OREGON PARKS AND RECREATION DEPARTMENT
OCEAN SHORE PERMIT APPLICATION

SHORELINE PROTECTION STRUCTURES

FOR OFFICIAL USE ONLY

OPRD PERMIT #:	3051-24
APPLICATION DATE:	5/17/2024
DATE POSTED:	5/30/2024
COORDINATOR:	BLANCHETTE
60 DAY DUE DATE:	7/16/2024

Section 1. Proposed Project

Project type:

- [x] Riprap Revetment
- [ ] Seawall
- [ ] Vegetative Stabilization
- [x] Other — New Concrete Access Stairs

Provide a brief description of the project:

Build a riprap structure (and new integrated access stairs) ~ 600 feet in length with average height of ~24 ft and width of ~ 42 ft along dune and bluff at western side of SeaRidge Property, which is located at 4175 N Hwy 101, Depoe Bay, OR

Estimated project start date 10/18/24	Estimated project completion date 10/18/25

Section 2. Applicant Information

Owner	SeaRidge Homeowners Association		Agent		
Mailing Address	4175 N. HWY 101		Mailing Address		
City Depoe Bay	State Oregon	Zip 97341	City	State	Zip
Phone (541) 805-6453	Fax		Phone	Fax	
Email	searidgecondos@gmail.com		Email		

Primary Contact: [x] Owner [ ] Agent

Section 3. Property Location and Information

Situs Address	4175 N. HWY 101				
City/Town	Depoe Bay		County	Lincoln County	
Township 8S	Range 11W	Section 28	Subsection BA S1	Tax Lot Western 9000	

Current Use

- [ ] Residential
- [x] Vacant (unbuilt)
- [ ] Commercial/Industrial
- [x] Other (explain) — General Common Elements
- [ ] Public

City/County Zoning Designation R-1, PD, RC	Year main structure was built Condos to the East ~1986

Lot Dimensions

Lot Size N/A	Oceanfront footage (in feet) ~613
Street front footage (in feet) None	East-West footage (in feet) ~277 (North) to ~499 (South)

Setbacks

Distance from eastern (or landward) property line to nearest building (in feet)	~60 feet to easternmost building
Distance from seaward dune crest or bluff edge to nearest building (in feet)	~18 feet to utility infrastructure
Approximate height of oceanfront bluff, dune or escarpment (in feet)	Variable, at times ~15 feet

List the names, situs and mailing addresses of oceanfront landowners with property boundaries common to those of the property or properties described in the application.

Name	Property situs address	Mailing address
Ruben J Menashe, Inc	No Situs Tax Lot 4700, Map 8-11-28BA	11359 NE Halsey Portland, OR 97230
SLAMA CAROL JEANNE TTEE & KLAMMER PETER JON TTEE &	4075 Lincoln Avenue Depoe Bay, Oregon	3343 NW Silktassel Drive Corvallis, OR 97330
KLAMMER JENNIFER AU TTEE ETAL		

Section 4. Project Justification and Impacts

Provide a detailed explanation of the hazards and threat to property:
See Engineering Geologic Investigation Report by HG Schlicker and Associates, Inc (HGSA #Y214577) and Supporting Application Documents

(Include documented supporting evidence, i.e. photographs, and/or chronology of bank retreat)
Attach additional pages as necessary

Describe all potential impacts:
See Engineering Geologic Investigation Report by HG Schlicker and Associates, Inc (HGSA #Y214577) and Supporting Application Documents

Attach additional pages as necessary

Describe measures that will be taken to minimize the impacts identified above:
See Engineering Geologic Investigation Report by HG Schlicker and Associates, Inc (HGSA #Y214577) and Supporting Application Documents

Attach additional pages as necessary

Section 5. Project Details

Total Length along shoreline (in feet)	~600	Height (in feet)	~24 feet
Total width of project (in feet)	~42		
Slope (ratio-horizontal to vertical)	outer face 2H:1V	Total volume of all material(s) (cubic yards)	8700

Riprap Specifications:

Armor stone type	Basalt	Armor stone source	TBD Upland Source
Diameter of armor stone (in feet)	3 to 7 feet	Amount of armor stone (cubic yards)	6600
Type of filter fabric	Mirafi 1100N or equivalent	Type of backing fill material	ODOT Class 200&Quarry-run
The amount of backing fill material (cubic yards)	2100	Will toe be keyed into bedrock?	☒ Yes ☐ No
Elevation of toe trench	~6 ft (NAVD 88)	Depth of toe trench	~14 ft

Section 6. Analysis Of Hazard Avoidance

Please verify that the attached hazard avoidance analysis includes:

☒ A list of hazard avoidance alternatives	
☒ A description of why hazard avoidance alternatives are not feasible	☒ If an alternative was tried, explain why it did not succeed

☐ Is the relocation cost estimate included? ***(If the cost of moving the building is listed as an unfeasible factor.)***

Section 7. Geologic Report

Please provide the following information:

Date of Report	~~7/31/23~~ 7/19/23	Company	HG Schlicker and Associates, Inc.
Geologist Name	Adam M Large	Geologist Certifications	RG, CEG
Mailing Address	607 Main Street Suite 200		
City	Oregon City	State	Oregon
Zip	97045		
Phone	(503) 655-8113	Fax	(503) 655-8113
Email address	hgsa@teleport.com		

Please verify your geologic report contains all of the following information:

☒ The potential impacts from the proposed project on the sand source, supply, and movement on the affected beach as well as within the same littoral cell.	☒ A review of potential non-structural solutions, including, but not limited to: vegetative stabilization; non-structural dynamic revetments and foredune enhancement.
☒ The known or suspected geologic and seismic hazards in the project area and how the proposed project may affect or be impacted by those geologic and seismic hazards.	☒ The bank or bluff stability and erosion rates on the subject property and adjacent properties.

Section 8. Additional Permit Requirements

List the agency and type of permit required:

Lincoln County Flood Plain Development Permit

Lincoln County Building Permit for Access Stairs

☐ **No additional agency permit required**

Section 9. Signature Requirement

The application is hereby made for the ocean shore alteration described within this application. I certify that I am familiar with the information contained in this application, and, to the best of my knowledge and belief, this information is true, complete and accurate. I further certify that I possess the authority to undertake the proposed alteration.

I understand that the granting of an OPRD permit does not release me from obtaining any additional permits from any/all local, state, and/or federal agencies that may be required before commencing the project.

I understand that the payment of required OPRD processing fee does not guarantee the issuance of an approved permit.

Aboo Balgamwalla
President
SeaRidge Homeowners Association

Owner Signature Date

☐ *I (Owner) authorize the Agent included in this application to act on my behalf during this application process.*

[redacted]

Agent Signature Date July 23, 2023

See the attached Executive Summary which is an integral part of this Application.

Section 10. Required Drawings

The submitted application shall be accompanied by a plan view and a cross-section of the proposed project. Neatness and accuracy are important in order for those reviewing the application to clearly understand the proposal. Copies of county assessor's maps may not be used as site plan maps.

For consistency and quality please follow these format specifications:

- **All Drawings shall be:**
  - On 8.5 X 11 inch white paper
  - In black ink or clear legible photocopy of plan(s)
  - Printed or typed (no cursive) minimum size 10 point font
  - Drawn with a straight-edge and not freehanded.
  - Drawn accurately to scale
  - Be labeled appropriately

- **Plan view drawing shall include:**
  - Scale of drawing and north arrow
  - All lot lines with dimensions
  - Existing structures
  - Roads, driveways, etc. (existing, proposed, or temporary access roads)
  - Setback distance from nearest structure or infrastructure to upper edge of bluff or dune edge
  - Location of proposed improvements in relation to Statutory Vegetation Line and Actual Vegetation Line
  - Location of proposed project in relation to all property lines
  - Location of the proposed project in relation to the top of the bluff or dune and the existing toe of bluff or dune

- **Cross-section (side view) drawing shall include:**
  - Scale of drawing
  - Location of the existing base of bluff or dune
  - Location of top of bluff or dune
  - Location of proposed project in relation to base and top of bluff or dune
  - Approximate length, in feet, the project will occupy beyond the existing toe of bluff or dune, include buried toe of proposed shoreline protection structure.
  - Depth of toe trench or footing
  - Slope of the project (width/height ratio (i.e. 2:1))
  - Overall height of the project from bottom of buried toe to the top
  - Armor stone layer with rock size accurately depicted
  - Thickness of armor stone
  - Backing fill layer with thickness accurately depicted
  - Type of filter fabric, if applicable

Section 11. Application Fees and Calculation Worksheet (to be submitted with application)

Each application filed under ORS 390.640, for an alteration on the ocean shore shall be accompanied by a processing fee for the purpose of partial recovery to the Department of its administrative costs. The fee shall be determined according to the construction value of the project.

The application processing fee shall be:
(a) $400 for projects with a construction value less than $2,500; or
(b) $400 plus three percent of the construction value over $2,500 for projects with a construction value equal to or greater than $2,500.

Please use the formula below to determine total application fees.

Total construction value of project		$ 1,504,485	
Base construction value (Subtractable allowance)	-	$ 2500.00	
Subtotal (construction value minus base fee)	=	$ 1,501,985	(x .03 = 45,060)
3% of subtotal		$ 45,060	
Add Base Fee	+	$ 400.00	
TOTAL APPLICATION FEE	=	$ 45,460	

EXAMPLE

Total construction value of project		*$ 10,000.00*	
Base construction value (Subtractable allowance)	-	*$ 2,500.00*	
Subtotal (construction value minus base fee)	=	*$ 7,500.00*	*(x .03 = 225.00)*
3% of subtotal		*$ 225.00*	
Add Base Fee	+	*$ 400.00*	
TOTAL APPLICATION FEE	=	*$ 625.00*	

Total Construction Value (see the attached estimates from Dan Kauffman Excavating, LLC for the revetment and the stairs)

Revetment 613 ft x $2,345/ft = $1,437,485
Stairs 67,000
$1,504,485

Submitted Ocean Shore Permit Application shall include this completed fee worksheet, as well as, evidence of construction value

CITY/COUNTY PLANNING DEPARTMENT AFFIDAVIT

Applicant

Last	First	MI
SeaRidge Homeowners Assc		

Property Details

Township	Range	Section	Subsection
8S	11W	28	BA Supp Map No. 1

Tax Lot 9000

County

☐ Clatsop	☐ Tillamook	☒ Lincoln	☐ Lane
☐ Douglas	☐ Coos	☐ Curry	

Project Type

☒ Shorefront Protection	☒ Access/Other Misc.	☐ Sand Alteration
☐ Pipeline/Cable/Conduit	☐ Natural Product Removal	

Planning Department Certification

(To be completed by local planning official)

Part I

In accordance with Statewide Planning Goal #18, Beaches and Dunes alteration permits for beachfront protective structures may be issued only where development existed on January 1, 1977, or where an exception to this Goal 18 implementation requirement has been approved by the appropriate local jurisdiction. For the purpose of this requirement, the definition of "development" means houses, commercial and industrial buildings, and vacant subdivision lots which are physically improved through the construction of streets and provisions of utilities to the lot.

Above property meets Goal 18 Eligibility? ☐ Yes ☐ No ☐ Not Applicable

Part II

I have reviewed the proposed project application and have determined that:

☐ This project is not regulated by the local comprehensive plan and zoning ordinances.

☑ This project has been reviewed and **is consistent** with the local comprehensive plan and zoning ordinance.

☐ This project has been reviewed and **is not consistent** with the local comprehensive plan and zoning ordinance.

☐ The consistency of this project with the local planning ordinance cannot be determined until the following local approvals are obtained:

☐ Conditional Use Approval ☐ Zone Change ☐ Plan Amendment
☐ Development Permit ☐ Other (Specify) _____

Comments:

OK per 01-LUPC-21; Ordinance that adopted an Exception to Goal 18, and, therefore, makes a shoreline protective structure on Map and Tax Lot 08-11-28-BA-9000 consistent with Lincoln County's Comprehensive plan is #520. Also, OK per Floodplain Development Permit Case File 30-FP-23.

Megan Hoff	Senior Planner
Local Planning Official Name (Please Print)	Title
[redacted]	8/18/23
Signature	Date

The completed/signed form shall be submitted with the completed Ocean Shore Permit Application

May 15, 2024

OPRD Application for Installation of a Riprap Protective Barrier

For 38 years, SeaRidge has been in full compliance with Oregon's recommended 'soft measure' erosion-control guidelines.

This has resulted in:

A. A 50% loss of berm area
B. A berm inadequate for containing internal pressures due to built-up rainwater
C. "blow outs" where pressure releases soil into the ocean in sudden, dramatic failures
D. recurring wave encroachment (see picture below)
E. exposure of a sewer pump station such that it is now ~25 feet from the bluff edge (compared to its original position of ~70 feet from the bluff edge).

2018 example of wave encroachment.

Lesser category storms now cause irreversible berm loss that was previously encountered only after the most intense El Niño events.

Thirty-eight years of reliance on "soft measures" erosion control has significantly degraded our beachfront/berm. We believe installing a riprap barrier is our only viable option for protecting our beachfront from catastrophic damage in a not-too-distant future El Niño event.

Aboo Balgamwalla SeaRidge President
Sally Davies. SeaRidge Secretary
Marc Allen SeaRidge Treasure
John Wager SeaRidge Board Member
Andy Fitzgerald SeaRidge Board Member

Bruce Dummer & David Smith

EXECUTIVE SUMMARY

May 15, 2024

Executive Summary Supporting SeaRidge's Application to OPRD for an Ocean Shores Permit

We believe that the attached document produced by H.G. Schlicker & Associates, Inc. strongly supports SeaRidge's application to the Oregon Parks and Recreation Department (OPRD) for an Ocean Shores Permit approving installation of a riprap protective barrier structure.

Highlights from Schlicker's report are as follows:

- In 1984/85, a sewage pump station was positioned ~70 feet from the bluff edge.
- In 2023, this sewage pump station is now positioned ~25 feet from the bluff edge.
- Approximately 45 feet of erosion has occurred over 38 years (~1.2 feet per year).
- Erosion is very nonuniform across SeaRidge's 600-foot-long berm.
- The northern portion of the SeaRidge berm is much less stable than the southern portion.
- Erosion tends to occur in spurts, not at a uniform rate.
- Approximately 40 feet of erosion occurred during the 1997-1998 El Niño storms.

For 38 years, SeaRidge has been in full compliance with Oregon's recommended 'soft measure' erosion-control guidelines. Enormous amounts of sand (~17 sand alterations since 1985) have been hauled in or pushed from the beach in order to reinforce our berm. Numerous attempts have been made to plant shrubs, bushes, grass, etc. in order to anchor our berm. Largely, these efforts have failed; typically, abruptly, and dramatically during an intense El Niño event. As we know, future El Niño events are projected to be both more numerous and more intense.

Exposure of the sewage pump station is arguably the greatest concern underlying our desire to more adequately protect our berm. Our concern is shared by the Gleneden Sanitary District, as evident from the letter of support written by their President, as included in the attached document.

2018 example of wave encroachment.

In conclusion, we believe that SeaRidge needs to install a riprap protective barrier structure as soon as possible; hopefully, before the onset of the next El Niño cycle.

Sincerely,

[redacted]

Aboo Balgamwalla
President
SeaRidge


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Kernville - Gleneden Beach - Lincoln Beach Water District
Gleneden Sanitary District
PO Box 96
Gleneden Beach, OR 97388
541-764-2475

June 9, 2021

Searidge Homeowner's Association
4175 NW Highway 101
Depoe Bay OR 97341

By a Board Motion on June 9, 2021, the Board of Directors of the Gleneden Sanitary District strongly supports the Searidge Homeowner's Association in their efforts to establish a protective barrier for their westerly units.

As many agencies are aware, one of the Sanitary District's lift stations, number 6, is in jeopardy due to the continued erosion, immediately west of the lift station.

The plan by the Searidge Homeowner's Association to install "Rip Rap" on their property would serve to protect the lift station and the related sewer mains from further ocean encroachment.

The chance of a raw sewage spill on the public beach because of the lack of prevention attempts is inappropriate in the Board's opinion.

Sincerely,

[redacted]

Phil Jensen, President
GLENEDEN SANITARY DISTRICT

Cc: Lincoln County Health & Human Services
Adam Springer, Gleneden Sanitary District's Attorney

This Agreement made as of June 20, 2023

BETWEEN

Sea Ridge Condominiums
4175 N Hwy 101
Depoe Bay Or. 97341

The owner of the project location Sea Ridge Condominiums (hereinafter "Owner"),

AND

Dan Kauffman Excavating, LLC
PO Box 79
Lincoln City OR 97367
541-994-8584, Phone
541-994-6466, Fax
office@dankauffmanexcavating.com
(hereinafter "Contractor" or "DKE"),

The project is located at 4175 N Hwy 101 Depoe Bay Or. 97149 (hereinafter "location")

Contractor (DKE) to build riprap as per figure 6 cross section completed by H.G. Schlicker and Associates.

This price includes all labor, materials and equipment.
Includes beach sand placed as per figure 6.
Does not include beach grass or planting.

The property owner shall be responsible for all property lines.

Riprap Cost:

Riprap construction shall be charged at $ 2,345.00 per lineal foot. This price is for ***riprap only***.

If we are the successful bidder, we can start this job approximately in mid August 2023

Added charges:

DKE (Contractor) shall charge, as an extra, at standard time and materials rates, any work done if bedrock, unforeseen water or other situations beyond our control should occur during the course of work. All attempts will be made to contact the owner if such a situation should occur, however workers on site will have to correct any situation that should pose a hazard or threat to them or the public.

Escalator clause:

Prices in effect at the time of shipment will apply. Price changes, if any, will reflect only changes in our cost for materials and or freight from our suppliers at the time of shipment, as well as the cost of fuel to operate our machinery and trucks to complete this project and/or supply materials to this project.

Nature of the Project:

Project involves the dumping of very large boulders used to construct the riprap wall, the back fill of large quantities of earth and the operation of heavy excavation machinery. The Owner acknowledges that the project may cause vibrations to the owner's land and adjacent properties. Owner assumes all responsibility in the event damage occurs to Owner's property and adjacent properties. DKE will not, for example, be responsible for any damage to the home, property, driveway, etc. of Owner or adjacent properties. Owner shall hold DKE harmless from vibration claims by owners of adjacent properties.

Contract sum:

The owner shall pay the contractor (DKE) the contract sum, which is the total of all charges for this project, in current funds for the contractor's performance of the contract. The contract sum shall be subject to additions and deductions as provided in the contract documents and change orders.

Prices quoted in this agreement are good for 30 days.

Payments and progress payments:

Payments by Owner shall be based upon applications for payment submitted by Contractor to the Owner. Applications for payment shall indicate the amount of work completed by the end of the billing period covered by the application for payment. The Owner shall make progress payments on the contract sum to the Contractor as provided herein and elsewhere in the contract documents. The Contractor shall submit a request for payment by the 25th of each month, which shall be approved by the Owner. Owner shall mail a check for approved payment on or before the 10th of the following month.

Final payment:

The Owner shall make final payment, constituting the entire unpaid balance of the contract sum, to the contractor when:

1. The contractor has fully performed the contract except for the contractor's responsibility to correct the work and to satisfy other requirements, if any, which extend beyond final payment: and

2. The owner's final payment to the contractor shall be made no later than 30 days after the issuance of the final invoice for payment.

Payments due and unpaid under the contract shall bear interest from the date payment is due at the rate of 18% per annum.

Change Orders:

Any alteration or deviation from the plans and specifications, involving extra cost of time, material or labor will be executed only upon written change orders for same, and will become an extra charge over the sum mentioned in this contract. All Change Orders must be in writing and based upon mutual agreement between the owner and the contractor. Change orders shall include the Change in the work to be performed and the adjustment, if any, in the contract price. All proposed Change Orders shall be submitted to the other party at ten days prior to the change date.

Miscellaneous:

The contractor agrees to carry workers compensation and public liability insurance, to pay all old age benefit and unemployment compensation taxes under this contract as required by the United States government and the state(s) in which this work is performed, and to pay all sales tax, if any, upon the materials furnished.

This contractor is not expert in contaminated or hazardous waste cleanup or management. All such materials are required to be removed by the owner prior to the start of job. DKE will be held harmless if such materials should be encountered on the job site.

In the event that any litigation arise between the parties to this agreement regarding this agreement the prevailing party shall be entitled to reimbursement of that parties attorney's fees and costs from the other party. Venue is agreed to be in the state courts of Lincoln County Oregon.

This agreement is entered into as of the day and year written above and is executed in at least two original copies, of which one is to be delivered to the owner and the remainder to the contractor.

Dan Kauffman Excavating LLC
CCB: 116417

Owner signature	Date	Contractor signature	Date
Printed name and title		Printed name and title	

This Agreement made as of June 30, 2023

BETWEEN

Sea Ridge Condominiums
4175 N Hwy 101
Depoe Bay Or. 97341

The owner of the project location Sea Ridge Condominiums (hereinafter "Owner"),

AND

Dan Kauffman Excavating, LLC
PO Box 79
Lincoln City OR 97367
541-994-8584, Phone
541-994-6466, Fax
office@dankauffmanexcavating.com
(hereinafter "Contractor" or "DKE"),

The project is located at 4175 N Hwy 101 Depoe Bay Or. 97149 (hereinafter "location")

Quote for beach access stairs based on the engineering report and designs completed by Field Engineering dated June 16, 2023 for Searidge Condominiums

Total $67,000.00

Quote for beach access stairs based on our previous experience building beach access stairs on numerous projects over the last 30 years

Total $45,000.00

The property owner shall be responsible for all property lines.

Added charges:

DKE (Contractor) shall charge, as an extra, at standard time and materials rates, any work done if bedrock, unforeseen water or other situations beyond our control should occur during the course of work. All attempts will be made to contact the owner if such a situation should occur, however workers on site will have to correct any situation that should pose a hazard or threat to them or the public.

Escalator clause:

Prices in effect at the time of shipment will apply. Price changes, if any, will reflect only changes in our cost for materials and or freight from our suppliers at the time of shipment, as well as the cost of fuel to operate our machinery and trucks to complete this project and/or supply materials to this project.

Nature of the Project:

Project involves the dumping of very large boulders used to construct the riprap wall, the back fill of large quantities of earth and the operation of heavy excavation machinery. The Owner acknowledges that the project may cause vibrations to the owner's land and adjacent properties. Owner assumes all responsibility in the event damage occurs to Owner's property and adjacent properties. DKE will not, for example, be responsible for any damage to the home, property, driveway, etc. of Owner or adjacent properties. Owner shall hold DKE harmless from vibration claims by owners of adjacent properties.

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1. The contractor has fully performed the contract except for the contractor's responsibility to correct the work and to satisfy other requirements, if any, which extend beyond final payment: and

2. The owner's final payment to the contractor shall be made no later than 30 days after the issuance of the final invoice for payment.

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Miscellaneous:

The contractor agrees to carry workers compensation and public liability insurance, to pay all old age benefit and unemployment compensation taxes under this contract as required by the United States government and the state(s) in which this work is performed, and to pay all sales tax, if any, upon the materials furnished.

This contractor is not expert in contaminated or hazardous waste cleanup or management. All such materials are required to be removed by the owner prior to the start of job. DKE will be held harmless if such materials should be encountered on the job site.

In the event that any litigation arise between the parties to this agreement regarding this agreement the prevailing party shall be entitled to reimbursement of that parties attorney's fees and costs from the other party. Venue is agreed to be in the state courts of Lincoln County Oregon.

This agreement is entered into as of the day and year written above and is executed in at least two original copies, of which one is to be delivered to the owner and the remainder to the contractor.

Dan Kauffman Excavating LLC
CCB: 116417

Owner signature	Date	Contractor signature	Date
Printed name and title		Printed name and title	

Additional Narrative for Sections 4, 5, 6, and 8 of the SeaRidge Application

This narrative supplements SeaRidge's application to the Oregon Parks and Recreation department (OPRD) for an oceanshore permit to allow the construction of a riprap structure along the ocean bluff. This revetment is necessary to stop the rapid erosion of the bluff that poses an imminent threat to several buildings and the Sewer System.

SITE DESCRIPTION

The SeaRidge Condominium subdivision consists of approximately 13 acres located on an oceanfront marine terrace fronted by a dune and bluff slope in the Lincoln Beach area south of Lincoln City, Oregon, approximately ½ mile north of Fishing Rock (Figures 1 and 2; Appendix A HGSA Report). The subject site consists of the western portion of oceanfront Tax Lot 90000, identified as general common elements for the SeaRidge Condominiums, and is approximately 600 feet wide along the beachfront. Additional information about the project site is provided in the Engineering Geologic Investigation report (Section 2.0 Site Description) as prepared by H.G. Schlicker & Associates.

PROJECT OVERVIEW

As provided on the application submitted herewith and Section 9 of the HG Schlicker Report

The proposed revetment will be located entirely on the western portion of a privately owned property (Tax Lot 90000). The majority of the proposed revetment will be located east of the mapped Statutory Vegetation Line. The proposed revetment structure, including the backing slope, will potentially extend up to approximately 50 feet west of the current location of the base of the dune and bluff scarp (Figures 4 and 5). It also includes the Embeded Stairs as designed by Fields Engineering and Detailed in (Appendix F). Based on HG Schlicker's review of aerial photographs (Appendix C) and historical slope profiles (Appendix D), this encroachment will generally not exceed the configuration of the fronting dune as it existed prior to 1997/98 winter. The proposed revetment's recommended location, size, configuration, and alignment were determined to limit impacts to public rights, reduce detrimental effects on the ocean shore, and avoid long-term costs to the public while providing appropriate and necessary protection to the site's infrastructure. As detailed in Section 3 of the HG Schlicker Report, All the previous attempts to stabilize the site have been unsuccessful. The full design details are provided in the Plans and Geologic Report

APPLICATION SECTION 4

Section 4: Property Justification.

1. **The site is particularly susceptible to erosion.**

The site is located in the Lincoln littoral cell between Fishing Rock to the south and Cascade Head to the north (Allan et al., 2015). Delivery and balance of sand and sediment within the Lincoln littoral cell are influenced by ocean and weather conditions which include the cyclic nature of El Niño and La Niña events; these occur with approximately the same historical frequency and are grouped into periods of approximately 20 to 25 years (Taylor, 1998).

Based on our prior work in this coastal area and our review and interpretation of historical aerial and satellite photographs from 1977, 1988, 1994, 2000, 2003, 2005, 2011, 2014, 2016, 2018, and 2020, sand at the site appears to generally accrete in the summers and erode in the winters. Accretion in the summers primarily results from accumulating windblown sand and a less energetic wave environment. Erosion in the winter is generally the result of high-energy storm waves.

The Northwest Association of Networked Ocean Observing Systems (NANOOS) Beach and Shoreline Changes historical beach profile mapping dating from 1997 onward shows that seasonal accretion and retreat of beach sand has occurred in this coastal area due to the cyclic ocean and weather conditions (Allan and Hart, 2005).

The site lies in an area that has been mapped as experiencing critical erosion of sand spits and dune areas (Schlicker et al., 1973). Priest and others (1994) determined the average annual erosion rate for the unprotected bluff segments near the site as 0.62 ± 0.76 feet per year. This erosion rate was calculated by measuring the distance from existing structures to the bluff and compared to distances measured on a 1939 or 1967 vertical aerial photograph (Priest et al., 1994).

Based on mapping completed by Priest and Allan (2004), the bluff and beach on the western part of the site lies in the Active Erosion Hazard Zone, and the area adjacent to the bluff slope lies in the High-Risk Coastal Erosion Hazard Zone. Additional Details are in the Section 5 of the Schlicker Report

The erosion of the Site is rapid and increasing.

At SeaRidge (SR) a great deal of beachfront berm and foredune area has been lost since the first (1982-1983) Very Strong El Nino event occurred just as SR site entered ground construction phases.

By end of 1984, Oregon Parks investigated the SR site finding: *"….high tides had eroded approximately 150 feet of beachfront creating a steep sandy bank along what had been a low, heavily vegetated slope to the beach."*

In 1988 Shannon & Wilson report states: "*The foredune is one of only a few small foredunes that have survived ocean erosion along this stretch of beach."*

1988 Paeth survey data indicated prior loss in the 50-60' range.

The “stability” and erosion patterns of SR beachfront changed dramatically with advent of severe El Nino events. This would play out only more predictably in the years to come.

Although significant and continuing, these berm losses have now come to reflect losses in berm stability eastward from bluff faces. Combined with growing storm intensities, even storms once outside El Nino events can affect erosion periods.

1997/1998 Very strong El Nino event

By June 1998 HG Schlicker report (pg 7) states*: “The recent abnormally large amount of erosion (approximately 40 feet) may be attributed, in part, to the placement of sand along the foredune in 1998 which initially created an artificial shoreline 40 feet farther seaward than the naturally formed shoreline. This placed sand has been undergoing a process of redistribution by waves and currents since its placement.”*

By February 1999, Wright/ Deacon & McCoy and Assoc., Inc. (Geotechnical Consultants) stated: “The survey of the site on February 11, 1999, indicates that the present active wave erosion line is approximately 90 to 100 feet from the edge of the condominiums. We estimate the property's erosion since 1971 to be approximately 100 feet, at a rate of about 3 feet per year, with most of the erosion occurring during a few severe storms. The present beach line is continuing to erode easterly toward the condominiums. *(note: 2023 maximum points of erosion are 41’ to 60’ - measured westward from building support points)*

The eroded area has been backfilled from time to time by dozing sand from the beach; however, the severe storms have continuously eroded the beach closer to the condominiums. It is reasonable to expect future erosion to continue to move the beach line closer to the condominiums and eventually to reach the condominiums.” Also stated: “The foredune on the property is in short supply of sand for growth and is being easily eroded by wave action.”

By 1999, SeaRidge had pushed sand 4 times since 1985. This artificial replenishment lasted only short periods until the next storms removed it quickly, leaving remaining natural berm soils subject to deeper incremental erosion in the following storms. The “hot spot erosion” patterns recognized on this site are very evident in this process.

Natural site sand loss over accretion is evident in the 5-year period of “gentler” storm patterns depicted in the pictures below.

From a risk management position at SR, no one is considering average loss per year as a responsible way to predict any intense category year’s more aggressive outcomes.

By 2000, “Blowouts” (“washouts” per HG Schlicker 7/2023 application report/description- see pg 5) began indicating berm E-W widths had reached a deteriorated state where heavy rain event internal berm pressures could no longer be retained.

