ID No. 75

Stormwater Management Report

Our Coastal Village Florence

Elm Park Early Learning Center

Prepared for: Our Coastal Village, Inc.
Prepared by: Jack Present, EIT
Project Engineer: Anna Backus, PE

November 2024 | KPFF Project #2400153

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Appendices

Existing Conditions

Description of Pre-Development Site

The Our Coastal Village Florence Elm Park Early Learning Center site is located northwest of the corner of 9th and Greenwood Streets in Florence, Oregon. See Appendix A1 for a Vicinity Map of the site. The site will eventually be bounded by Greenwood Street on the east, a proposed public alley to the north, a proposed private alley on the west and proposed 10th Street to the south. The site is approximately 0.4 acres in size. There is no constructed storm drainage system on the site. The existing site is fully vegetated and includes shrubs and trees, mainly Pacific Rhododendron. See Appendix A2 for an Existing Conditions Map of the site. The Geotechnical Report indicates the site is entirely Waldport fine sand (Hydrologic Soil Group A). See Appendix C1 for more information.

Proposed Site

Site Description

The proposed site is zoned for commercial use and will be used for an early learning facility. The site will be served by both new public and private streets. The total impervious area added is 0.30 ac (13,276 sf) with 0.13 ac (5,781.1 sf) of that being the proposed building. See Appendix A3 for a Breakdown of Site Areas.

The site will rely on a piped system to collect runoff from the building downspouts and site features. The parking lot runoff will be routed to the rain gardens located behind the building. The building runoff will be piped to the rain gardens as well. Overflow from the rain gardens will be routed to a soakage trench.

Hydrologic Analysis

Water Quality

The City of Florence water quality standards will be met by using rain gardens. Proposed storm runoff from added impervious site and roof areas will be routed to these rain gardens for water quality treatment. For the PUD, the rain garden sizing has been assessed by lot. Individual rain gardens will be sized for the Building Permit. See Appendix A for the Stormwater Basin Map.

The stormwater water quality facilities were sized using the City of Florence SWMM Presumptive Approach. See Appendix B for more information.

Infiltration

Due to the soil type, the site soil can be assumed to have favorable infiltration rates. The infiltration rate can be assumed to be equal to or greater than 6 inches per hour. Per the Geotech Report, the groundwater is estimated to be 7.5 to 8.3 feet deep. The treated runoff from the stormwater facilities will be routed to subsurface soakage trenches for infiltration. A minimum of 5 feet will be maintained between the bottom of the soakage trenches and all the water will be pre-treated. All the soakage trenches are considered UIC's and all will be designed so they meet the Rule Authorization standards for DEQ, which have a 2-week review.

The soakage trenches were sized per the Florence SWMM standards.

The runoff was modeled using the Santa Barbara Urban Hydrograph Method to demonstrate that the proposed rain gardens treat the water quality storm and that the soakage trenches will infiltrate the City of Florence 25-year design storm (5.06 in/24hr). See Appendix B for Calculations.

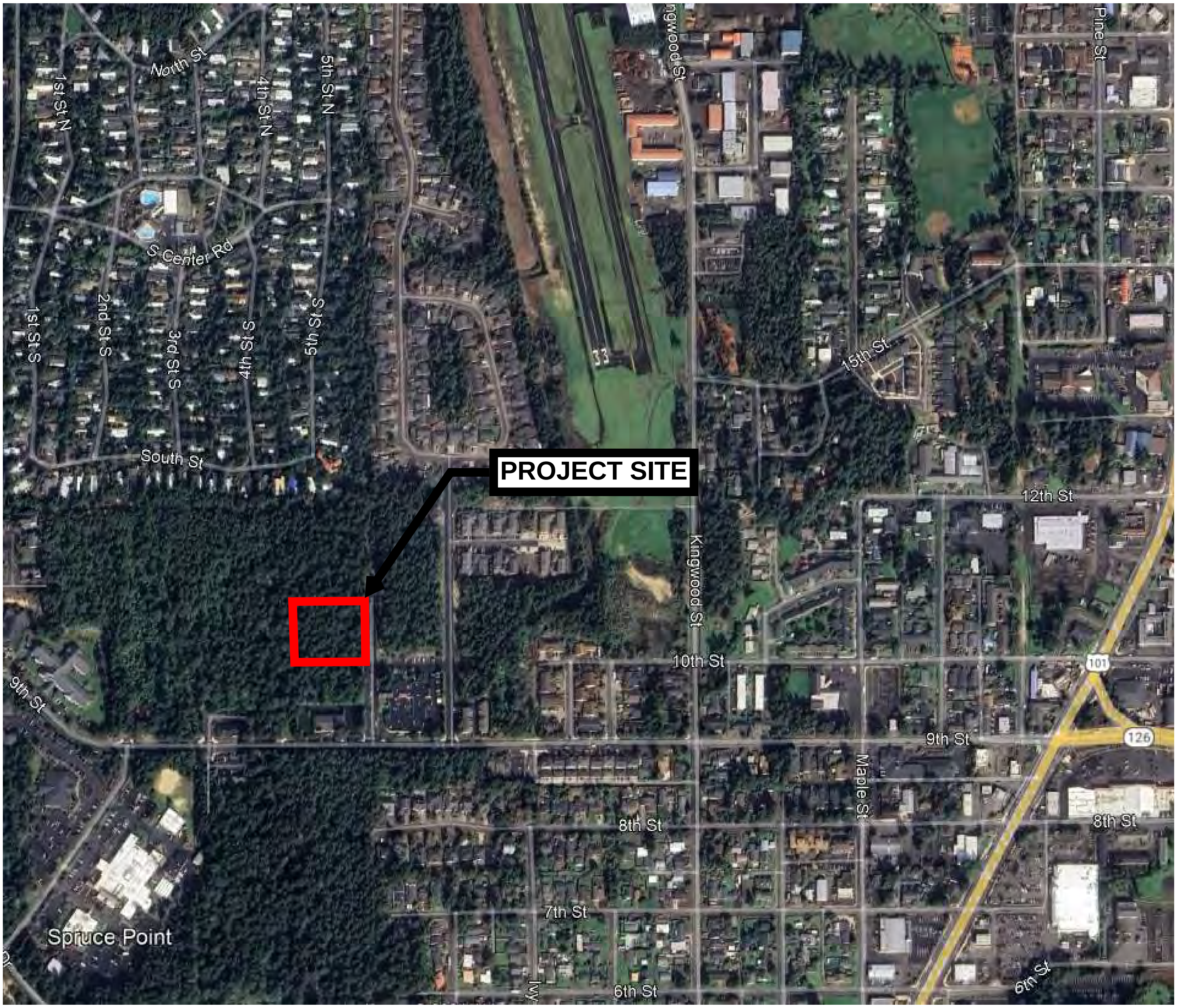
Emergency Overflow

An emergency overflow connects the soakage trenches to the public storm system per the City of Florence SWMM's requirements. The overflow pipe will be set at 1-foot above the top of the soakage trench, to ensure that the full 25-year design storm is infiltrated on site.

2400153-kg

Appendix A

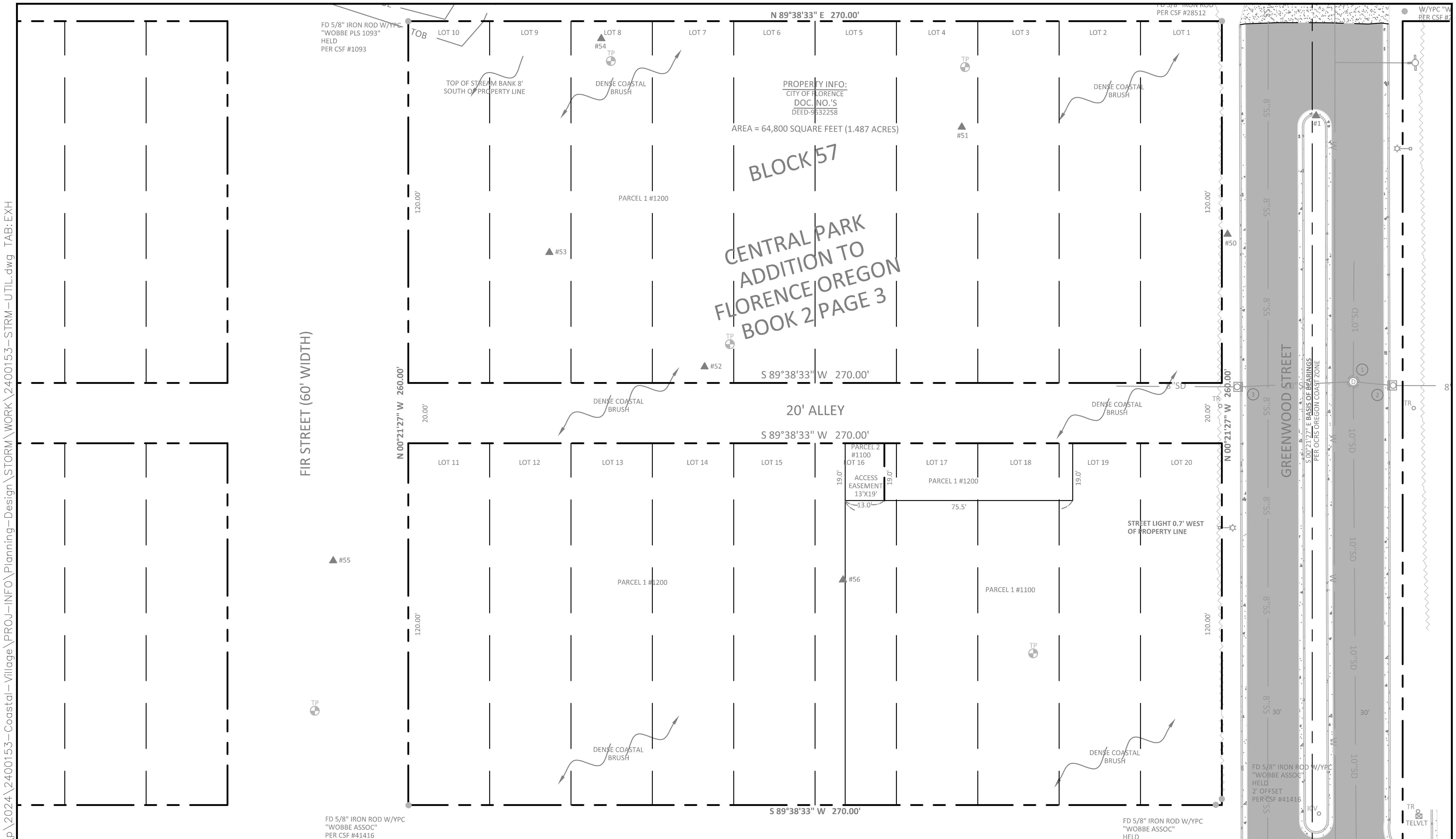
Drainage Basin Information



VICINITY MAP

A-1

#2400153



OUR COASTAL VILLAGE FLORENCE
EXISTING CONDITIONS PLAN

SCALE: 1"=30'

0 30' 60'

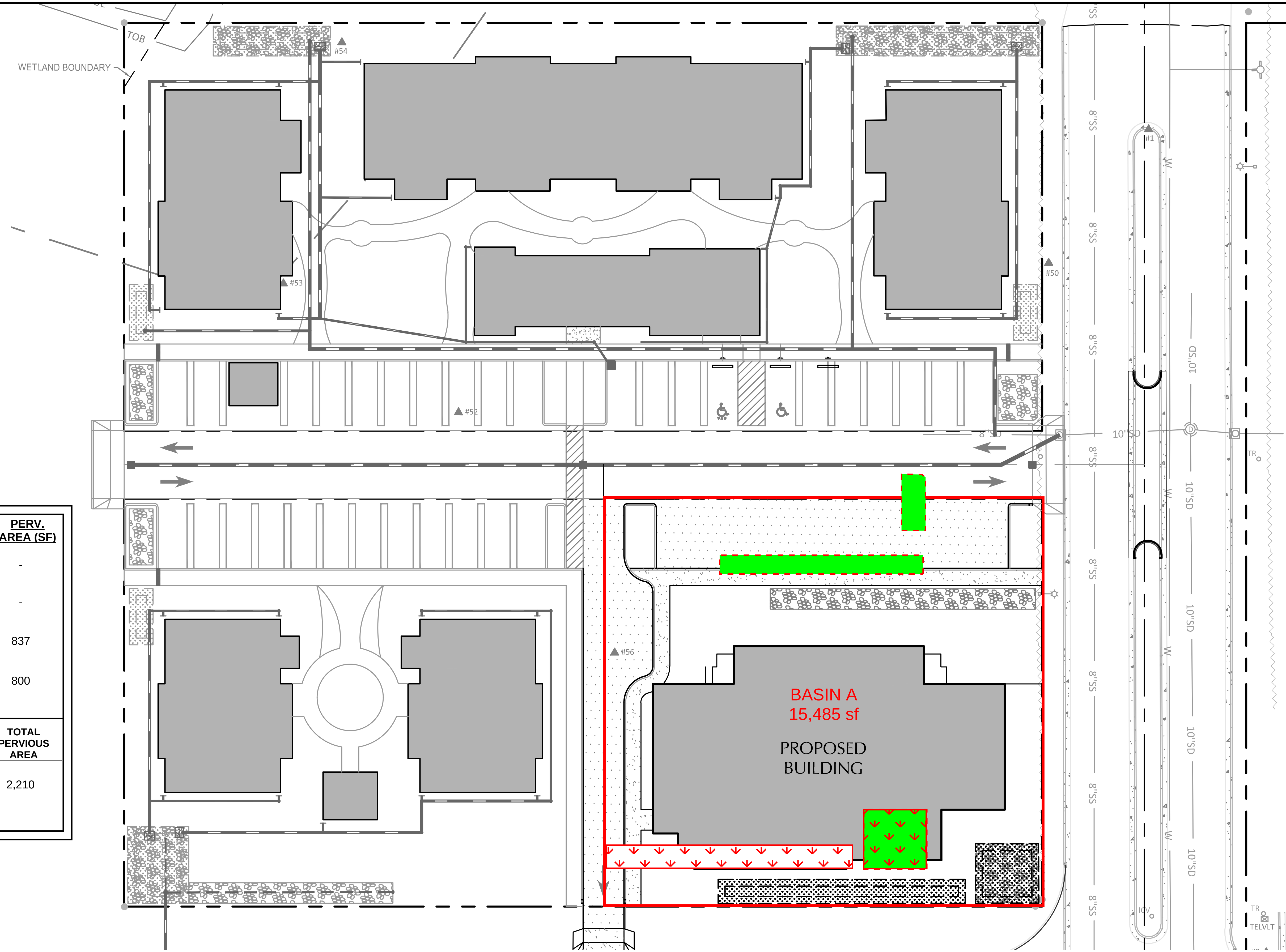
SHEET NO.

