters created, suffered, assumed, agreed to or actually known by the Customer.
3. **Report Entire Contract.** Any right or action or right of action that the Customer may have or may bring against the Company arising out of the subject matter of this report must be based on the provisions of this report. No provision or condition of this report can be waived or changed except by a writing signed by an authorized officer of the Company. By accepting this form report, the Customer acknowledges and agrees that the Customer has elected to utilize this form of public record report and accepts the limitation of liability of the Company as set forth herein.
4. **Charge.** The charge for this report does not include supplemental reports, updates or other additional services of the Company.

LIMITATIONS OF LIABILITY

"CUSTOMER" REFERS TO THE RECIPIENT OF THIS REPORT.

CUSTOMER EXPRESSLY AGREES AND ACKNOWLEDGES THAT IT IS EXTREMELY DIFFICULT, IF NOT IMPOSSIBLE, TO DETERMINE THE EXTENT OF LOSS WHICH COULD ARISE FROM ERRORS OR OMISSIONS IN, OR THE COMPANY'S NEGLIGENCE IN PRODUCING, THE REQUESTED REPORT, HEREIN "THE REPORT." CUSTOMER RECOGNIZES THAT THE FEE CHARGED IS NOMINAL IN RELATION TO THE POTENTIAL LIABILITY WHICH COULD ARISE FROM SUCH ERRORS OR OMISSIONS OR NEGLIGENCE. THEREFORE, CUSTOMER UNDERSTANDS THAT THE COMPANY IS NOT WILLING TO PROCEED IN THE PREPARATION AND ISSUANCE OF THE REPORT UNLESS THE COMPANY'S LIABILITY IS STRICTLY LIMITED. CUSTOMER AGREES WITH THE PROPRIETY OF SUCH LIMITATION AND AGREES TO BE BOUND BY ITS TERMS

THE LIMITATIONS ARE AS FOLLOWS AND THE LIMITATIONS WILL SURVIVE THE CONTRACT:

ONLY MATTERS IDENTIFIED IN THIS REPORT AS THE SUBJECT OF THE REPORT ARE WITHIN ITS SCOPE. ALL OTHER MATTERS ARE OUTSIDE THE SCOPE OF THE REPORT.

CUSTOMER AGREES, AS PART OF THE CONSIDERATION FOR THE ISSUANCE OF THE REPORT AND TO THE FULLEST EXTENT PERMITTED BY LAW, TO LIMIT THE LIABILITY OF THE COMPANY, ITS LICENSORS, AGENTS, SUPPLIERS, RESELLERS, SERVICE PROVIDERS, CONTENT PROVIDERS AND ALL OTHER SUBSCRIBERS OR SUPPLIERS, SUBSIDIARIES, AFFILIATES, EMPLOYEES, AND SUBCONTRACTORS FOR ANY AND ALL CLAIMS, LIABILITIES, CAUSES OF ACTION, LOSSES, COSTS, DAMAGES AND EXPENSES OF ANY NATURE WHATSOEVER, INCLUDING ATTORNEY'S FEES, HOWEVER ALLEGED OR ARISING, INCLUDING BUT NOT LIMITED TO THOSE ARISING FROM BREACH OF CONTRACT, NEGLIGENCE, THE COMPANY'S OWN FAULT AND/OR NEGLIGENCE, ERRORS, OMISSIONS, STRICT LIABILITY, BREACH OF WARRANTY, EQUITY, THE COMMON LAW, STATUTE OR ANY OTHER THEORY OF RECOVERY, OR FROM ANY PERSON'S USE, MISUSE, OR INABILITY TO USE THE REPORT OR ANY OF THE MATERIALS CONTAINED THEREIN OR PRODUCED**, SO THAT THE TOTAL AGGREGATE LIABILITY OF THE COMPANY AND ITS AGENTS, SUBSIDIARIES, AFFILIATES, EMPLOYEES, AND SUBCONTRACTORS SHALL NOT IN ANY EVENT EXCEED THE COMPANY'S TOTAL FEE FOR THE REPORT.**

CUSTOMER AGREES THAT THE FOREGOING LIMITATION ON LIABILITY IS A TERM MATERIAL TO THE PRICE THE CUSTOMER IS PAYING, WHICH PRICE IS LOWER THAN WOULD OTHERWISE BE OFFERED TO THE CUSTOMER WITHOUT SAID TERM. CUSTOMER RECOGNIZES THAT THE COMPANY WOULD NOT ISSUE THE REPORT BUT FOR THIS CUSTOMER AGREEMENT, AS PART OF THE CONSIDERATION GIVEN FOR THE REPORT, TO THE FOREGOING LIMITATION OF LIABILITY AND THAT ANY SUCH LIABILITY IS CONDITIONED AND PREDICATED UPON THE FULL AND TIMELY PAYMENT OF THE COMPANY'S INVOICE FOR THE REPORT.