Heavier rain events have increased through time, partly evidenced by the number of “blowouts,” which are independent of sea wave and storm conditions but acerbate size in combined events. 7 of 9 of these “Blow outs” have occurred from 10/2016 thru 12/2022 all in the area west of the sewer pump station.

The winter of 2000 a curtain drain system was installed across the entire N-S length of the SR berm.

By 2004 the first large rocks of that system were exposed at our northernmost property line thru storm wave actions. As directed, SR removed the rocks leaving them unstructured, opening up that portion of the berm to future erosion events.

2015/2016 Very strong El Nino event

As anticipated following the initial 2015-16 Very Strong El Nino event, in 2016 and 2017 additional rocks were exposed again. This time OPRD recognized:

"..11/17/2016 Sennewald OPRD ltr pg 3 1 st para: "Given the seriousness of the situation, and the fact that the exposed riprap is currently providing protection of the upland improvements as we head into the winter season, the immediate removal of the exposed riprap would be inappropriate and unnecessarily increase the risk of damage to existing upland development. Because the exposure of the rock (and violation) has already become apparent, and the need to address the problem has finally arrived, OPRD is willing to defer enforcement of Ocean Shore regulations on a temporary basis."

SeaRidge covered the rocks each year by importing sand as recommended by state

".. *8/9/2017 letter from OPRD..my hope is that reliance on the use of sand cover will be replaced by a longer-term solution not currently available and that SeaRidge will continue to pursue an appropriate, lawful way to protect the development"*

SeaRidge covered the rocks in each year by importation of sand, and initiated Goal 18 exception relief.

By September of 2018, SeaRidge undertook another (now #17-- not counting any of the 9 "Blow outs") push of sand combined with importation to rebuild (not the first time) the entire berm and dune. The pictures below reflect the result and effects of follow-up years of Weak category El Nino and La Nina periods. This "gentler" time ran from the 2017-18 winter to the present. Also visible are overall losses (Fig 2 & 3) of sand during this time of greatest expected build ups.

Figure 1 1/20/2018 From mid SR along beachfront to north post' 17-'18 winter erosion

Figure 3 March 1998 Satirs Gone

Approximately 2½ feet of accreted sand currently covers the lowest portion of the stairway not in existence in figure 3.

Regarding the SeaRidge site and upcoming 2023-2024 Strong category El Nino winter.

As of 11/9/2023 predictions, the coming winter is expected to be category Strong and last into March 2024.

The remaining sand cover is 6 ½ feet lower than the previous time SR entered an El Nino winter (2015.) Past experience dictates this will be a head start for oncoming storms and erosion.

In the sewer pump station area: 7 “Blowouts” (10/2016 to 12/2022) and subsequent sand fills have weakened this berm area, with the greatest incursion into the berm currently reaching 14.5 feet from the sewer pump station. Any combination of storm/rain/high sea conditions will affect this area.

Historically, the north half of the SR beachfront has the highest sand fill and the most sand maintenance. Because of this, it is most susceptible to wave actions and quick loss of sand. Due to the removal of rock at the northernmost property line area, the un-rip rapped Menashe adjacent lot and remaining unstructured (currently covered) rocks would leave this area most likely for “end run” wave action or direct frontal action toward the D7 north end unit foundations. The most exposed rocks are all in this northern half of the SR beachfront.

Using the above-quoted statements should give an idea of losses occurring in previous years, which now cause the inability of the berm to defend against the increasing intensities of modern storms.

The impending approach of another Strong El Nino cycle extending into March will leave ample opportunity for events to combine, creating a “Big gulp” erosion typical of this “Hot spot erosion” site.

Due to the increasing number of SR rock exposures in 2004, 2016, and 2017 (see Schlicker 2023 application report Appendices A & B), the 2023-24 winter will reveal and disrupt additional rocks over a larger beachfront area than seen in the past. The first-ever rocks exposure in the SR berm's southern half occurred in 2018 (see Figure 2 above). Since there is now only a thin veneer of sand over those rocks, it is very likely most of these rocks could surface during the coming El Nino cycle.

It seems the above 11/17/2017 OPRD remains prophetic: “…*to address the problem has finally arrived.”*

In September of 2021, SeaRidge completed its role of obtaining a Goal 18 Exception based on all the above circumstances and through recognition of the preponderance of rip rap structures on Gleneden & Lincoln beaches having reached its own breaking point.

The Schlicker Report appropriately cites certain authoritative studies that have documented net average annual erosion rates in the SeaRidge region by comparing aerial photographs taken during different years.

A 600-foot revetment is not something that is erected quickly. It is not reasonable for OPRD to withhold approval for a revetment until SeaRidge is in the midst of reacting to the tragic consequences from the next El Nino event. The berm is too narrow and too unstable to continue to protect the critical SeaRidge infrastructure without the support of a revetment.
The Site structures are in imminent danger of collapse from the rapid erosion.

Section 4: Minimizing Project Impacts.

Best practices, construction methods and techniques, and design considerations that will be used to minimize impacts from all aspects of the project and construction: The proposed construction of a revetment for the benefit of the Property will be done by a qualified Excavation company that will apply impact-reduction methods in preparation for, and construction of, the proposed revetment. Below is an overview of the construction plan, along with best practices and impact reduction considerations.

Work Area: This project will require a construction area, a staging area, and a haul route between them. It will also need a storage area for materials and vehicles during nonwork hours and parking for construction crew members. Such activities will require multiple points of Access to the shoreline.

Regulatory Impact Reduction Requirements.

OAR 736-020-0003(4): "*Alterations and Project Modifications — There are no reasonable alternatives to the proposed activity or project modifications that would better protect the public rights, reduce or eliminate the detrimental affects on the ocean shore, or avoid long-term cost to the public."*

Details of unsuccessful solutions are fully documented in section 10 of the HGSA report. They are summarised here for reference.

- Improving Stormwater
- Control Vegetation Stabilization
- Stabilization by Regrading Beach Filling or Nourishment Dynamic
- Relocation of the Building. Based on the Geotechnics at the site, relocation of the buildings is not Feasible (Page 24 HGSA report)

OAR 736-020-0010(2): *"Protection of Public Rights — Public ownership of or use easement rights on the ocean shore shall be adequately protected."*

None of the proposed construction activities will infringe on public ownership of, or use easement rights on, the ocean shore. As reflected in the construction plans, at no point of construction will north-south or east-west Access along the beach be blocked by the revetment or its structure. Details Section 10.6.1 Pg 25 HGSA report

The SeaRidge Construction Impacts, Staging, and Public Safety Plan provide detail of how Public recreational easement will be protected.

OAR 736-020-0010(2): *Alteration and Project Modification*

Repeated nonstructural alternatives, including san alteration, planting, and stormwater improvements, have been attempted since the site development to mitigate the adverse effect of erosion. These alterations have been ineffective. Details in Section 10.6.2 HGSA report

OAR 736-020-00010(5): "*Public Costs — There are no reasonable special measures which might reduce or eliminate significant public costs. Prior to submission of the application, the applicant shall consider alternatives such as nonstructural solutions, provision for ultimate removal responsibility for structures when no longer needed, reclamation of excavation pits, mitigation of project damages to public interests, or a time limit on project life to allow for changes in public interest."*

There are no significant public costs associated with this project that require special measures before, during or after construction activities. The Property leaseholder will cover all costs for the revetment construction on their leasehold, and for all of the construction restoration activities performed after the revetment is finished. As documented above, nonstructural solutions were considered for the Property, but found deficient based on the erosive conditions present at the Property.

OAR 736-020-0015: *"Scenic Standards- Projects on the ocean shore shall be designed to minimize damage to the scenic attraction of the ocean shore area." This includes natural features, vegetation, views, and blending in with existing scenery."*

The proposed revetment will not substantially affect the aesthetic quality typical of this section of the beach. Storms, high tides, swells, and shifting sands will control how much of the lower portion of the revetment is exposed at any one time. During times when the western portion of the revetment is covered with sand, it will generally appear as a sandy slope rising up from the beach. Details in Section 10.6.5 of the HGSA report

OAR 736-020-0020(1): *"Recreation Use — The project shall not be a detriment to public recreation use opportunities within the ocean shore area"; and OAR 736-020-0020(2): "Recreation Access — The project shall avoid blocking off or obstructing public access routes within the ocean shore area."*

Impacts on recreation opportunities along this beach were a consideration in the design of the riprap revetment by locating the revetment as far east as possible while providing adequate protection of the existing infrastructure, providing sufficient infiltration space for stormwater, and minimizing the encroachment onto the beach.

Details on Recreational Use, Recreational Access are provided in Section 10.6.6 of the HGSA report.

During construction, temporarily blocking off or obstructing public access routes may be necessary to facilitate efficient and safe construction techniques and reduce the total construction period. Information provided in the drive-on beach permit and OPRD's newly required construction plan will discuss the construction logistics and methods to minimize/avoid meaningful impacts on beach access while ensuring public and worker safety.

OAR 736-020-0025(1): *"Structural Safety — The project shall not be a safety hazard to the public due to inadequate structural foundations, lack of bank stability, or the use of weak materials subject to rapid ocean damage."*

During construction, temporarily blocking or obstructing public access routes may be necessary to facilitate efficient and safe construction techniques and reduce the total construction period. Information provided in the drive-on beach permit and OPRD's newly required construction plan will discuss the construction logistics and methods to minimize/avoid meaningful impacts on beach access while ensuring public and worker safety.

OAR 736-020-0025(2): *"Obstructional Hazards — The project shall minimize obstructions to pedestrians or vehicles going onto or along the ocean shore area."*

The proposed revetment is designed (as specified herein) to minimize obstructions to pedestrians or vehicles going onto or along the ocean shore area. When construction is finalized, the proposed revetment will not restrict beach access or passage in the north-south direction. Details in section 10.6.8 HGSA Report

OAR 736-020-0025(3): *"Neighboring Properties — The project shall be designed to avoid or minimize ocean erosion or safety problems for neighboring properties."*

The revetment proposed herein is designed to be entirely located on the privately owned subject site (Tax Lot 90000). As specified herein, the northern and southern ends of the proposed revetment are designed to wrap around and taper to the east along the property lines in order to avoid or minimize potential adverse impacts or safety problems to the adjoining properties.

OAR 736-020-0025(4): *"Property Protection — Beachfront property protection projects shall be designed to accomplish a reasonable degree of increased safety for the on-shore property to be protected."*

See Section 10.6.10 HGSA report:

OAR 736-020-0030(6) *"Natural and Cultural Resource Standard"*

1. **Fish and wildlife**

   There are no conservation activities or sites within the construction Area. This was verified by using the ODFW Compass site. A report of the surrounding area of the construction site does not show any conservation sites or Activities(report Attached). We verified this report output with ODFW.

2. **Estuarine Value and Navigation Interest**

   There is no Estuarine Value and Navigation Interest in the construction area or its surroundings. The Oregon Conservation Strategy Site was used to confirm this information. Map Attached

3. **Historical, cultural, and Archaeology sites**.

   Stacy Scott from OPRD alerted us regarding this concern. We hired Geoscience to investigate. They did not find any Historical material. Their report is attached. According to SHPO, the OPRD archeologist needs to make the decision on the conclusion

4. **Natural Area**

   The Oregon Conservation Strategy or ODFW data on Compass show any vegetation or aquatic Features on the construction site or the surrounding area.

5. **Air and Water quality.**

   The construction of the Berm does not affect air or water quality. The EPA map does not show any other items of concern.

6. **Area of Geologic interest**

   HGSA dug test pits along the entire construction path to reduce the risk of finding any geologic material of interest during construction. Page 29 of the HGSA report states the awareness and importance of this. If we encounter any Geologic material during construction, HGSA states that they will work with the construction company to evaluate options to preserve the material. At this project stage, we can only act to minimize the probability of such an encounter.

OAR 736-020-0030(13): *"In the event it is determined that the issuance of a permit hereunder will affect property not owned by the applicant, the Department shall withhold the issuance of such permit until such time as the applicant shall have obtained an easement, license, or other written authorization from fee owner of such land. Such easement, license, or other written authority, shall meet the approval of the Department, except as to the compensation to be paid to the private fee owner."*

No property owners other than the applicant are impacted by the subject application.

Section 5: Project Details

Please see Section 10.5 Pg 24 of the HGSA report.

Section 6: Analysis of Hazard Avoidance.

Please see the Conclusions and Recommendations section of the Schlicker Addendum for Hazard Avoidance.

Please also refer to the Constrction Plan

Section 8: Other Necessary Permits.

OAR736-020-0003(12): *The application must include appropriate information regarding other necessary permits. A Lincoln County Floodplain Development Permit is required*.

The Approved Permit is attached.

Index of items in appendix

A Lincoln County Floodplain Development Permit is required

Archaeology sites Report from Geoscience

ODFW Report

Estuarine and River map

Oregon Conservation Strategy Map

EPA Map and Search results

Compass: *Oregon Conservation Strategy Reporting Tool*


Map


Data


Resources


Contacts

The Compass Oregon Conservation Strategy reporting tool provides an initial overview of Strategy components within a user generated area of interest. This tool is intended to be used in an early planning phase of a project, or preliminary investigation into a given area. Some data used to generate this report has been summarized into a larger area, and as such may not reflect exact occurrences of these components within the provided area. The results of this tool are not intended to be used in a legal, formal, or binding way; and do not replace or supersede site-specific consolation with appropriate agencies, including the Oregon Department of Fish and Wildlife. If specific locations are needed, users are encouraged to follow up with local ODFW biologists, contact specific data providers, and/or communicate with local land management authorities for additional detail and information.

How to Use the Reporting Tool

1. Open up the ODFW Compass mapping application, and click on the "TOOLS" tab.
2. Click on "+ NEW" button.
3. Click on "Draw Shape" and follow the instructions to outline your area of interest. After completing the drawing, click "NEXT".
4. Provide a name to identify your project, a description (optional), and click "SAVE".
5. After the report generation is completed, you can now view the results. Click within your area of interest to open up the Compass identify window. Click the arrow to view a list of the Strategy components documented in your project area (see data description, and details on how the data has been summarized below).
6. At the top of the identify window (may need to scroll up), click "Export Data" to save a comma delimited text file format, viewable in Microsoft Excel, of your report.

Export Report Contents

Name: The user provided name for the project area.

Area (sq. Miles): Data has been compiled using 1 square-mile hexagon units, spanning across all of Oregon. These hexagon units are the same base data as those used within the ODFW crucial habitat layers. The user defined project area selects intersected hexagons. This field provides the total number of select hexagons, which coencides with the total area (in sq. Miles) that is being reported on.

Ecoregions: Oregon Conservation Strategy Ecoregions included in the area of interest.

Conservation Opportunity Areas: Oregon Conservation Strategy Conservation Opportunity Areas (COAs) included in the area of interest. Access COA profiles to see additional details on recommended conservation actions, local conservation actions and plans, potential partners, and information on the local Strategy Species and Habitats.

Strategy Habitats: Oregon Conservation Strategy Habitats whose distribution was modeled, or documented, within the area of interest during the 2016 Strategy Habitat mapping update. See the Strategy Habitat Mapping Methodology for details on how each Strategy Habitat was mapped.

Documented Fish: Documented fish species within the area of interest, provided from the ODFW crucial habitat assessment Aquatic Species of Concern layer. Note that not all fish Strategy Species are included in this dataset, and additional detail on species may be available through contacting ODFW.

Observed Wildlife: Wildlife species observations within the area of interest, using data compiled within the ODFW crucial habitat assessment Terrestrial Species of Concern layer. All observations have been summarized to at least the 1 square-mile hexagon units. Some observations are further summarized to 12 digit HUC watersheds, to protect locations of high priority or sensitive species.

- List of Species Summarized to 12 digit HUC Watersheds

Modeled Wildlife Habitat: Wildlife species distribution models (developed and maintained by the Oregon Biodiversity Information Center occurring within the area of interest. Note that these models indicate potential "good" or "fair" habitat for these species, and do not necessarily mean that the species occurs within the area of interest.

ODFW Compass

Oregon Conservation Strategy Report

Searidge Berm

Riprap permit for Berm

Mar 28, 2024

Leaflet | Sources: ESRI, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), © OpenStreetMap contributors, and the GIS User Community

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Area mi^2: 1

Ecoregions :
- **Coast Range**

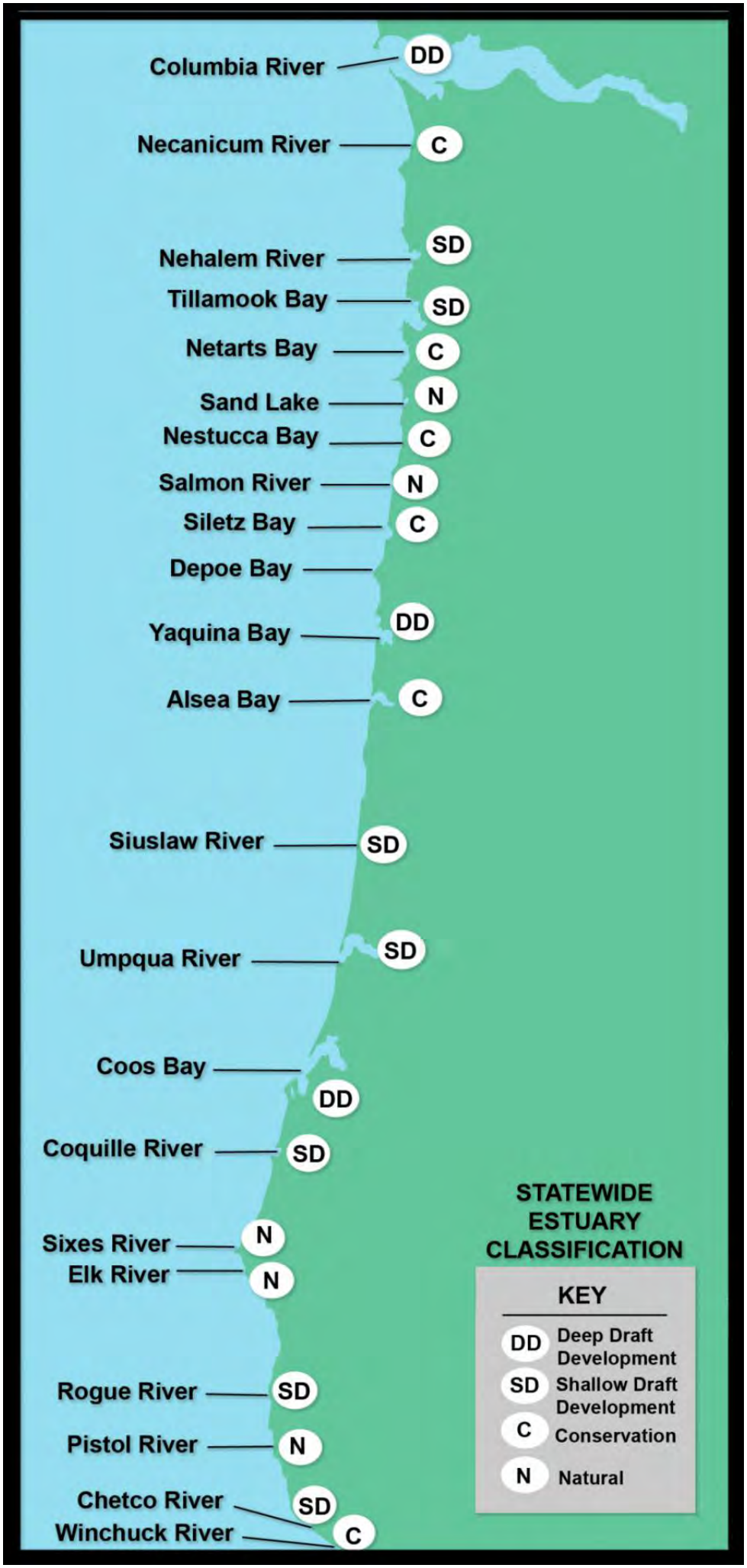
Conservation Opportunity Areas :
- None

Strategy Habitats :
- **Coastal Dunes**
- **Flowing Water and Riparian Habitats**

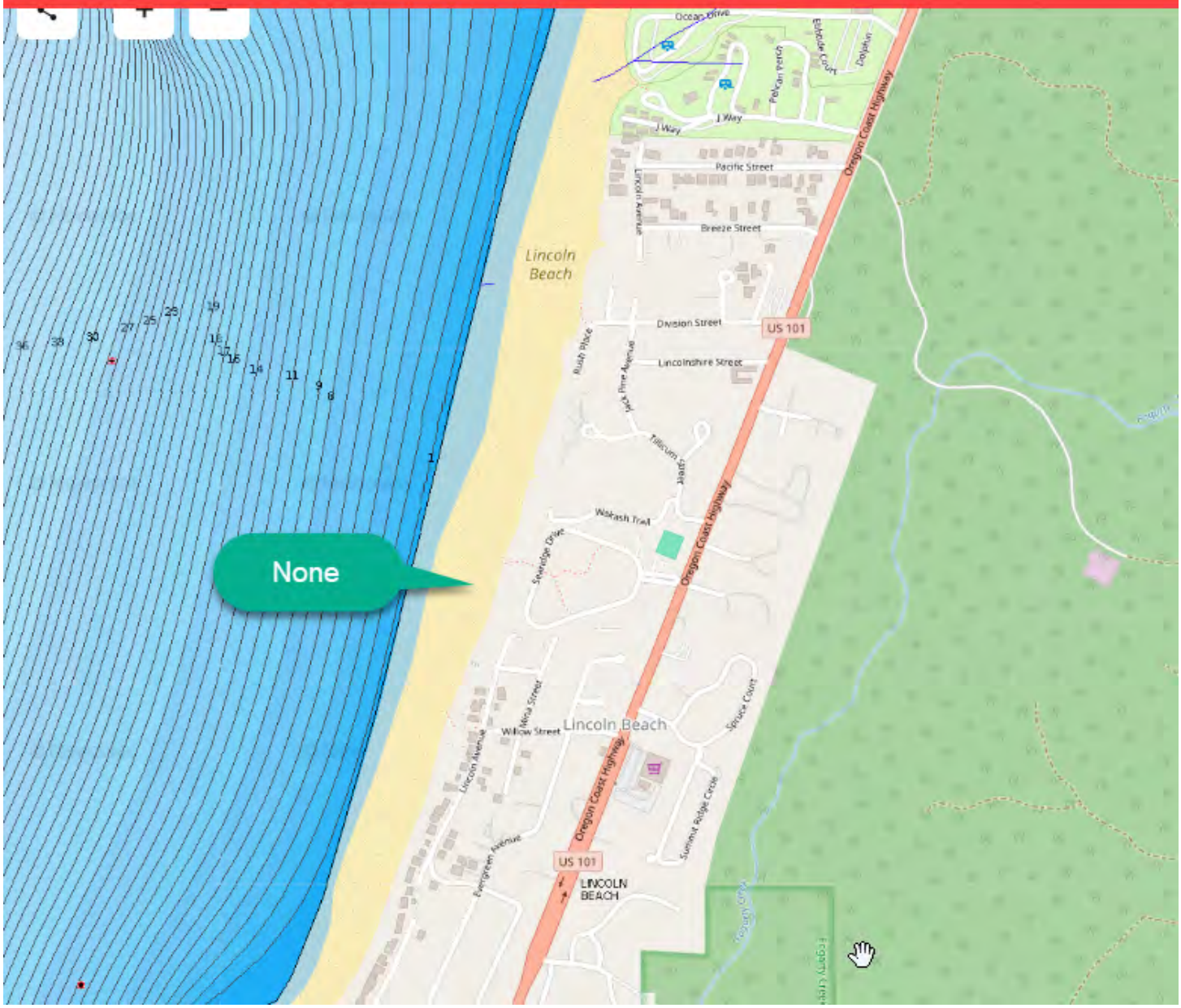
Documented Strategy Fish :
- **Coho Salmon**

Observed Strategy Wildlife :
- **Peregrine Falcon (American)**
- **Brown Pelican (California)**
- **Caspian Tern**
- **Fork-tailed Storm-Petrel**
- **Harlequin Duck**
- **Marbled Murrelet**
- **Tufted Puffin**
- **Western Snowy Plover**

Modeled Strategy Wildlife Habitat :
- **Black Oystercatcher**
- **California Myotis**
- **Clouded Salamander**
- **Coastal Tailed Frog**
- **Fringed Myotis**
- **Hoary Bat**
- **Long-legged Myotis**
- **Marbled Murrelet**
- **Northern Spotted Owl**
- **Olive-sided Flycatcher**
- **Red Tree Vole**
- **Silver-haired Bat**
- **Southern Torrent Salamander**
- **Purple Martin**
- **Western Toad**


Columbia River
DD
Necanicum River
C
Nehalem River
SD
Tillamook Bay
SD
Netarts Bay
C
Sand Lake
N
Nestucca Bay
C
Salmon River
N
Siletz Bay
C
Depoe Bay
Yaquina Bay
DD
Alsea Bay
C
Siuslaw River
SD
Umpqua River
SD
Coos Bay
DD
Coquille River
SD
Sixes River
N
Elk River
N
Rogue River
SD
Pistol River
N
Chetco River
SD
Winchuck River
C
STATEWIDE ESTUARY CLASSIFICATION
KEY
DD Deep Draft Development
SD Shallow Draft Development
C Conservation
N Natural

Navigation Interest




Oregon Conservation Strategy Area Map
No Active Area or Strategy
Breeze St
Division St
Lincolnshire St
Rush Pl
Jack Pine Ave
Tillicum Ridge Pl
101
Wakash Trl
Searidge Dr
Marion Ln
Oregon Coast Hwy
Lincoln Beach
Mina Ave
Mina Pl
Willow St
Activity

The following map was generated for your entry of **4175 N Highway 101, Depoe Bay, Oregon, 97341**. Please verify the location, or adjust the map to your desired location. You can zoom in or out, as well as pan within the map to another location. Once the map displays your location of interest, you can display the facility information for your defined area by clicking the button below called "List and Map Facilities Reporting in this View".

List and Map Facilities Reporting in This View

*Zoom or pan map to change location.

Only facilities with a valid latitude and longitude will appear in the map.

Multisystem Search

Home | Multisystem Search | Topic Searches | System Data Searches | About the Data | Data Downloads | Widgets | Services | Mobile | Other Datasets

You searched on:

Area: 44.85178741287726 - -124.04577118532951/44.8533085991664 - -124.04282075541273

No data found for provided search criteria

SeaRidge Construction Impacts, Staging, and Public Safety Plan

Submitted to OPRD March 1, 2024

Below is the Construction, staging, and safety plan for the proposed revetment structure to protect the Searidge Condos (the "SeaRidge"), as described in detail in the plans, narrative, and other supporting materials for Searidge Permit Applications. The plan responds to each item in the Oregon Parks and Recreation Department (OPRD) construction plan guidelines (the "Guidelines") and staff Feedback.

This written plan is submitted in conjunction with the Revetment Staging Plan (Figure 3), which shows the staging area, haul routes, public paths, and other information outlined in section 2(a) of the Guidelines. Also enclosed with this plan is the list of construction vehicles and equipment that could be used on-site. Together, these documents demonstrate that all potential impacts from the proposed construction and staging activities have been considered and mitigated and that public safety will not be compromised.

A. Beach Access for Construction Equipment and Vehicles

Construction vehicles and equipment will access the revetment worksite and staging area via HYW 101 and on to Searidge Private Drive. As highlighted in Figure 1, all construction traffic will be on the Searidge property. During Construction, the hauling on the beach is shown in Figure 3. The hauling on the beach would mostly be on the site where the revetment is being constructed

Figure 2

This access will be used for the periodic delivery of rock and other construction materials, primarily to the staging area, and daily movement of construction equipment from the upland equipment staging area to the worksite and back, including occasional vehicle access for management personnel and professionals visiting the site.

B. Temporary Public Access Ways

This plan does not envision any other Public Access usage. If the Searidge Property route is compromised due to the failure of the private road, a new plan will be submitted for approval. To ensure public safety, signs will be placed around the work and staging areas, directing the public to exercise caution when construction activities are occurring. The approach information signs will be bright orange 36" x 36" signs (diamond orientation) or similar warning signs commonly used in connection with construction activities. Construction "caution" and/or "danger" signs, as shown below, will be placed around the staging and construction areas, no more than 50 feet apart.

Several strategies will be employed to minimize conflicts between pedestrians and construction activities (i.e., equipment operation, hauling of materials, vehicle access, etc.). First, construction work will occur only during weekdays when public use of the beach is lowest; work will not be done on weekends or holidays. Multiple highly visible signs will be placed to define the construction and staging areas clearly. The boundaries of the public path and staging area will be configured so that stockpiles will not encroach and will be placed away from the public-use areas. Moreover, equipment operators will exercise extreme caution and always defer to the public's absolute right-of-way.

In the summer months, the temporary path and worksite locations are less likely to be impacted by high tides. However, it is possible that the location of the public path and work area will need to be temporarily adjusted due to unusually high tides. Such adjustments could include relocation of signs or slight alteration of the haul route. Tides will be closely monitored, and any temporary changes will prioritize the preservation of public access over construction work.

The path for the public will be kept free of debris or other items that may obstruct or disrupt the transit of the public.

Finally, the progressive, section-by-section Construction of the revetment is intended to minimize hazards to the public, such as open trenches left unfilled overnight. Moreover, to prevent unauthorized climbing on riprap rock or other rock materials, the staging and work areas will have multiple signs warning of the danger, stating:

ROCKS EXTREMELY DANGEROUS
ROCKS FOR CONSTRUCTION ONLY
DO NOT CLIMB

The signs will be placed around the staging area, approximately 50 feet apart, so that at least one sign will be highly visible from each point around the staging area boundary.

C. Proposed Haul Routes

The work site, staging area, and haul route between them are located along the eastern edge of the beach, adjacent to the bluffs and SeaRidge Property. In this area, there is no vegetation and no significant change in grade slope. Also, the equipment and vehicles used to construct the revetment and haul materials are designed to run in sand. Accordingly, no construction, excavation, or other alteration is necessary to operate equipment or vehicles on these sites or the haul route between them.

Figure 3 ***Haul Route into SeaRidge***

The specific location of the haul route is shown in the Revetment Staging Plan (Figures 2 & 3). The haul route will be used for eight hours on non-holiday weekdays in the ten-hour window between 7:30 a.m. and 5:30 p.m., with the specific start and stop times dependent on that day's tide schedule. As set out above and in the Revetment Staging Plan, the public will be directed out of the haul route by signs along its entire length.