EXH

File: O:\c\p\2024\2400153-Coastal-Village\PROJ-INFO\Planning-Design\STORM\WORK\2400153-STRM-UTIL.dwg TAB: EXH

11X17-EXHIBIT

Plotted: 8/16/24 at 11:07am By: jpresent



BASIN A

	SURFACE TYPE	IMPERV. AREA (SF)	PERV. AREA (SF)
	PAVEMENT	7,494	-
	ROOF	5,781	-
(red hatched symbol)	STORMWATER TREATMENT	-	837
(green symbol)	STORMWATER INFILTRATION	-	800

BASIN	DRAINS TO	TOTAL AREA	TOTAL IMPERVIOUS AREA	TOTAL PERVIOUS AREA
A	Infil-trates	15,485	13,275	2,210

OUR COASTAL VILLAGE FLORENCE
BASIN MAP

SCALE: 1"=30'

0 30' 60'

SHEET NO.

A3

File: O:\c\p\2024\2400153-Coastal-Village\PROJ-INFO\Planning-Design\STORM_CURRENT-ELF\PR-BASINS.dwg TAB: A3

11X17-EXHIBIT

Plotted: 11/1/24 at 3:04pm By: ABackus

Appendix B

Runoff and Water Quality Calculations

SBUH Calculation Worksheet for Florence Storm Events

Project Name: Our Coastal Village - ELF **Date: 8.22.24**
Designer: JP/AB **Basin: A**

User-Supplied Data

Pervious Area		**Impervious Area**	
Pervious Area, SF	2,210	Impervious Area, SF	13,275
Pervious Area, Acres	0.05	Impervious Area, Acres	0.30
Pervious Area Curve Number, CNperv	80	Impervious Area Curve Number, CNimp	98
Time of Concentration, Tc, minutes	5	Note: minimum Tc is five minutes	

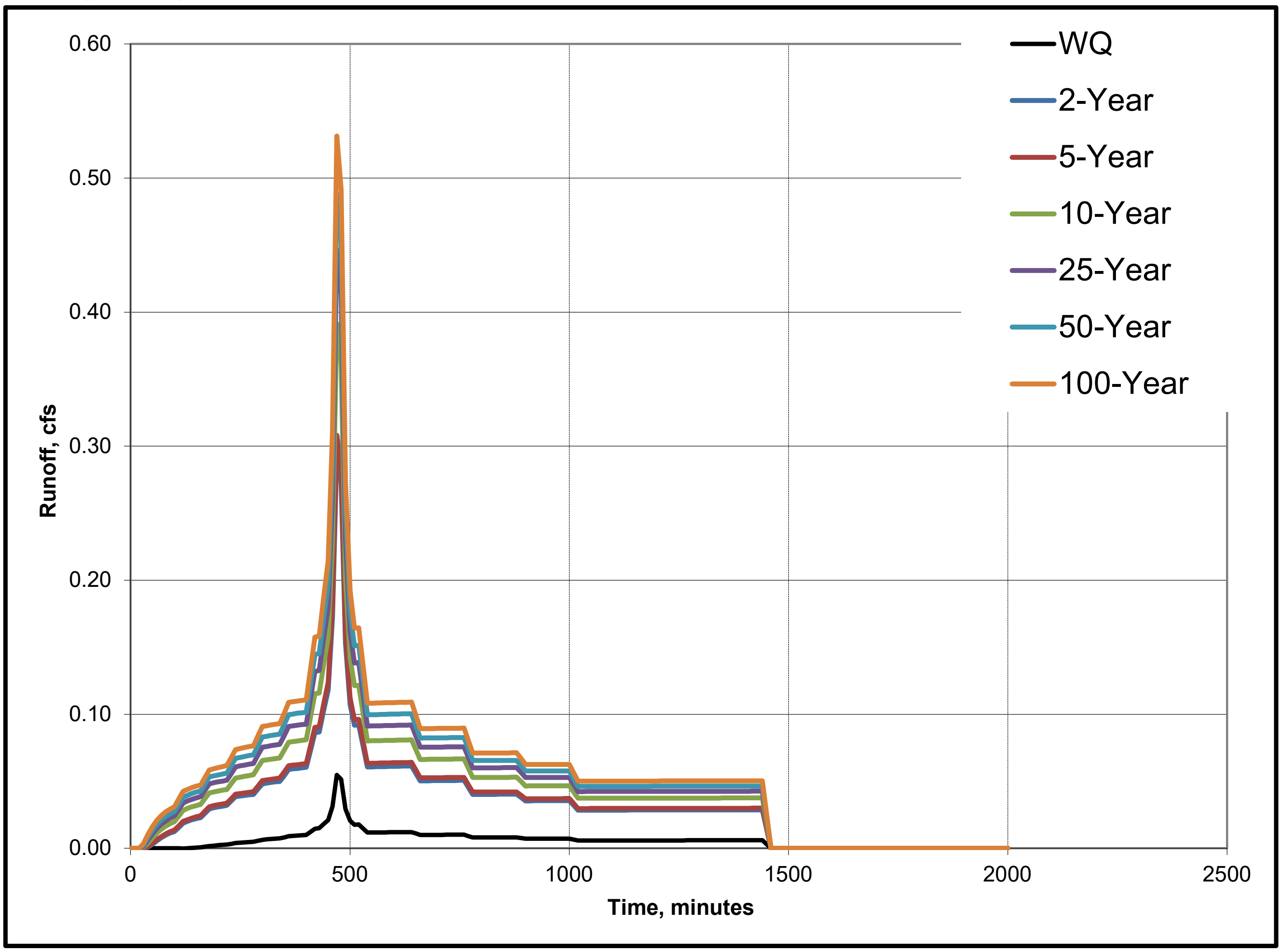
City of Florence 24-Hour Rainfall Depths (NRCS Type 1A distribution)							
Recurrence Interval	WQ	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Inches	0.83	3.46	3.6	4.48	5.06	5.5	5.95

Calculated Data

Total Project Area, Acres	**0.36**	Total Project Area, Square Feet	**15,485**

Recurrence Interval	WQ	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Peak Flow Rate, Qpeak, cfs	**0.05**	**0.29**	**0.31**	**0.39**	**0.45**	**0.49**	**0.53**
Total Runoff Volume, V, cubic feet	**701**	**3,865**	**4,040**	**5,145**	**5,878**	**6,435**	**7,007**
Time to Peak Runoff, hours	**7.83**	**7.83**	**7.83**	**7.83**	**7.83**	**7.83**	**7.83**

Runoff Hydrograph



Eugene Stormwater Facility Calculator

Project Name: Our Coastal Village - ELF

Basin: A

Date: 8.22.24

Instructions:

1. Choose Facility Type
2. Choose shape
3. Complete information in highlighted cells

Facility

Raingarden

Above-Grade

Bottom Area:	406	sf
Top Area:	837	sf
Side Slope:	4	to 1
Storage Depth:	6	in
Growing Media:	18	in

Surface Storage Capacity	**311**	cf
Infiltration Area	**837**	sf
GM Infiltration Rate	**2.5**	in/hr
Infiltration Capacity (avg)	**0.048**	cfs

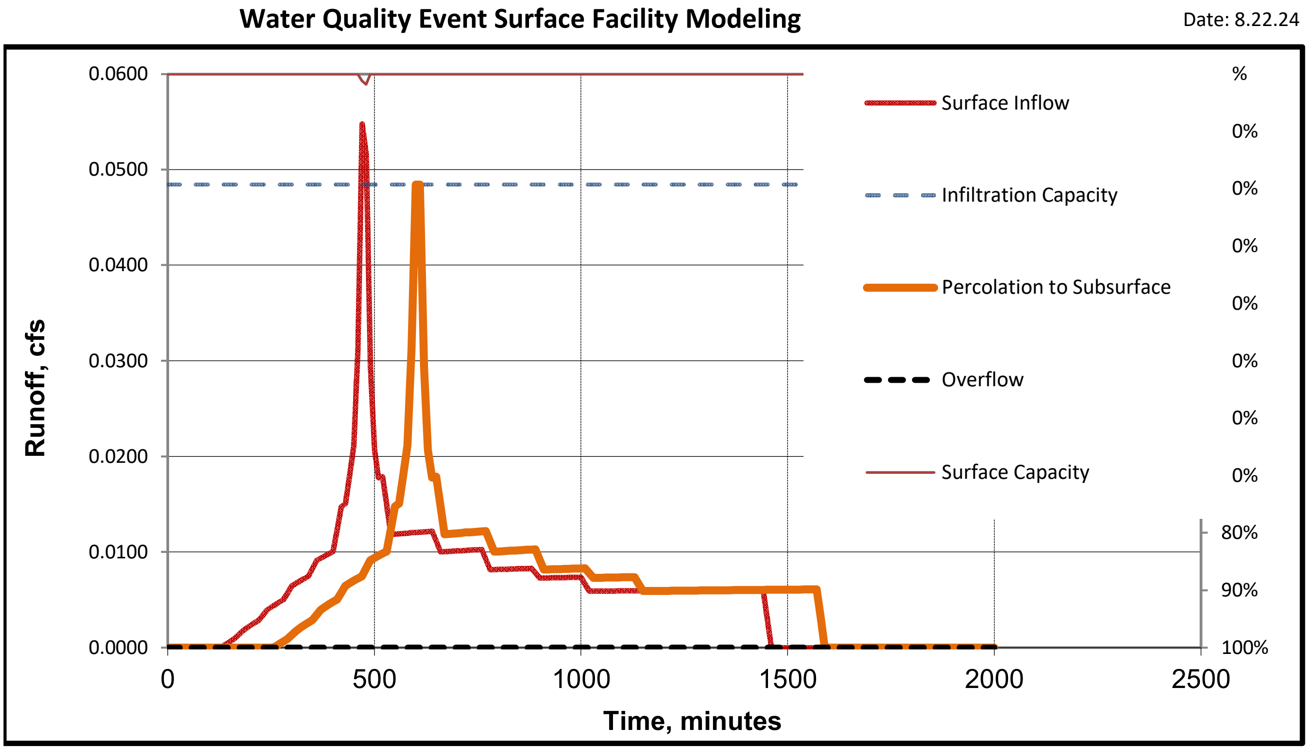
Below-Grade

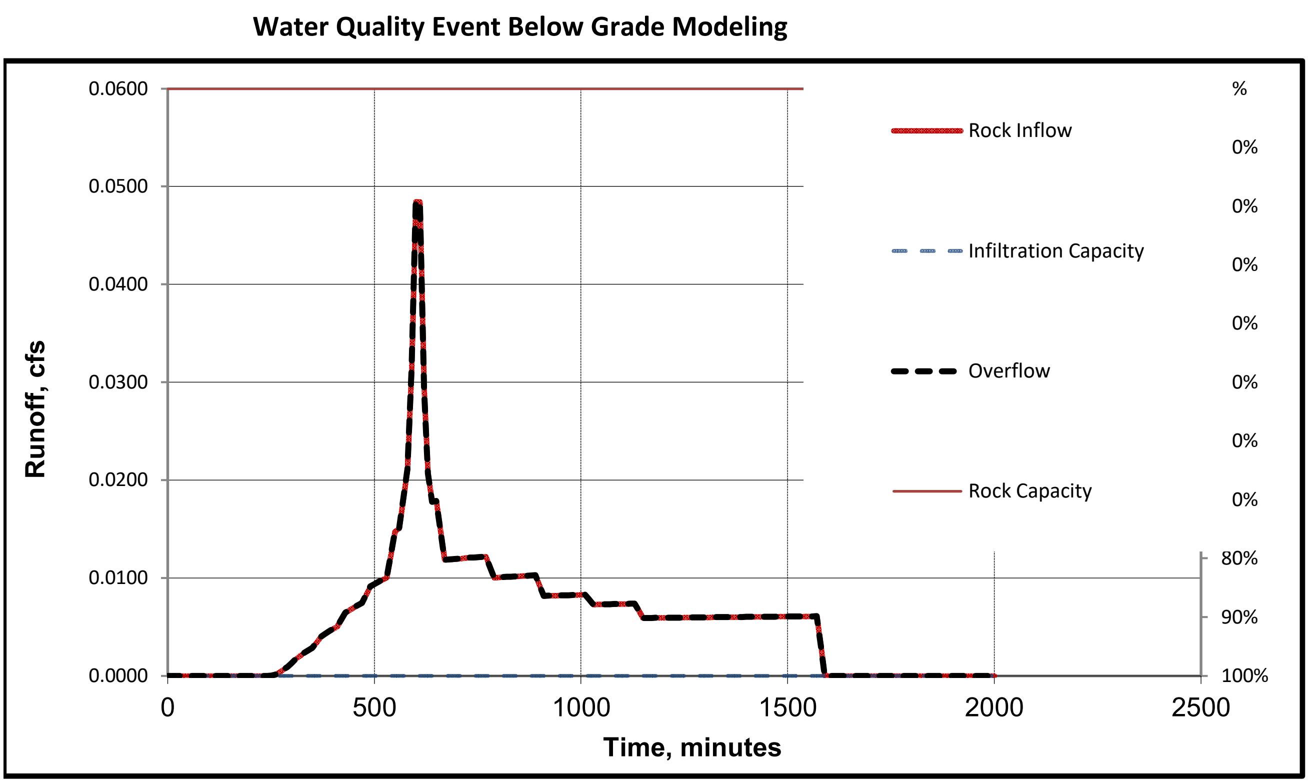
See Detention Calculations

Results

WATER QUALITY EVENT	**PASS**	**ROCK CAPACITY**	**0%**
SURFACE CAPACITY	**2%**		

Recurrance Interval	Peak Flow (cfs)	Volume (cf)	Rock Capacity	Meets Infiltration?
WQ	0.0484	695	**N/A**	See Detention
2-Yr	0.2949	3,616	**N/A**	**10-Yr Infiltration Volume (cf):**
5-Yr	0.3081	3,756	**N/A**	
10-Yr	0.3914	4,847	**N/A**	**298**
25-Yr	0.4465	5,580	**N/A**	
50-Yr	0.4884	6,135	**N/A**	
100-Yr	0.5313	6,725	**N/A**	