THE REPORT IS LIMITED IN SCOPE AND IS NOT AN ABSTRACT OF TITLE, TITLE OPINION, PRELIMINARY TITLE REPORT, TITLE REPORT, COMMITMENT TO ISSUE TITLE INSURANCE, OR A TITLE POLICY, AND SHOULD NOT BE RELIED UPON AS SUCH. THE REPORT DOES NOT PROVIDE OR OFFER ANY TITLE INSURANCE, LIABILITY COVERAGE OR ERRORS AND OMISSIONS COVERAGE. THE REPORT IS NOT TO BE RELIED UPON AS A REPRESENTATION OF THE STATUS OF TITLE TO THE PROPERTY. THE COMPANY MAKES NO REPRESENTATIONS AS TO THE REPORT'S ACCURACY, DISCLAIMS ANY WARRANTY AS TO THE REPORT, ASSUMES NO DUTIES TO CUSTOMER, DOES NOT INTEND FOR CUSTOMER TO RELY ON THE REPORT, AND ASSUMES NO LIABILITY FOR ANY LOSS OCCURRING BY REASON OF RELIANCE ON THE REPORT OR OTHERWISE.

IF CUSTOMER (A) HAS OR WILL HAVE AN INSURABLE INTEREST IN THE SUBJECT REAL PROPERTY, (B) DOES NOT WISH TO LIMIT LIABILITY AS STATED HEREIN AND (C) DESIRES THAT ADDITIONAL LIABILITY BE ASSUMED BY THE COMPANY, THEN CUSTOMER MAY REQUEST AND PURCHASE A POLICY OF TITLE INSURANCE, A BINDER, OR A COMMITMENT TO ISSUE A POLICY OF TITLE INSURANCE. NO ASSURANCE IS GIVEN AS TO THE INSURABILITY OF THE TITLE OR STATUS OF TITLE. CUSTOMER EXPRESSLY AGREES AND ACKNOWLEDGES IT HAS AN INDEPENDENT DUTY TO ENSURE AND/OR RESEARCH THE ACCURACY OF ANY INFORMATION OBTAINED FROM THE COMPANY OR ANY PRODUCT OR SERVICE PURCHASED.

NO THIRD PARTY IS PERMITTED TO USE OR RELY UPON THE INFORMATION SET FORTH IN THE REPORT, AND NO LIABILITY TO ANY THIRD PARTY IS UNDERTAKEN BY THE COMPANY.

CUSTOMER AGREES THAT, TO THE FULLEST EXTENT PERMITTED BY LAW, IN NO EVENT WILL THE COMPANY, ITS LICENSORS, AGENTS, SUPPLIERS, RESELLERS, SERVICE PROVIDERS, CONTENT PROVIDERS, AND ALL OTHER SUBSCRIBERS OR SUPPLIERS, SUBSIDIARIES, AFFILIATES, EMPLOYEES AND SUBCONTRACTORS BE LIABLE FOR CONSEQUENTIAL, INCIDENTAL, INDIRECT, PUNITIVE, EXEMPLARY, OR SPECIAL DAMAGES, OR LOSS OF PROFITS, REVENUE, INCOME, SAVINGS, DATA, BUSINESS, OPPORTUNITY, OR GOODWILL, PAIN AND SUFFERING, EMOTIONAL DISTRESS, NON-OPERATION OR INCREASED EXPENSE OF OPERATION, BUSINESS INTERRUPTION OR DELAY, COST OF CAPITAL, OR COST OF REPLACEMENT PRODUCTS OR SERVICES, REGARDLESS OF WHETHER SUCH LIABILITY IS BASED ON BREACH OF CONTRACT, TORT, NEGLIGENCE, THE COMPANY'S OWN FAULT AND/OR NEGLIGENCE, STRICT LIABILITY, BREACH OF WARRANTIES, FAILURE OF ESSENTIAL PURPOSE, OR OTHERWISE AND WHETHER CAUSED BY NEGLIGENCE, ERRORS, OMISSIONS, STRICT LIABILITY, BREACH OF CONTRACT, BREACH OF WARRANTY, THE COMPANY'S OWN FAULT AND/OR NEGLIGENCE OR ANY OTHER CAUSE WHATSOEVER, AND EVEN IF THE COMPANY HAS BEEN ADVISED OF THE LIKELIHOOD OF SUCH DAMAGES OR KNEW OR SHOULD HAVE KNOWN OF THE POSSIBILITY FOR SUCH DAMAGES.

END OF THE LIMITATIONS OF LIABILITY

FIRWOOD
DESIGN GROUP
Reliable Engineering Solutions

TO: **DATE:** 04-02-2021

Attn: Melissa Jenk

Tillamook County Department of Community Development - Planning

PROJECT NO. / NAME: E20-036 Second Avalon Heights Subdivision
Land Use Package Submittal

ENCLOSED ARE ONE COPY (unless otherwise noted) OF THE FOLLOWING:

Description

Signed Application
Application Narrative
Supplemental Narrative, Section 070
Land Use Plans (with Preliminary Plat) -15 Copies
Preliminary Stormwater Report
Geohazard Report
Transportation Impact Study
Road Section Analysis
Netarts Water District Water Availability Letter
Netarts-Oceanside Sewer District Availability Letter
Title Report
Letter From DSL
ODOT Review of Draft TIS
Check for Fees

Please let us now if you need additional copies or if we can assist in any way in your processing and review. A link to the electronic copies has been emailed to you. We look forward to working with you on this project.

THESE ARE TRANSMITTED:

X FOR YOUR REVIEW ☐ FOR YOUR FILES

☐ FOR YOUR SIGNATURE ☐ OTHER

359 E. Historic Columbia River Highway Troutdale, OR 97060
Tel: 503-668-3737 Fax: 503-668-3788