Because alterations are not necessary to establish the haul route, little work will be necessary to restore the area to its original condition upon completion of the revetment construction. The area, however, will be graded to a slope and contour that closely matches the surroundings so that no visual cues of the prior construction activities remain.

D. Staging Area and Temporary Impacts

The rock materials for this project are planned to be sourced from a location close to Searidge. Therefore, in order to maintain a consistent supply of material on site, rock must be stockpiled in a staging area near the worksite. The location of the staging area for this project is shown on the Revetment Staging Plan. The staging area is naturally flat and has no vegetation, so no excavation, sand movement, or other alteration is necessary to make the area usable.

Figure 4 ***Staging Area—Facing North and South of SeaRidge Property***

To minimize the impacts from the staging area and its footprint, no more than a two-week supply of rock will be stored at any time. The staging area is located and shaped in a way that provides unimpeded access for pedestrian and vehicular traffic. Only rock material is being placed on the beach staging site. Accordingly, the only impacts of the staging area will be the temporary unavailability of this limited area to the public and the minor disturbance of sand from construction vehicles and equipment.

Rock and other building materials will not be stored within the work area except when Construction is occurring, and only the amount needed for that day. Sand that is excavated to create the revetment toe trench will be stored within the work area because it will shortly be placed back on the revetment structure. Because the revetment is being constructed in sections, however, the sand stockpile will be kept to a limited size, which is also necessary to avoid interference with construction work.

Construction equipment and vehicles will be parked on Searidge Property along the haul route. All vehicle maintenance and most fueling will occur upland off the beach. Fueling of equipment is performed using automatic shutoff nozzles to prevent overfilling. To protect against spills during the operation of the equipment, spill kits will be staged near the work area so that cleanup of an unexpected spill can begin within two minutes of the beginning of the event. Spill kits consist of personal protective equipment, garbage bags for disposal of used spill-kit items, wattles, oil-

absorbent pads, oil-absorbent granules (used on hard surfaces only), and a small broom and dustpan. Oil-absorbent pads are used to wipe up any fuel immediately that drips from equipment surfaces.

Upon completion of the revetment construction, all rock materials will be removed from the staging area. Other than potential light grading to eliminate any minor sand disruption from construction vehicle traffic or rock storage, the area should not need restoration work.

Regarding the work area, Construction of the revetment requires grading and excavation of the sand within the revetment footprint. Typically, an adequate volume of material is excavated from the toe trench to cover the revetment adequately above the severe wave splash elevation (approximately 28 feet (NAVD 88)) as per the design. Excavated sand that is not placed on the revetment structure will be spread out across the haul route, which will not cause any noticeable change in grade. SeaRidge annually plants Sea Grass to prevent erosion and, after the completion of the project, will do the same.

E. Signage and Barriers

The type and substance of the warning and other types of signs to be used during the revetment's Construction are set out in detail above. The sign locations are also set out in the Revetment Staging Plan. As described above, the signs will comply with all standards in the Guidelines, including visibility from 100 feet and spacing no farther apart than 50 feet (or less, as needed, for a person to be able to see each sign from the next).

Because the revetment will be constructed in individual sections of 10 to 35 feet per workday, trenches will not typically be left overnight. If a trench cannot be filled by the end of the day, the area will be fenced off from the public using a heavy-duty Safety Fence (product listing details shown below) or equivalent.

Due to potential encroachment by unusually high tides and to avoid unnecessarily restricting the use of the beach when work is not occurring, the construction and staging areas will not be physically fenced off, except in small areas when necessary to protect the public from a trench or other fall hazard. Physical barriers may be employed around portions of the staging and equipment storage areas, which will consist of concrete “Eco” blocks (3’ x 3’ x 4’).

F. Description of Construction Equipment and Vehicles

On a typical day, two haul trucks and three excavators will be used to construct the revetment. A schedule of the vehicles and heavy equipment that could be used on the site during this time is attached.

G. Site Photos

All Site Photos have been provided in the detailed Application and Geology report and are not duplicated here. If Any JPGs are required we will provide them as needed.

H. Detailed Project Schedule and Description of Daily Construction Activities

The targeted date for the start of work will be based on the Approval Date and to avoid any Public Holidays.
Construction activities will occur for eight hours on non-holiday weekdays in the ten-hour window between 7:30 a.m. and 5:30 p.m., with the specific start and stop times dependent on that day's tide schedule. A typical workday is as follows:

1. Survey the site to confirm that all warning signs are in place, the temporary public pathway is free of obstruction, and no other hazards exist. Remediate any issues.
2. Fuel and perform maintenance on equipment/vehicles in the upland area as necessary.
3. Drive equipment from upland parking to that day's work area (Construction of the revetment will start at the south end of the Development and be built in daily sections, working north).
4. Excavate sand at the base of the revetment and place it to the west of the work area, which will help divide the public pathway from that day's worksite.
5. Dig the trench for Construction of the revetment toe.
6. Drive to/from the staging area with riprap rock.
7. Install riprap material and rock.
8. Cover the newly constructed revetment section with sand. Any excess sand is stockpiled on the western half of the revetment construction area to the north of the section currently

being built.

9. Survey the site to confirm that all warning signs are in place, the temporary public pathway is free of obstruction, and no other hazards exist. Remediate any issues.

10. Drive equipment/vehicles back to the upland parking area.

As described above, the work and staging areas will be made safe for the public prior to any break in work by fencing off hazards (e.g., open trenches), posting warning signs, and removing equipment and vehicles from the beach.

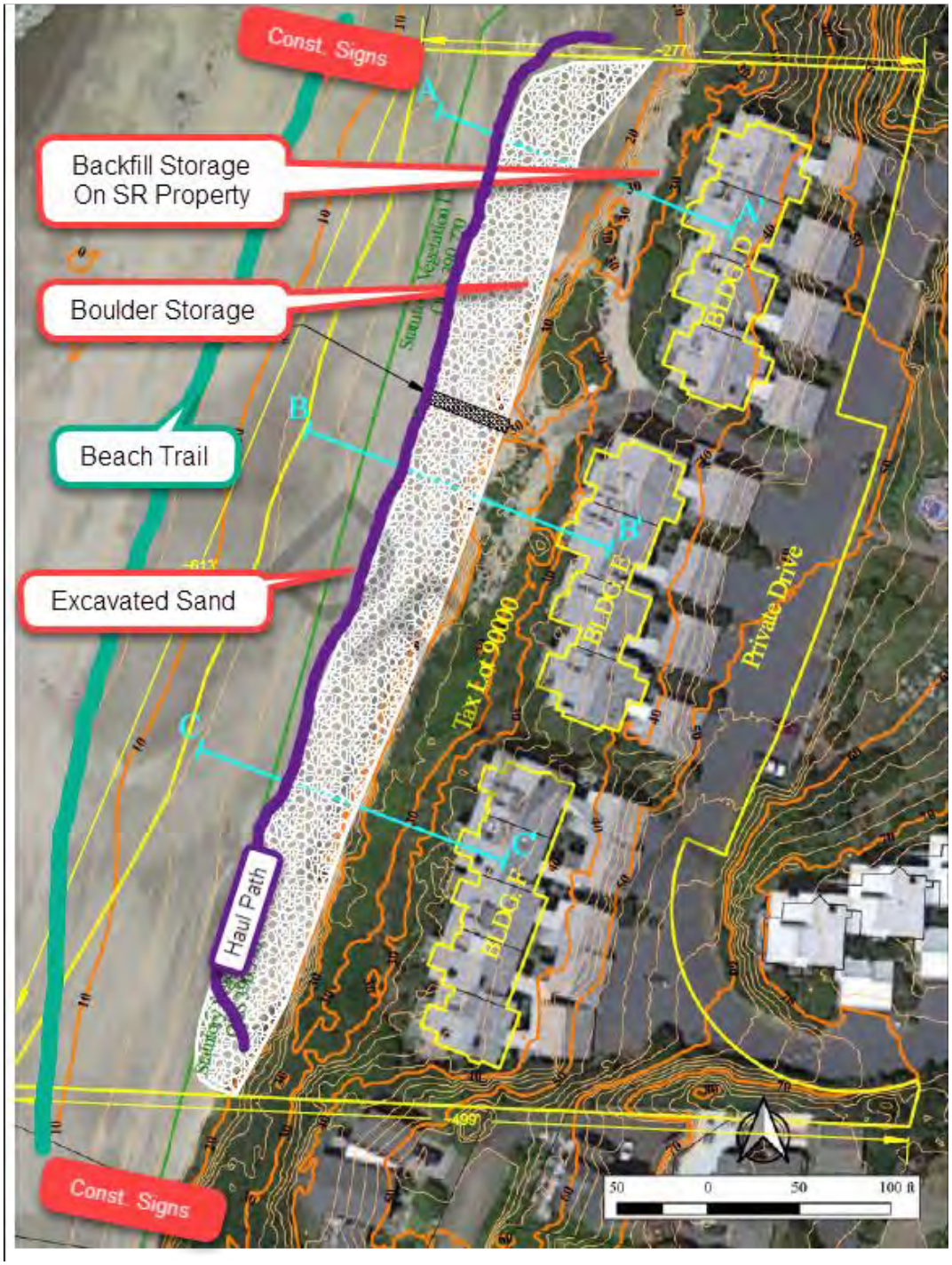


Figure 5 ***Detail Staging and Storage Area***

NOTES

1. THE CONTRACTOR WILL MAKE EVERY EFFORT TO MINIMIZE DISRUPTION TO ONGOING PARK AND BEACH ACCESS DURING CONSTRUCTION.
2. OFF-SITE STORAGE LOCATIONS WILL BE UTILIZED (ROCK AND EQUIPMENT ON SEARIDGE PROPERTY
3. WORK / STAGING AREA TO BE SURROUNDED BY TEMPORARY FENCING DURING CONSTRUCTION.
4. CONTRACTOR TO PROVIDE TEMPORARY SIGNS TO DIRECT TRAFFIC FLOW AS REQUIRED.
5. SHORT-TERM FENCING TO BE PROVIDED IN ADDITION TO DELINEATION FENCE FOR ANY OPEN TRENCHES LEFT OVERNIGHT OR UNATTENDED.

CONSTRUCTION EQUPMENT AND VEHICLES

Dan Kauffman Excavating, Inc.

All vehicles and equipment below are yellow in color.

Item #	Cust #	Year	Manufacturer	Model	Description	Serial #
1			Hitachi		Track Excavator w/Access	EX300LC
2		1988	Komatsu		Excavator	36882
3		1993	Komatsu	PC2006	Excavator	81753
4		1996	Komatsu	120PE	Excavator	48559
5			Caterpillar	966	C-Loader	76J12298
6		1990	Dresser	TD7G	Dozer	K005153
7					Water Tank/Heater & Pump	
9			Kubota		Tractor	51274
10			Komatsu	PC2006E	Excavator	97125
11			Thomas		Skidsteer	65002847
12		1996	Komatsu	PC-2006	Excavator	92414
15		2001	Komatsu	9C120	Excavator	64651
16		1996	Komatsu	9C120	Excavator	53932
18		2005	Komatsu	PC-200-7	Excavator	203640
26		2002	Komatsu	PC-200-7	Excavator	60122
28		2004	Komatsu	PC200LC-7	Hydraulic Excavator	KMTPC049J02205272
29			Ford	F600	Service Truck	F60DVY20891
32			Komatsu	PC-90-5	Excavator w/Attachments	
36		1988	D25	Caterpillar	Off Road Truck	09YC99725
37	E78	2003	Komatsu	PC350LC-7	w/Attachments	E78
38	E79	2004	Kobelco	SK330LC	w/Attachments	YC07U0775
39	E80	1995	Komatsu	PC120-6	w/Attachments	52241
44		2016	Kubota	KX040-4RITP	Excavator with Attachments	23972/7FW2994
45			Kubota	MX5200HST	Tractor w/ attachments	57617
46			Kubota	LA1065	Loader w/ attachments	B2533
49		2014	Komatsu	PC-240LC-10	Excavator	90176
50		2014	Komatsu	PC-240LC-10	Excavator	90181
51			Caterpillar	D30D	Haul Truck	3AJ000034
52		1996	Case	1845C	Skid Steer	JAF0194327
56		2015	Hitachi	ZX135US-5N	Excavator with (3) three buckets	HCMDAF60E00100140
57	OR1760		Caterpillar	769B	Haul Truck	99F3201
58	OR1770		Caterpillar	769B	Haul Truck	99F3202
59	OR1780		Caterpillar	769B	Haul Truck	99F3214
60	E3499	2020	Doosan	DK300LC	w/ Bucket Attachment (B4677)	DHKCECACHOO20258
61	E3718		Komatsu	PC360LC-10	w/ Thumb Attachment	KMTPC242E54A33718
62	E6097	2018	Komatsu	PC360LC-11	Excavator	A36097
63	E4146	2015	Komatsu	PC360LC-10	Excavator	K64146
64	E0140	2015	Hitachi	ZX135US-5N	Excavator	HCMDAF60E00700140
65			Kubota	Excavator	Excavator	KX057-5R3AP
66			Kubota	KX057-SR3AP	Excavator	KBCD237CPN3H15000
67			Komatsu	PC360	Excavator	064812U

PLI Systems' Equipment and Vehicles

Takeuchi 290
Excavator

Kubota Side by Side

Ford F550
trucks, (Year
2022)


800-858-2883
WWW.SEINC.COM

HGSA Response to OPRD questions

Section 4

Redesign

Saction 5

Sand Calculation. In addition question regarding Sea Grass.

SeaRidge Plants Sea Groass as soft measure every year. This is part of our operational cost so it is not considered in this project cost.

Section 7

Erosion

H.G. Schlicker & Associates, Inc.
607 Main Street, Suite 200 · Oregon City, Oregon 97045
(503) 655-8113 · FAX (503) 655-8173

Project #Y214577 January 9, 2024

To: **Searidge Homeowners Association**
Mr. Aboo Balgamwalla
4175 N. Hwy 101
Depoe Bay, Oregon 97341

Subject: **Response to Oregon Parks and Recreation Department's December 5, 2023 Letter**
RE: Request for Additional Information for Application for Ocean Shore Alteration Permit #3051
Tax Lot 90000, Map 8-11-28BA, Supp. Map No. 1
Lincoln County, Oregon

Dear Mr. Balgamwalla:

As requested, H.G. Schlicker and Associates, Inc. (HGSA) is providing this letter to address issues identified in the Oregon Parks and Recreation Department's (OPRD) December 5, 2023 letter in reference to the *Request for Additional Information for Application for Ocean Shore Alteration Permit #3051* for the Searidge Condominiums at Tax Lot 90000, Map 8-11-28BA, Supp. Map No. 1, Lincoln County, Oregon. Listed below are our responses to select items identified in OPRD's letter that reference specific parts of HGSA's July 19, 2023 report.

Section 4:

d.i.4) OPRD states: *"Considering this recommendation by the engineering report, OPRD will likely require as-built documentation of the finished report, with drawings that support the project was built in conformance with the proposed recommendations."*

Please note the statement made on page 17 of our report was not a recommendation. As stated in our report, only if "substantial modifications" from our design are necessary "based on the field conditions encountered during construction" as-built drawings may be required by HGSA and OPRD.

Section 5:

a) OPRD requests: *"Please identify the source of sand for top dressing of rip rap for planting. If using sand excavated from the toe, please identify the volume necessary to top dress compared to the volume available from toe excavation. If this information is included, please provide a citation. Also, please reference section 11 below."*

As stated in our report on page 18, the upper portion of the revetment should be covered with "sand, or toe trench spoils," this includes the underlying mudstone and other soils encountered in the toe trench.

Additional information regarding volumes of sand and underlying material present on the beach at the time of future construction is not possible to provide. Therefore, a comparison of available sand to the volume necessary to top dress the revetment can not be made.

Typically, there is an adequate volume of material excavated from the toe trench to cover the revetment adequately above the severe wave splash elevation (approximately 28 feet (NAVD 88)), as per our design.

Section 7:

b.i) OPRD requests: *"Please confirm if 0.62±0.76 feet per year is the erosion rate for the subject property and neighboring properties."*

HGSA confirms this is the mapped erosion rate.

b.ii) OPRD asks: *"What will the erosion rate be on neighboring properties following the installation of revetment? Will the project increase erosion to the adjacent properties?"*

According to Priest et al. (1994), the mapped erosion rate for the unprotected shoreline in the area of the site, including the neighboring properties, is 0.62±0.76 feet per year. The erosion rate at the neighboring properties will be unchanged as they will remain unprotected. The project will not increase erosion to the adjacent properties; however, as stated in our report, "it should be anticipated that the unprotected bluff and dune fronting the adjacent properties will continue to experience ongoing erosion until mitigated."

HGSA has assisted property owners with completing the permit applications for numerous approved shoreline protective structures along the Oregon coast for more than 30 years. Based on HGSA's experience completing Engineering Geologic Investigations and reports with recommendations and design specifications for the construction of riprap revetments along the Oregon coast, our July 19, 2023 report (HGSA #Y214577) provides adequate

information consistent with historical and recently submitted applications that have been deemed adequate and complete by OPRD.

If you have any questions concerning this letter or the site, please contact us.

Respectfully submitted,

H.G. SCHLICKER AND ASSOCIATES, INC.

Adam M. Large, MSc, RG, CEG
President/Principal Engineering Geologist

AML:mgb

Engineering Geologic Investigation, Recommendations for Oceanfront Protection and Application for a Shoreline Protection Structure SeaRidge Condominiums Tax Lot 90000, Map 8-11-28BA, Supp. Map No. 1, Lincoln County, Oregon

Prepared for:
SeaRidge Homeowners Association
Attn: Mr. Bruce Dummer
4175 N. Highway 101
Depoe Bay, Oregon 97341

Project #Y214577

July 19, 2023

H.G. Schlicker & Associates, Inc.

H.G. Schlicker & Associates, Inc.
607 Main Street, Suite 200 · Oregon City, Oregon 97045
(503) 655-8113 · FAX (503) 655-8173

Project #Y214577 July 19, 2023

To: **SeaRidge Homeowners Association**
Attn: Mr. Bruce Dummer
4175 N. Highway 101
Depoe Bay, Oregon 97341

Subject: **Engineering Geologic Investigation,**
Recommendations for Oceanfront Protection, and
Application for a Shoreline Protection Structure
SeaRidge Condominiums
Tax Lot 90000, Map 8-11-28BA, Supp. Map No. 1,
Lincoln County, Oregon

Dear Mr. Dummer:

The accompanying report presents the results of our engineering geologic investigation and analysis of the above subject site, recommendations for construction of a riprap revetment, a plan set for new access stairs completed by Field Engineering, the Ocean Shore Permit Application for a Shoreline Protection Structure, and the Lincoln County Flood Plain Development Permit. You will need to submit a copy of this report and flood permit application to the Lincoln County Planning Department for their review and have them complete page 9 of 9 of the Shoreline Protection Structure application titled "City/County Department Affidavit." Once Lincoln County has completed the form, determined that the property meets Goal 18 eligibility requirements and that the project is consistent with the local comprehensive plan and zoning regulations, you will need to submit this report and the completed County Affidavit along with the required funds for the Permit Application Fee to the Oregon Parks and Recreation Department. It is our understanding that the proposed new access staircase will also require a county b[redacted]ks and Recreation Department will require a contractor's estimate, so you must have a contractor review this report and provide you with a written estimate. We can assist you in this endeavor.

CERTIFIED OREGON [redacted] E2434 ENGINEERING GEOLOGIST

After you have reviewed our report, we would be pleased to discuss the report and to answer any questions you might have.

This opportunity to be of service is sincerely appreciated. If we can be of any further assistance, please contact us.

H.G. SCHLICKER & ASSOCIATES, INC.

[redacted]
Adam M. Large, MSc, RG, CEG
President/Principal Engineering Geologist
AML:mgb

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APPENDICES

H.G. Schlicker & Associates, Inc.
607 Main Street, Suite 200 · Oregon City, Oregon 97045
(503) 655-8113 · FAX (503) 655-8173

Project #Y214577 July 19, 2023

To: **SeaRidge Homeowners Association**
Attn: Mr. Bruce Dummer
4175 N. Highway 101
Depoe Bay, Oregon 97341

Subject: **Engineering Geologic Investigation,**
Recommendations for Oceanfront Protection, and
Application for a Shoreline Protection Structure
SeaRidge Condominiums
Tax Lot 90000, Map 8-11-28BA, Supp. Map No. 1
Lincoln County, Oregon

Dear Mr. Dummer:

1.0 Introduction and Project Description

At your request and authorization, representatives of H.G. Schlicker and Associates, Inc. (HGSA) visited the subject site (Figures 1 and 2; Appendix A) on February 24, April 25, and May 3, 2022, and March 17, 2023, to complete an engineering geologic investigation for proposed shoreline protection at Tax Lot 90000, Map 8-11-28BA, Supp. Map No. 1 Lincoln County, Oregon. We completed this investigation to determine whether the site needs and would benefit from the construction of a Shoreline Protection Structure, in this specific case, an oceanfront riprap revetment at the site. Based upon our investigation, historical, recent, and ongoing oceanfront erosion threatens the existing infrastructure at the subject property. Additionally, nonstructural solutions have previously been attempted but proved ineffective and only provided short-term and finite mitigation of erosion at the site. We have determined that the site would benefit from a shoreline protective structure and have provided designs and specifications for a riprap revetment. Also included herein are geotechnical design recommendations and structural engineering plans for a proposed concrete staircase integrated into the proposed revetment.

HGSA has provided engineering geologic consultation services for the property since 1998 (Appendix B and D). In March 2021, we provided an investigation and report (HGSA #Y214349) to support a Goal 18 exception for the subject property.

This report addresses the engineering geology at the subject site with respect to the construction of a riprap revetment for shoreline protection. The scope of our work consisted of site observations and measurements, observing excavated test pits, a topographic survey, construction of slope profiles, a limited review of previous work at the site, existing permits, and the geologic literature, interpretation of topographic maps and aerial photographs, preparation of this report of our findings, conclusions and recommendations, and preparation of the engineering geologic requirements for the Oregon Parks and Recreation Department (OPRD) Ocean Shore Permit Application Forms (Appendix H). A Lincoln County Floodplain Development permit has also been prepared (Appendix I). Our discussion of floodplain development impacts is presented in Section 10 below.

Based on recent staff changes at OPRD, new interpretations of existing code, and work on similar projects, we anticipate additional consultation during the permitting process may be necessary. Consideration should be given to providing any relevant additional supporting documents and/or narratives you deem appropriate to include in the submittal package for OPRD.

2.0 Site Description

The SeaRidge Condominium subdivision consists of approximately 13-acres located on an oceanfront marine terrace fronted by a dune and bluff slope in the Lincoln Beach area south of Lincoln City, Oregon, approximately ½ mile north of Fishing Rock (Figures 1 and 2; Appendix A). The subject site consists of the western portion of oceanfront Tax Lot 90000, identified as general common elements for the SeaRidge Condominiums, and is approximately 600 feet wide along the beachfront. The subject site is bounded to its west by the Pacific Ocean, to the east by additional common elements and condominium units within Tax Lot 90000, to the north by an undeveloped lot (Tax Lot 4700, Map 8-11-28BA), and to its south by a developed lot (Tax Lot 1800, Map 8-11-28BC). According to Lincoln County records, the condominiums at the site were built between 1985 and 1987 (Appendix B).

The area of the property investigated herein as the subject site consists of the western portion of Tax Lot 90000, Map 8-11-28BA Supp. Map No. 1, fronting 3 two-story condominium buildings comprised of Phase 3, 10, and 11 of the SeaRidge Condominiums development, with a total of 26 condominium units. Reportedly, these condominium building foundations are supported on piers embedded approximately 20 feet or more below the ground surface and are located as close as approximately 41 feet from the top of the dune and bluff, according to the survey completed for this investigation (Figure 4; Appendix A). Critical stormwater and sanitary sewer systems are located west of the three existing condominium buildings, as close as approximately 18 feet east of the bluff edge (Figure 4; Appendix A). An underground sanitary sewer line is located approximately 10 to 30 feet west of Buildings D and E and connects to the

northwest corner of building F (Figure 4; Appendix A). A sewage pump station, operated and maintained by Kernville-Gleneden Beach-Lincoln Beach Water District Gleneden Sanitary District, is located along the sanitary sewer line approximately 25 feet east of the bluff edge and adjacent to the beach access path that runs between Buildings D and E.

This path ends at wooden stairs along the bluff, which provide access to the beach (Figure 4; Appendix E). It is our understanding that the existing beach access stairs have a history of repeated damage by ocean wave erosion and repair since their initial construction. Provided herein is a structural engineering plan set for a new concrete access staircase designed to integrate into the oceanfront protection structure and to be built at the time of construction of the proposed revetment. HGSA has provided relevant engineering geologic design considerations and recommendations for the geotechnics related to the proposed staircase.

The marine terrace in the site area generally slopes down to the west from approximately 5 to 20 degrees. During site visits for previous investigations, there has been an approximately 12 to 17 feet high bluff slope (dune escarpment) along the oceanfront (Appendix B and Appendix D). The beach west of the bluff has generally had an approximately 2 to 3 feet thick layer of sand at the time of our site visits. During a 2016 site visit, the beach was devoid of sand due to severe storm wave conditions over the fall of 2016. During our 2022 exploratory test pit excavations, approximately 3 to 9 feet of sand was encountered in the location of the proposed revetment. During periods of severe erosion, stripping of the sand layer off of the beach has previously exposed the underlying organic-rich soil and mudstone and ancient forest remnants along this beach, with a greater number of stumps observed in the southern project area than in the northern project area. The ancient forest remnants vary in height from approximately 8 inches to 2 feet tall (Appendix B). The beach in the site area is very dynamic and can experience substantial changes in the beach sand elevation. The occurrence of rip currents and their resultant embayments that allow larger waves to run further inshore are common in this area and can significantly contribute to the dune's and bluff's rapid erosion.

Vegetation at the site consists of small shorepine, salal, European beach grass, blackberry, equisetum and native wildflowers. The lower bluff slope and beach are typically sparsely vegetated, with limited areas of European beach grass from past plantings (Appendix A).

According to the Oregon Coastal Atlas Ocean Shores webpage (accessed June 2023), the subject property appears to be not eligible for protection in the Goal 18 eligibility inventory for a beachfront protective structure. However, it is our understanding that on September 15, 2021, the Lincoln County Board of Commissioners adopted Ordinance #520, which amended the Lincoln County Comprehensive Plan to except the subject property (Tax Lot 90000) from Statewide Planning Goal 18, implementation requirement 5, thereby making the site eligible for

protection due to the exception. It is our understanding that the ordinance was not appealed and is final.

In summary, the bluff and dune fronting Tax Lot 90000 needs an oceanfront protection structure to protect the existing utility infrastructure. The proposed project is to construct a riprap revetment along the bluff and dune. We have provided design and recommendations for the construction of a revetment along the entire width of the lot, approximately 600 feet north to south (Figures 4, 5 and 6).

3.0 Previous Investigations, Site Development, and Permitting History

Several site-specific environmental and geologic hazards investigations have been conducted at the subject property in the past, which include three separate geologic and geotechnical reports dated April 2, 1971, March 27, 1978, and April 26, 1988, by Shannon and Wilson, Inc., along with an environmental hazards investigation report dated March 1984 by Rohleder and Associates, Inc. H.G. Schlicker and Associates, Inc. previously issued an oceanfront erosion hazards investigation and OPRD ocean shore permit application report dated June 26, 1998, for the site (HGSA #981592). According to the property owners' records, the oceanfront sand alteration has occurred during at least nine separate years since 2000. In 2016, we completed an engineering geologic investigation, recommendations for sand alteration and application for sand alteration (HGSA #Y163845) (Appendix D). We also visited the site in 2018 and 2020 to provide additional oceanfront sand alteration recommendations and observations.

The SeaRidge Condominiums were constructed on a single undeveloped oceanfront parcel in Lincoln Beach (Good, 1992) (Appendix C- Figure 1). The SeaRidge Condominiums project was approved as a planned development by the Lincoln County Planning Department in January 1984. The approval came in the form of an amendment to a prior development proposed for the site entitled Ocean Pines. The buildings were completed from 1985 to 1988, including approximately 80 condominium units with common areas owned and managed by the SeaRidge Homeowners Association. The specific area of SeaRidge Condominiums investigated herein is the western portion (Phase 3, 10, and 11) located on Map 8-11-28BA Supp. Map No. 1.

Based on plans prepared in 1984/85 for water and sanitary sewer improvements (maintained in HGSA's offices), the top of the bank fronting the infrastructure was approximately 70 feet west of the sewage pump station and no closer than approximately 60 feet west of the lateral sanitary sewer lines servicing the western condominium buildings. Additionally, four stormwater drains servicing the development discharged approximately 70 feet east of the top of the bank; however, the southernmost stormwater pipe discharged to the southern end of a *Rock "Dry" Stream Bed* fronting Buildings E and F approximately 45 feet east

of the top of the bank. The plans also indicate that an overflow pipe was located at the northern end of the *Rock "Dry" Stream Bed* and discharged approximately 45 feet east of the top of the bank and approximately 20 feet west of the sewage pump station.

Recession of the fronting dune and bluff since initial development (described below) has reduced the effectiveness of the stormwater system leading to several washouts of the remaining dune sand during times of high stormwater discharge (Appendix A). As a result of the progressive ineffectiveness of the stormwater system due to the recession of the dune (described below), ongoing improvements to the stormwater system were made to facilitate greater infiltration in the remaining dune and bluff. A curtain drain was constructed in around 2000 to facilitate better drainage of the area east of the fronting dune and bluff (Figure 4; Appendix B), and an infiltration cistern was designed and installed in 2014 to improve the infiltration of stormwater runoff during times of high flow and mitigate washouts of the dune fronting the sewer pump station. Over time continuous erosion of the dune and bluff has reduced the effectiveness of both the curtain drain and infiltration cistern improvements to adequately accommodate volumes of stormwater during high-flow events. The history of stormwater washouts is discussed below (Appendices A and B).