Water Quality Event Surface Facility Modeling
Runoff, cfs
0.0600
0.0500
0.0400
0.0300
0.0200
0.0100
0.0000
0
500
1000
1500
2000
2500
Time, minutes
Surface Inflow
Infiltration Capacity
Percolation to Subsurface
Overflow
Surface Capacity
%
0%
0%
0%
0%
0%
0%
0%
80%
90%
100%


Water Quality Event Below Grade Modeling
Runoff, cfs
0.0600
0.0500
0.0400
0.0300
0.0200
0.0100
0.0000
0
500
1000
1500
2000
2500
Time, minutes
Rock Inflow
Infiltration Capacity
Overflow
Rock Capacity
%
0%
0%
0%
0%
0%
0%
0%
80%
90%
100%

Detention Worksheet

Project Name: Our Coastal Village - ELF

Basin: A

Date: 8.22.24

Instructions:

1. Choose Storm Event to limit
2. Enter maximum runoff
3. Choose detention facility

Storm Event 25-Yr

Max. Runoff 0.00 cfs

Detention Facility Rocked

Area	800	sf
Void Space	0.4	
Depth	2.2	ft (min.)
Infiltration Rate	6	in/hr

Orifice Sizing

A = Orifice Area, in sf
Q=Max Runoff Flow, in cfs
C=Orifice Coefficient (0.63)
H=Height of Water on Orifice

Depth from Pond Bottom to Orifice:	0.50
Water Height:	2.70
Orifice Area:	0.00
Orifice Size:	0.0

Results

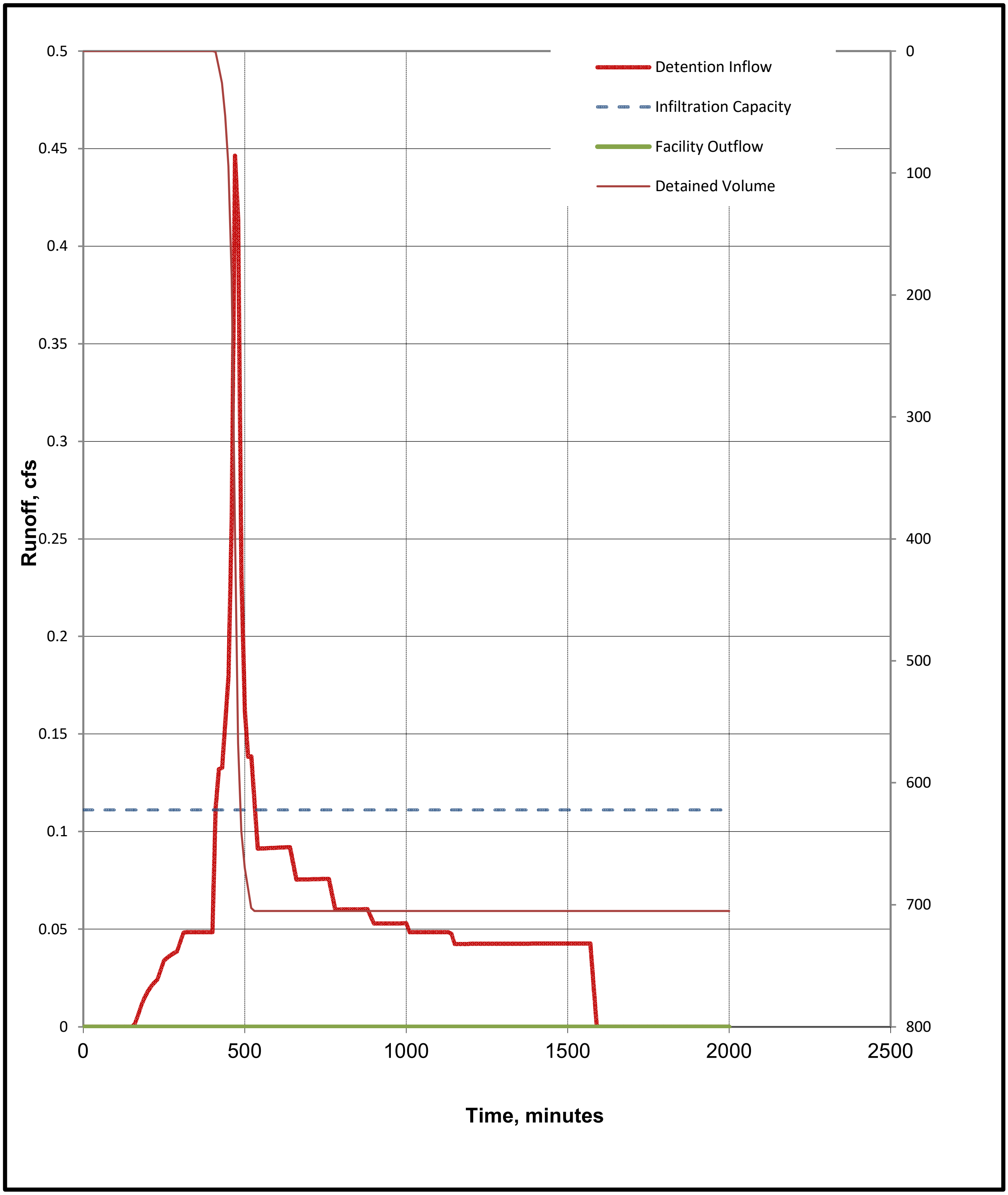
Required Detention Volume	**705**	cf

Recurrance Interval	Undetained Flow (cfs)	Undetained Volume (cf)
WQ	0.0000	0
2-Yr	0.0000	0
5-Yr	0.0000	0
10-Yr	0.0000	0
25-Yr	0.0000	0
50-Yr	0.2526	148
100-Yr	0.4916	299

Detention Hydrograph 25-Yr

Basin: A

Date: 8.22.24



Appendix C

Soils Information

June 21, 2024

Layne Morrill
Our Coastal Village, Inc.
P.O. Box 108
Yachats, OR 97498
Email: klaynemorrill@gmail.com

RE: GEOTECHNICAL ENGINEERING INVESTIGATION
ELM PARK PUD
TAX LOTS 18-12-27-31-01100 & 01200
FLORENCE, OREGON
BRANCH ENGINEERING INC. PROJECT NO. 24-191

Pursuant to your authorization, Branch Engineering Inc. (BEI) has performed a geotechnical engineering investigation at the subject site for the proposed development of multi-family residential units, a community building, and child care facility on the approximately 1.5-arce subject site. On June 11, 2024 five (5) exploratory test pits were advanced using a Komatsu PC 35 MR tracked excavator, to a maximum depth of 9.5-feet below ground surface (BGS). The subsurface soil conditions in the test pits were logged in accordance the USCS (Unified Soil Classification System) ASTM D2488.

The accompanying report presents the results of our site research, field exploration and testing, data analyses, as well as our conclusions and recommended geotechnical design parameters for the project. Based on the results of our study, the site may experience liquefaction and severe shaking in the event of a Cascadia Subduction Zone (CSZ) earthquake. Recommendations for the risk posed to the development by seismic hazards are presented herein, which includes the potential for severe shaking and induced settlement due to liquefaction. The risk is no greater for this site than its surrounding area and complete mitigation of these hazards is either likely not to be feasible by current engineering design methods or be economically feasibility. The client accepts the risk of a natural disaster occurring and the potential damage to the proposed development. No other geotechnical/geologic hazards were identified at the site that would impede development as planned, provided that the recommendations of this report are implemented in the design and construction of the project.

Sincerely,
Branch Engineering Inc.

REGISTERED PROFESSIONAL ENGINEER #16,170 OREGON SEPT 15, 1992 RONALD J. DERRICK
EXPIRES: 12/31/25

Sam Rabe

Sam Rabe, EIT
Field Engineer

Ronald J. Derrick P.E., G.E.
Principal Geotechnical Engineer

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1.0 INTRODUCTION

1.1 Purpose and Scope of Work

The purpose of this work is to assess the pertinent geotechnical engineering parameters related to the site and subsurface conditions that may influence the design and construction of the proposed project. Our scope of work included a field reconnaissance with subsurface exploration stipulated by the 2022 Oregon Structural Specialty Code (OSSC) Section 1803.3 that was performed on June 11, 2024. Explorations were observed and logged by BEI geotechnical staff; in-situ testing and collection of representative samples was conducted for additional assessment to formulate foundation design parameters. BEI has conducted an engineering data review of work by BEI in the area, and other pertinent site research activities that culminated in the preparation of this report as outlined by Section 1803.6 of the OSSC.

1.2 Project Location and Description

The 1.5-acre subject site is comprised of multiple tax lots separated by a 23-foot wide, alley right-of-way between an existing portion of Greenwood Street on the east side and unimproved Fir Street to the west. The site is currently heavily vegetated and located at coordinates of 43.975516°, North Latitude, and 124.114416° West Longitude in Florence, Oregon. The site is nearly rectangular in shape measuring 270'x260' including the alley width. The area immediately adjacent to the site is undeveloped property with a municipal building and office building located about 300-feet southeast and south, respectively.

Although a survey of the site has not yet been provided, the site topography is relatively flat, with elevation changes of up to 5-feet. The site is heavily vegetated with vegetation consisting of shore pines, manzanita, salal, rhododendrons, and other vegetation typical of the Oregon Coast dune ecology. A creek within a shallowly depressed area is located within the northwest corner of the property.

Based on a preliminary drawing provided to BEI by the client, five separate multi-family housing structures are proposed for the site along with a community building/office, a child care facility, playgrounds, and a garden area with a greenhouse. The residential structures will be three stories tall with building footprints on the order of 3,500- and 4,500 square feet with the largest building footprint of 6,000 square feet being the childcare facility located in the southeast corner of the site. Specific structural loads were not provided; however, 3-story wood-framed apartment buildings typically do not exceed 15-kip column loads or 2 kip/ft line loads on foundations. A double-sided parking lot is shown in the alley alignment between the four proposed structures on the north half and the three structures on the south half.

1.3 Site Information Resources

The following site investigation activities were performed and literature resources were reviewed for pertinent site information:

- Review of the United States Department of the Interior Geological Survey (USGS) 1984 Florence, Oregon Quadrangle Map 7.5 Minute Series.
- Department of Geologic and Mining Industries (DOGAMI) Online Geologic Map of Oregon (Walker and MacLeod, 1991) and DOGAMI Bulletin 85, Environmental Geology of Coastal Lane County, Oregon 1974
- Review of the USGS Geologic Map of Oregon, (USGS 1991, Walker & MacLeod).
- Five (5) exploratory test pits advanced to a maximum depth of 9.5-feet BGS on June 11, 2024 at the approximate locations shown on the attached Figure-2 Site Exploration Map. See attached boring log summaries in Appendix A.
- DOGAMI web hazard viewer (HazVu) and Statewide Landslide Information Layer for Oregon (SLIDO).
- DOGAMI Open File Report 0-21-12, Landslide Inventory Map of the Coastal Portion of Lane County, Oregon, 2021
- Review of the Web Soil Survey of Lane County Area, United States Department of Agricultural (USDA) Natural Resources Conservation Service (NRCS) (attached in Appendix A).
- Review of Oregon Department of Water Resources Well Logs (attached in Appendix A).
- Oregon Structural Specialty Code 2022 (OSSC 2022), applicable building code criteria

2.0 SITE SUBSURFACE CONDITIONS

The analyses, conclusions and recommendations contained in this report are based on site conditions as they presently exist and assume that our exploratory test pit findings presented in Appendix A are representative of the subsurface conditions throughout the site. If during construction subsurface conditions differ from those encountered in the exploratory test pits, BEI requests that we be informed to review the site conditions and adjust our recommendations if necessary.

2.1 Subsurface Soils

Visual classification of the near surface soils was performed in accordance with the American Society of Testing and Materials (ASTM) Method D-2488 and the Unified Soil Classification System (USCS). In general, test pits were consistent between locations for logged strata. Groundwater was noted in all test pits during excavation. Subsurface conditions generally consisted of the following:

- Sandy organics “forest duff” 6- to 12-inches in thickness
- Gray-brown poorly graded sand and roots to an average of 2-feet BGS
- Red-brown sand (SP) that was observed to be partially cemented at certain depths; medium dense, to dense.
- A thin (<6-inches thick) gray poorly graded sand and organics lens. We interpreted this as a buried topsoil horizon. Found in Test Pits 1, 2, 4, and 5. This possible relic topsoil may have been buried by wind shifted sand or tsunami deposits.
- Medium dense, moist to wet, brown-tan sand (SP) with groundwater percolating into the excavation along with “running sand”. Caving of sidewalls usually occurred once groundwater was reached.

The NRCS Web Soil Survey mapping unit was used to identify soils at the project site and is summarized below in Table 1:

Table 1: Site Soil Units

Unit Name	***Description***
131C—Waldport fine sand	Excessively drained, landform consisting of dunes, parent material is eolian sand of mixed origin, and slopes between 0- and 7-degrees

Nearby well logs show that sands are present to a depth of over 100-feet BGS.

2.2 Groundwater

Groundwater was encountered in Test pits 2, 4, and 5 during site explorations with depths ranging from 7.5- to 8.3-feet BGS. Wet sand was found in all test pits below 7-feet BGS. The Well Logs attached in Appendix A were obtained from the Oregon Department of Water Resources online database and are mapped as being in the vicinity (0.5-mile) from the subject site and show a static water level measured after drilling at about 18-feet BGS at the well location, the elevation of the well site is unknown and may be higher than that of the subject site.

Dewatering will likely be necessary for in-ground utility work. Utilities deeper than 4-feet BGS will likely require shoring or laying back of sidewalls at a slope of 1:1 (H:V) if granular soils are wet. If the site pursues an infiltration-based design for the disposal of storm water, infiltration basins are recommended to be placed at least 10-feet from foundations and at a sufficient depth to promote vertical migration of infiltrated water.

3.0 GEOLOGIC SETTING

The following sections describe the regional and local site geology. Our field findings are consistent with the geologic mapping of the site area by the Oregon Department of Geology and Mineral Industries and the 1991 Geologic Map of Oregon (Walker and MacLeod).

3.1 Regional Geology

The western boundary of the North American continent lies offshore of the Oregon coast where the oceanic Juan de Fuca plate descends under the North American plate forming the Cascadia Subduction Zone (CSZ). The subduction of the oceanic plate led to the accretion of a large oceanic igneous province formed during the Paleocene to middle Eocene onto the North American plate. This province is named the Siletz River Volcanics and forms the basement rock of the region. Deposited within, intruding, and overlying the Siletz formation are marine siltstone, mudstones, and sandstones formed by deposition of turbidity currents derived from terrestrial sources.

3.2 Site Geology

The subject site is located near the northern extent of the longest coastal strip of dunes on the Oregon Coast. The dunes in the area were likely formed post ice-age during the Holocene epoch by eolian processes associated with the activity of wind. The typical pattern seen in the area is transverse dunes (running parallel to the ocean) caused by the varying on, and off shore winds. The area is mapped as sedimentary deposits of the Holocene and or Pleistocene, unconsolidated to poorly consolidated eolian sands and fluvial sedimentary deposits. The subject site is underlain by Holocene-aged sedimentary deposits of unconsolidated to poorly consolidated fine-grained sands.

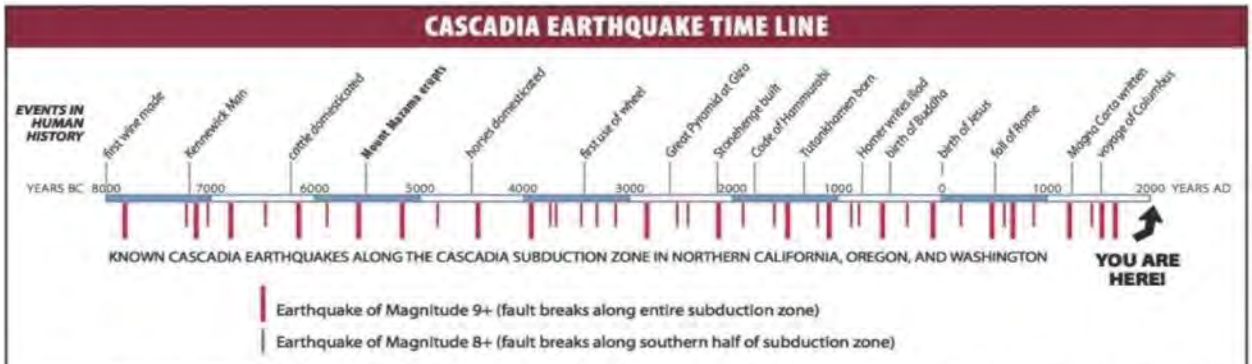
3.3 Geologic Hazards

OSSC Sections 1803.5.11 and 1803.5.12 outline the hazards to be addressed by this geotechnical investigation for seismic design categories C through F, which are presented below:

Earthquake Shaking: The site is located on the Oregon Coast where the CSZ is located approximately 100-miles off the coast line and is a zone of converging tectonic plates that historically produces major earthquake events. The Juan de Fuca binds with the North American plate, causing the North American plate to compress and bow upwards. This continues until the stress exceeds the binding forces, causing large magnitude earthquakes. The repeated cycle of these earthquakes can be seen in the geology as layers of peat and alternating mud-rich intertidal deposits. A major risk to coastal development, the CSZ has historically produced intraplate earthquakes with moment magnitudes (M_W) that can exceed 9.0. Tsunamis, sudden near shore land subsidence, earthquake induced soil liquefaction, and landslides can all be expected to occur during a future CSZ megathrust earthquake. A depiction of the historical Subduction Zone earthquake events is shown below in the following figure. The DOGAMI HazVu website shows the subject site is expected to experience severe shaking in the event of a CSZ earthquake, and very strong shaking for lesser earthquakes, and a high hazard for earthquake-initiated soil liquefaction.

The site is predicted to experience “severe” to “violent” shaking, as mapped by the DOGAMI Hazard Viewer. Strong shaking generally correlates to a Modified Mercalli Intensity (MMI) rating of VI. Shaking of this magnitude is described as shaking objects off of shelves and causing minor damage to structures and chimneys. Some isolated areas of rockfalls, landslides, and instances of liquefaction may occur. Violent shaking generally correlates to a MMI rating of IX, which is described as causing collapse of unreinforced masonry structures and damage that is moderate to severe in buildings designed to be resistant to earthquakes. People can be forcibly thrown to the ground during this level of shaking[i].

The rupturing of faults within the Earth’s crust is generally the cause of earthquakes. The ability of a given fault to produce an earthquake that could cause significant shaking at the site is dependent upon the direction of the fault, size of the earthquake that the fault can produce, and its distance from the site. The nearest mapped active fault to the site is located approximately 5.8-miles to the southwest; however, the primary generator of the level of shaking that is expected to occur at the site is the CSZ. Rupture of this fault can produce earthquakes and tsunamis similar to those that occurred during the 1960 and 2020 Chilean earthquakes, the 1964 Good Friday earthquake in Alaska, the 2004 Sumatran earthquake, and the March 2011 quake in Japan. The estimated probability of such an earthquake occurring off the Oregon Coast within the next 50-years is as high as 12-percent[ii]. The image on the following page shows a timeline of historical subduction zone earthquake events and their estimated magnitudes with respect to human history. Earthquakes of similar magnitudes are expected to occur from the CSZ again in the future that is expected to cause widespread damage and disruption to the Pacific Northwest.



Comparison of the history of subduction zone earthquakes along the Cascadia Subduction Zone in northern California, Oregon, and Washington, with events from human history. Ages of earthquakes are derived from study and dating of submarine landslides triggered by the earthquakes. Earthquake data provided by Chris Goldfinger, Oregon State University; time line by Ian P. Madin, DOGAMI.

- <u>Slope Instability</u>: The site is not mapped as being at risk for landsliding. The potential for landslides to occur onsite is unlikely due to the relatively flat topography on-site and that of the surrounding terrain. The risk for slope instability to affect the proposed development is low.

- <u>Liquefaction</u>: Liquefaction is caused by the rapid increase of porewater pressure within a saturated soil that leads to the reduction of the interparticle friction between soil grains and can cause a sudden loss of shear strength within the soil. This can lead to the loss of bearing capacity, densification of subsurface soils that can cause large surficial settlements, and the migration of soil particles to the surface in the form of sand boils. Loose, granular soils with a low fine-grained soil content and with a recent depositional history are especially vulnerable to liquefaction. Saturation is required for a soil to experience liquefaction.

  The soils observed at the site in the test pits are loose sands with low silt and clay contents and are of a young geologic age. Groundwater was observed in all exploratory test pits in the near surface—within 8.5-feet. It is our opinion that the onsite sand is susceptible to liquefaction during a significant seismic event. The risk of differential settlement and damage to the proposed structures can be reduced if the recommendations in the Building Foundation Subgrade Preparation section below are incorporated into design.

  The DOGAMI online hazard viewer maps the site as having a moderate to high risk for liquefaction. This is likely due to the relative age of the underlying young alluvial deposits that were deposited within the last 10,000-years. Our site explorations observed medium dense poorly graded sand down to the water level where the density of the sand was slightly more dense but saturate.

- <u>Fault Surface Rupture:</u> As previously stated above, there are no known faults on, or near to, the site. Surface displacement due to surface faulting or rupture is not expected to occur onsite although it may be possible, if unlikely, that unmapped faults exist beneath the site.

- <u>Seismically Induced Lateral Spreading or lateral flow</u>: There are no abrupt changes in ground elevation on or near the site other than an apparent shallow drainageway in the northwest corner of the site that would present a potential for lateral spreading to occur during a seismic event; the risk for lateral spread on the site is low, provided any embanked fill on the site is constructed per the recommendations in this report.

- Tsunami/seiche: Based on the Tsunami Inundation Map Lane-04 Florence and the DOGAMI HazVu website, the subject site is mapped outside of the tsunami inundation limit for a XXL, 9.1 to over 9.1 earthquake magnitude. These limits are speculated and should not be considered exact. A tsunami generated by a CSZ earthquake may result in damage to the subject site and will likely affect access to the site. The nearest body of water is to the site is the Siuslaw River about 0.5-mile west with the ocean about 1.25-west of the site.

- Surface Displacement due to faulting: There are no known active faults on the site, with the nearest mapped faults being more than 5-miles away from the site.

- Total and Differential Settlement: The estimated amount of static total and differential settlement is estimated to be less than ¾-inch and ½-inch, respectively, provided subgrade preparation follows the recommendations in Section 5.2 of this report. Larger total and differential settlements are anticipated in the event of a significant seismic event that causes the site to experience liquefaction. The magnitude of the differential settlement can be minimized by incorporating the more conservative design option outlined below.

- Expansive Soils: The site sand subgrade has little to no expansive soil characteristics.

- Flood Risk: The site is mapped outside the 100-year flood plain.

4.0 CONCLUSIONS

Our investigation revealed the presence of potentially liquefiable soils over the entire site within the saturated zone below a depth of 7-feet or more. The near surface sands can be densified in-place to some degree to facilitate foundation support; however, the saturated sands are likely to experience liquefaction during a significant seismic event and some settlement and differential settlement should be expected.

5.0 RECOMMENDATIONS

The following sections present site-specific recommendations for site preparation, drainage, foundations, utility excavations, and slab/pavement design. General material and construction specifications for the items discussed herein are provided in Appendix B.

5.1 Site Preparation and Foundation Subgrade Requirements

The following recommendations are for earthwork in the building foundation areas, public roadway, and private parking areas. Earthwork shall be performed in general accordance with the standard of practice as generally described in Appendix J of the Uniform Building Code, the Oregon Structural Specialty Code, and as specified in this report.

All areas intended to directly or laterally support structures, roadways, or pavement areas shall be stripped of vegetation, organic soil, unsuitable fill, and/or other deleterious material. These strippings shall be removed from the site, or reserved for use in landscaping or non-structural areas. In areas of existing trees, vegetation, or if any undocumented fill is observed, the required depth of site stripping/grubbing may be increased. The stripping and grubbing depth for the site is expected to be less than 12-inches in depth unless root zones are encountered, which may be up to 24-inches thick. The northwest area of the site near the creek may require additional excavation depth and shall be evaluated at the time of building pad preparation.

The subsurface conditions observed in our site investigation test pits are consistent; however, the test pits only represent those specific locations on the site. Should soft or unsuitable soils extend to a depth greater than that described herein, or areas of distinct soil variation be discovered, this office shall be notified to perform site observation and additional excavation may be required.

Areas of Private Access and Parking Improvements

The depth to suitable subgrade for roadway structural sections is below the organic topsoil layer found to be 6- to 12-inches thick in our test pits. We recommend that the top 12-inches of pavement subgrade be prepared by moisture conditioning and subsequent compaction with a smooth drum roller (minimum 7,500 lbs. drum weight). Should grading plans require engineered fill, see section 5.3 for engineered fill requirements. Prior to placing compacted crushed rock aggregate for the roadway structural section, the exposed subgrade shall be approved by the Geotechnical Engineer of Record (GER) or approved representative.

Localized soft/loose areas may be encountered during excavation activities and may require removal and replacement with structural fill, or recompaction. Proof rolls with a loaded 10 cubic yard haul truck or equivalent vehicle shall be conducted on the prepared subgrade prior to the placement of compacted aggregate. Any observed areas of deflection or excessive rutting under load shall be corrected prior to placement of compacted aggregate.

Utility trenches excavated to depths below the top of the subgrade elevation shall be backfilled with material compacted to 90% relative compaction as determined by ASTM D1557 or AASHTO T-180 (modified Proctor). We expect that fill placed on the site will generally be the native sandy soil that will require moisture conditioning and appropriate compaction equipment selection. Sampling of on-site material to be used as engineered fill will be required for Proctor testing to generate moisture-density curves unless provided by supplier.

Building Foundation Subgrade Preparation

The depth to suitable subgrade for shallow building foundations is approximately 12- to 18-inches BGS. The GER, or designated representative should visit the site to approve the subgrade soil prior to the placement of compacted aggregate or any geotextile fabric. Site grading plans were not available at the writing of this report; however, final building elevations area expected to be near the existing ground elevations. If any test pit explorations are located in building foundation areas, the loose, disturbed soils should be recompacted in lifts back to surface.

BEI recommends remove of loose surface soil to suitable subgrade at a depth of 12- to 18-inches BGS over the entire building footprint and 2-feet beyond perimeter; moisten and compact subgrade material in-place using a vibratory plate compactor mounted on a minimum 30,000 lbs. excavator until no deflection can be observed and then proceed to place structural fill, if necessary, in lifts until 4-inches below footing elevation. Cover compacted subgrade/fill with a cover of crushed aggregate (1.5"-0 or smaller) to a minimum thickness of 4-inches. The aggregate shall be compacted to at least 90% of the aggregate's maximum dry density as determined by ASTM Method D1557.

Prior to placing fill or foundation concrete forms, exposed subgrade materials shall be observed by a Branch Engineering field representative. Areas of loose or unsuitable soil shall be removed to a depth recommended by the GER or designated representative, or otherwise improved at the discretion and direction of the GER.