Based on our previous investigation, review of historical documents and communications, and discussion with the property owners, we have provided a summary of the permitting history related to erosion mitigation at the site:

1984/1985 Following a very strong El Nino cycle that caused erosion, the developer obtained permission to build a *gravel road* in the western portion of the site (DSL permit SP2394). The developer was later allowed to complete the first sand alteration, reportedly grading approximately 600 cu yds of sand. These early erosion events and mitigation efforts are recorded in Appendix D -1988 Paeth Map.

1988/1989 Division of State Land and State Parks issued permits SP2906/BA-304-88 for erosion control. Under this permit, SeaRidge attempted erosion control through sand alteration and dune restoration, reportedly grading approximately 3,000 cu yds of sand. Under condition 10 of this permit, riprap placement could proceed under verbal authorization by the division of state lands if an emergency situation described in the permit occurred. This permit was renewed in 1990 and 1991.

1992 Sand alteration occurred under the renewal of the above existing permit.

1996 The permitting process for beach construction and fill placement was streamlined, and the Oregon Parks and Recreation Department (OPRD) became the primary agency involved in reviewing and issuing these permits. In the winter of 1997–1998, severe erosion again occurred along the western part of the property, which resulted in approximately 40 feet of recession of

the dune, and lowering of the beach level several feet. A March 29, 1998 letter from OPRD to the SeaRidge Homeowners Association stated that oceanfront erosion conditions which constitute an emergency would still be recognized under the guidelines of the originally granted Permit No. SP 2906 as follows:

"It has been brought to our attention that the above permit is due to expire once again. However, rather than have the permit renewed on a continual basis, OPRD will continue to recognize the circumstance which will constitute an emergency, as spelled out in Condition #10 of Attachment A to the original permit conditions. If these circumstances occur in the future, riprap can be authorized under an emergency authorization, subject to the guidelines of the original permit." -Steve Williams Coastal Land Use Coordinator OPRD

1998 As required by the Ocean Shore Improvement Permit SP 9054, HGSA visited the subject site on October 12, 1998, to observe the beach west of SeaRidge Condominiums in Lincoln Beach, Oregon. We conducted our site visit to determine if sufficient quantities of sand exist on the beach to allow the grading of sand at the project site without causing adverse impacts to the beach or other upland properties in the vicinity. In November 1998, approximately 2,000 cubic yards of sand were skimmed from the beach berm west of the site and placed along the bluff at a 2 horizontal to 1 vertical slope to replace sand that had been eroded from the bluff during the El Niño winter of 1997/1998.

1999 HGSA visited the subject site on July 21, 1999, to observe the bluff and beach west of SeaRidge Condominiums. During the winter of 1998/1999, unusually severe ocean wave activity again caused erosion along the bluff, which removed some of the sand which had been placed the year before. It was our understanding that DSL permit #SP9054/BA-419-98 was still in effect and allowed SeaRidge to maintain the sand along the bluff provided that HGSAs recommendations be obtained if more than 500 cubic yards of sand need to be replaced.

1999/2000 The curtain drain was constructed (Appendix B and E) in the area east of the bluff edge, and actual vegetation line to better manage stormwater.

2000 Sand alteration occurred to mitigate erosion of the dune and bluff slope.

2004 Sand alteration occurred to mitigate erosion of the dune and bluff slope.

2006 Sand alteration occurred to mitigate erosion of the dune and bluff slope.

2007 Sand alteration occurred to mitigate erosion of the dune and bluff slope.

2009 Sand alteration occurred to mitigate erosion of the dune and bluff slope.

2010 Sand alteration occurred to mitigate erosion of the dune and bluff slope.

2012 Sand alteration occurred to mitigate erosion of the dune and bluff slope.

2013 Sand alteration occurred to mitigate erosion of the dune and bluff slope.

2016 OPRD informed HGSA that the property owners had requested permission to move 500 cubic yards of sand, which would be deducted from the quantity of 2,000 cubic yards applied for with the current permit. During HGSA's July and August 2016 site visits, we observed that insufficient sand was available for pushing with sand depths of only 2 to 3 feet, and therefore heavy equipment and grading activity had a substantial potential to damage the ancient stumps during the grading operation. Due to extensive sand deficits on Oregon's beaches in 2016, including the area of the subject site, we recommended sand for grading purposes to be brought in from off-site because insufficient sand had built up along the beach to be utilized for the dune repair.

2017 Reportedly, sand alteration occurred to mitigate erosion of the dune and bluff slope.

2018 HGSA visited the site on August 15, 2018, to observe, measure, and estimate the available sand supply on the beach for the proposed sand alteration. We determined that a sufficient sand supply was available for the proposed sand alteration. We recommended that grading of the sand occur as soon as possible due to predicted high tides.

2020 HGSA visited the site on July 15, 2020, to observe, measure, and estimate the available sand supply on the beach for the proposed sand alteration. We determined that a sufficient sand supply was available for the proposed sand alteration. We recommended that grading of the sand occur as soon as possible due to predicted high tides.

2021 HGSA completed an investigation and report (HGSA Project #Y214349) to support a Goal 18 exception for oceanfront protection at the subject property.

Based on the review of the previous work at the site and the site erosion history discussed below, we recommend the construction of a riprap revetment to control erosion along the shoreline permanently.

4.0 Geology

The site lies in an area which is mapped as unconsolidated fine- to medium-grained beach and dune sand, underlain by Quaternary marine terrace (Schlicker et al., 1973; Priest, 1994 (Appendix C – Figure 2); Priest and Allan, 2004). The marine terrace deposits consist of semi-consolidated, fine- to medium-grained, uplifted beach sand commonly overlain by

unconsolidated, fine-grained stabilized dune deposits. The uplifted marine terrace sediments are typically high-energy nearshore marine deposits capped by beach sand (Kelsey et al., 1996). In the 1970s, the subject site was mapped in an area of recently stabilized foredunes backed by younger stabilized dunes (USDA et al., 1975).

In the area of the site, the marine terrace deposits are locally underlain by lower Miocene Astoria Formation. The Astoria Formation is mapped as the primary geologic unit southeast of the site and consists of massive to thin-bedded, very fine- to medium-grained micaceous and carbonaceous arkosic sandstone and siltstone (Schlicker et al., 1973). Locally, the Astoria Formation is typically below beach elevation.

During our February 24, 2022, site visit, a geologist from our office explored the subsurface by observing and logging seven excavated test pits up to 12 feet below the ground surface. An engineering geologist visually classified soils encountered in the test pits according to the Unified Soil Classification System (USCS).

Materials encountered in the test pits generally consisted of loose, tan, medium-grained dune and beach sand overlying saturated, dark brown, organic-rich, clayey silt with peat and wood debris. The highly organic soils encountered below the sand are indicative of wet deflation plain deposits. Shannon and Wilson (1988) interpreted the site's mixed organic clay and peat as lagoon deposits.

Colluvial sands and sandy fill have been observed along the southern half of the bluff. Previously, compacted, crushed rock fill was observed along the lower half of the bluff north of the existing beach access stairs. We understand that this crushed rock fill was placed in the late 1980s as a beach access road for riprap construction issued under an emergency permit from SPRD (now OPRD) and DSL (Good, 1992). Bluffs in the site's southern portion expose brown, dense, slightly clayey, silty sand overlain by approximately 3 to 4 feet of black to dark brown, loose, organic, silty sandy topsoil.

4.1 Geologic Structures

Structural deformation and faulting along the Oregon Coast are dominated by the Cascadia Subduction Zone (CSZ) which is a convergent plate boundary extending for approximately 680 miles from northern California to northern Vancouver Island. This convergent plate boundary is defined by the subduction of the Juan de Fuca plate beneath the North America Plate and forms an offshore north-south trench approximately 40 to 60 miles west of the Oregon coast shoreline. A resulting deformation front consisting of north-south oriented reverse faults is present along the western edge of an accretionary wedge east of the trench, and a zone of margin-oblique folding and faulting extends from the trench to the Oregon Coast (Geomatrix, 1995).

An inferred (concealed) fault that trends in a northwesterly direction has been mapped approximately 2 miles north of the subject site (Schlicker et al., 1973; Priest and Allan, 2004). This fault is believed to be a normal fault with its upthrown side to the southwest. The fault cuts Tertiary units with no indications of recent movement.

A northwest-striking fault, the Fishing Rock fault, is mapped approximately 0.4 miles south of the site, near the headland of Fishing Rock (Personius et al., 2003; Priest and Allan, 2004). This fault offsets Quaternary Marine Terrace deposits by 15 feet and is downthrown to the northeast. A similar west-northwest striking, downthrown-north fault with 18-foot offset, named the Fogarty Creek fault, is also mapped approximately 0.9 miles south of the site (Personius et al., 2003; Priest and Allan, 2004). These faults are the two most distinct in a group of several other generally northwest-striking faults in the area from Government Point northward to the mouth of the Siletz River, which are collectively referred to as the Siletz Bay faults by Personius et al. (2003); their sense of movement and level of activity is poorly known at present.

Other mapped potentially active faults are the Yaquina Head Fault, located approximately 12.3 miles south of the site, and the Yaquina Bay Fault, located approximately 15.3 miles south of the site. The Yaquina Head Fault is an east-trending oblique fault with left-lateral strike-slip and either contractional or extensional dip-slip offset components (Personius et al., 2003). It offsets the 80,000-year-old Newport marine terrace by approximately 5 feet, indicating a relatively low rate of slip, if still active (Schlicker et al., 1973; Personius et al., 2003). The Yaquina Bay Fault is a generally east-northeast trending oblique fault that also has left-lateral strike-slip and either contractional or extensional dip-slip offset components (Personius et al., 2003). This fault is believed to extend offshore for approximately 7 to 8 miles and may be a structurally controlling feature for the mouth of Yaquina Bay (Goldfinger et al., 1996; Geomatrix, 1995). At Yaquina Bay, a 125,000-year-old platform has been displaced approximately 223 feet up-on-the-north by the Yaquina Bay Fault. This fault has the largest component of vertical slip (as much as 2 feet per 1,000 years) of any active fault in coastal Oregon or Washington (Geomatrix, 1995). Although the age for the last movement of the Yaquina Bay Fault is not known, the fault also offsets 80,000-year-old marine terrace sediments.

5.0 History of Erosion, Accretion, Stabilization, and Current Site Conditions

The site is located in the Lincoln littoral cell between Fishing Rock to the south and Cascade Head to the north (Allan et al., 2015). Delivery and balance of sand and sediment within the Lincoln littoral cell are influenced by ocean and weather conditions which include the cyclic nature of El Niño and La Niña events; these occur with approximately the same historical frequency and are grouped into periods of approximately 20 to 25 years (Taylor, 1998).

Based on our prior work in this coastal area and our review and interpretation of historical aerial and satellite photographs from 1977, 1988, 1994, 2000, 2003, 2005, 2011, 2014,

2016, 2018, and 2020, sand at the site appears to generally accrete in the summers and erode in the winters. Accretion in the summers primarily results from accumulating windblown sand and a less energetic wave environment. Erosion in the winter is generally the result of high-energy storm waves.

The Northwest Association of Networked Ocean Observing Systems (NANOOS) Beach and Shoreline Changes historical beach profile mapping dating from 1997 onward shows that seasonal accretion and retreat of beach sand has occurred in this coastal area due to the cyclic ocean and weather conditions (Allan and Hart, 2005).

The site lies in an area that has been mapped as experiencing critical erosion of sand spits and dune areas (Schlicker et al., 1973). Priest and others (1994) determined the average annual erosion rate for the unprotected bluff segments near the site as 0.62 ± 0.76 feet per year. This erosion rate was calculated by measuring the distance from existing structures to the bluff and compared to distances measured on a 1939 or 1967 vertical aerial photograph (Priest et al., 1994).

Based on mapping completed by Priest and Allan (2004), the bluff and beach on the western part of the site lies in the Active Erosion Hazard Zone, and the area adjacent to the bluff slope lies in the High-Risk Coastal Erosion Hazard Zone. The area from near the bluff to just west of the existing condominium buildings lies in the Moderate-Risk Coastal Erosion Hazard Zone. The western part of the condominium buildings lies in the Low-Risk Coastal Erosion Hazard Zone. Coastal erosion hazard zone definitions and methodology are provided below.

The methodology provided by Priest and Allan (2004) defines four coastal erosion hazard zones for the bluffs of Lincoln County, Oregon as follows:

"*The basic techniques used here are modified from Gless and others (1998), Komar and others (1999), and Allan and Priest (2001). The zones are as follows:*

> *1) <u>Active hazard zone:</u> The zone of currently active mass movement, slope wash, and wave erosion.*
>
> *2) The other three zones define high-, moderate-, and low-risk scenarios for expansion of the active hazard zone by bluff top retreat. Similar to the dune-backed shorelines, the three hazard zones depict decreasing levels of risk that they will become active in the future. These hazard zone boundaries are mapped as follows:*
>
> *a. <u>High-risk hazard zone:</u> The boundary of the high-risk hazard zone will represent a best case for erosion. It will be assumed that erosion proceeds gradually at a mean erosion rate for 60 years, maintaining a slope at the angle of repose for talus of the bluff materials.*

b. Moderate-risk hazard zone: The boundary of the moderate-risk hazard zone will be drawn at the mean distance between the high- and low-risk hazard zone boundaries.

c. Low-risk hazard zone: The low-risk hazard zone boundary represents a "worst case" for bluff erosion. The worst case is for a bluff to erode gradually at a maximum erosion rate for 100 years, maintaining its slope at the angle of repose for talus of the bluff materials. The bluff will then be assumed to suffer a maximum slope failure (slough or landslide). For bluffs composed of poorly consolidated or unconsolidated sand, another worst-case scenario will be mapped that assumes that the bluff face will reach a 2:1 slope as rain washes over it and sand creeps downward under the forces of gravity. For these sand bluffs, whichever method produces the most retreat will be adopted." (Priest and Allan, 2004).

It should be noted that mapping done for the 2004 study was intended for regional planning use, not for site-specific hazard identification.

The site is also mapped in an area of moderate to high landslide susceptibility based on the DOGAMI methodology (Burns, Mickelson, and Madin, 2016).

As described above, the subject site has been permitted for sand alteration due to oceanfront erosion in the past and has experienced severe erosion from the 1980s onward, beginning with the 1982 -1983 El Niño event. During the winter of 1987/88, additional erosion occurred and in September of 1988, a permit was issued for approximately 3,000 cu yds of beach sand against the bluff (Appendix D). Since 1985, sand alteration has regularly occurred in response to erosion.

During the El Nino winter of 1997–1998, severe oceanfront erosion again occurred, which resulted in approximately 40 feet of recession of the vegetated dune and the lowering of the beach by several feet. In March 1998, OPRD granted continuance (for emergency purposes) of the originally-issued sand alteration permit; following this, H.G. Schlicker and Associates, Inc.'s June 26, 1998, oceanfront erosion hazards investigation report (HGSA # 981592) provided recommendations and an ocean shore improvement application for the site.

In the fall of 1998, HGSA visited the site to determine if sufficient quantities of sand existed on the beach to allow grading of sand at the project site without causing adverse impacts to the beach or to other upland properties in the vicinity. At the time of our site visit, we observed a sand berm that had formed along the beach during the summer. The crest of the berm was approximately 130 feet west of the base of the existing bluff. The east slope of the berm sloped down towards the bluff at approximately 1 degree, and the west slope of the berm sloped

down towards the ocean at approximately 8 degrees. At the time of our visit, it was high tide, and ocean water was approximately 30 feet west of the crest of the berm. We completed slope profiles documenting the approximate location of the western buildings relative to the bluff and dune edge (Appendix D). Based on our site observations, there was a substantial increase in sand volume along this section of the beach since our site observations the previous spring (1998). Subsequently, in November of 1998, we completed site observations during sand alteration and found that it was completed in general conformance with our recommendations.

During the winter of 1998/1999, unusually severe ocean wave activity again caused erosion along the bluff, which removed some of the sand which had been placed the year before.

At the time of our July 21, 1999, site visit, we observed that most of the sand placed along the southern 250 feet of the bluff at the site had been eroded during the past winter. Additionally, approximately 50% of the sand along the northern 50 feet of the bluff had been eroded. Less severe erosion occurred on the central 300 feet of the bluff. Based on our site measurements and calculations, approximately 1,320 cubic yards of sand had been eroded from the bluff during the winter of 1998/1999.

At the time of our July 1999 site visit, we constructed two beach profiles west of the site to determine the sand volume making up the beach berm west of the site. Based on our calculations, the beach berm west of the site contained approximately 6,600 cubic yards of sand. We recommended that some of this could be used to replace the sand eroded along the bluff the previous winter.

As discussed in Section 2.0, we understand from communication with the SeaRidge property manager that a curtain drain was installed along the oceanfront west of the condominium buildings around 2000 (Appendix B). Based on construction as-builts (Appendix D), it appears that a rockery structure consisting of approximately 2 to 5½ feet diameter basaltic boulders was constructed east of the bluff in 1999/2000 as an integral part of a curtain drain to protect the curtain drain and better facilitate the infiltration of stormwater (Appendix B).

It is our understanding that repeated sand alteration activities were attempted between 2000 and 2013 to rebuild the dune and mitigate frequent severe erosion episodes during that period.

In 2016 HGSA completed an engineering geologic investigation for proposed shoreline sand alteration. At that time, we determined that ongoing and recent oceanfront erosion threatened the existing condominium buildings at the subject property. The beach west of the bluff generally had an approximately 2 to 3 feet thick layer of sand at the time of our site visits. The beach was largely devoid of sand due to severe storm wave conditions from October 14 through 18, 2016. The removal of the thin sand layer had exposed the underlying mudstones and

the State-protected tree stumps along this beach, with a greater number of stumps present in the southern project area than the northern project area. We completed slope profiles documenting the approximate location of the western buildings relative to the bluff and dune edge (Appendix D). During this investigation, HGSA and OPRD determined that insufficient sand had built up along the beach to be utilized for the recommended dune repair. We made recommendations for imported sand, if necessary. We noted that placing sand along the shoreline to repair the dune would not permanently protect the shoreline from future erosion and that future dune and bluff repair should be anticipated.

In 2016 we estimated that many thousands of cubic yards of sand had been eroded from the beach and bluff area since the summer of 2015. Erosion of the shoreline will continue in the future during most severe storms and during future El Niño events. In most summers, sand would accrete and form small transient dunes west of the bluff.

Based on our previous conversations with the property manager, the beach access stairs at the site were undermined in a storm during the first part of 2016; prior to the storm event, less than half a dozen steps were exposed, and at the time of our mid-summer 2016 site visit all of the steps and their foundation are visible. The severe erosion during the Winter of 2015–2016 initially caused the need for sand alteration, and the ongoing erosion in the Fall of 2016 increased the need for sand alteration at the site.

In 2017 sand alteration activities occurred. HGSA visited the subject site in February 2017 to observe and classify imported sand being placed by the grading contractor. We observed that the imported sand was generally light gray/brown, fine-grained, and less well-graded than the native beach sand, which is fine to coarse-grained but nearly identical to the sand exposed in the dune scarp. The imported sand generally matched the medium and fine sand components of the native beach sand and the sand in the dune scarp but lacked coarse sand. It was our opinion that the imported sand met the requirements of OPRD.

In the fall of 2018, HGSA was called to the site to observe and determine if an adequate sand supply was available for proposed grading activities. At that time, we observed that the last high tide wave strand line was approximately 225 feet west of the base of the bluff and located on the western side of a sand berm. Recent erosion had exposed areas of the curtain drain, and the bluff portions of the site were oversteepened. During previous site visits, tree stumps have been exposed on the beach. During our August 15, 2018, site visit, we measured approximately 2.5 to 3.5 feet of sand accumulated above what we believe to be the elevation of the tops of the ancient tree stumps in the area of the site. We estimated there was about 22,800 cubic yards of sand available for relocation from the sand berm to the bluff slope. Reportedly, sand alteration based on our recommendations occurred in September 2018.

In the summer of 2020, HGSA was called to the site to make observations and determine if an adequate sand supply was available for proposed grading activities. At that time, we observed that the last high tide wave strand line was approximately 370 feet west of the base of the bluff and located on the western side of the westernmost sand berm. We observed sand approximately 4 to 6 feet thick was available for grading between the last high tide wave strand line and the top of the berms. The available sand thinned east of the berms and was approximately 270 feet wide east to west above the last high tide wave strand line and the easternmost berm. Relatively greater sand volumes were available at the central and northern areas of the site than in the southern area. We estimated that there were about 22,800 cubic yards of sand available for relocation from the sand berms to the bluff slope.

During our site visits for this investigation, our observations of the ongoing erosion at the site are consistent with our past investigations and knowledge of the site. The beach west of the site appears to respond to seasonal changes as the result of changes in wave amplitude, frequency and direction. High waves during the winter months cause sand to be eroded from the beach, moved offshore and deposited along offshore bars, and in response, the bluff and dune slope can be eroded back, undermined, and oversteepened. However, typically, in the summer months, the absence of high storm waves and the occurrence of low regular swells causes sand to move onshore, forming a wide beach. During our March 17, 2023, site visit, we observed that the fronting dune was starting to rebuild in response to this accretion of sand.

As shown on Figure 5, slope profiles derived from elevation data from 2002, 2009, 2016, and 2022 generally indicate progressive erosion of the bluff and dune at the site. Select slope profiles from the late 1980s, 1998, and 2016 provide additional evidence for the historical eastward progression of the bluff and dune slope due to erosion (Appendix D). As discussed herein, past sand alteration and stormwater improvement attempts have been short-term and temporary solutions for mitigating the threat to the infrastructure from the persistent erosion at the site.

6.0 Regional Seismic Hazards

Abundant evidence indicates that a series of geologically recent large earthquakes related to the Cascadia Subduction Zone have occurred along the coastline of the Pacific Northwest. Evidence suggests that more than 40 great earthquakes of magnitude 8 and larger have struck western Oregon during the last 10,000 years. The calculated odds that a Cascadia earthquake will occur in the next 50 years range from 7–15 percent for a great earthquake affecting the entire Pacific Northwest, to about a 37 percent chance that the southern end of the Cascadia Subduction Zone will produce a major earthquake in the next 50 years (OSSPAC, 2013; OSU News and Research Communications, 2010; Goldfinger et al., 2012). Evidence suggests the last

major earthquake occurred on January 26, 1700 and may have been of magnitude 8.9 to 9.0 (Clague et al., 2000; DOGAMI, 2013).

There is now increasing recognition that great earthquakes do not necessarily result in a complete rupture along the full 1,200 km fault length of the Cascadia subduction zone. Evidence in the paleorecords indicates that partial ruptures of the plate boundary have occurred due to smaller earthquakes with moment magnitudes (Mw) < 9 (Witter et al., 2003; Kelsey et al., 2005). These partial segment ruptures appear to occur more frequently on the southern Oregon coast, as determined from paleotsunami studies. Furthermore, the records have documented that local tsunamis from Cascadia earthquakes recur in clusters (~250–400 years) followed by gaps of 700–1,300 years, with the highest tsunamis associated with earthquakes occurring at the beginning and end of a cluster (Allan et al., 2015).

These major earthquake events were accompanied by widespread subsidence of a few centimeters to 1–2 meters (Leonard et al., 2004). Tsunamis appear to have been associated with many of these earthquakes. In addition, settlement, liquefaction and landsliding of some earth materials are believed to have been commonly associated with these seismic events.

Other earthquakes related to shallow crustal movements or earthquakes related to the Juan de Fuca plate have the potential to generate magnitude 6.0 to 7.5 earthquakes. The recurrence interval for these types of earthquakes is difficult to determine from present data, but estimates of 100 to 200 years have been given in the literature (Rogers et al., 1996).

The subject site is mapped in an area of severe expected earthquake shaking during an earthquake in a 500-year period (DOGAMI Oregon HazVu website, accessed March 2023). “Severe” is the second-highest level of a six-level gradation from “Light” to “Violent” in this mapping system.

DOGAMI’s HazVu website (https://gis.dogami.oregon.gov/maps/hazvu/) has mapped the site as having a moderate susceptibility to liquefaction. DOGAMI states: “Buildings and infrastructure sitting on these soils are likely to be severely damaged in an earthquake.”

Liquefaction occurs when saturated, cohesionless soils are subjected to ground vibrations, resulting in a decrease in volume of the soil. If drainage is unable to occur, the tendency to decrease in volume results in an increase in pore water pressure, and if the pore water pressure builds up to the point at which it is equal to the overburden pressure, the effective stress becomes zero, and the soil loses its strength and develops a liquefied state. Liquefaction is most common in saturated, loose, granular sand or silty sand materials. Cohesive soils, such as clayey silt and clay, will generally not liquefy during earthquakes (Seed and Idriss, 1982). Older sediments are also more resistant to liquefaction than recently deposited sediments (Idris and Boulanger, 2008).

Settlement can result from liquefaction of saturated soils or simply a result of dry soil densifying under vibration (volumetric compression). Volumetric compression during an earthquake is the result of vibrations of the soil, causing soil particles to settle into a denser state, decreasing the soil's volume. The degree of settlement is primarily dependent upon the soil's initial density and the magnitude and duration of ground vibrations (shaking). Settlement caused by liquefaction is commonly differential, and the magnitude of settlement typically varies throughout a site, whereas settlement caused by volumetric compression tends to be more uniform.

7.0 Flooding Hazards

Based on the 2019 Flood Insurance Rate Map (FIRM, Panel #41041C0235E), the eastern portion of the SeaRidge development lies in an area rated as Zone X, which is defined as determined to be outside the 0.2% annual chance floodplain. The western half of the westernmost buildings and the western oceanfront area lie in an area rated as Zone VE (EL 38) (NAVD 88). Zone VE is defined as an area of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

Based on the Oregon Department of Geology and Mineral Industries mapping, the western oceanfront area of the site lies within the tsunami inundation zone resulting from an approximately 8.9 or larger magnitude Cascadia Subduction Zone (CSZ) earthquake (DOGAMI, 2013). The 2013 DOGAMI mapping is based upon five computer-modeled scenarios for shoreline tsunami inundation caused by potential CSZ earthquake events ranging in magnitude from approximately 8.7 to 9.1. The January 1700 earthquake (discussed in Section 6.0 above) has been rated as an approximate 8.9 magnitude event in DOGAMI's methodology. Other earthquake source zones can also generate tsunamis.

8.0 Climate Change

According to most of the recent scientific studies, the Earth's climate is changing as the result of human activities which are altering the chemical composition of the atmosphere through the buildup of greenhouse gases, primarily carbon dioxide, methane, nitrous oxide, and chlorofluorocarbons (EPA, 1998). Although there are uncertainties about exactly how the Earth's climate will respond to enhanced concentrations of greenhouse gases, scientific observations indicate that detectable changes are underway (EPA, 1998; Church and White, 2006). Global sea level rise, caused by melting polar ice caps and ocean thermal expansion, could lead to flooding of low-lying coastal property, loss of coastal wetlands, increased wave heights, erosion of beaches and bluffs, and saltwater contamination of fresh groundwater. It can also lead to increased rainfall which can result in an increase in landslide occurrence. Global

climate change and the resultant sea level rise may impact the subject site through accelerated coastal erosion.

9.0 Conclusions and Recommendations

To mitigate future ocean wave erosion of the bluff and dune, support the oversteepened bluff and protect the critical utility infrastructure, we recommend constructing a riprap revetment at the subject site, as detailed in Figures 3 through 6.

Modifications to the recommendations provided herein may be necessary based on the field conditions encountered during construction. If substantial modifications are necessary, consultation with and/or approval by OPRD prior to proceeding with the modified construction and As-Built drawings or narratives may be required after completion of construction. There will be additional costs for these services.

The lateral extent of the top of the revetment should extend from the northern property boundary of Tax Lot 90000 to the southern property boundary of Tax Lot 90000 approximately 600 feet, as indicated on Figures 2, 3 and 4. The top of the armor stone should be placed up to a minimum elevation of approximately 30 feet (NAVD 88), which generally corresponds to the elevation of the actual vegetation line at the time of completion of the topographic survey of the subject site (Figure 4).

The northern terminal end of the revetment should wrap and taper into the dune to minimize end effects, as shown on Figures 3 and 4. Based on historical photos of the northern portion of the site, curtain drain rocks may be encountered during excavation at the northern end of the revetment (Appendix B). If curtain drain rocks are encountered, care should be taken not to disturb or damage the curtain drain system, and HGSA should be contacted to observe the conditions and provide modified design recommendations as necessary.

The southern terminal end of the revetment should taper into the bluff and dune to minimize end effects, as shown on Figures 3 and 4. Based on historical photos of the southern portion of the site and the material observed during test pit excavation, encountering ancient forest remnants is more likely to occur in the southern area of the proposed revetment (Appendix B). If encountered within the footprint area of the proposed revetment, care should be taken to avoid or minimize damage to ancient forest remnants, and HGSA should be contacted to observe the conditions and provide modified design recommendations as necessary.

The eastern side of the armor stone at the top of the revetment should be a minimum of approximately 20 feet westward of the nearest exposed stormwater catchment. The alignment of the top of the revetment should generally follow the existing top of the bluff and dune, and care should be taken to minimize disturbance of the established vegetation. Placement of well-

compacted quarry-run fill or sand may be necessary to construct and maintain the alignment of the backing slope and to minimize the disturbance of the established vegetation. The dune area in the northern portion of the site, where stormwater washouts have frequently occurred, may require more well-compacted quarry-run fill or sand to maintain the recommended alignment presented in Figures 3 through 5. The backing slope for the revetment should be constructed from approximately 1.5H:1V (1.5 Horizontal : 1 Vertical) to 1.75H:1V (1.75 Horizontal : 1 Vertical) to accommodate the typical revetment configuration, as shown in Figure 6.

We recommend that the revetment be embedded through the beach sand and underlying lagoon/marine terrace deposits at or below a maximum elevation of 6 feet (NAVD 88). The final revetment embedment depth should be as deep as "flowing/heaving" sand conditions allow at low tide. Toe trench embedment depths must be approved by a representative of HGSA at the time of construction.

Non-woven filter fabric (Mirafi® 1100N or equivalent), quarry-run bedding rock, and filter rock (aka "chunky rock") should be placed between the riprap armor and the native soils and quarry-run fill, as shown on Figure 6. The non-woven filter fabric should be installed from the top of the slope to the bottom of the toe trench and wrap the bottommost armor stone placed in the trench. Overlapping and installation of the fabric should follow manufacturer guidelines and ODOT Oregon Standard Specification for Construction 2021. An approximately 6-inch-thick layer of quarry-run bedding rock, consisting of 4-inch minus rock with minimal fines, should be placed on the filter fabric to prevent the more angular filter rock from puncturing the filter fabric. An approximately 18-inch-thick layer of filter rock, consisting of ODOT Class 200 standard riprap, should be placed between the quarry-run bedding rock and the riprap armor to dissipate wave energy and provide bedding material for armor stones.

Riprap (armor stone) should consist of hard, durable, angular, non-vesicular basalt rock from an upland source, approximately 3 to 7 feet diameter, and weighing at least 165 pounds per cubic foot. Armor stones should be individually placed with "3-point bearing" (no wobbling) on adjacent rock (Racin et al., 2000). Two layers of riprap should be installed. The outer face of riprap revetment should slope at 2H:1V (2 Horizontal : 1 Vertical). The top of the armor stone should be at approximately 30 feet elevation (NAVD 88) minimum. Constructing the top of the revetment to a higher elevation may better mitigate overtopping. Additional design details are provided on Figures 3 through 6.

Following revetment construction, above the severe wave splash elevation (approximately 28 feet (NAVD 88) or as directed by HGSA based on field conditions, the revetment and pit-run fill should be covered with a minimum 2-foot-thick layer of sand, or toe trench spoils, being sure to infill all interstitial space between riprap boulders, and planted with beach grass, fertilized and watered as necessary to establish vegetation growth for improved

aesthetics. Any imported sand for this use should be free of invasive species and debris and consistent with typical beach sand. The revetment will need to be maintained and repaired as necessary.

Construction of a riprap revetment along the entire length of the property will provide the greatest protection for the property, increased longevity of the revetment, and reduce long-term costs. If the riprap revetment is not maintained and repaired as needed, we anticipate that ocean wave attack will render the revetment less effective in providing adequate protection.

Based on information provided to us and site observations, there are four main stormwater drains that service the development and discharge within the subject site. The discharge for the northernmost stormwater drain pipe daylights on the dune slope and is typically easily located. Two drain pipes run between buildings D and E and discharge west of the access path, east of the top of the bluff. The fourth drain pipe has been difficult to locate recently, but according to information and plans we have reviewed, the pipe may discharge near the southern end of the curtain drain. An effort to locate all four stormwater pipes should be made, and the stormwater drain pipes should be extended to discharge no farther east than the top of the revetment.

Proposed Access Staircase

Based on our review of the engineering plan set for the proposed staircase provided in Appendix F, we have provided the following engineering geologic recommendations and considerations for use during construction:

Final embedment depth of the proposed reinforced concrete piers will depend on the subsurface material encountered during excavations and/or augering. Based on our knowledge of the subsurface in the area of the site, suitable bearing surfaces for the base of the piers include firm native sands or mudstone.

Structural fill under, behind, and on the sides of the new staircase should consist of imported, granular material, free of organics and deleterious materials, and contain no particles greater than 1.5 inches in diameter. Structural fill should be placed in lifts not exceeding 12 inches and mechanically compacted with large equipment to a dense state. To achieve the designed fill slope, the structural fill should be benched. Benches shall be cut into native, firm soil. The lowest bench shall be keyed a minimum of 2 feet into suitable soil and be a minimum of 4 feet wide. To achieve adequate compaction, the lifts comprising the benches should be compacted in a downward vertical fashion. The final outer slope face should be built up from the benches and compacted as necessary to achieve the slope configuration as designed.

We recommend that additional structural fill be placed and compacted on either side of the staircase footprint extending a minimum of approximately 6 feet to the north and south. Based on field conditions, this structural fill along the sides should taper to integrate into the adjacent revetment backing slope at a stable configuration.

Non-woven filter fabric (Mirafi® 1100N or equivalent) should be placed along the sides of the staircase between the structural fill and the revetment materials. Fabric should extend from near the top of concrete rails down to the north and south to adequately overlap with the adjacent filter fabric on the revetment backing slope. At the base of the staircase, non-woven filter fabric (Mirafi® 1100N or equivalent) should be placed from the lowest stair tread to the bottom of the toe trench and wrap the bottommost armor stone in the trench below the stairs.

Based on the final configuration of the structural fill slope behind and on the sides of the staircase and to maintain a uniform and aligned outer face of the revetment, we anticipate that the armor stones placed adjacent to the concrete rails will likely be a single layer thick with associated underlying filter rock and quarry-run bedding rock. The constructed revetment should be able to return to the double-layer design specifications after the 6 feet-wide side slope tapers into the typical revetment backing slope.

Engineering Geologic Considerations Related to Equipment Access

The closest improved public beach access that has typically been used for construction equipment access along this portion of Lincoln Beach is located at Willow Street, approximately 525 feet south of the site. During previous mitigation work at the Searidge Condominiums, on-site access between buildings D and E has been used; however, the number of heavy truckloads of armor stone and other construction materials required for the construction of the proposed riprap revetment may have a detrimental impact on the existing infrastructure and condition of the upland portion of the dune. We recommend using the developed Willow Street beach access to minimize the potential for damage to the existing infrastructure and dune.

10.0 Satisfaction of Application Criteria:

10.1 Proposed Project

As discussed and specified herein, the proposed project consists of the construction of an approximately 42 feet wide riprap revetment along approximately 600 feet of ocean frontage at the subject site.

10.2 Applicant Information

Provided on OPRD Permit Application (Appendix H).

10.3 Property Location and Information

Provided on OPRD Permit Application (Appendix H) and discussed in Section 2 above.

10.4 Project Justification and Engineering Geologic Impacts

10.4.1 Project Need: Hazards and Threat to Property OAR 736-020-0010 (1)

As discussed above, since its development in the 1980s, the oceanfront area of the subject site has experienced repeated severe erosion episodes that have removed the fronting dune and currently threaten to damage or destroy critical utilities for the SeaRidge Condominiums. Critical stormwater and sanitary sewer infrastructure are located as close as approximately 18 feet from the bluff edge (Figure 4).

10.4.2 Engineering Geologic Impacts and Analysis of Hazard Avoidance Sand Source, Supply, and Movement

Sand supplies along the Oregon coast are derived primarily from two sources, (1) from erosion of bluffs, headlands and dunes, and (2) to a lesser extent from sediments carried by streams and rivers that discharge to coastal areas.

The proposed revetment would prevent erosion along approximately 600 feet of bluff and dune length. As mentioned above, mapping by Priest (1994) and Priest et al. (1994) estimated the net erosion rate at 0.62 ± 0.76 feet per year for the area of the site.

Assuming an average annual erosion rate of 0.62 feet per year and an anticipated life of the revetment of 60 years, we estimate that the maximum total loss of sediment supply as a result of the revetment will be approximately 11,573 cubic yards in 60 years or an annual average loss of approximately 193 cubic yards of material. The estimated total loss of material was calculated by multiplying the average annual erosion rate (0.62 feet per year) by 60 years, multiplied by the approximate height of the bluff (14 feet) and length (600 feet) of the unprotected bluff segment. Approximately 40% of this material is sand-sized, and approximately 60% is silt and clay. Forty percent of these 11,573 cubic yards or 4,629 cubic yards of material has the potential to contribute to the sand supply.

We believe that the loss of sand to the beach in this littoral cell as a result of this revetment will be minimal during the life of the riprap structure.

The revetment has been designed to minimize obstructions to sand movement along the beach. We do not anticipate that sand movement along this very dynamic beach

will be adversely impacted by the riprap revetment. The revetment will protect a section of the bluff and dune which was previously unprotected.

Post-Construction Bank or Bluff Stability and Erosion Rates on Subject Property and Adjacent Properties

The riprap revetment will increase the stability of the bluff and dune slope at the subject site and will protect the bluff and dune from continued ocean wave erosion. Because the proposed revetment's north and south ends will be curved and tapered into the bluff, end-effects will be minimized on the subject and adjacent properties. There will essentially be no erosion below the elevation of the top of the revetment if the revetment is well maintained and repaired. However, any exposed bluff above the revetment will continue to recede due to wind and rain erosion and severe wave splash. Additionally, it should be anticipated that the unprotected bluff and dune fronting the adjacent properties will continue to experience ongoing erosion until mitigated.

Review of Potential Nonstructural Solutions

Nonstructural solutions have been attempted for this site, and other nonstructural solutions were considered as potential alternatives:

(1) Improving Stormwater Control –

Erosion along the bluff and dune is primarily the result of ocean wave attack, with wind and rain activity being a relatively lesser concern. Since the development of the SeaRidge Condominiums, several attempts to improve the stormwater system have been attempted; however, as the fronting dune has receded, the effectiveness of the systems has been reduced, as described above.

Recommendations provided above include extending stormwater drains west of the top of the revetment to prevent a buildup of hydrostatic pressure by reducing the amount of water discharged behind the proposed revetment. However, the improvement of stormwater control systems alone without additional mitigation, such as the construction of the proposed revetment, would not significantly improve bluff stability or provide adequate protection for the infrastructure at the subject site.

(2) Vegetation Stabilization – Due to the high energy, transitory environment along this section of the coastline and the loose nature of the sand, we do not believe that vegetation stabilization of the site alone could be successfully implemented, nor would it be adequate to protect the site

from future ocean wave erosion. Attempts of grass planting during previous sand grading have generally been unsuccessful.

(3) Slope Stabilization by Regrading – Grading the bluff and dune to a more stable slope angle would not provide significant or lasting protection from erosion at this site because of the weak nature of the soil and the constant erosive force of repetitive storm wave action. The topography and existing infrastructure and buildings limit room for any regrading of the slope. Regrading to a flatter slope angle at this site would also increase wave run-up and flooding potential.

(4) Beach Filling or Nourishment – Beach nourishment, by placing sand along the back beach environment, can temporarily protect exposed dunes and bluffs from continued ocean wave attack. This has been repeatedly attempted since the site's development, as discussed above. Additional sand in front of the bluff and dune typically erodes rapidly due to the substantial, frequent wave attack, erosion, and rip current embayment formation. Therefore, repeated beach nourishment by sand alteration has been necessary throughout the years. Continuing this nonstructural solution is not a long-term solution and necessitates frequent construction activities on the ocean shores.

(5) Dynamic Structures - Dynamic revetments are structures in which the movement of construction materials is a fundamental design concept (Lorang, 1994). Unlike riprap revetments which are designed to be static, dynamic structures consist of cobbles, sand, sandbags, gravel mounds, logs or composite materials, which are designed to mimic the natural dynamic beach environment. According to the Guidebook on Erosion Control Practices of the Oregon Coast, cobble-based dynamic revetments are not suitable for use in areas which don't already have cobbles on the beach, like the subject site (Bond, 2021).

There are few examples of dynamic revetments worldwide and few studies of their long-term effectiveness (Allan et al., 2005). There remain a number of uncertainties concerning the physical design of dynamic revetments, especially on high-energy beaches such as that observed at the subject site (Allan et al., 2005). It is also unclear if dynamic revetments can be effective in a limited shoreline zone, such as a shoreline zone confined within the area of a single development. We cannot recommend them for this site because of the uncertainty and lack of design methodology for dynamic revetments.

(6) Relocation of the Buildings and Infrastructure – Based on the geotechnics at the site, relocation of the existing structures is not feasible due to their size, foundation design, and construction, although an evaluation by a structural engineer and contractor's cost estimate has not been determined. The closest existing exposed critical infrastructure on the bluff is located approximately 18 feet east of the bluff edge. Additional separate and connected infrastructure elements and improvements occupy much of the space between the buildings and the bluff edge, limiting room for their potential relocation. Drain pipes associated with the stormwater infrastructure, at times, have been exposed along the bluff and dune slope.

Potential Geologic and Seismic Hazards

Ocean wave activity along the site will eventually damage any riprap structures placed along the oceanfront. Therefore, the riprap revetment should be maintained and repaired as needed.

The site lies in an area that is subject to possible tsunami inundation hazards. In the event of a Great Subduction Zone Earthquake and possibly other large earthquakes, a tsunami may damage the riprap revetment, which would require that the revetment is repaired or replaced following a tsunami event. The presence of the riprap revetment along the bluff during a tsunami event would probably lessen any potential erosive damage to the bluff slope resulting from the tsunami. Ground shaking during an earthquake can cause soils to liquefy and/or settle, resulting in loss of bearing capacity and structural damage.

Special Flood Hazards Area Impacts

The project area and proposed construction lie within a Special Flood Hazards Area based on the 2019 FEMA Map products. The revetment is designed to dissipate wave energy, including velocity waves associated with flooding events. Based on the FEMA flood mapping, the proposed revetment and staircase may be subject to overtopping. We do not anticipate that the proposed revetment structure and staircase will increase the adverse effects associated with potential flooding at the site or adjacent properties. A Lincoln County Flood Plain Development Permit will be required for the project (Appendix I).

10.5 Project Details

Provided on the application (Appendix H) and discussed in Section 9 above.

10.6 Engineering Geologic Design Considerations

10.6.1 Protection of Public Rights OAR 736-020-0010 (2)

The proposed revetment will be located entirely on the western portion of a privately owned property (Tax Lot 90000). The majority of the proposed revetment will be located east of the mapped Statutory Vegetation Line. The proposed revetment structure, including the backing slope, will potentially extend up to approximately 50 feet west of the current location of the base of the dune and bluff scarp (Figures 4 and 5). Based on our review (discussed above) of aerial photographs (Appendix C) and historical slope profiles (Appendix D), this encroachment will generally not exceed the configuration of the fronting dune as it existed prior to 1997/98 winter. It is our understanding that this area, previously occupied by vegetated dune topography, was generally not available for use by the public.

10.6.2 Alterations and Project Modifications OAR 736-020-0010 (4)

As discussed above, repeated nonstructural alternatives, including sand alteration, planting, and stormwater improvements, have been attempted since the site's development to mitigate the adverse effects of erosion. The effectiveness of these alternatives has been temporary. Based on our review of these previously attempted soft solutions, there are no alternatives appropriate for the site left to attempt. We recommend a riprap revetment (design specifications provided herein) to provide long-term protection of the subject site.

The proposed revetment's recommended location, size, configuration, and alignment were determined to limit impacts to public rights, reduce detrimental effects on the ocean shore, and avoid long-term costs to the public while providing appropriate and necessary protection to the site’s infrastructure.

Sea-level rise and climate change are discussed above. Discussions of past storms and climate cycles, such as El Nino, are discussed above. The proposed revetment is designed to mitigate the adverse effects of future wave erosion, including waves caused by storm events.

10.6.3 Public Costs OAR 736-020-0010 (5)

Prior to the submission of this report and application, the applicant has considered and attempted nonstructural solutions, as discussed above. Public costs associated with the project will be the loss of a flat back beach area, to be replaced by a sloped riprap revetment, partially covered with sand and planted with vegetation located completely on a privately owned tax lot. There will be no public costs for

construction or to maintain the revetment, as the maintenance and needed repairs are the responsibility of the property owner.

10.6.4 Compliance with LCDC Goals

As discussed above, Lincoln County approved SeaRidge's application for an exception to Goal 18. The attached permits (Appendix H and I) include certification that the project complies with Lincoln County's comprehensive plan and zoning code. It is our understanding that the proposed staircase will require a Lincoln County Building permit under separate cover.

10.6.5 Scenic Standards OAR 736-020-0015

(1) Natural Features: The project specifications and recommended construction observations (provided herein) are designed to minimize damage to the scenic attraction of key natural features in the site area. Riprap revetments are common in this area, and we anticipate additional nearby revetments will be constructed in the future. The bluff slope at the site may be considered a natural feature that the proposed revetment is designed to cover from view and protect.

The proposed revetment will not substantially affect the aesthetic quality typical of this section of the beach. Storms, high tides, swells and shifting sands will control how much of the lower portion of the revetment is exposed at any one time. During times when the western portion of the revetment is covered with sand, it will generally appear as a sandy slope rising up from the beach.

Typically, the evidence of temporary disturbance of the beach area by heavy equipment necessary for construction is erased by wind, rain, and waves.

Based on our review of previous investigations and select historical site photographs (Appendix B), after severe storms and erosion episodes, stumps and remains of an ancient forest have been temporarily exposed in the site area. However, typically the ancient forest remnants are covered with sand, not visible to the public, limiting their potential as a scenic attraction. The relative location and depth of individual stumps to the proposed revetment are unknown until they are exposed. We will work with the contractor during construction to minimize the impact to the scenic attraction of the ancient forest remains as required, if encountered.

(2) Shoreline Vegetation: Currently, there is limited vegetation below the top of and on the bluff and dune slopes fronting the site. As part of past permitted sand alteration activities, repeated attempts at replanting in this area have generally

been unsuccessful. The alignment and location of the proposed revetment have been designed to limit disturbance of the existing established vegetation along the top of the bluff and dune slope. As recommended herein, the area of the revetment above the wave swash line shall be covered with imported sand or toe trench spoils and planted with vegetation.

(3) View Obstruction: The minimum top height of the proposed revetment will be approximately 30 feet elevation (NAVD 88). The armor stone's top height will approximately match the top of the existing bluff at the site. The proposed revetment is designed to avoid or minimize obstructions to existing ocean and beach views at the development and from the adjacent properties.

(4) Compatibility with Surroundings: Riprap revetments are common in the area of the site, and we anticipate additional nearby revetments will be constructed in the future. When constructed as designed, the proposed project's appearance will be consistent with existing nearby protected oceanfront properties. As recommended herein, the revetment area above the wave swash line shall be covered with sand or toe trench spoils and planted with vegetation. Typically, the lower portion of the proposed revetment may become buried with accreted sand seasonally and appear as a natural back beach. These design considerations will help blend the structure with the typical shoreline scenery.

10.6.6 Recreation Use Standards OAR 736-020-0020

Impacts on recreation opportunities along this beach were a consideration in the design of the riprap revetment by locating the revetment as far east as possible while providing adequate protection of the existing infrastructure, providing sufficient infiltration space for stormwater, and minimizing the encroachment onto the beach.

(1) Recreation Use: The proposed revetment structure will occupy an approximately 27,000 square foot area of the beach along the approximately 600 feet frontage of the privately owned tax lot. The proposed revetment is to be generally located in an area historically occupied by a vegetated foredune and previously outside the public recreation easement. When completed, the proposed revetment, designed herein, will help stabilize the bluff and dune, reduce adverse effects of stormwater erosion along the bluff, and support safe public recreation use opportunities within the ocean shore area.

(2) Recreation Access: The subject site has long had private beach access stairs in the central portion of the site. These stairs have been repeatedly damaged and repaired over the years. New concrete access stairs are proposed as part of this

project and have been designed by a structural engineer. HGSA and the project's structural engineer have worked together to integrate the proposed revetment structure and the proposed access stairs. The new stairs will provide improved recreational access to the ocean shore as a part of the proposed revetment project. The proposed revetment is designed to minimize blocking off or obstructing public access routes within the ocean shore area. During times of high tides and storms, the base of the proposed revetment may be subject to direct wave attack, with limited lateral access along the beach. However, during these times, other areas of the beach are also likely to be impassable, with limited recreation opportunities.

During construction, temporarily blocking off or obstructing public access routes may be necessary to facilitate efficient and safe construction techniques and reduce the total construction period. Information provided in the drive-on beach permit and OPRD's newly required construction plan will discuss the construction logistics and methods to minimize/avoid meaningful impacts on beach access while ensuring public and worker safety.

10.6.7 Structural Safety OAR 736-020-0025 (1)

The undersigned Oregon certified engineering geologist has designed and provided construction recommendations for a riprap revetment (specified herein). The proposed riprap revetment constitutes a means of structural protection and will function primarily as a buffer to reduce the adverse effects of wind, rain, and ocean wave erosion forces. The proposed revetment will help stabilize the bank. As specified herein, we recommend using strong, durable materials in construction, not weak materials subject to rapid ocean damage.

An Oregon Professional Engineer designed the proposed staircase (Appendix F) and incorporates geotechnical recommendations provided herein by HGSA.

10.6.8 Obstruction Hazards OAR 736-020-0025 (2)

The proposed revetment is designed (as specified herein) to minimize obstructions to pedestrians or vehicles going onto or along the ocean shore area. When construction is finalized, the proposed revetment will not restrict beach access or passage in the north-south direction. There is currently no public beach access for pedestrians or vehicles in the immediate area of the site. Existing revetment structures already occupy the eastern portion of the ocean shores area along this stretch of beach. Based on our past observations, the bluff and dune slope at the site can be

oversteepened in a potentially unstable configuration and is generally unsuitable for recreation or pedestrian use.

Temporary obstructions along the ocean shore during construction activities will be necessary to protect the construction contractors from the inherent dangers of working on the shore of the Pacific Ocean. However, based on our observations of the construction processes throughout the year, the construction contractors make an effort to minimize the temporary obstructions to ensure the safety of the public and the construction crew and efficiently complete the project and quickly restore full access to the beach.

10.6.9 Neighboring Properties OAR 736-020-0025 (3)

Currently, the vacant lot to the north and the developed lot to the south of the subject site do not have oceanfront protection structures. The revetment proposed herein is designed to be located completely on the privately owned subject site (Tax Lot 90000). As specified herein, the northern and southern ends of the proposed revetment are designed to wrap around and taper to the east along the property lines in order to avoid or minimize potential adverse impacts or safety problems to the adjoining properties. If the adjoining properties construct oceanfront protection structures in the future, we recommend that those new revetments be structurally tied into the revetment proposed herein.

10.6.10 Property Protection OAR 736-020-0025 (4)

The proposed beachfront property protection project consists of a riprap revetment which is designed to accomplish a reasonable degree of increased safety for the onshore property to be protected. The purpose of the proposed revetment is to provide protection from wind, rain, and wave erosion that threatens the infrastructure at the site. The proposed revetment is intended to reduce the chance of erosion continuing further than the existing bluff and dune slope. Past attempts of re-grading the sand dune have only provided temporary protection at best.

10.6.11 Natural and Cultural Resource Standards OAR 736-020-0030 (6)

The proposed project lies in an area of the ocean shore known to be occupied by ancient forest remnants. These ancient forest remnants are typically buried by sand and were not exposed during our site visits for this investigation. If encountered during revetment construction, we will work with the contractor to avoid or minimize damage to ancient forest remnants. Based on conditions encountered during excavation, this may require alterations or modifications to the location or design of the revetment proposed herein. If substantial alterations or modifications

to the location or design of the proposed revetment are necessary to avoid or minimize damage to ancient forest remains, we will provide you with *As-Built* figures for future reference.

11.0 Construction Observations

The project's contractor will need to determine equipment access and associated construction logistics. Prior to construction, the earthwork, revetment, and foundation contractors should provide a work plan for HGSA's review. We recommend that preconstruction meetings occur on-site with HGSA and the contracting team.

A representative of HGSA should observe and approve all rock sources to be used in the proposed revetment at the quarry source prior to construction to ensure that appropriate materials are obtained and delivered to the project site. We should also periodically observe revetment construction operations, including toe trench excavation, fabric placement, placement of pit run materials, backing rock ("chunky rock"), and armor stone, sand covering placement, and the planting of vegetation to ensure that materials and work meet the project design and specifications. Please provide us with at least five (5) days' notice prior to any site observations. There will be additional costs for these services.

We should observe the earthwork and footing excavations for the staircase prior to placing fill and forming and/or pouring of concrete to ensure that suitable bearing soils have been reached and adequate compaction is being achieved. At the time of our observations, we may recommend additional excavation if suitable bearing soils have not been reached. There will be additional charges for these services.

12.0 Limitations

The Oregon Coast is a dynamic environment with inherent, unavoidable risks to development. Landsliding, erosion, tsunamis, storms, earthquakes and other natural events can cause severe impacts to structures built within this environment and can detrimentally impact the health and welfare of those who choose to place themselves within this environment. The client is warned that, although this report is intended to identify the geologic hazards causing these risks, the scientific and engineering communities' knowledge and understanding of geologic hazard processes is not complete. This report pertains to the subject site only and is not applicable to adjacent sites nor is it valid for types of development other than that to which it refers. Geologic conditions including materials, processes, and rates can change with time and therefore a review of the site, and this report may be necessary as time passes to assure its accuracy and adequacy.

The subsurface information depicts generalized subsurface conditions only at these specific locations and at the particular time the subsurface exploration was completed. Soil and groundwater conditions at other locations may differ from the conditions at these locations. Also, the passage of time may result in a change in the soil and groundwater conditions at the site.

Our investigation was based on engineering geological reconnaissance and a limited review of published information. The information presented in this report is believed to be representative of the site. The conclusions herein are professional opinions derived in accordance with current standards of professional practice and no warranty is expressed or implied. The performance of this site during a seismic event has not been evaluated. If you would like us to do so, please contact us. This report may only be copied in its entirety.

13.0 Disclosure

H.G. Schlicker & Associates, Inc. and the undersigned Certified Engineering Geologist have no financial interest in the subject site, the project or the Client's organization.

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It has been our pleasure to serve you. If you have any questions concerning this report, or the site, please contact us.

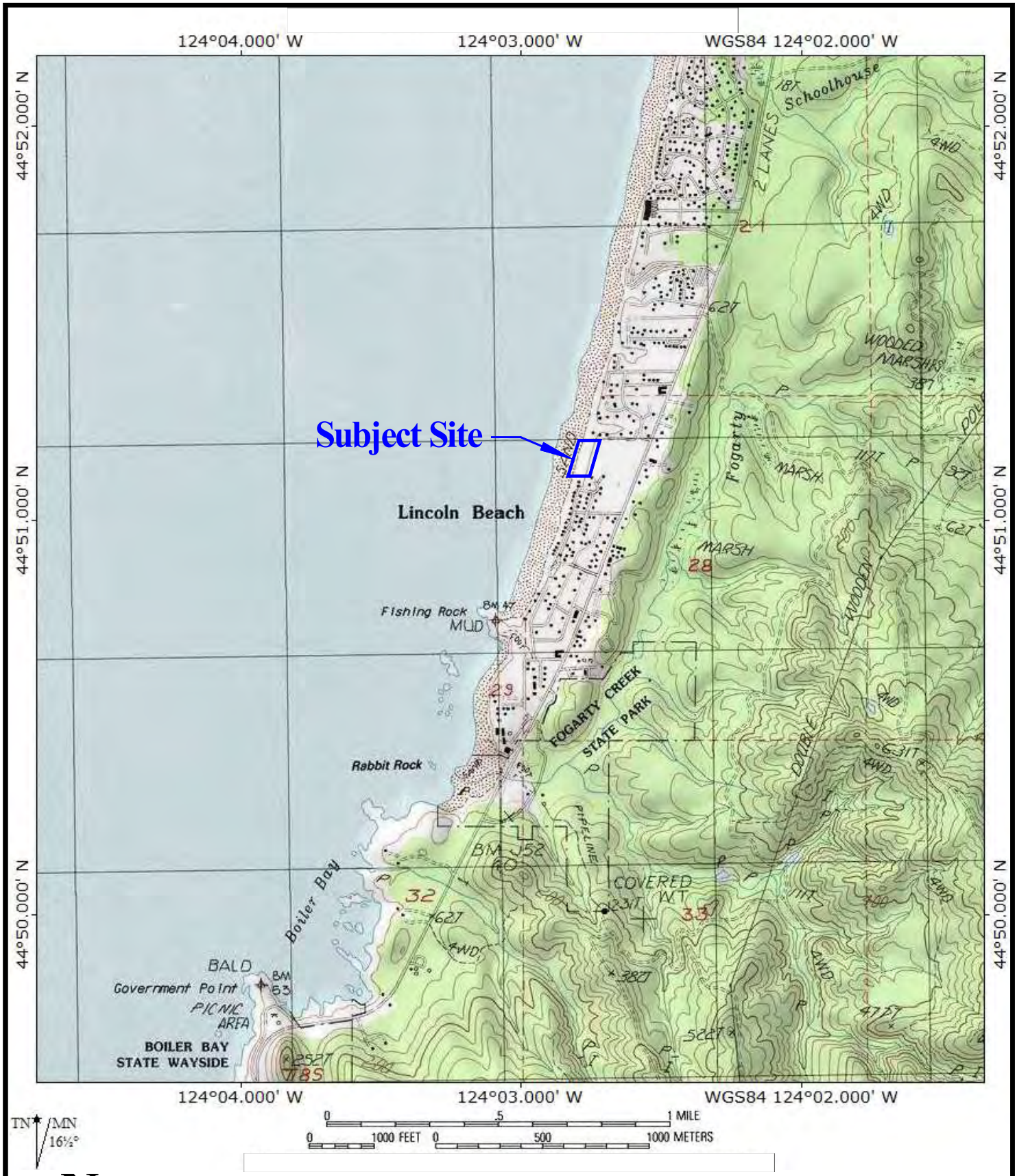
Respectfully submitted,

H.G. SCHLICKER AND ASSOCIATES, INC.