5.2 Soil Bearing Capacity and Settlement

Once the building pad is prepared as described above, the surface of the compacted aggregate shall have an allowable bearing capacity of 1,500 psf that may be increased by 1/3 for short term loading, such as wind or seismic events. We recommend that foundation loads are distributed evenly to mitigate the potential for differential settlement. Settlement due to static loading is expected to be less than ¾-inch and ½-inch for differential settlement. Expected maximum total settlement due to liquefaction may be greater than 6-inches with differential settlement being half of that. Large amounts of damage are likely to occur to the onsite structures in the event of a significant seismic event; although, damage is not expected to be more severe than that caused to other structures in the area.

5.3 Structural Fill Recommendations

All engineered fill placed on the site shall consist of homogenous material and shall meet the following recommendations.

- Prior to placement on-site, the aggregate to be used as structural fill shall be approved by the GER, if no Proctor curve (moisture-density relationship) for the material performed within the last 12-months is on file, a material sample will be required for testing to determine the maximum dry density and optimum moisture content of the aggregate or fill material.

- The structural fill shall be moisture conditioned to within +/- 2% of optimum moisture content and compacted in lifts with loose lift thickness not exceeding 12-inches.

- Periodic visits to the site to verify lift thickness, source material, and compaction efforts shall be conducted by the GER, or designated representative, and documented.

- The recommended compaction level for crushed aggregate or soil fill is 90% relative compaction, as determined by ASTM D-1557 (modified Proctor). Compaction shall be measured by testing with nuclear densometer ASTM D-6938, or D-1556 sand cone method on structural fill in excess of 12-inches in thickness.

- If on-site or imported non-granular material is approved for structural fill placement, a sample of the material shall be collected for modified Proctor testing to use for field compaction test comparison. If, due to the nature of the on-site material compaction testing is not possible due to factors such as oversize rock content and variable material, proof rolls with a fully loaded 10 cubic yard haul-truck, or equivalent equipment, shall be observed at regular intervals. Observed areas of soft soil will require over-excavation and replacement with suitable material.

5.4 Excavations

The site soils are classified as OSHA Type C soils. Heavy equipment or stored materials should not be placed within 10-feet of open excavations.

5.5 Drainage

A site drainage system is expected to be engineered for this project. Alteration of existing grades for this project will likely change drainage patterns. Slopes next to adjacent properties shall be graded away or blocked from flow so as to not adversely impact adjacent properties. Perimeter landscape and hardscape grades shall be sloped away from the foundations and water shall not be allowed to pond adjacent to footings during or after construction.

5.6 Slabs-On-Grade

After site preparation to expose suitable subgrade and after compaction of the top 12-inches, load bearing concrete slabs shall be underlain by a minimum of 4-inches of compacted, crushed aggregate. If soft/loose or saturated subgrade is encountered, over-excavation and replacement with engineered fill will be required. A free draining aggregate is recommended beneath structural slabs.

The modulus of subgrade reaction (K) of the in-situ soil at about 12-inches below existing grade is 150 lb/in^3 and the correlated California Bearing Ratio of the soil is correlated to be 5 in the onsite sand. The K value represents the anticipated result from an in-situ load test of a standard 1-foot square plate placed on the subgrade. Use of this modulus for the design of other on-grade structural elements, such as footings, should include appropriate modification based on the dimensions of the element.

5.7 Soil Shrink/Swell Potential

The underlying native sandy soils have little to no shrink/swell potential.

5.8 Friction Coefficient and Earth Pressures

For use in design of subsurface structures or retaining walls the following allowable parameters are given based on an internal angle of friction of 27° for the native sand. These values are assuming that the retaining structures are free draining with no hydrostatic pressures and the retained soil is level and there are no surcharge loads.

1. The coefficient of friction for concrete poured neat against undisturbed native soil is 0.45 and if poured atop a minimum thickness of 12-inches of compacted aggregate placed on the on-site material the coefficient is 0.50.

2. The passive earth pressure is 240 pcf (assuming soil unit weight of 90 pcf).
3. The active earth pressure is 35 pcf for unrestrained walls.
4. The at-rest earth pressure for a restrained wall is 50 pcf.

5.9 Wet Weather/Dry Weather Construction Practices

The site material is well drained and shall be covered with compacted aggregate in a timely manner after excavation to subgrade or placement of structural fill. Construction during the wet season may require special drainage considerations, such as covering of excavations, pumping to mitigate standing water in footing excavations, or sidewall caving mitigation such as back sloping footing excavation at a 1:1 (H:V).

5.10 Pavement Design Recommendations

Our recommendations for any parking or driveway improvements used a CBR of 10 and the guidance of the 1993 AASHTO Guide for Design of Pavement Structures and 2003 revised Asphalt Pavement Design Guide, published by the Asphalt Pavement Association of Oregon.

For new AC pavement installation in parking areas and light vehicle routes, we recommend a minimum pavement thickness of 3-inches of AC over a minimum of 6-inches of compacted base rock. We recommend that the AC thickness be increased to 4-inches in areas of heavier traffic, such as refuse truck routes or delivery vehicles. Prior to placement of base rock any soft soil, wet soil, or organic soil shall be removed from the pavement subgrade. The geotechnical engineer of record, or designated representative should visit the site to approve the subgrade soil prior to the placement of the base rock.

The base rock shall be compacted to at least 95% relative compaction as determined by ASTM 1557/AASHTO T-180 (modified Proctor). The base rock shall be tested to measure compliance with this compaction standard prior to placement of asphalt concrete.

Table 2: Recommended Structural Pavement Section for private road section

Pavement Criteria	***Asphalt Concrete (inches)***	***ABM Section (inches)***
Parking Lot Access Route	4	6
Private Road Section	3	6

The pavement recommendations discussed above are designed for the type of vehicle use on the site after construction completion, not for construction vehicle traffic which is generally heavier, occurs over a short time, and impacts the site before full pavement sections are constructed. The construction traffic may cause subgrade failures and the site contractor should consider over-building designated haul routes through the site to mitigate soft areas at the time of final paving.

5.11 Geotechnical Construction Site Observations

Periodic site observations by a geotechnical representative of BEI are recommended during the construction of the project; the specific phases of construction that should be observed are shown below in Tables 3 and 4.

Table 3: OSSC Soil Special Inspection Criteria

TABLE 1705.6 REQUIRED SPECIAL INSPECTIONS AND TESTS OF SOILS		
TYPE	**CONTINUOUS**	**PERIODIC**
1. Verify materials below shallow foundations are adequate to achieve the design bearing capacity.	-	X
2. Verify excavations are extended to proper depth and have reached proper material.	-	X
3. Perform classification and testing of compacted fill materials.	-	X
4. During fill placement, verify use of proper materials and procedures in accordance with the provisions of the approved geotechnical report. Verify densities and lift thicknesses during placement and compaction of compacted fill.*	X	-
5. Prior to placement of compacted fill, inspect subgrade and verify that site has been prepared properly.	-	X

*An accredited testing agency is recommended to be retained for density testing; BEI staff should perform the remaining inspection items shown.

Table 4: BEI Inspection Criteria

BRANCH ENGINEERING REQUIRED SPECIAL INSPECTIONS AND TESTS OF SOILS		
TYPE	**CONTINUOUS**	**PERIODIC**
1. Verify recommended setbacks from footings to edge of structural fill is provided.	-	X

6.0 REPORT LIMITATIONS

This report has presented BEI's site observations and research, subsurface explorations, geotechnical engineering analyses, and recommendations for the proposed site development. The conclusions in this report are based on the conditions described in this report and are intended for the exclusive use of addressee of this report and designated representatives for use in design and construction of the development described herein. The analysis and recommendations may not be suitable for other structures or purposes.

Services performed by the geotechnical engineer for this project have been conducted with the level of care and skill exercised by other current geotechnical professionals in this area. No warranty is herein expressed or implied. The conclusions in this report are based on the site conditions as they currently exist and it is assumed that the limited site locations that were physically investigated generally represent the subsurface conditions at the site. Should site development or site conditions change, or if a substantial amount of time goes by between our site investigation and site development, we reserve the right to review this report for its applicability. If you have any questions regarding the contents of this report, please contact our office.

[i] USGS MMI Scale: https://www.usgs.gov/media/images/modified-mercalli-intensity-mmi-scale-assigns-intensities (accessed date June 2024)

[ii] DOGAMI Oregon Hazvu: Statewide Geohazards Viewer Hazards and Assets: https://www.oregon.gov/dogami/hazvu/Pages/hazards-assets.aspx (accessed date June 2024)

Image from Google Maps

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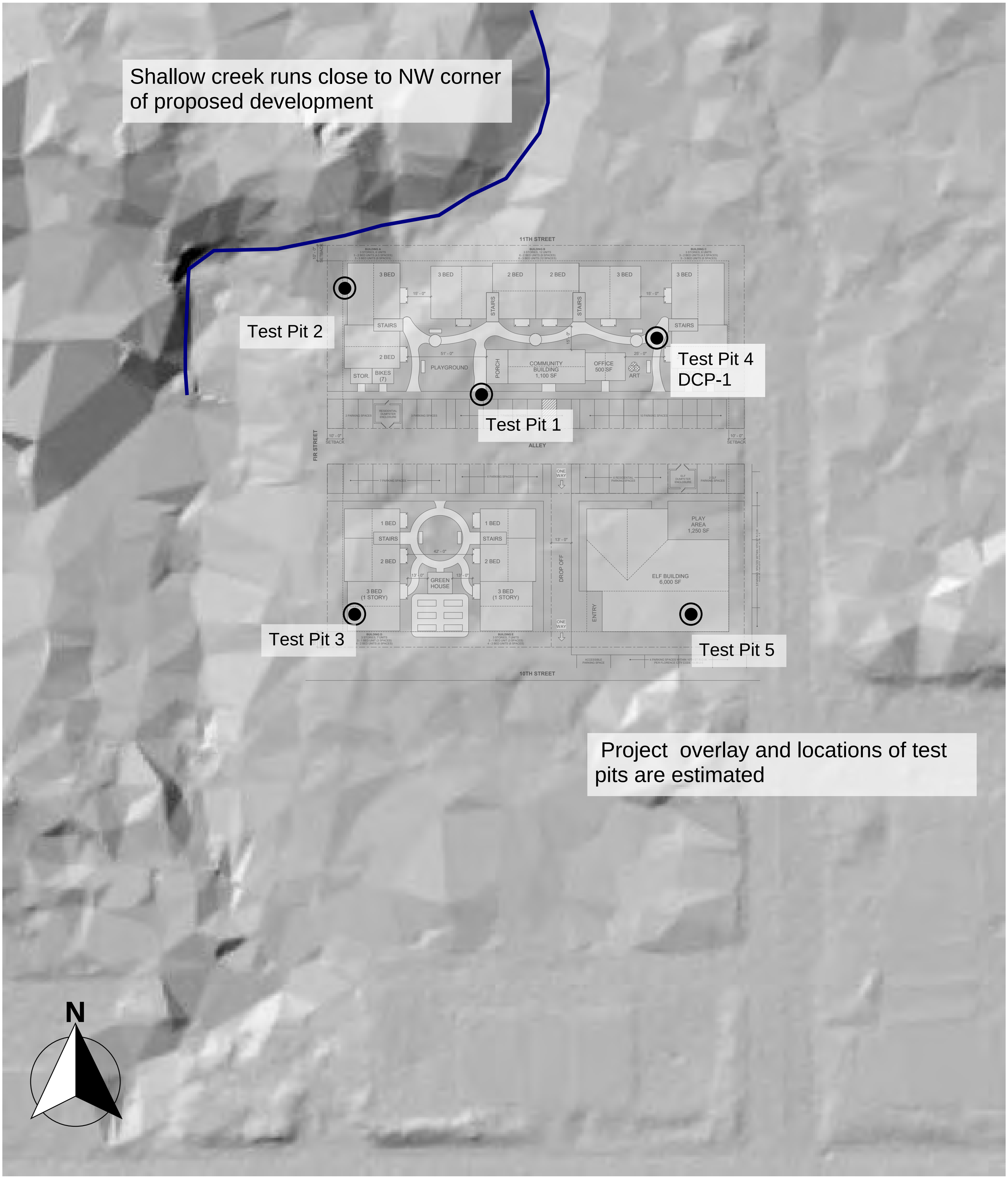
SITE VICINITY MAP - OUR COASTAL VILLAGE, INC **FIGURE-1**