EXPIRES: 12/31/2023

Adam M. Large, MSc, RG, CEG
President/Principal Engineering Geologist

[redacted]

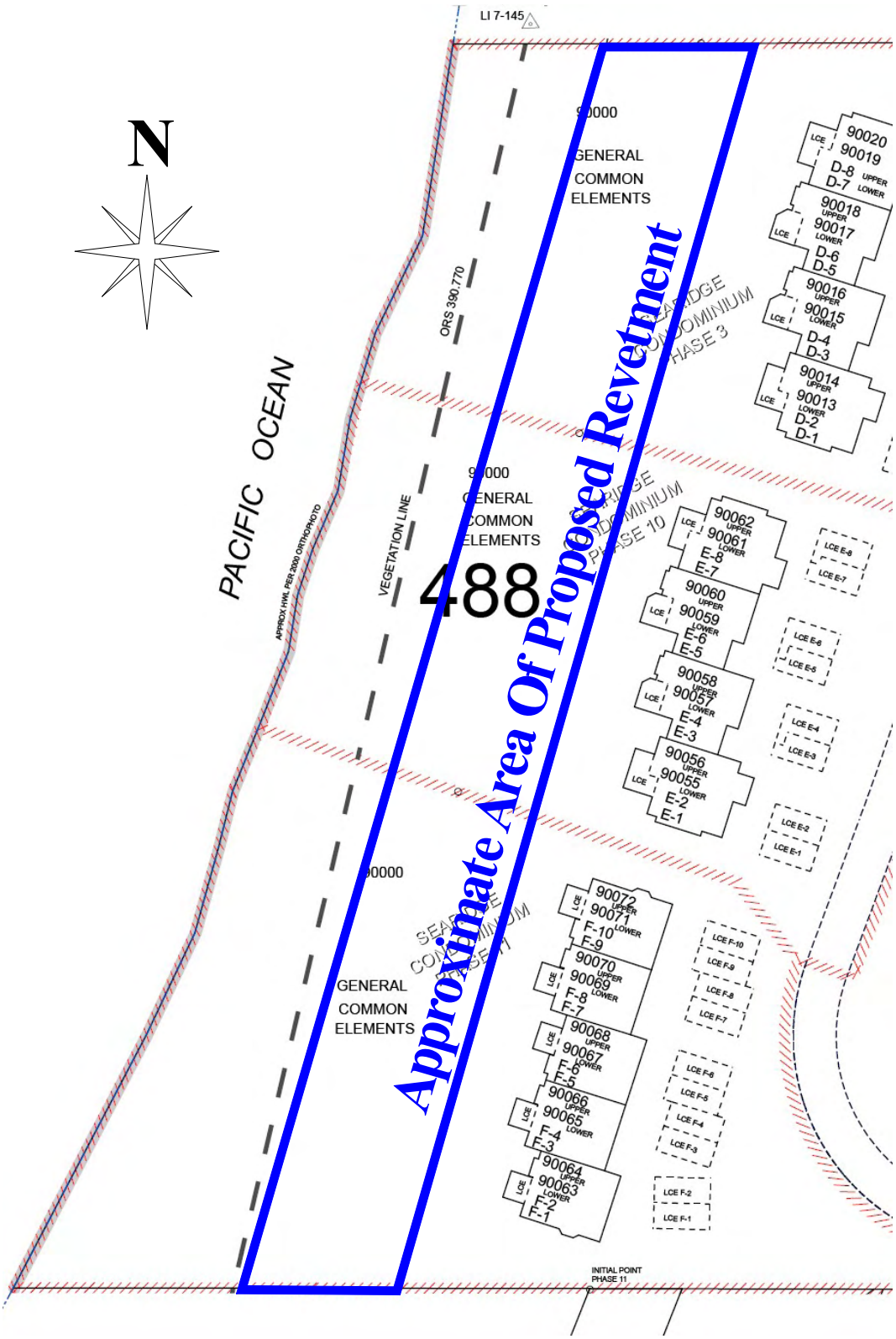


Date: 07/19/2023	**Project #Y214577**	Prepared by: MGB
Scale: 1" = 2,000'		Approved by: AML

Location Map
Tax Lot 90000, Map 8-11-28BA, Supp. Map No. 1
Lincoln County, Oregon

H.G. Schlicker & Associates, Inc.

Figure 1



Plat Map

Tax Lot 90000, Map 08-11-28BA, Supp. Map No. 1
Lincoln County, Oregon

From the Lincoln County assessor's plat T8S, R11W, Sec. 21.
All locations and dimensions are approximate.

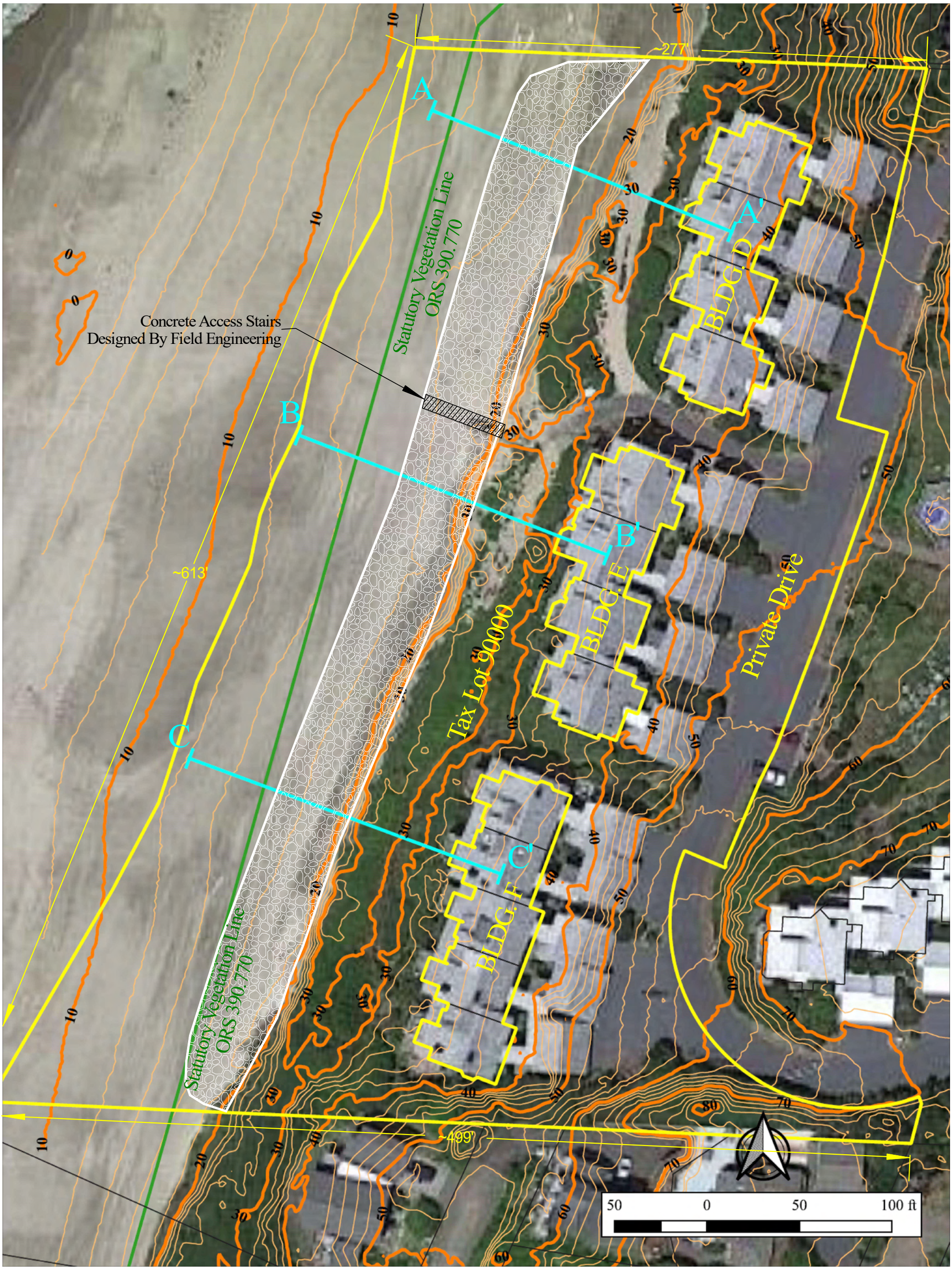
Date: 07/19/2023
Scale: 1" = 75'

Project #Y214577

Prepared by: MGB
Approved by: AML

H.G. Schlicker & Associates, Inc.

Figure 2



A A' = Approximate trend of profile line

Imagery provided Google (7/24/2019).
Topographic data derived from 2016 West Coast El Nino lidar provided by NOAA.
All locations and dimensions are approximate.

Site Topographic Map With Profile Locations And Location Of Proposed Revetment Shown

Tax Lot 90000, Map 8-11-28BA, Supp. Map No. 1
Lincoln County, Oregon

Date: 07/19/2023
Scale: 1" = 50'

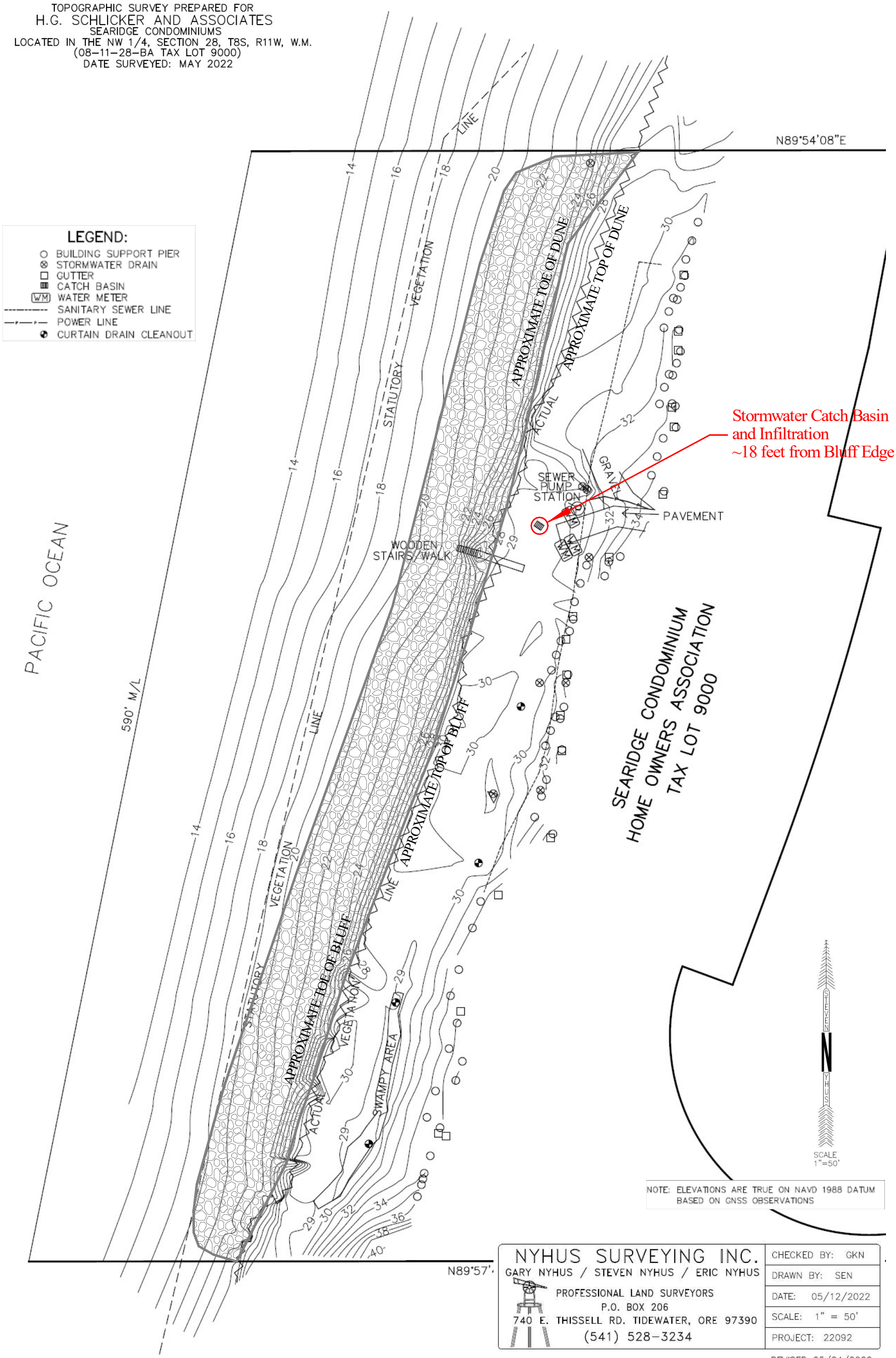
Project #Y214577

Prepared by: AML
Approved by: AML

H.G. Schlicker & Associates, Inc.

Figure 3

TOPOGRAPHIC SURVEY PREPARED FOR
H.G. SCHLICKER AND ASSOCIATES
SEARIDGE CONDOMINIUMS
LOCATED IN THE NW 1/4, SECTION 28, T8S, R11W, W.M.
(08-11-28-BA TAX LOT 9000)
DATE SURVEYED: MAY 2022



NYHUS SURVEYING INC.
GARY NYHUS / STEVEN NYHUS / ERIC NYHUS
PROFESSIONAL LAND SURVEYORS
P.O. BOX 206
740 E. THISSELL RD. TIDEWATER, ORE 97390
(541) 528-3234

CHECKED BY:	GKN
DRAWN BY:	SEN
DATE:	05/12/2022
SCALE:	1" = 50'
PROJECT:	22092

REVISED 05/24/2022

Site Topographic Survey With Revetment Shown
Tax Lot 90000, Map 8-11-28BA, Supp. Map No. 1
Lincoln County, Oregon

Modified from survey provided by Nyhus Surveying Inc.
All locations and dimensions are approximate.

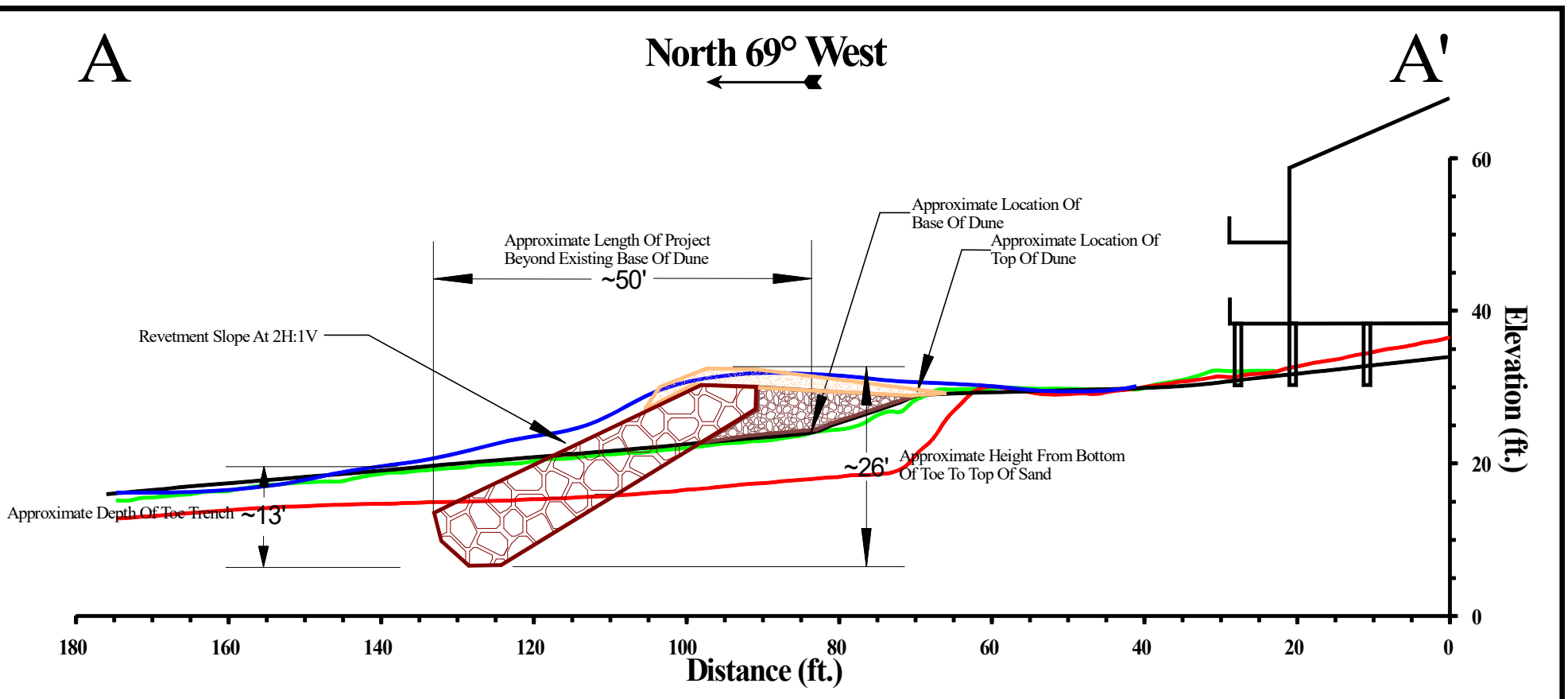
Date: 07/19/2023
Scale: 1" = 50'

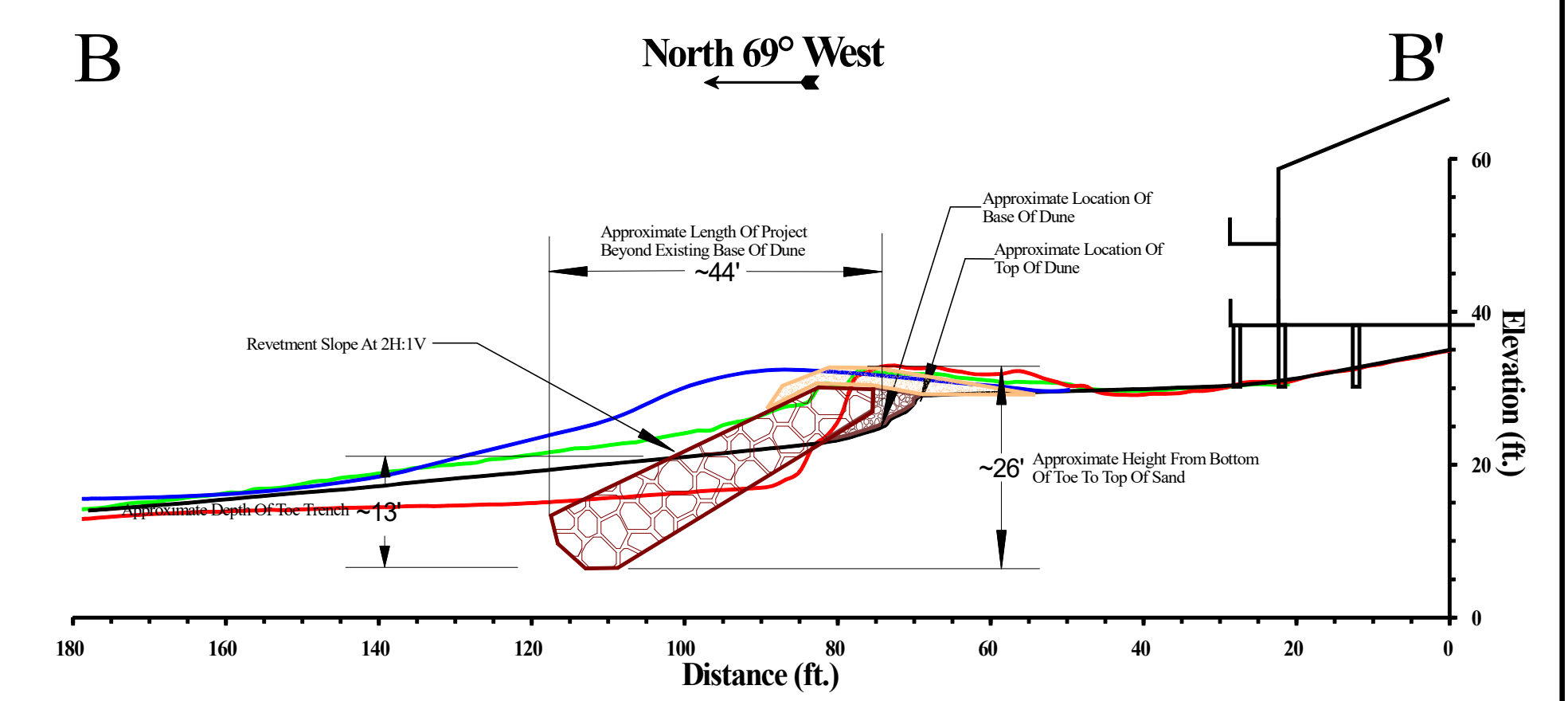
Project #Y214577

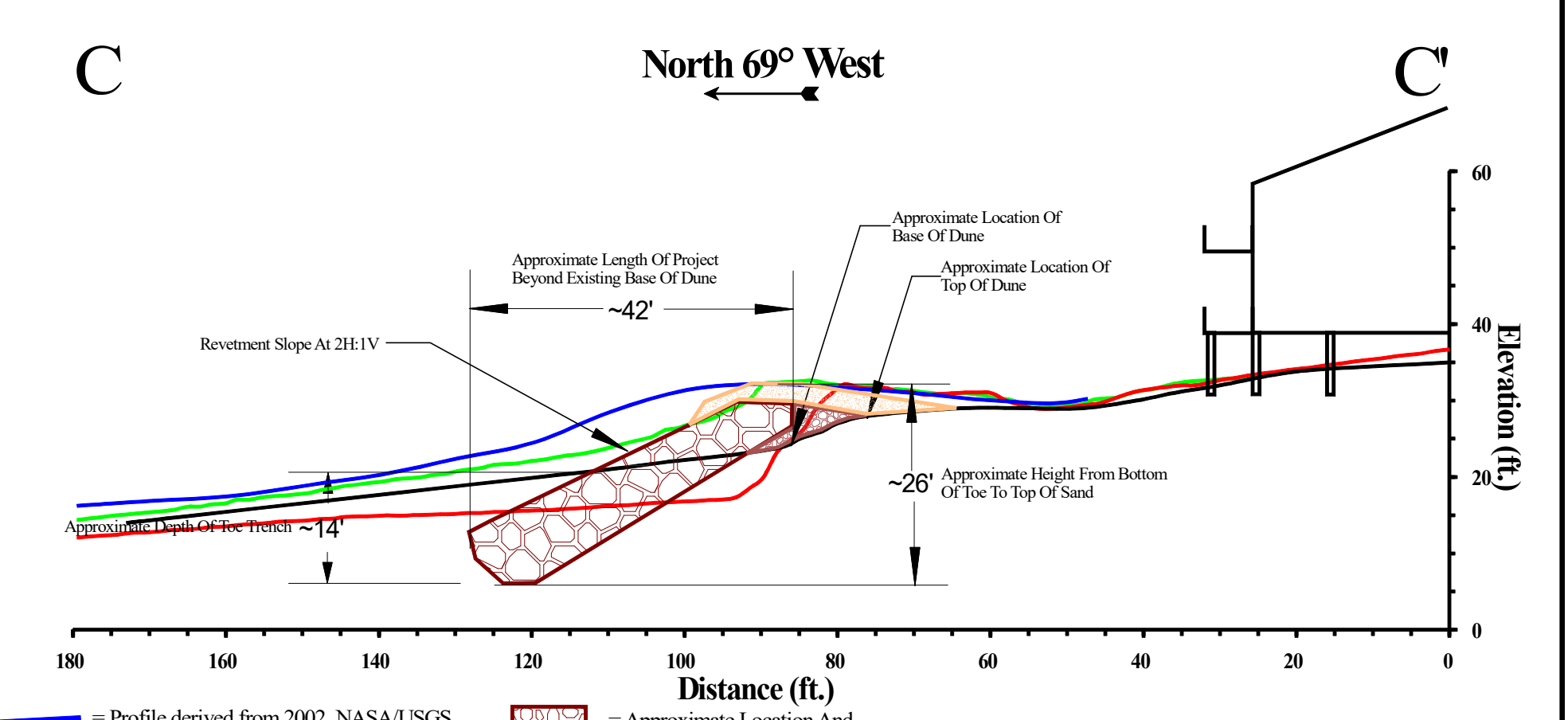
Prepared by: AML
Approved by: AML

H.G. Schlicker & Associates, Inc.

Figure 4







= Profile derived from 2002_NASA/USGS Lidar provided by NOAA.

= Profile derived from 2009_OLC_North_Coast Lidar provided by DOGAMI.

= Profile derived from West Coast 2016 El Nino Lidar provided by NOAA

= Profile derived from 2022 Topographic Survey by Nyhus Surveying.

= Approximate Location And Profile Of Proposed Revetment

= Approximate Location Of Pit Run Fill

= Approximate Location Of Beach Sand Covering

All dimensions, elevations and locations are approximate.

Date: 07/19/2023	**Project #Y214577**	Prepared by: AML
Scale: 1" = 20'		Approved by: AML

Slope Profiles A-A', B-B', and C-C'
Tax Lot 90000, Map 8-11-28BA, Supp. Map No. 1
Lincoln County, Oregon

H.G. Schlicker & Associates, Inc.

Figure 5

1. Base of the riprap should be embedded at approximately 6 feet elevation (NAVD 88) maximum. The final revetment embedment depth should be as deep as "flowing/heaving" sand conditions at low tide allow.
2. If the minimum embedment cannot be achieved due to heaving or flowing sands at low tide, then the contractor should contact HGSA.
3. Top of the riprap armor stone should be at appoximately 30 feet elevation (NAVD 88) minimum.
4. Riprap Armor should consist of hard, durable, fresh, angular basaltic rock, interlocked with a minimum of three points of contact. Larger stones should be placed at the base, and smaller stones toward the top. The largest stones should be placed at the toe of the revetment.
5. Non-woven filter fabric (Mirafi 1100N or equivalent) should be placed between the quarry run bedding and the native soils.
6. Riprap slopes should be 2 horizontal to 1 vertical (2H:1V).
7. Following construction, the revetment should be covered with a minimum of 2 feet of sand and planted with European Beachgrass above approximately 28 feet elevation or as directed by HGSA.
8. Quarry-Run Fill (as necessary) should consist of well-graded ~4 inch minus, placed and equipment compacted in 12 inch lifts.
9. Following construction, the revetment should be covered with a minimum of 2 feet of sand to match existing berm grades and planted with beach grass or other approved vegetation for stabilization.
10. See Section 9.0 of this report for additional design considerations and specifications.

GRADATIONS
Armor Stone

Stone Size (ft)*	Stone Weight (tons)	% Smaller Than Or Equal To
7+	10 to 14	100
5	6 to 10	80
4	3 to 5	50
3	.5 to 2	10

* Long Dimension < 2.5× Short Dimension

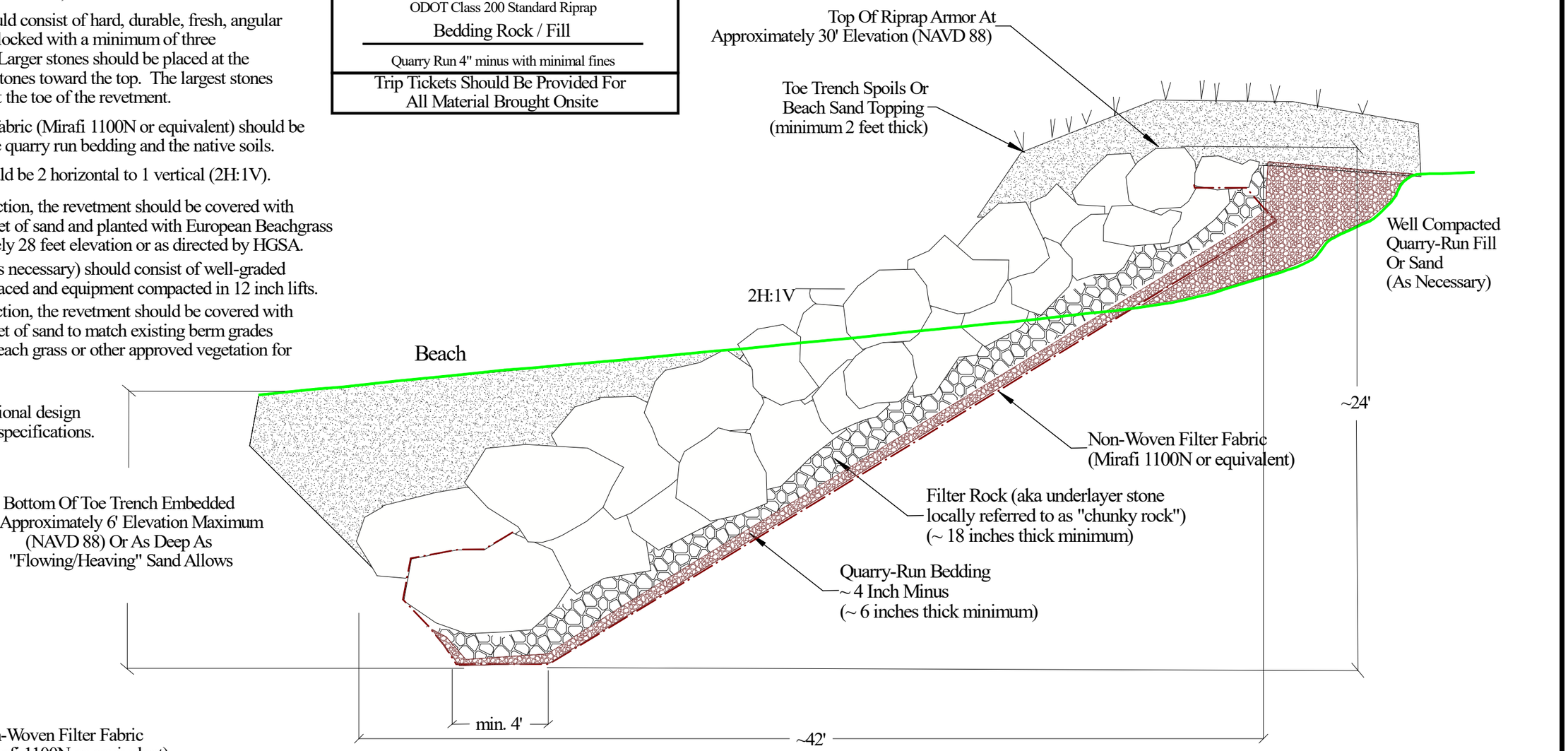
Filter Rock (Underlayer Stone)

ODOT Class 200 Standard Riprap

Bedding Rock / Fill

Quarry Run 4" minus with minimal fines

Trip Tickets Should Be Provided For All Material Brought Onsite



= Non-Woven Filter Fabric (Mirafi 1100N or equivalent)

= Ground Profile Derived From May 2022 Topographic Suvey Completed By Nyhus Suveying, Inc.

As built dimensions may vary depending on site conditions actually encountered.

Date: 07/19/2023 Scale: 1" : 5'	**Project #Y214577**	Prepared by: AML Approved by: AML

Typical Revetment Detail
Tax Lot 90000, Map 8-11-28BA, Supp. Map No. 1
Lincoln County, Oregon

H.G. Schlicker & Associates, Inc.

Figure 6

Appendix A
- Site Photographs -

Photo 1 – Easterly view of the central portion of the site (From 03/17/2023).

Photo 2 – Southerly view of the southern portion of the site (From 03/17/2023).

Photo 3 – Easterly view of the bluff at the southern portion of the site and neighboring house (From 03/17/2023).

Photo 4 – Easterly view of the dune at the northern portion of the site (From 03/17/2023).

Photo 5 – Southerly view of the bluff slope from near the center of the site (From 5/03/2022).

Photo 6 – Northerly view of the bluff slope from near the center of the site (From 5/03/2022).

Photo 7 – Northeasterly view of the bluff slope (From 04/25/2022).