Tax Lots 01100 & 01200 Greenwood Street **6-14-2024**

BEI PROJECT NO. 21-191



LIDAR image from DOGAMI, Overlay from client

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SITE INVESTIGATION - OUR COASTAL VILLAGE, INC **FIGURE-2**

Tax Lots 01100 & 01200 Greenwood Street **6-14-2024**

BEI PROJECT NO. 21-191

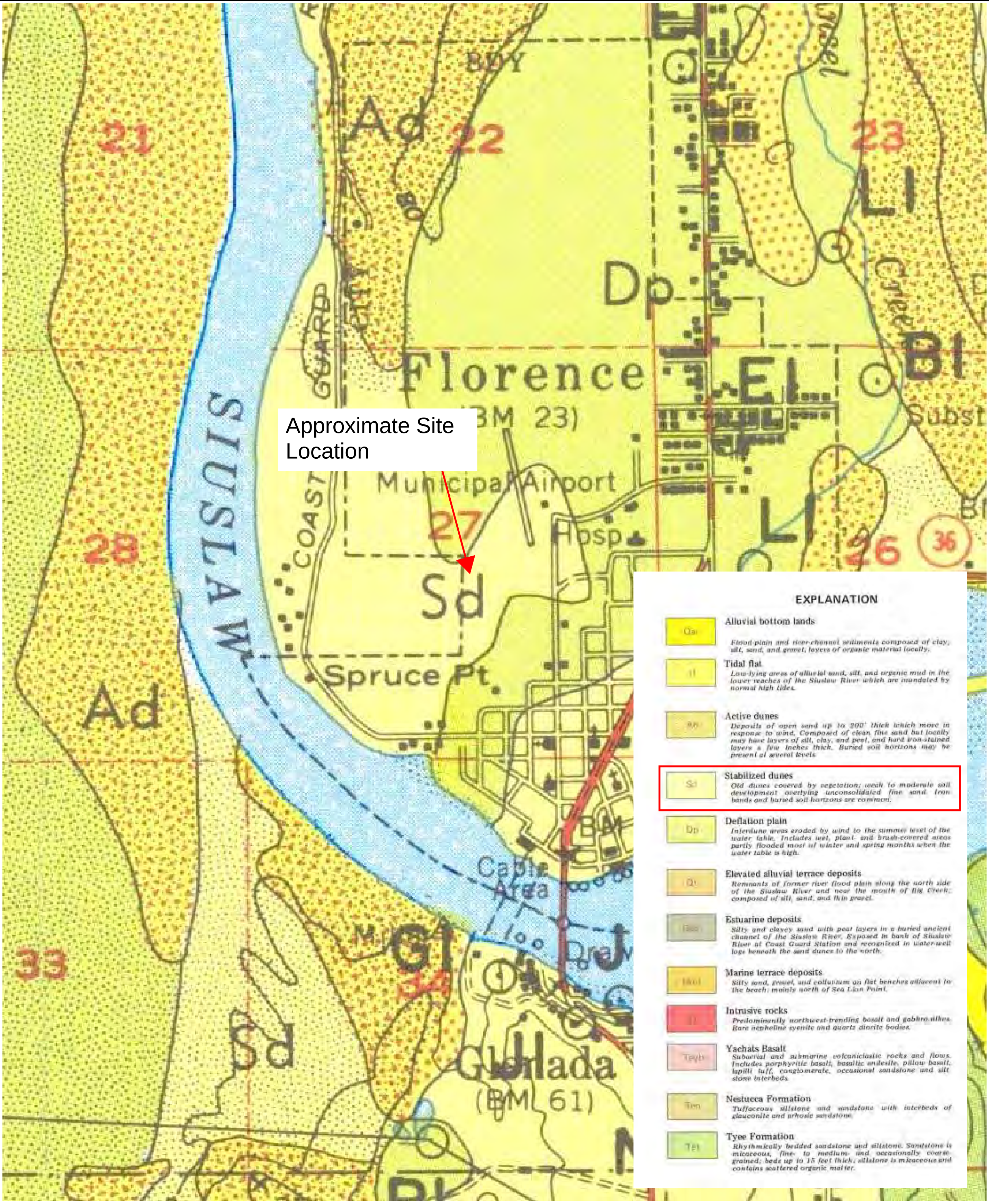

IMAGE from DOGAMI

SITE GEOLOGY - OUR COASTAL VILLAGE, INC **FIGURE-3**

Tax Lots 01100 & 01200 Greenwood Street **6-01-2024**

BEI PROJECT NO. 21-191

APPENDIX A:

- USCS SOIL KEY
- SOIL TEST PIT LOGS
- OWRD WELL LOGS
- USDA SOIL SURVEY

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RELATIVE DENSITY - COARSE GRAINED SOILS

RELATIVE DENSITY	SPT N-VALUE	D&M SAMPLER (140 lbs hammer)	D&M SAMPLER (300 lbs hammer)
VERY LOOSE	< 4	< 11	< 4
LOOSE	4 - 10	11 - 26	4 - 10
MEDIUM DENSE	10 - 30	26 - 74	10 - 30
DENSE	30 - 50	74 - 120	30 - 47
VERY DENSE	> 50	> 120	> 47

USCS GRAIN SIZE

FINES		< #200 (.075 mm)
SAND	Fine	#200 - #40 (.425 mm)
	Medium	#40 - #10 (2 mm)
	Coarse	#10 - #4 (4.75 mm)
GRAVEL	Fine	#4 - 0.75 inch
	Coarse	0.75 - 3 inch
COBBLES		3 - 12 inches

CONSISTENCY - FINE GRAINED SOILS

CONSISTENCY	SPT N-VALUE	D&M SAMPLER (140 lbs hammer)	D&M SAMPLER (300 lbs hammer)	POCKET PEN. / UNCONFINED (TSF)	MANUAL PENETRATION TEST
VERY SOFT	< 2	< 3	< 2	< 0.25	Easy several inches by fist
SOFT	2 - 4	3 - 6	2 - 5	0.25 - 0.50	Easy several inches by thumb
MEDIUM STIFF	4 - 8	6 - 12	5 - 9	0.50 - 1.00	Moderate several inches by thumb
STIFF	8 - 15	12 - 25	9 - 19	1.00 - 2.00	Readily indented by thumb
VERY STIFF	15 - 30	25 - 65	19 - 31	2.00 - 4.00	Readily indented by thumbnail
HARD	> 30	> 65	> 31	> 4.00	Difficult by thumbnail

UNIFIED SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			GROUP SYMBOLS AND TYPICAL NAMES	
COARSE-GRAINED SOILS: More than 50% retained on No. 200 sieve	GRAVELS: 50% or more *retained* on the No. 4 sieve	CLEAN GRAVELS	GW	Well-graded gravels and gravel-sand mixtures, little or no fines.
			GP	Poorly-graded gravels and gravel-sand mixtures, little or no fines.
		GRAVELS WITH FINES	GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
	SANDS: 50% or more *passing* the No. 4 sieve	CLEAN SANDS	SW	Well-graded sands and gravelly sands, little or no fines.
			SP	Poorly-graded sands and gravelly sands, little or no fines.
		SANDS WITH FINES	SM	Silty sands, sand-silt mixtures.
			SC	Clayey sands, sand-clay mixtures.
FINE-GRAINED SOILS: Less than 50% retained on No. 200 sieve	SILT AND CLAY	LIQUID LIMIT LESS THAN 50	ML	Inorganic silts, rock flour, clayey silts.
			CL	Inorganic clays of low to medium plasticity, lean clays.
			OL	Organic silt and organic silty clays of low plasticity.
		LIQUID LIMIT 50 OR GREATER	MH	Inorganic silts, clayey silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity.
HIGHLY ORGANIC SOILS			PT	Peat, muck, and other highly organic soil.

MOISTURE CONTENT

DRY: Absence of moisture, dusty, dry to the touch
DAMP: Some moisture but leaves no moisture on hand
MOIST: Leaves moisture on hand
WET: Visble free water, usually saturated

	PLASTICITY	DRY STRENGTH	DILATANCY	TOUGHNESS
ML	Non to Low	Non to Low	Slow to Rapid	Low, can't roll
CL	Low to Med.	Med. to High	None to Slow	Medium
MH	Med. to High	Low to Med.	None to Slow	Low to Med.
CH	Med. to High	High to V.High	None	High

STRUCTURE

STRATIFIED: Alternating layers of material or color > 6mm thick.
LAMINATED: Alternating layers < 6mm thick.
FISSURED: Breaks along definate fracture planes.
SLICKENSIDED: Striated, polished, or glossy fracture planes.
BLOCKY: Cohesive soil that can be broken down into small angular lumps which resist further breakdown.
LENSES: Has small pockets of different soils, note thickness.
HOMOGENEOUS: Same color and appearance throughout.

LIST OF ABBREVIATION & EXPLANATIONS

SPT	Standard Penetration Test split barrel sampler	G	Grab sample
D&M	Dames and Moore sampler	MC	Moisture Content
LL	Atterberg Liquid Limit	MD	Moisture Density
PL	Atterberg Plastic Limit	UC	Unconfined Compressive Strength
PP	Pocket Penetrometer		
VS	Vane Shear		

TABLE A-1

310 5th Street Springfield, Oregon | p: 541.779.2577 | www.branchengineering.com

Branch Engineering

Client:	Layne Morrill		**Project Name:**	Our Coastal Village	
Project Number:	24-191		**Project Location:**	Greenwood Street Florence, Oregon	
Date Started:	Jun 11 2024	**Completed:** Jun 11 2024	**Logged By:**	SPR	**Checked By:** RJD
Drilling Contractor:	Branch Engineering Inc.		**Latitude:**	**Longitude:**	**Elevation:**
Drilling Method:	Test Pit Excavation		**Ground Water Levels**		
Equipment:	Rubber Tracked Mini-Excavator				
Hammer Type:					
Notes:					

Depth	Graphic	Material Description	Sample	Pocket Pen. (tsf)	Free Swell	Moisture Content: ⊗ PL and LL: ●–■ (10 20 30 40 50 60 70 80 90)
		Very loose, damp, dark brown sandy organics, forest duff.				
1		Loose, moist, reddish-orange gray poorly graded sand (SP), trace roots.				
2		Medium dense, moist, reddish-orange poorly graded sand (SP), weak cementation.				
3		Medium dense, moist, brown-tan poorly graded sand (SP)				
4						
5		Medium dense, moist, gray poorly graded sand (SP) with roots. Interpreted as a buried topsoil horizon.				
		Medium dense, moist to wet, brown-tan poorly graded sand (SP)				
6						
7						
8						
9						
10						

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Borehole ID: TP-2

Client: Layne Morrill
Project Name: Our Coastal Village
Project Number: 24-191
Project Location: Greenwood Street Florence, Oregon
Date Started: Jun 11 2024 **Completed:** Jun 11 2024
Logged By: SPR **Checked By:** RJD
Drilling Contractor: Branch Engineering Inc.
Latitude: **Longitude:** **Elevation:**
Drilling Method: Test Pit Excavation
Ground Water Levels: Static GW at 7.5-feet BGS
Equipment: Rubber Tracked Mini-Excavator
Hammer Type:
Notes:

Depth	Graphic	Material Description	Sample	Pocket Pen. (tsf)	Free Swell	Moisture Content: ⊗ PL and LL: ●–■ (10 20 30 40 50 60 70 80 90)
0		Very loose, damp, dark brown sandy organics, forest duff				
		Loose, moist, gray poorly graded sand (SP), trace roots				
1		Medium dense, moist reddish-orange poorly graded sand (SP), weakly cemented				
2.8		Medium dense, moist, brown-tan poorly graded sand (SP)				
6.6		Medium dense, moist, gray poorly graded sand (SP) with roots. Interpreted as a buried topsoil horizon				
6.8		Medium dense, wet, brown-tan poorly graded sand (SP). Sidewall caving at 6.9-feet BGS. Static groundwater at 7.5-feet BGS.				
8						
10						

Borehole ID: TP-3

Client: Layne Morrill
Project Name: Our Coastal Village
Project Number: 24-191
Project Location: Greenwood Street Florence, Oregon
Date Started: Jun 11 2024 **Completed:** Jun 11 2024
Logged By: SPR **Checked By:** RJD
Drilling Contractor: Branch Engineering Inc.
Latitude: **Longitude:** **Elevation:**
Drilling Method: Test Pit Excavation
Ground Water Levels
Equipment: Rubber Tracked Mini-Excavator
Hammer Type:
Notes:

Depth	Graphic	Material Description	Sample	Pocket Pen. (tsf)	Free Swell	Moisture Content: ⊗ PL and LL: ●–■ (10 20 30 40 50 60 70 80 90)
0–1		Very loose, damp, dark brown sandy organics, forest duff				
1–2.8		Medium dense, moist reddish-orange poorly graded sand (SP), weakly cemented				
2.8–6		Medium dense to dense, moist, brown-tan poorly graded sand (SP)				

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Borehole ID: TP-4

Client:	Layne Morrill	**Project Name:**	Our Coastal Village
Project Number:	24-191	**Project Location:**	Greenwood Street Florence, Oregon
Date Started:	Jun 11 2024 **Completed:** Jun 11 2024	**Logged By:**	SPR **Checked By:** RJD
Drilling Contractor:	Branch Engineering Inc.	**Latitude:**	**Longitude:** **Elevation:**
Drilling Method:	Test Pit Excavation	**Ground Water Levels**	
Equipment:	Rubber Tracked Mini-Excavator	▽	Static GW at 8.3-feet BGS
Hammer Type:		▼	
Notes:		▽	

Depth	Graphic	Material Description	Sample	Pocket Pen. (tsf)	Free Swell	Moisture Content: ⊗ PL and LL: ●–■ (10 20 30 40 50 60 70 80 90)
0		Very loose, damp, dark brown sandy organics, forest duff				
0.5		Medium dense to dense, moist, reddish-orange poorly graded sand (SP), weakly cemented				
4		Medium dense, moist to wet, brown-tan poorly graded sand (SP)				
6		Medium dense, wet, gray poorly graded sand (SP) with roots. Interpreted as a buried topsoil horizon				
		Wet, dense, brown-tan poorly graded sand (SP). Sidewall caving at 8.2-feet BGS, static groundwater level at 8.3-feet BGS.				
8.3	▼					
10						

Borehole ID: TP-5

Client: Layne Morrill		**Project Name:** Our Coastal Village	
Project Number: 24-191		**Project Location:** Greenwood Street Florence, Oregon	
Date Started: Jun 11 2024	**Completed:** Jun 11 2024	**Logged By:** SPR	**Checked By:** RJD
Drilling Contractor: Branch Engineering Inc.		**Latitude:**	**Longitude:** / **Elevation:**
Drilling Method: Test Pit Excavation		**Ground Water Levels**	
Equipment: Rubber Tracked Mini-Excavator		▽	Static GW at 7.5-feet BGS
Hammer Type:		▼	
Notes:		▽	

Depth	Graphic	Material Description	Sample	Pocket Pen. (tsf)	Free Swell	Moisture Content: ⊗ PL and LL: ●–■ (10 20 30 40 50 60 70 80 90)
0–1		Very loose, damp, dark brown sandy organics, forest duff				
1–3		Medium dense to dense, moist, reddish-orange poorly graded sand (SP) weakly cemented				
3–3.5		Loose, moist, gray poorly graded sand (SP) with roots. Interpreted as a buried topsoil horizon				
3.5–6.3		Medium dense, moist, brown-tan poorly graded sand (SP)				
6.3–8.5		Dense, wet, brown-tan poorly graded sand. Sidewall caving at 7-feet BGS, Static groundwater at 7.5-feet BGS.				

Depth scale: 1 2 3 4 5 6 7 8 9 10

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DYNAMIC CONE LOG

PROJECT NUMBER: 21-191
DATE STARTED: 06-11-2024
DATE COMPLETED: 06-11-2024

HOLE #: DC-1
CREW: Sam Rabe EI
PROJECT: Our Coastal Village
ADDRESS: Greenwood Street
LOCATION: Florence, Oregon

SURFACE ELEVATION:
WATER ON COMPLETION: No
HAMMER WEIGHT: 35 lbs.
CONE AREA: 10 sq. cm

DEPTH	BLOWS PER 10 cm	RESISTANCE Kg/cm²	GRAPH OF CONE RESISTANCE 0 50 100 150	N'	TESTED CONSISTENCY NON-COHESIVE	TESTED CONSISTENCY COHESIVE
-						
-	4	17.8	•••••	5	LOOSE	MEDIUM STIFF
- 1 ft	3	13.3	•••	3	VERY LOOSE	SOFT
-	4	17.8	•••••	5	LOOSE	MEDIUM STIFF
-	6	26.6	•••••••	7	LOOSE	MEDIUM STIFF
- 2 ft	7	31.1	•••••••••	8	LOOSE	MEDIUM STIFF
-	11	48.8	••••••••••••••	13	MEDIUM DENSE	STIFF
-	12	53.3	•••••••••••••••	15	MEDIUM DENSE	STIFF
- 3 ft	14	62.2	••••••••••••••••••	17	MEDIUM DENSE	VERY STIFF
- 1 m	12	53.3	•••••••••••••••	15	MEDIUM DENSE	STIFF
-	14	54.0	•••••••••••••••	15	MEDIUM DENSE	STIFF
- 4 ft	15	57.9	••••••••••••••••	16	MEDIUM DENSE	VERY STIFF
-	9	34.7	••••••••••	9	LOOSE	STIFF
-	10	38.6	•••••••••••	11	MEDIUM DENSE	STIFF
- 5 ft	8	30.9	••••••••	8	LOOSE	MEDIUM STIFF
-	11	42.5	••••••••••••	12	MEDIUM DENSE	STIFF
-	10	38.6	•••••••••••	11	MEDIUM DENSE	STIFF
- 6 ft	10	38.6	•••••••••••	11	MEDIUM DENSE	STIFF
-	14	54.0	•••••••••••••••	15	MEDIUM DENSE	STIFF
- 2 m						
- 7 ft						
-						
-						
- 8 ft						
-						
-						
- 9 ft						
-						
-						
- 3 m 10 ft						
-						
-						
-						
- 11 ft						
-						
-						
- 12 ft						
-						
-						
- 4 m 13 ft						

NOTICE TO WATER WELL CONTRACTOR
The original and first copy of this report
are to be filed with the
WATER RESOURCES DEPARTMENT,
SALEM, OREGON 97310
within 30 days from the date
of well completion.

RECEIVED
FEB 5 1981
WATER RESOURCES DEPT.
SALEM, OREGON

WATER WELL REPORT
STATE OF OREGON
(Please type or print)
(Do not write above this line)

019298

LANE

State Well No. 18s-12w-27
State Permit No. Test Well

(1) OWNER:
Name Lane Council of Governments
Address 125 East 8th Avenue
Eugene, Oregon 97401

(2) TYPE OF WORK (check):
New Well XX Deepening ☐ Reconditioning ☐ Abandon X
If abandonment, describe material and procedure in Item 12.

(3) TYPE OF WELL:
Rotary ☐ Driven ☐
Cable XX Jetted ☐
Dug ☐ Bored ☐

(4) PROPOSED USE (check):
Domestic ☐ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well X Other ☐

(5) CASING INSTALLED: Threaded ☐ Welded XX
6 5/8" Diam. from +11 ft. to 189 ft. Gage .250
(PULLED CASING AT COMPLETION OF JOB) " Diam. from ft. to ft. Gage
" Diam. from ft. to ft. Gage

(6) PERFORATIONS: Perforated? ☐ Yes X No.
Type of perforator used
Size of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

(7) SCREENS: Well screen installed? ☐ Yes X No
Manufacturer's Name
Type Model No.
Diam. Slot size Set from ft. to ft.
Diam. Slot size Set from ft. to ft.

(8) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? ☐ Yes X No If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "
Bailer test gal./min. with ft. drawdown after hrs.
Artesian flow g.p.m.
Temperature of water Depth artesian flow encountered ft.

(9) CONSTRUCTION:
Well seal—Material used See No. 12
Well sealed from land surface to ft.
Diameter of well bore to bottom of seal in.
Diameter of well bore below seal in.
Number of sacks of cement used in well seal sacks
How was cement grout placed?

Was a drive shoe used? ☐ Yes ☐ No Plugs Size: location ft.
Did any strata contain unusable water? ☐ Yes ☐ No
Type of water? depth of strata
Method of sealing strata off
Was well gravel packed? ☐ Yes ☐ No Size of gravel:
Gravel placed from ft. to ft.

(10) LOCATION OF WELL:
County Lane Driller's well number 605-165
¼ ¼ Section 27 T. 18 S R. 12 W. W.M.
Bearing and distance from section or subdivision corner
Tax Lot No. 105

(11) WATER LEVEL: Completed well.
Depth at which water was first found 9'8"
Static level 17'10" below land surface. Date 1/7/81
Artesian pressure lbs. per square inch. Date

(12) WELL LOG: Diameter of well below casing 6"
Depth drilled 225 ft. Depth of completed well 0 ft.

Formation: Describe color, texture, grain size and structure of materials; and show thickness and nature of each stratum and aquifer penetrated, with at least one entry for each change of formation. Report each change in position of Static Water Level and indicate principal water-bearing strata.

MATERIAL	From	To	SWL
Rock - surfacing	0	6"	
Sand, dry, tan	6"	8'6"	
Sand, plastic, some tan clay	8'6"	18'2"	
", fine, brown	18'2"	20'	
", fine, gray, heaving	20'	44'	
", fine, gray w/wash.	44'	48'	
", fine, gray, heaving	48'	50'	
", fine, gray-tan, mottled, heaving	50'	58'	
", fine, gray w/red wash & vegetative matter	58'	60'	
", fine, gray, clean	60'	75'	
", fine, gray w/brn wash	75'	90'6"	
", fine, gray, heaving	90'6"	98'	
", fine, gray w/brn wash	98'	102'	
", fine, gray, heaving	102'	108'	
", fine, gray w/brn wash	108'	116'6"	
", fine, gray; dark green w/ silt clay	116'6"	131'	

CONTINUED ON NEXT SHEET

Work started Dec. 8 1980 Completed Jan. 8 1981
Date well drilling machine moved off of well Jan 8 1981

Drilling Machine Operator's Certification:
This well was constructed under my direct supervision. Materials used and information reported above are true to my best knowledge and belief.
[Signed] John L Hoeck (Drilling Machine Operator) Date 2/2/, 1981
Drilling Machine Operator's License No. 931

Water Well Contractor's Certification:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
Name Hoeck Well Drilling (Person, firm or corporation) (Type or print)
Address P. O. Box 1577, Eugene, OR 97440
[Signed] John L Hoeck (Water Well Contractor)
Contractor's License No. 605 Date Feb. 2, 1981

(USE ADDITIONAL SHEETS IF NECESSARY)

SP*45656-119

NOTICE TO WATER WELL CONTRACTOR
The original and first copy of this report are to be filed with the

WATER RESOURCES DEPARTMENT,
SALEM, OREGON 97310
within 30 days from the date of well completion.

RECEIVED
FEB 5 1981
WATER RESOURCES DEPT
SALEM, OREGON

WATER WELL REPORT
STATE OF OREGON
(Please type or print)
(Do not write above this line)

State Well No. 18s-12w-27
State Permit No.

(1) OWNER:
Name Lane Council of Governments
Address 125 East 8th Avenue
Eugene, Oregon 97401

(2) TYPE OF WORK (check):
New Well ☐ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 12.

(3) TYPE OF WELL:
Rotary ☐ Driven ☐
C... ☐ Jetted ☐
D... ☐ Bored ☐

(4) PROPOSED USE (check):
Domestic ☐ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

(5) CASING INSTALLED: Threaded ☐ Welded ☐
......" Diam. from ...... ft. to ...... ft. Gage ......
......" Diam. from ...... ft. to ...... ft. Gage ......
......" Diam. from ...... ft. to ...... ft. Gage ......

(6) PERFORATIONS: Perforated? ☐ Yes ☐ No.
Type of perforator used
Size of perforations in. by in.
...... perforations from ...... ft. to ...... ft.
...... perforations from ...... ft. to ...... ft.
...... perforations from ...... ft. to ...... ft.

(7) SCREENS: Well screen installed? ☐ Yes ☐ No
Manufacturer's Name
Type ...... Model No.
Diam. ...... Slot size ...... Set from ...... ft. to ...... ft.
Diam. ...... Slot size ...... Set from ...... ft. to ...... ft.

(8) WELL TESTS: Drawdown is amount water level is lowered below static level
...a pump test made? ☐ Yes ☐ No If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "
...er test gal./min. with ft. drawdown after hrs.
Artesian flow g.p.m.
Temperature of water Depth artesian flow encountered ...... ft.

(9) CONSTRUCTION:
Well seal—Material used
Well sealed from land surface to ...... ft.
Diameter of well bore to bottom of seal ...... in.
Diameter of well bore below seal ...... in.
Number of sacks of cement used in well seal ...... sacks
How was cement grout placed?

Was a drive shoe used? ☐ Yes ☐ No Plugs Size: location ...... ft.
Did any strata contain unusable water? ☐ Yes ☐ No
Type of water? depth of strata
Method of sealing strata off
Was well gravel packed? ☐ Yes ☐ No Size of gravel:
Gravel placed from ...... ft. to ...... ft.

(10) LOCATION OF WELL:
County Lane Driller's well number 605-165
¼ ¼ Section 27 T. 18 S R. 12 W W.M.
Bearing and distance from section or subdivision corner
Tax Lot No. 105

(11) WATER LEVEL: Completed well.
Depth at which water was first found ft.
Static level ft. below land surface. Date
Artesian pressure lbs. per square inch. Date

(12) WELL LOG: Diameter of well below casing
Depth drilled ft. Depth of completed well ft.

Formation: Describe color, texture, grain size and structure of materials; and show thickness and nature of each stratum and aquifer penetrated, with at least one entry for each change of formation. Report each change in position of Static Water Level and indicate principal water-bearing strata.

MATERIAL	From	To	SWL
Sand, fine, gray w/shells	131'	148'	
" , " , lighter gray	148'	150'	
" , " , w/some shells	150'	156'	
", fine, gray, w/less shell, some wood	156'	166'	
", fine, lighter, more wood	166'	168'6"	
Clay, dk. gray w/silt	168'6"	172'	
Silt, dk. gray w/clay	172'	180'	
Sand, fine, brown, heaving	180'	181'	
Silt & clay, dark gray	181'	184'6"	
Silt & clay, dk. gray, firm	184'6"	189'6"	
Silt w/some clay, dk gray	189'6"	201'	
Sandstone, gray, brown	201'	204'	
Silt w/clay w/wood, shell, charcoal, pine cone; some blue shale	204'	210'	
Silt, more clay, dk gray, less wood & shell	210'	213'	
Sand, dark gray, heaving	213'	215'	

CONTINUED ON NEXT SHEET

Work started 19 Completed 19
Date well drilling machine moved off of well 19

Drilling Machine Operator's Certification:
This well was constructed under my direct supervision. Materials used and information reported above are true to my best knowledge and belief.
[Signed] John L Hoeck (Drilling Machine Operator) Date 2/2/, 1981
Drilling Machine Operator's License No. 931

Water Well Contractor's Certification:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
Name Hoeck Well Drilling (Person, firm or corporation) (Type or print)
Address P. O. Box 1577, Eugene, OR 97440
[Signed] John L Hoeck (Water Well Contractor)
Contractor's License No. 605 Date Feb. 2, 1981

(USE ADDITIONAL SHEETS IF NECESSARY)

SP*45656-119

NOTICE TO WATER WELL CONTRACTOR
The original and first copy of this report are to be filed with the

WATER RESOURCES DEPARTMENT,
SALEM, OREGON 97310
within 30 days from the date of well completion.

WATER WELL REPORT
STATE OF OREGON
(Please type or print)

(Do not write above this line)

State Well No. 18S-12W-27

State Permit No. ....

(1) OWNER:

Name Lane Council of Governments

Address 125 East 8th Avenue
Eugene, Oregon 97401

(2) TYPE OF WORK (check):

New Well ☐ Deepening ☐ Reconditioning ☐ Abandon ☐

If abandonment, describe material and procedure in Item 12.

(3) TYPE OF WELL:

Rotary ☐ Driven ☐
☐ Jetted ☐
☐ Bored ☐

(4) PROPOSED USE (check):

Domestic ☐ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

(5) CASING INSTALLED: Threaded ☐ Welded ☐

......" Diam. from ...... ft. to ...... ft. Gage ......
......" Diam. from ...... ft. to ...... ft. Gage ......
......" Diam. from ...... ft. to ...... ft. Gage ......

(6) PERFORATIONS: Perforated? ☐ Yes ☐ No.

Type of perforator used

Size of perforations in. by in.

...... perforations from ...... ft. to ...... ft.
...... perforations from ...... ft. to ...... ft.
...... perforations from ...... ft. to ...... ft.

(7) SCREENS: Well screen installed? ☐ Yes ☐ No

Manufacturer's Name ......

Type ...... Model No. ......

Diam. ...... Slot size ...... Set from ...... ft. to ...... ft.
Diam. ...... Slot size ...... Set from ...... ft. to ...... ft.

(8) WELL TESTS: Drawdown is amount water level is lowered below static level

a pump test made? ☐ Yes ☐ No If yes, by whom?

Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

ler test gal./min. with ft. drawdown after hrs.

sian flow g.p.m.

Temperature of water Depth artesian flow encountered ...... ft.

(9) CONSTRUCTION:

Well seal—Material used ......

Well sealed from land surface to ...... ft.

Diameter of well bore to bottom of seal ...... in.

Diameter of well bore below seal ...... in.

Number of sacks of cement used in well seal ...... sacks

How was cement grout placed? ......

Was a drive shoe used? ☐ Yes ☐ No Plugs ...... Size: location ...... ft.

Did any strata contain unusable water? ☐ Yes ☐ No

Type of water? depth of strata

Method of sealing strata off

Was well gravel packed? ☐ Yes ☐ No Size of gravel: ......

Gravel placed from ...... ft. to ...... ft.