Photo 8 – Close-up view of pump station #6 located near the bluff edge at the site (From 04/25/2022).

Photo 9 – View of the foundation and deck supports typical of the oceanfront buildings at the site (From 04/25/2022).

Photo 10 – Southerly view of the northern area east of the bluff edge. Note the stakes with green paint that indicate the surveyed location of a sewer pipe (From 04/25/2022).

Photo 11 – Northerly view of the northern portion of the bluff slope (From 02/24/2022).


Photo 12 – Southerly view of the southern portion of the bluff slope (From 02/24/2022).

Photo 13 – View of the test pit excavations (From 02/24/2022)

Photo 14 – View of a test pit being excavated; note the water in the bottom of the pit (From 02/24/2022).

Photo 15 – Close-up view of the coarse sand and organic-rich silt and peat encountered in some of the test pits (From 02/24/2022).

Photo 16 – View of the organic-rich silty soil spoils encountered in some of the test pits (From 02/24/2022).

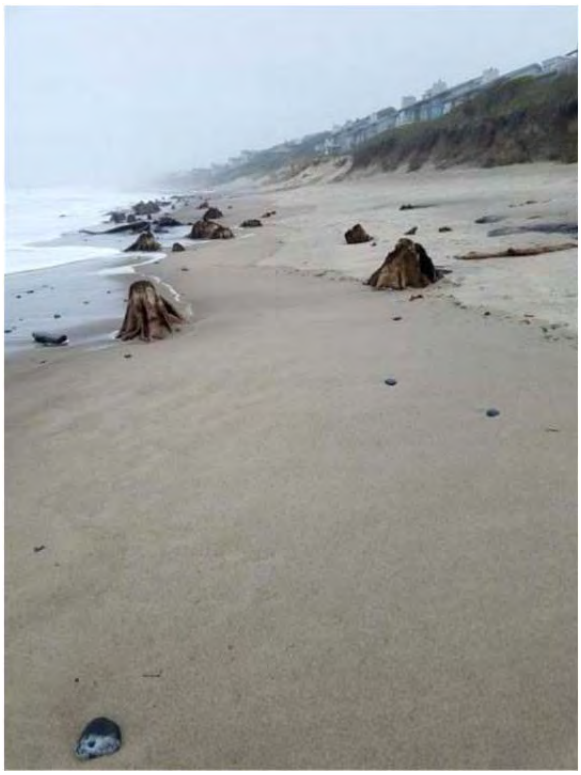


Photo 17 – Northerly view of the beach west bluff slope during low sand levels (From 11/21/2021 by B. Dummer).

Photo 18 – Close-up view of the materials exposed in the bluff on the southern portion of the site (From 11/19/2021 by B. Dummer).

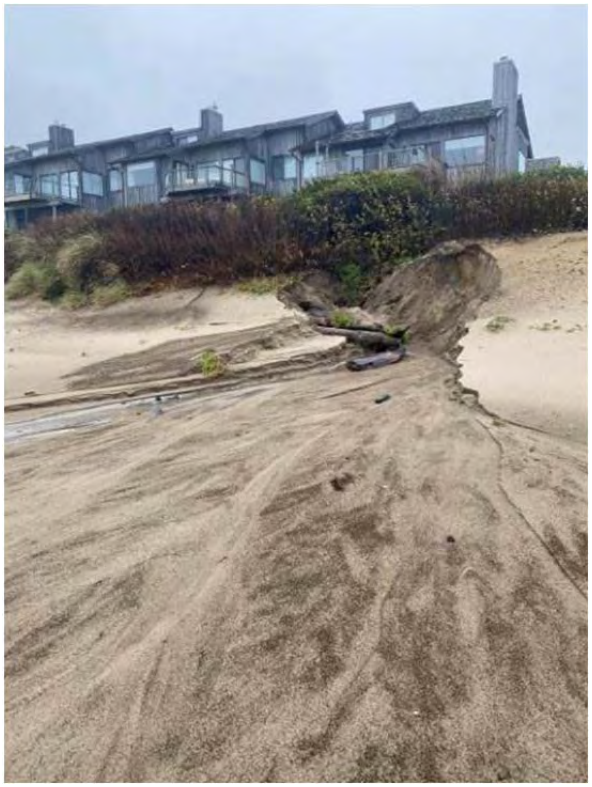


Photo 19 – View of a washout of the bluff slope from stormwater (From 11/15/2021 by B. Dummer)

Photo 20 – View of the bluff slope and the washout location relative to the access stairs (From 11/15/2021 by B. Dummer).

Photo 21 – View of the bottom of the existing staircase during a period of excessive stormwater runoff (From 11/15/2021 by B. Dummer).

Photo 22 – View of a stormwater washout of the bluff/dune slope near the northern property line (From 11/15/2021 by B. Dummer).

Appendix B
- Select Historical Site Photographs -

Photo 1 – View of the beach access stairs and central portion of the site (From 07/15/2020).

Photo 2 – View of a wave cut scarp west of the site (From 07/15/2020).

Photo 3 – View of the oversteepened and sloughing bluff slope (From 08/15/2018)

Photo 4 – View of a portion of the curtain drain exposed after severe erosion of the fronting dune and bluff slope (From 08/15/2018).

Photo 5 – View of a stormwater washout (From 10/02/2017).

Photo 6 – View of the mudstone and marine terrace exposed at the southern portion of the site after a period of severe erosion (From10/02/2017).

Photo 7 – View of the oversteepened bluff slope at the site's southern portion (From 10/02/2017).

Photo 8 – Close-up view of stormwater infrastructure near the bluff slope (Dated 10/02/2017).

Photo 9 – View of the beach west of the bluff slope (From 04/28/2017).

Photo 10 – Close-up view of a stormwater pipe daylighted at the bluff slope (From 02/15/2017).

Photo 11 – View of the oversteepened bluff slope (From 02/15/2017).

Photo 12 – Northerly view of the central portion of the site as waves impact the bluff and erode the base of the bluff slope (From 10/20/2017 by Sennewald/OPRD)

Photo 13 – View of the surf zone near the site (From 8/11/2017 by Sennewald/OPRD).

Photo 14 – View of the stumps and mudstone exposed near the southern portion of the site (From 10/18/2016 by OPRD).

Photo 15 – View of the beach access staircase and oversteepened bluff after a severe erosion episode (From October 2016 by SeaRidge).

Photo 16 – View of the curtain drain exposed at the northern portion of the site (From October 2016 by SeaRidge)

Photo 17 – Northerly view of the bluff slope (From 07/28/2016).

Photo 18 – View of the oversteepened bluff slope after a severe erosion episode (From March 2016 by SeaRidge)

Photo 19 – View of the beach access staircase after being undermined during a severe erosion episode (From 02/03/2003 by SeaRidge)

Photo 20 – View of the beach fronting the site after a severe erosion episode (From 2003 by SeaRidge)

Photo 21 – Composite of 3 photographs showing the construction of the curtain drain (From 2/8/2000 by SeaRidge).

Photo 22 – View of the curtain drain construction (From December 1999 by SeaRidge).

Photo 23 - View of the curtain drain construction (From December 1999 by SeaRidge).

Photo 24 – Composite of 3 photographs showing the construction of the curtain drain (From 12/30/1999 by SeaRidge).

Photo 25 – Composite of 2 photographs of the bluff slope at the site (From 09/03/1999).

Photo 26 – Composite of 2 photographs of the bluff/dune slope fronting the site and adjacent properties (From 07/21/1999). The upper photo shows the southern portion of the site, and the lower photo shows the northernmost portion of the site and the vacant lot to the north.

Photo 27 – Composite of 2 photographs showing the bluff slope at the site (From 05/27/1998).

Photo 28 – View of the erosion at the bluff slope (From March 1998 by SeaRidge).

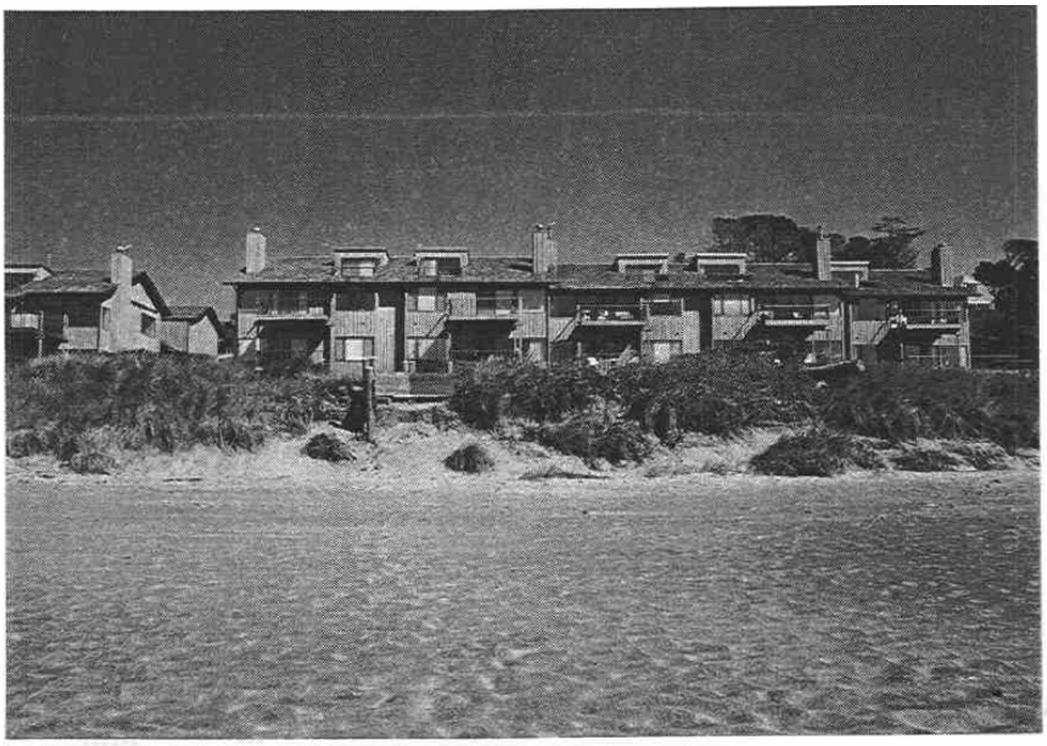


Figure 4-8. Sea Ridge condominiums, built on an "undeveloped" parcel in 1984 at Lincoln Beach; owners may place emergency riprap if erosion of the foredune exceeds a predetermined line.

Photo 29 – From OSU-Good Thesis (1992)

Photo 30 – View of the oceanfront buildings under construction (By SeaRidge).

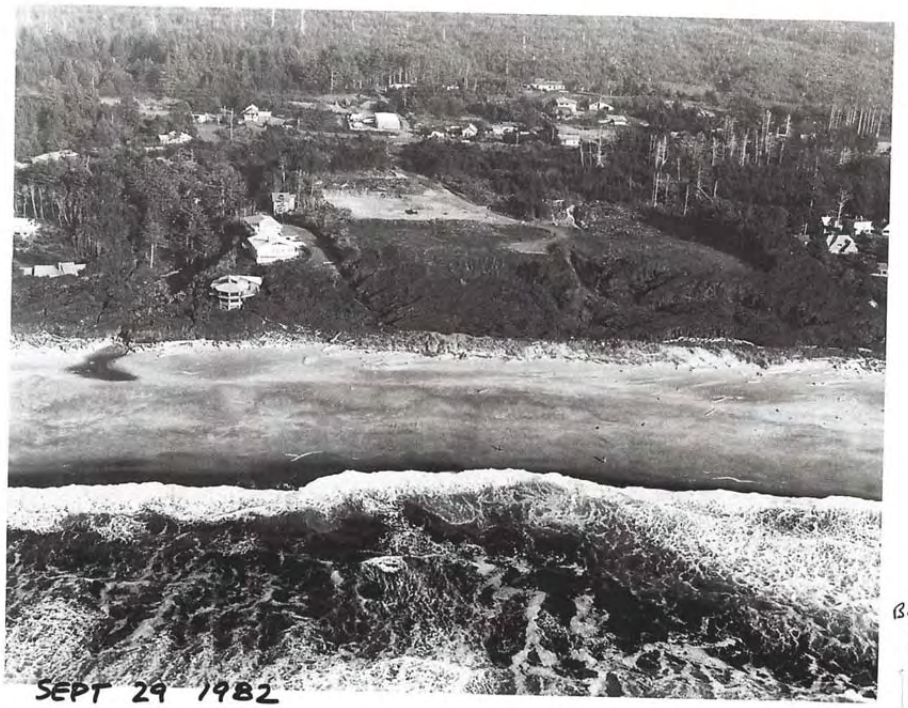


Photo 31 -Aerial photo of the SeaRidge site from 9/29/1982 after the previous developer initially cleared the vegetation on the eastern portion of the property. Note the existing house north of the site and the foredune fronting the site.

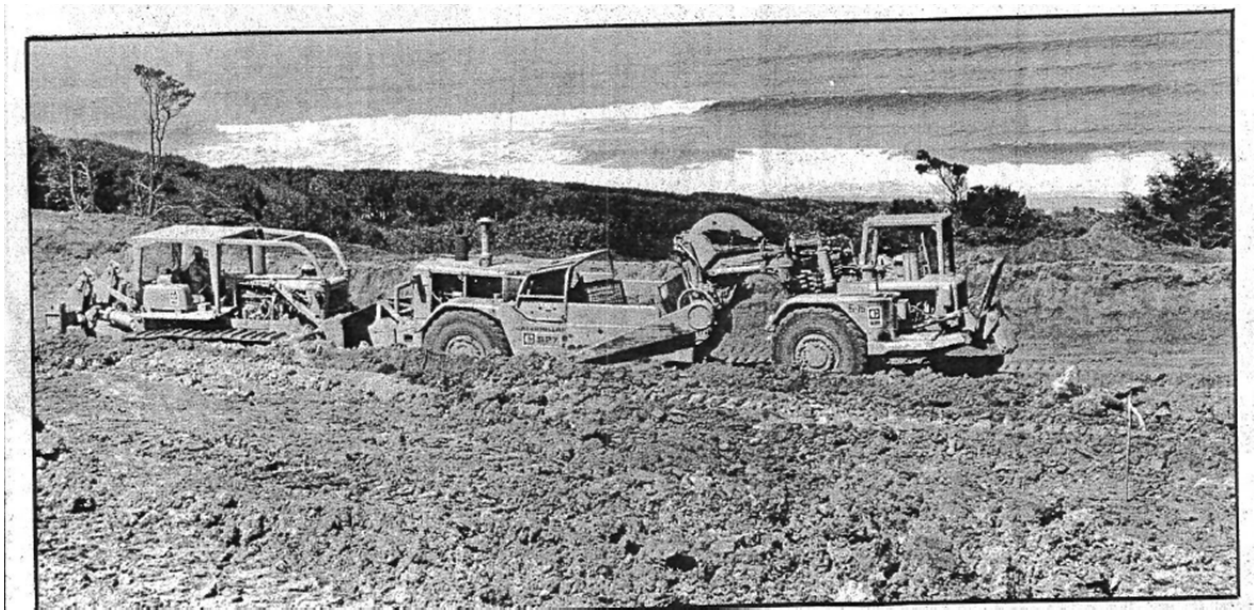


Photo 32 – During early construction of the development in the mid-1980s (From The News Guard-Lincoln City 07/03/1984).

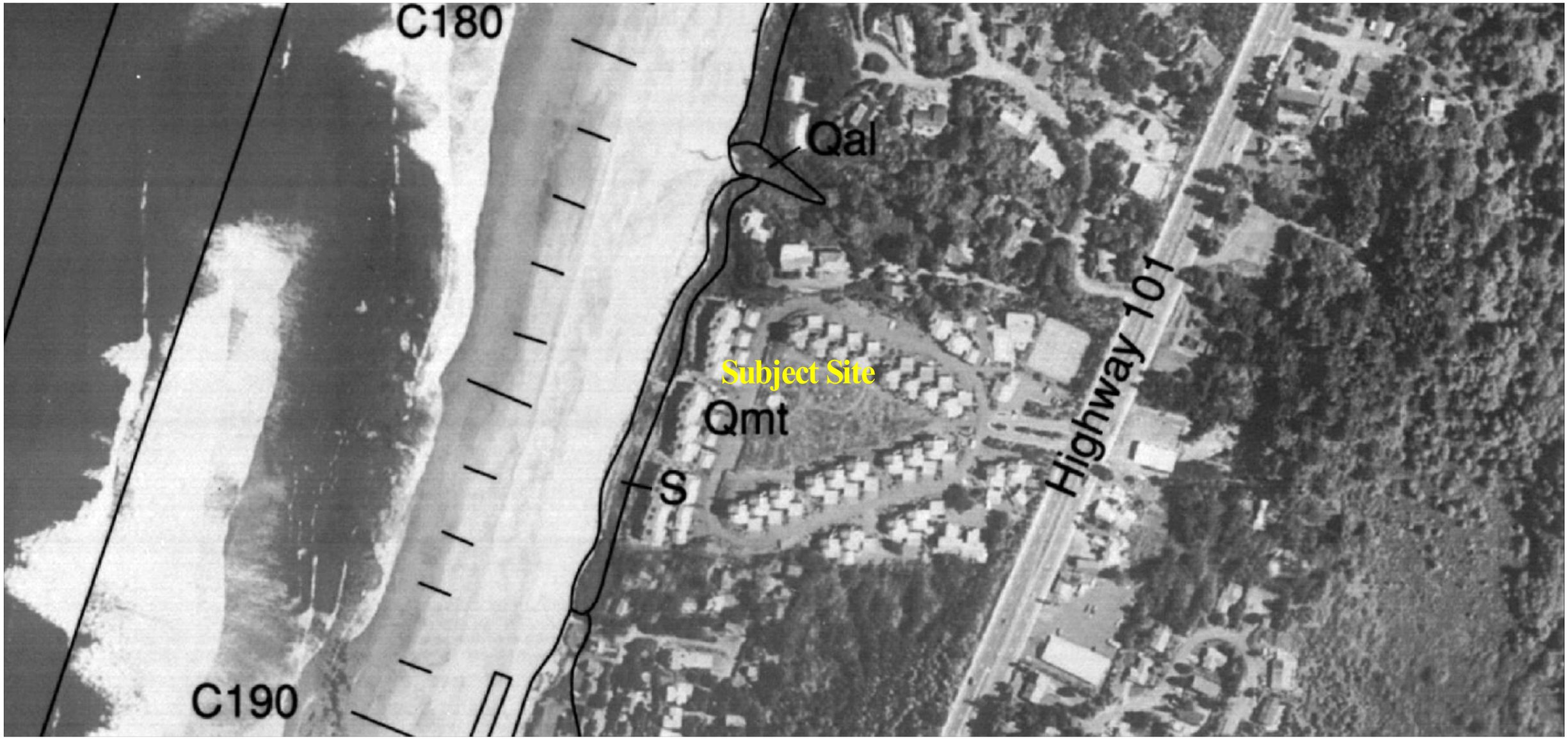
Photo 83. Well-developed foredune south of Gleneden provides protection for interior forested dunes and should not be disturbed. Note logs left by high tides and storm waves.

Photo 33 – Typical dunes in the area of the site during the early 1970s (From Schlicker et al., 1973 DOGAMI Bulletin 81)

Appendix C
- Select Historical Aerial Imagery -

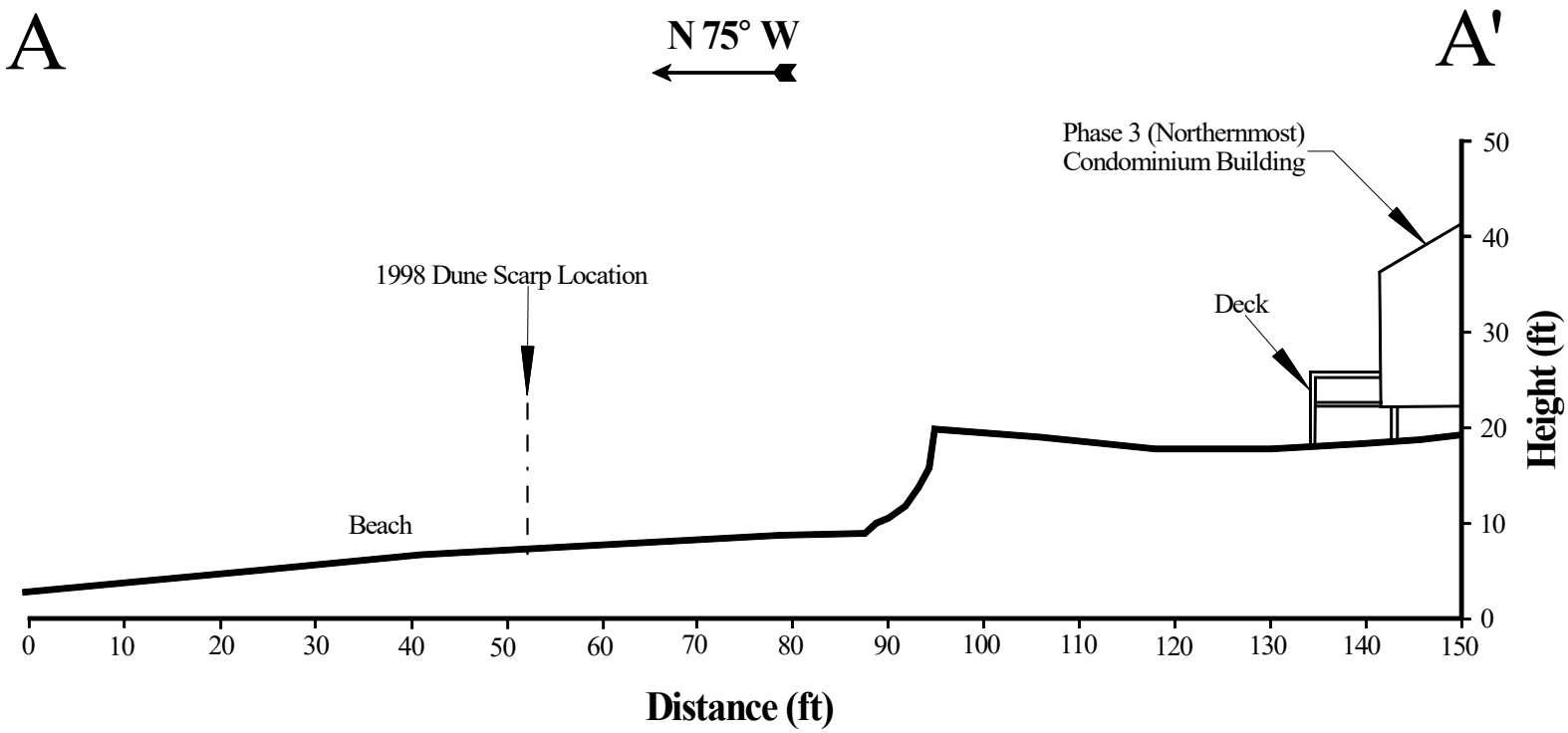
HGSA #Y214577 Appendix C -Figure 1

Modified From 1977 USGS: 13-032 NASA JSC 366 AUG 77



HGSA #Y214577 Appendix C - Figure 2
Modified From DOGAMI 1994 OFR O-94-18

Appendix D
- Select Historical Slope Profiles -



Date: 11/17/2016	**Project #Y163945**	Prepared by: CJH
Scale: 1" = 20'		Approved by: JDG

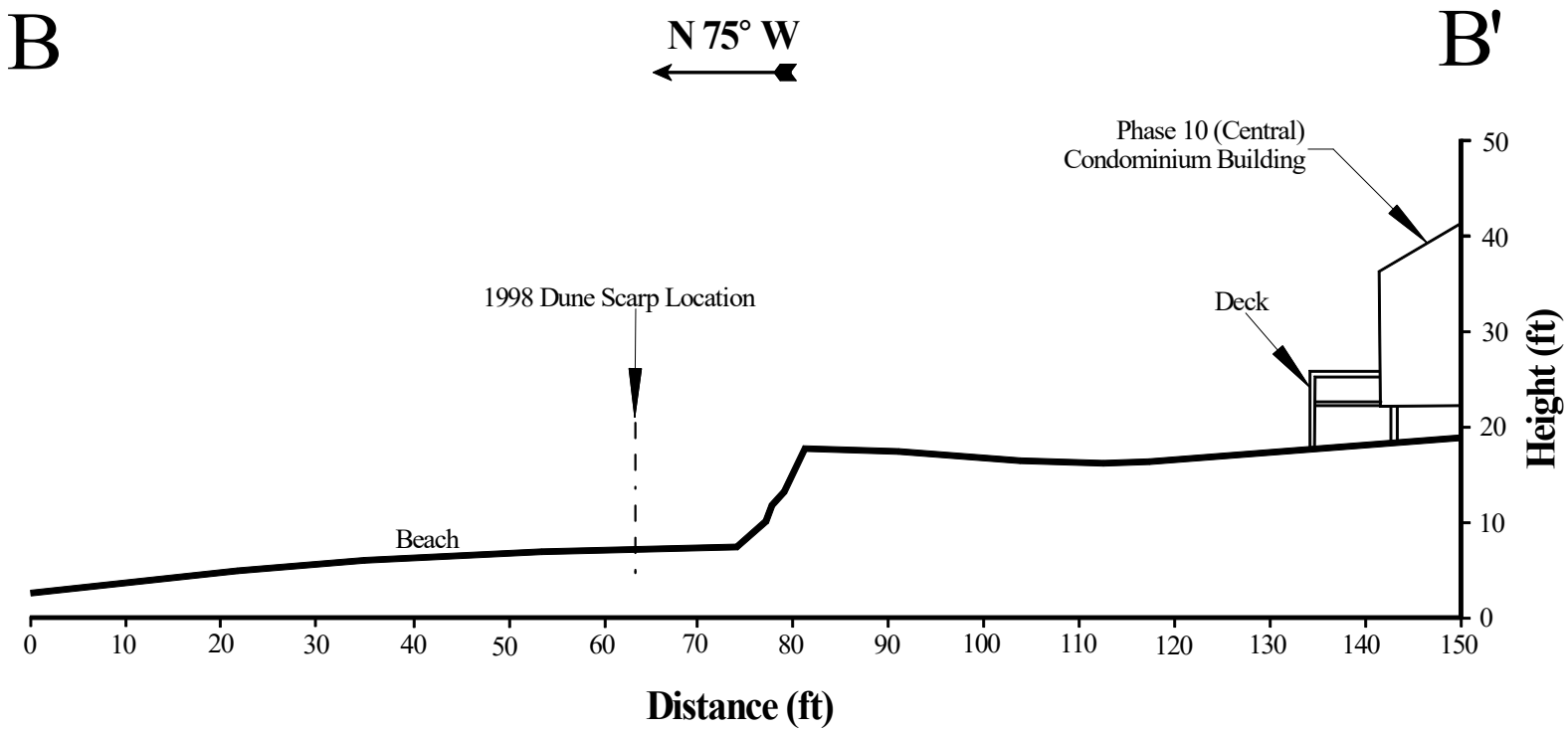
Slope Profile A-A'

Searidge Condominiums Phase 3, 10, and 11, Map 8-11-28BA Supp. Map No. 1
Lincoln County, Oregon

H.G. Schlicker & Associates, Inc.

Figure 3

All locations and dimensions are approximate.



Date: 11/17/2016	**Project #Y163945**	Prepared by: CJH
Scale: 1" = 20'		Approved by: JDG

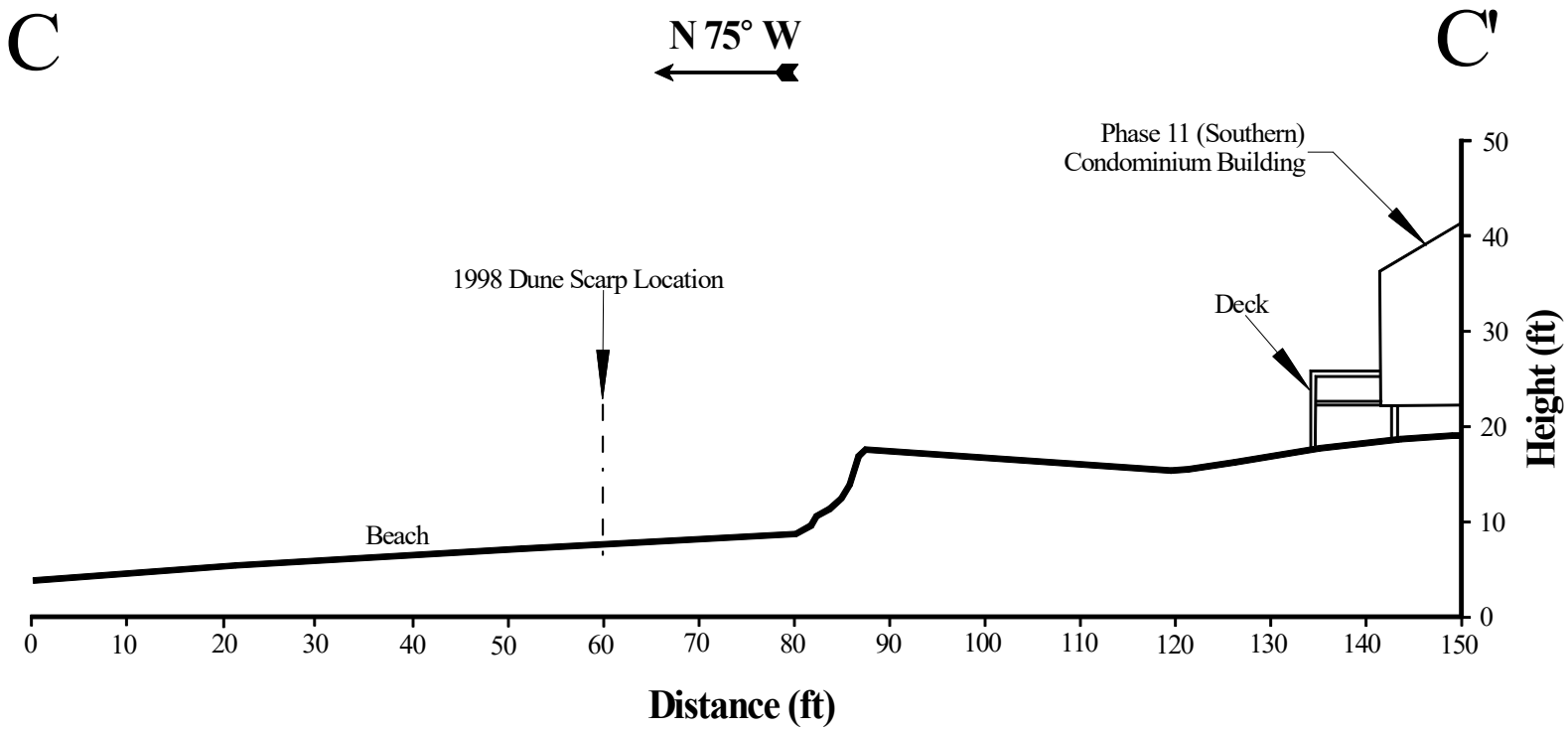
Slope Profile B-B'

Searidge Condominiums Phase 3, 10, and 11, Map 8-11-28BA Supp. Map No. 1
Lincoln County, Oregon

H.G. Schlicker & Associates, Inc.