(10) LOCATION OF WELL:

County Lane Driller's well number 605-165

¼ ¼ Section 27 T. 18 S R. 12 W. W.M.

Bearing and distance from section or subdivision corner
Tax Lot No. 105

(11) WATER LEVEL: Completed well.

Depth at which water was first found ft.

Static level ft. below land surface. Date

Artesian pressure lbs. per square inch. Date

(12) WELL LOG: Diameter of well below casing ......

Depth drilled ft. Depth of completed well ft.

Formation: Describe color, texture, grain size and structure of materials; and show thickness and nature of each stratum and aquifer penetrated, with at least one entry for each change of formation. Report each change in position of Static Water Level and indicate principal water-bearing strata.

MATERIAL	From	To	SWL
Silt w/clay and some sand, dark gray	215'	225'	17'10"
PIEZOMETERS INSTALLED IN HOLE TO 210 FEET. CASING REMOVED. HOLE FILLED AND CAVED IN AS CASING WAS REMOVED.			

RECEIVED
FEB 5 1981
WATER RESOURCES DEPT
SALEM, OREGON

Work started 19 Completed 19

Date well drilling machine moved off of well 19

Drilling Machine Operator's Certification:

This well was constructed under my direct supervision. Materials used and information reported above are true to my best knowledge and belief.

[Signed] John L Hoeck (Drilling Machine Operator) Date 2/2/ 1981

Drilling Machine Operator's License No. 931

Water Well Contractor's Certification:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Name Hoeck Well Drilling (Person, firm or corporation) (Type or print)

Address P. O. Box 1577, Eugene, OR 97440

[Signed] John L Hoeck (Water Well Contractor)

Contractor's License No. 931 Date Feb. 2 1981

(USE ADDITIONAL SHEETS IF NECESSARY)

SP*45656-119

RECEIVED
APR 7 1959
STATE ENGINEER
SALEM, OREGON

File Original and First Copy with the STATE ENGINEER, SALEM, OREGON

WATER WELL REPORT
STATE OF OREGON

State Well No. 18/12W-27
LANE
State Permit No. 019289

(1) OWNER:
Name OLIVE LA DUKE, SR.
Address CUSHMAN
OREGON

(2) LOCATION OF WELL:
County LANE Owner's number, if any—
¼ ¼ Section T. R. W.M.
Bearing and distance from section or subdivision corner
Lot 3 Block 51, Miller
Addition of Florence, Ore

(3) TYPE OF WORK (check):
New Well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):
Domestic ☒ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

(5) TYPE OF WELL:
Rotary ☐ Driven ☒
Cable ☐ Jetted ☐
Dug ☐ Bored ☐

(6) CASING INSTALLED: Threaded ☒ Welded ☐
1¼" Diam. from 21 ft. to ...... ft. Gage standard
...... " Diam. from ...... ft. to ...... ft. Gage
...... " Diam. from ...... ft. to ...... ft. Gage

(7) PERFORATIONS: Perforated? ☐ Yes ☒ No
Type of perforator used
SIZE of perforations in. by in.
...... perforations from ...... ft. to ...... ft.
...... perforations from ...... ft. to ...... ft.
...... perforations from ...... ft. to ...... ft.
...... perforations from ...... ft. to ...... ft.
...... perforations from ...... ft. to ...... ft.

(8) SCREENS: Well screen installed ☒ Yes ☐ No
Manufacturer's Name Edward E. Johnston Inc
Type ...... Model No. 824
Dia. 2 Slot size 8 Set from 21 ft. to 23½ ft.
Dia. ...... Slot size ...... Set from ...... ft. to ...... ft.

(9) CONSTRUCTION:
Was well gravel packed? ☐ Yes ☒ No Size of gravel:
Gravel placed from ...... ft. to ...... ft.
Was a surface seal provided? ☐ Yes ☒ No To what depth? ...... ft.
Material used in seal—
Did any strata contain unusable water? ☐ Yes ☐ No
Type of water? Depth of strata
Method of sealing strata off

(10) WATER LEVELS:
Static level ft. below land surface Date
Artesian pressure lbs. per square inch Date

Log Accepted by:
[Signed] Olive Laduke Date Apr. 16, 1959
(Owner)

(11) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? ☒ Yes ☐ No If yes, by whom? -
Yield: 550 gal./hr. with — ft. drawdown after — hrs.
" " " "
" " " "
Bailer test gal./min. with ft. drawdown after hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? ☐ Yes ☒ No

(12) WELL LOG: Diameter of well 1¼ inches.
Depth drilled 23½ ft. Depth of completed well 23½ ft.
Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Beach sand	—	23½

Work started Mar. 6 th. 1959 Completed Mar. 28 th. 1959

(13) PUMP:
Manufacturer's Name
Type: ...... H.P.

Well Driller's Statement:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
NAME CHARLES PANSCHOW
(Person, firm, or corporation) (Type or print)
Address RTE 1, BOX 192, FLORENCE, ORE.
Driller's well number 94
[Signed] ......
(Well Driller)
License No. 87 Date ...... , 19......

(USE ADDITIONAL SHEETS IF NECESSARY)

Soil Map—Lane County Area, Oregon
(Elm Park PUD - Florence)

Map Scale: 1:2,930 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 40, 80, 160, 240

Feet: 0, 100, 200, 400, 600

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Lane County Area, Oregon
Survey Area Data: Version 22, Sep 8, 2023

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

Date(s) aerial images were photographed: May 19, 2023—Jun 3, 2023

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
131C	Waldport fine sand, 0 to 12 percent slopes	29.7	82.4%
131E	Waldport fine sand, 12 to 30 percent slopes	6.4	17.6%
Totals for Area of Interest		**36.1**	**100.0%**

Lane County Area, Oregon

131E—Waldport fine sand, 12 to 30 percent slopes

Map Unit Setting

National map unit symbol: 234s
Elevation: 0 to 150 feet
Mean annual precipitation: 60 to 100 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 165 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Waldport and similar soils: 85 percent
Minor components: 6 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Waldport

Setting

Landform: Dunes
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian sand of mixed origin

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
Oe - 1 to 3 inches: moderately decomposed plant material
H1 - 3 to 8 inches: fine sand
H2 - 8 to 60 inches: fine sand

Properties and qualities

Slope: 12 to 30 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: F004AB202OR - Dune Forest
Hydric soil rating: No

Minor Components

Heceta

Percent of map unit: 3 percent
Landform: Interdunes
Hydric soil rating: Yes

Yaquina

Percent of map unit: 3 percent
Landform: Marine terraces
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Lane County Area, Oregon
Survey Area Data: Version 22, Sep 8, 2023

APPENDIX B:

Recommended Earthwork Specifications

GEOTECHNICAL SPECIFICATIONS

General Earthwork

1. All areas where structural fills, fill slopes, structures, or roadways are to be constructed shall be stripped of organic topsoil and cleared of surface and subsurface deleterious material, including but limited to vegetation, roots, or other organic material, undocumented fill, construction debris, soft or unsuitable soils as directed by the Geotechnical Engineer of Record. These materials shall be removed from the site or stockpiled in a designated location for reuse in landscape areas if suitable for that purpose. Existing utilities and structures that are not to be used as part of the project design or by neighboring facilities, shall be removed or properly abandoned, and the associated debris removed from the site.

2. Upon completion of site stripping and clearing, the exposed soil and/or rock shall be observed by the Geotechnical Engineer of Record or a designated representative to assess the subgrade condition for the intended overlying use. Pits, depressions, or holes created by the removal of root wads, utilities, structures, or deleterious material shall be properly cleared of loose material, benched and backfilled with fill material approved by the Geotechnical Engineer of Record compacted to the project specifications.

3. In structural fill areas, the subgrade soil shall be scarified to a depth of 4-inches, if soil fill is used, moisture conditioned to within 2% of the materials optimum moisture for compaction, and blended with the first lift of fill material. The fill placement and compaction equipment shall be appropriate for fill material type, required degree of blending, and uncompacted lift thickness. Assuming proper equipment selection, the total uncompacted thickness of the scarified subgrade and first fill lift shall not exceed 8-inches, subsequent lifts of uncompacted fill shall not exceed 8-inches unless otherwise approved by the Geotechnical Engineer of Record. The uncompacted lift thickness shall be assessed based on the type of compaction equipment used and the results of initial compaction testing. Fine-grain soil fill is generally most effectively compacted using a kneading style compactor, such as a sheeps-foot roller; granular materials are more effectively compacted using a smooth, vibratory roller or impact style compactor.

4. All structural soil fill shall be well blended, moisture conditioned to within 2% of the material's optimum moisture content for compaction and compacted to at least 90% of the material's maximum dry density as determined by ASTM Method D-1557, or an equivalent method. Soil fill shall not contain more than 10% rock material and no solid material over 3-inches in diameter unless approved by the Geotechnical Engineer of Record. Rocks shall be evenly distributed throughout each lift of fill that they are contained within and shall not be clumped together in such a way that voids can occur.

5. All structural granular fill shall be well blended, moisture conditioned at or up to 3% above of the material's optimum moisture content for compaction and compacted to at least 90% of the material's maximum dry density as determined by ASTM Method D-1557, or an equivalent method. 95% relative compaction may be required for pavement base rock or in upper lifts of the granular structural fill where a sufficient thickness of the fill section allows for higher compaction percentages to be achieved. The granular fill shall not contain solid particles over 2-inches in diameter unless special density testing methods or proof-rolling is approved by the Geotechnical Engineer of Record. Granular fill is generally considered to be a crushed aggregate with a fracture surface of at least 70% and a maximum size not exceeding 1.5-inches in diameter, well-graded with less than 10%, by weight, passing the No. 200 Sieve.

6. Structural fill shall be field tested for compliance with project specifications for every 2-feet in vertical rise or 500 cy placed, whichever is less. In-place field density testing shall be performed by a competent individual, trained in the testing and placement of soil and aggregate fill placement, using either ASTM Method D-1556/4959/4944 (Sand Cone), D-6938 (Nuclear Densometer), or D-2937/4959/4944 (Drive Cylinder). Should the fill materials not be suitable for testing by the above methods, then observation of placement, compaction and proof-rolling with a loaded 10 cy dump-truck, or equivalent ground pressure equipment, by a trained individual may be used to assess and document the compliance with structural fill specifications.

Utility Excavations

1. Utility excavations are to be excavated to the design depth for bedding and placement and shall not be over-excavated. Trench widths shall only be of sufficient width to allow placement and proper construction of the utility and backfill of the trench.
2. Backfilling of a utility trench will be dependent on its location, use, depth, and utility line material type. Trenches that are required to meet structural fill specifications, such as those under or near buildings, or within pavement areas, shall have granular material strategically compacted to at least the spring-line of the utility conduit to mitigate pipeline movement and deformation. The initial lift thickness of backfill overlying the pipeline will be dependent on the pipeline material, type of backfill, and the compaction equipment, so as not to cause deflection or deformation of the pipeline. Trench backfill shall conform to the General Earthwork specifications for placement, compaction, and testing of structural fill.

Geotextiles

1. All geotextiles shall be resistant to ultraviolet degradation, and to biological and chemical environments normally found in soils. Geotextiles shall be stored so that they are not in direct sunlight or exposed to chemical products. The use of a geotextile shall be specified and shall meet the following specification for each use.

Subgrade/Aggregate Separation

Woven or nonwoven fabric conforming to the following physical properties:

• Minimum grab tensile strength	ASTM Method D-4632	180 lb
• Minimum puncture strength (CBR)	ASTM Method D-6241	371 lb
• Elongation	ASTM Method D-4632	15%
• Maximum apparent opening size	ASTM Method D-4751	No. 40
• Minimum permittivity	ASTM Method D-4491	0.05 s^{-1}

Drainage Filtration

Woven fabric conforming to the following physical properties:

• Minimum grab tensile strength	ASTM Method D-4632	110 lb
• Minimum puncture strength (CBR)	ASTM Method D-6241	220 lb
• Elongation	ASTM Method D-4632	50%
• Maximum apparent opening size	ASTM Method D-4751	No. 40
• Minimum permittivity	ASTM Method D-4491	0.5 s^{-1}

Geogrid Base Reinforcement

Extruded biaxially or triaxially oriented polypropylene conforming to the following physical properties:

• Peak tensile strength lb/ft	ASTM Method D-6637	925
• Tensile strength at 2% strain lb/ft	ASTM Method D-6637	300
• Tensile strength at 5% strain lb/ft	ASTM Method D-6637	600
• Flexural Rigidity	ASTM Method D-1388	250,000 mg-cm
• Effective Opening Size rock size	ASTM Method D-4751	1.5x
• Pavement areas use Hanes Geocomponets or Terragrid BX1200 or Equivalent		Tensilte Strength of 1,300 lb-ft Recommended

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

Lane County Area, Oregon

July 25, 2024

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.

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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.

Soil Map

Map Scale: 1:740 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 10, 20, 40, 60

Feet: 0, 35, 70, 140, 210

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 1:20,000.

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

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

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

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

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

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

Soil Survey Area: Lane County Area, Oregon
Survey Area Data: Version 22, Sep 8, 2023

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

Date(s) aerial images were photographed: May 19, 2023—Jun 3, 2023

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
131C	Waldport fine sand, 0 to 12 percent slopes	2.9	100.0%
Totals for Area of Interest		**2.9**	**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.

Lane County Area, Oregon

131C—Waldport fine sand, 0 to 12 percent slopes

Map Unit Setting

National map unit symbol: 234r
Elevation: 0 to 150 feet
Mean annual precipitation: 60 to 100 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 165 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Waldport and similar soils: 85 percent
Minor components: 8 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Waldport

Setting

Landform: Dunes
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian sand of mixed origin

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
Oe - 1 to 3 inches: moderately decomposed plant material
H1 - 3 to 8 inches: fine sand
H2 - 8 to 60 inches: fine sand

Properties and qualities

Slope: 0 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: F004AB202OR - Dune Forest
Hydric soil rating: No

Minor Components

Heceta

Percent of map unit: 4 percent
Landform: Interdunes
Hydric soil rating: Yes

Yaquina

Percent of map unit: 4 percent
Landform: Marine terraces
Hydric soil rating: Yes

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