Figure 4

All locations and dimensions are approximate.



Date: 11/17/2016	**Project #Y163945**	Prepared by: CJH
Scale: 1" = 20'		Approved by: JDG

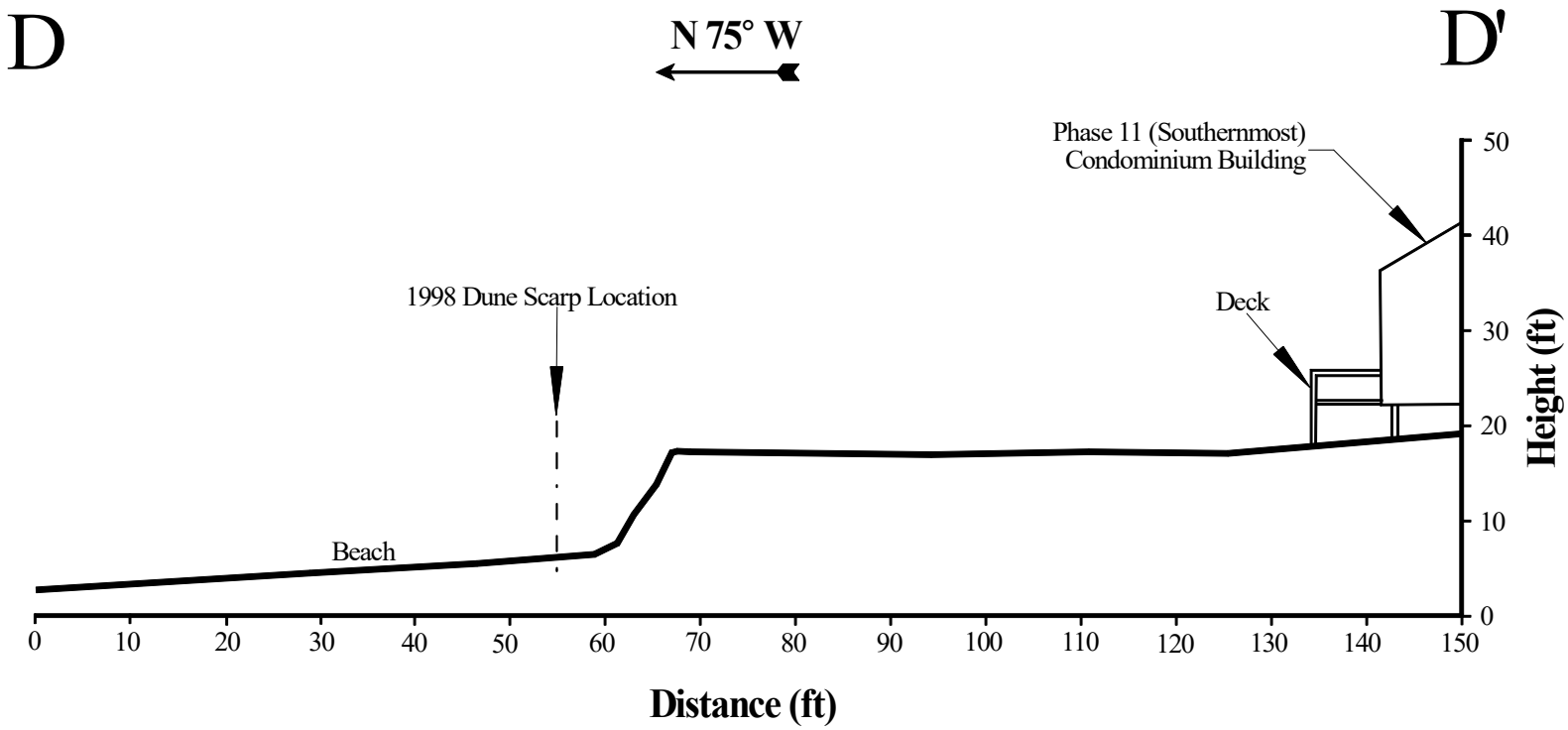
Slope Profile C-C'

Searidge Condominiums Phase 3, 10, and 11, Map 8-11-28BA Supp. Map No. 1
Lincoln County, Oregon

H.G. Schlicker & Associates, Inc.

Figure 5

All locations and dimensions are approximate.



Date: 11/17/2016	**Project #Y163945**	Prepared by: CJH
Scale: 1" = 20'		Approved by: JDG

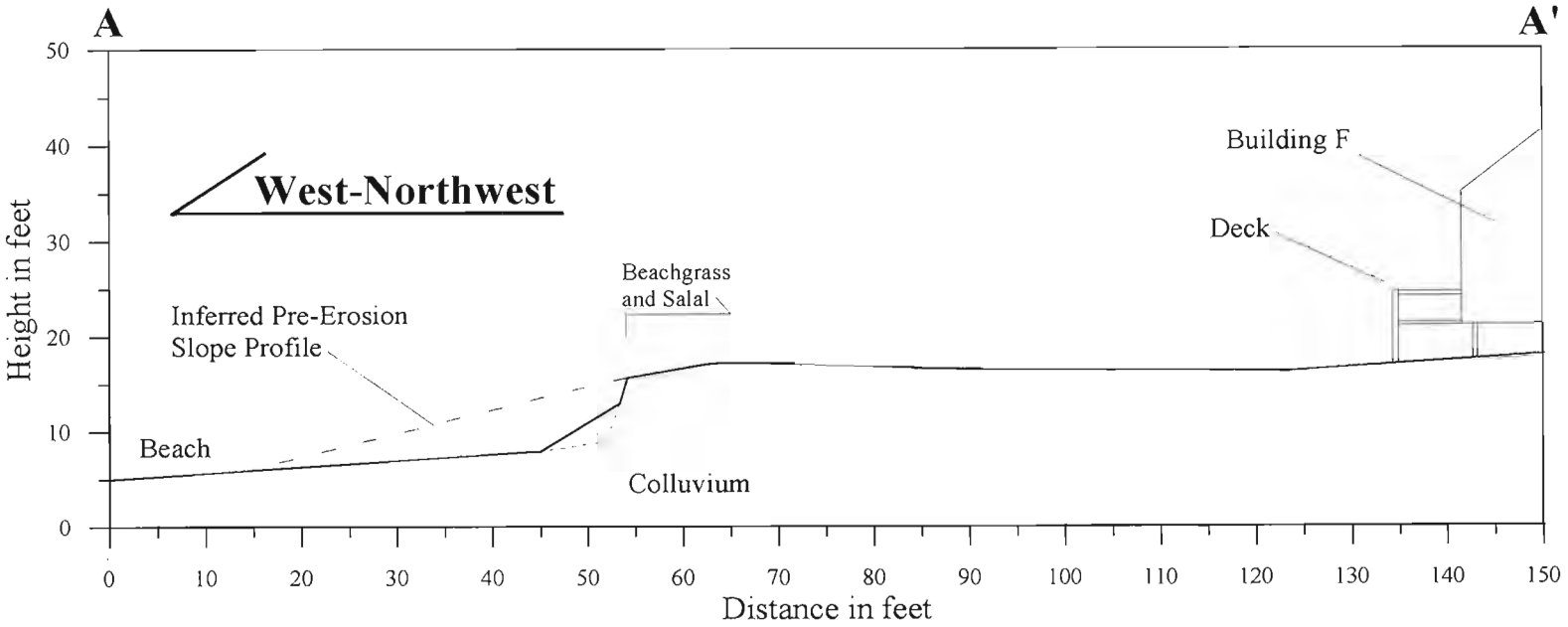
Slope Profile D-D'

Searidge Condominiums Phase 3, 10, and 11, Map 8-11-28BA Supp. Map No. 1
Lincoln County, Oregon

H.G. Schlicker & Associates, Inc.

Figure 6

All locations and dimensions are approximate.



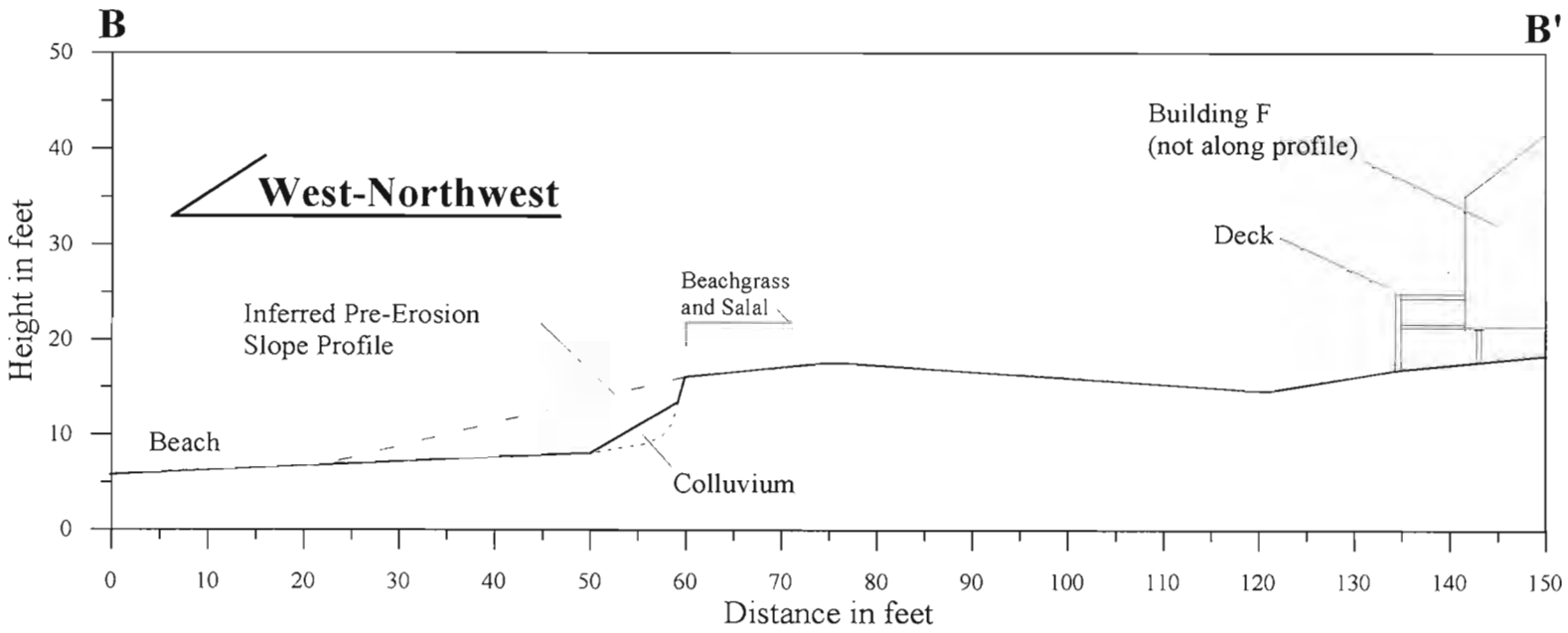
Date: 06/15/1998 Scale: 1" = 20'	**Project #981592**	Drawn by: CCH Approved by: JDG

Slope Profile, A-A'
SeaRidge Condominiums
Lincoln Beach, Oregon

All Measurements and Locations are Approximate

H.G. Schlicker & Associates, Inc.

Figure 4



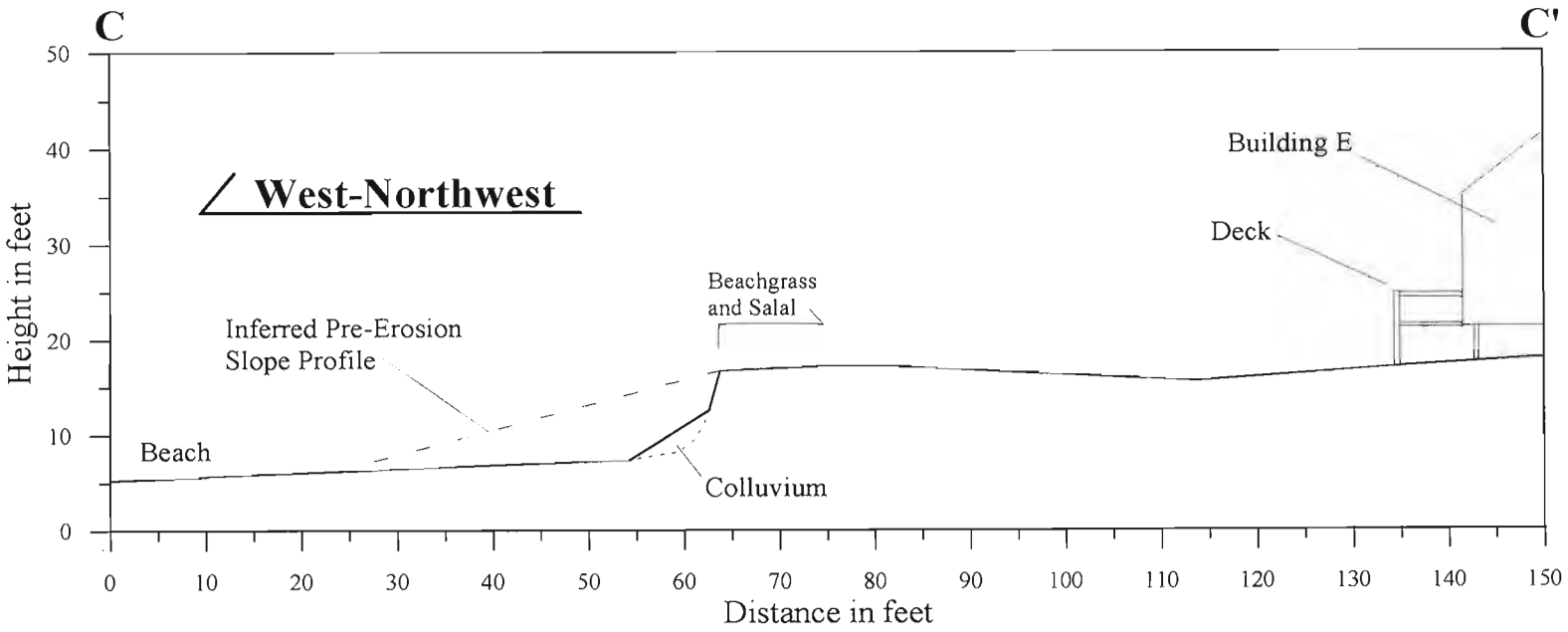
All Measurements and Locations are Approximate

Date: 06/15/1998	**Project #981592**	Drawn by: CCH
Scale: 1" = 20'		Approved by: JDG

Slope Profile, B-B'
SeaRidge Condominiums
Lincoln Beach, Oregon

H.G. Schlicker & Associates, Inc.

Figure 5



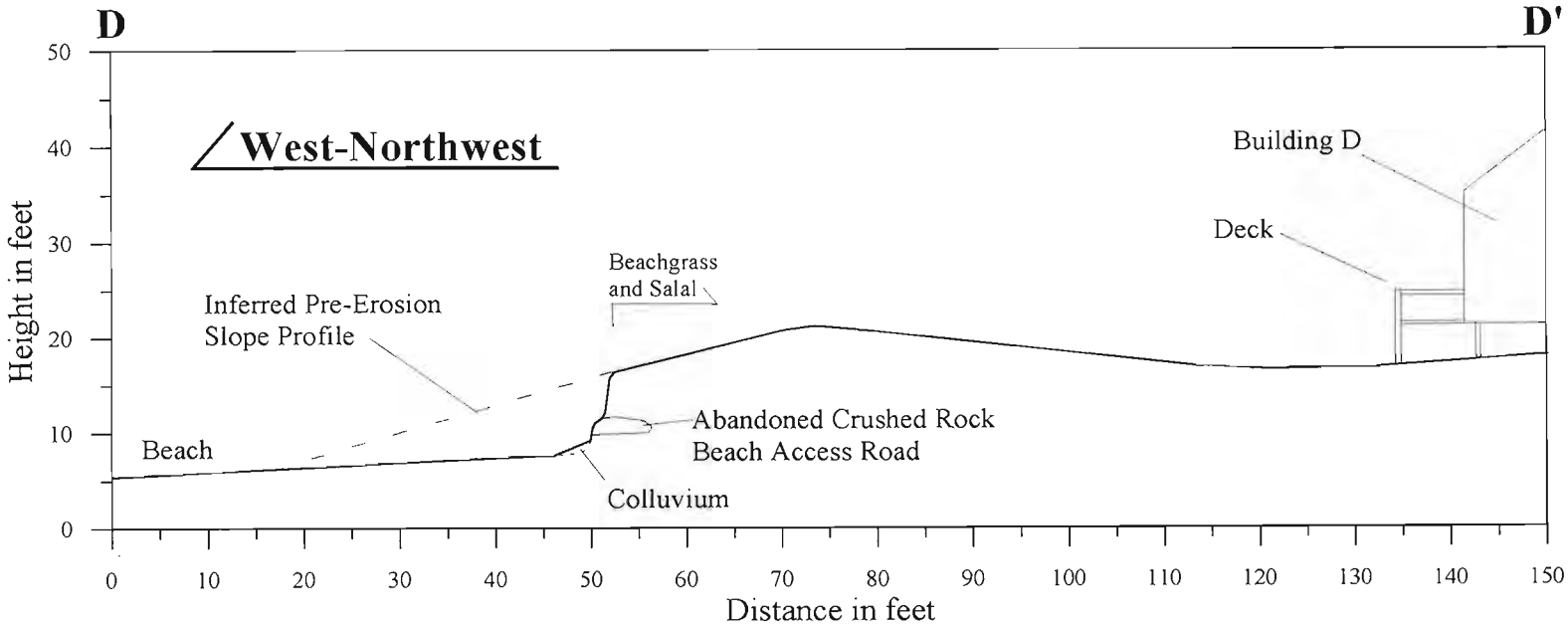
All Measurements and Locations are Approximate

Date: 06/15/1998	**Project #981592**	Drawn by: CCH
Scale: 1" = 20'		Approved by: JDG

Slope Profile, C-C'
SeaRidge Condominiums
Lincoln Beach, Oregon

H.G. Schlicker & Associates, Inc.

Figure 6



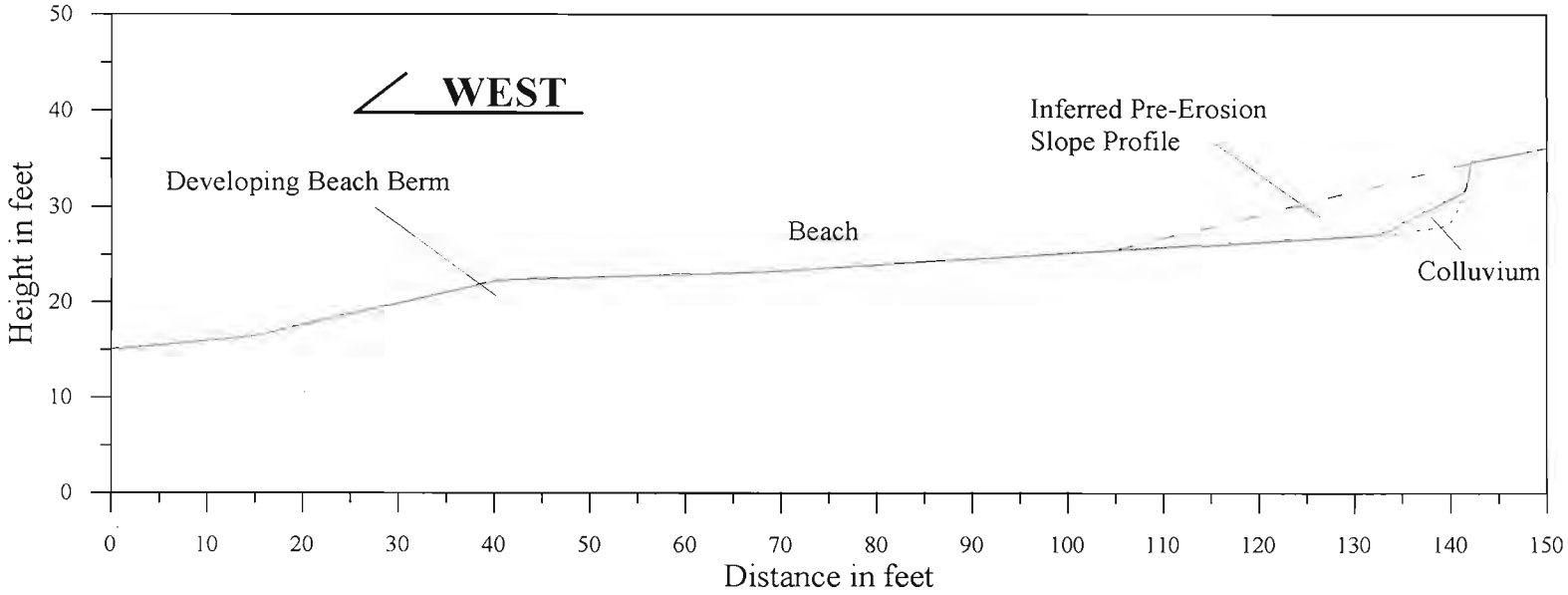
All Measurements and Locations are Approximate

Date: 06/15/1998 Scale: 1" = 20'	**Project #981592**	Drawn by: CCH Approved by: JDG

Slope Profile, D-D'
SeaRidge Condominiums
Lincoln Beach, Oregon

H.G. Schlicker & Associates, Inc.

Figure 7



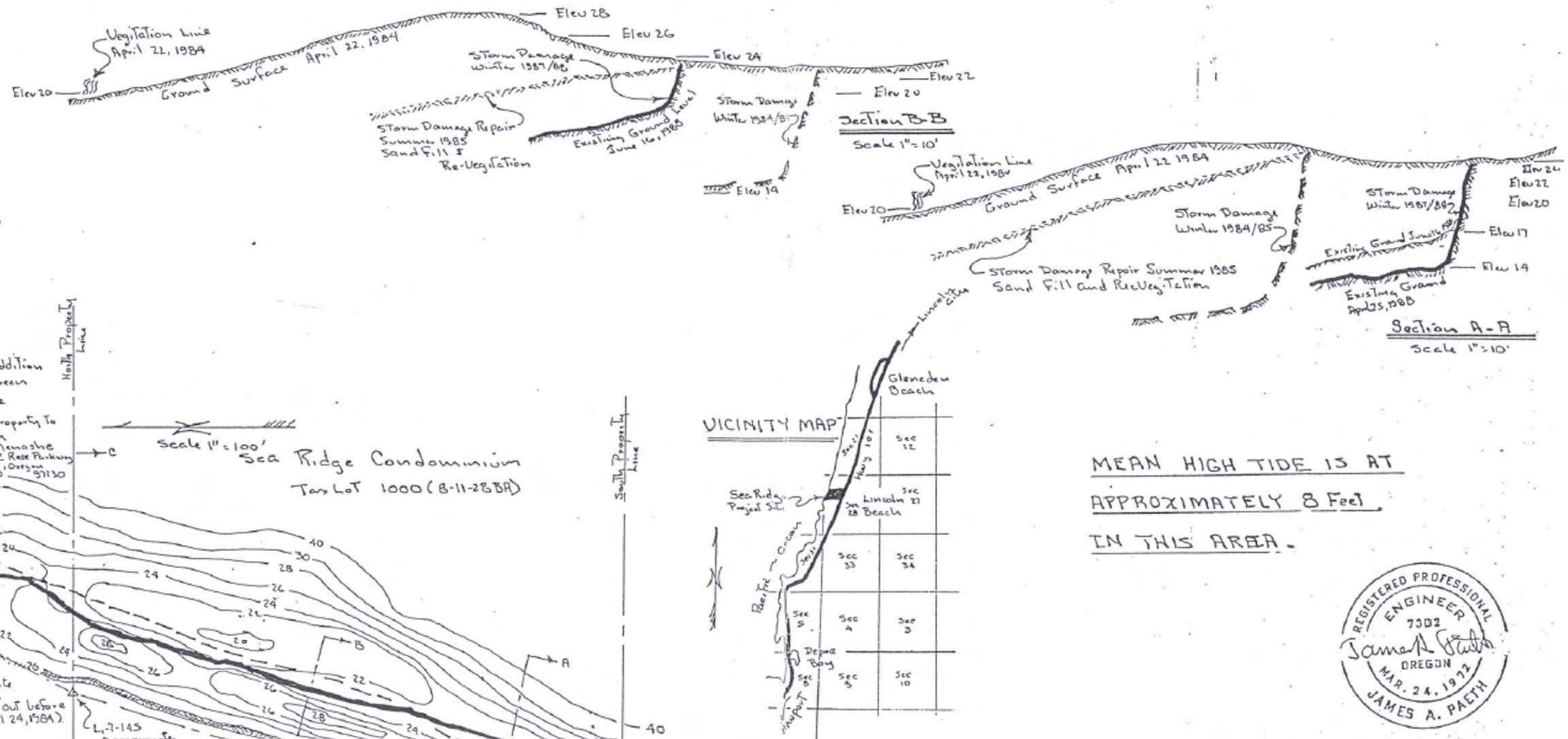
All Measurements and Locations are Approximate

Date: 06/15/1998	**Project #981592**	Drawn by: CCH
Scale: 1" = 20'		Approved by: JDG

Generalized Beach Profile (May 27, 1998)
SeaRidge Condominiums
Lincoln Beach, Oregon

H.G. Schlicker & Associates, Inc.

Figure 8

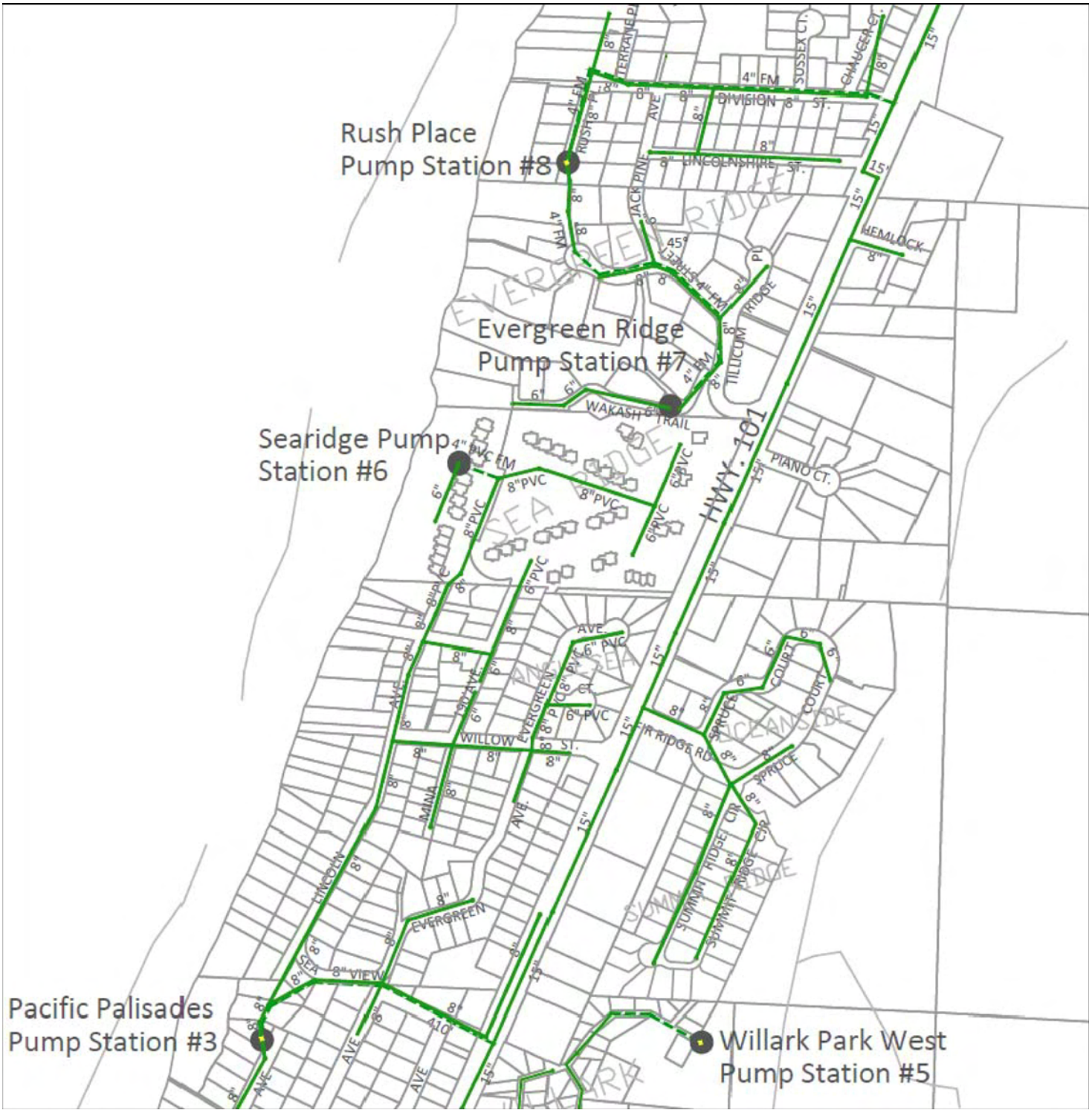


HGSA #Y214577 Appendix D - 1988 Paeth Map

Modified From Sheet 1 of Shoreline Protection NW1/4 Section 28 T8S, R11WWM- Lincoln County, Sea Ridge Condominium Tax Lot 1000 Map 8-11-28BA

Appendix E

- Select Site Infrastructure Documents -



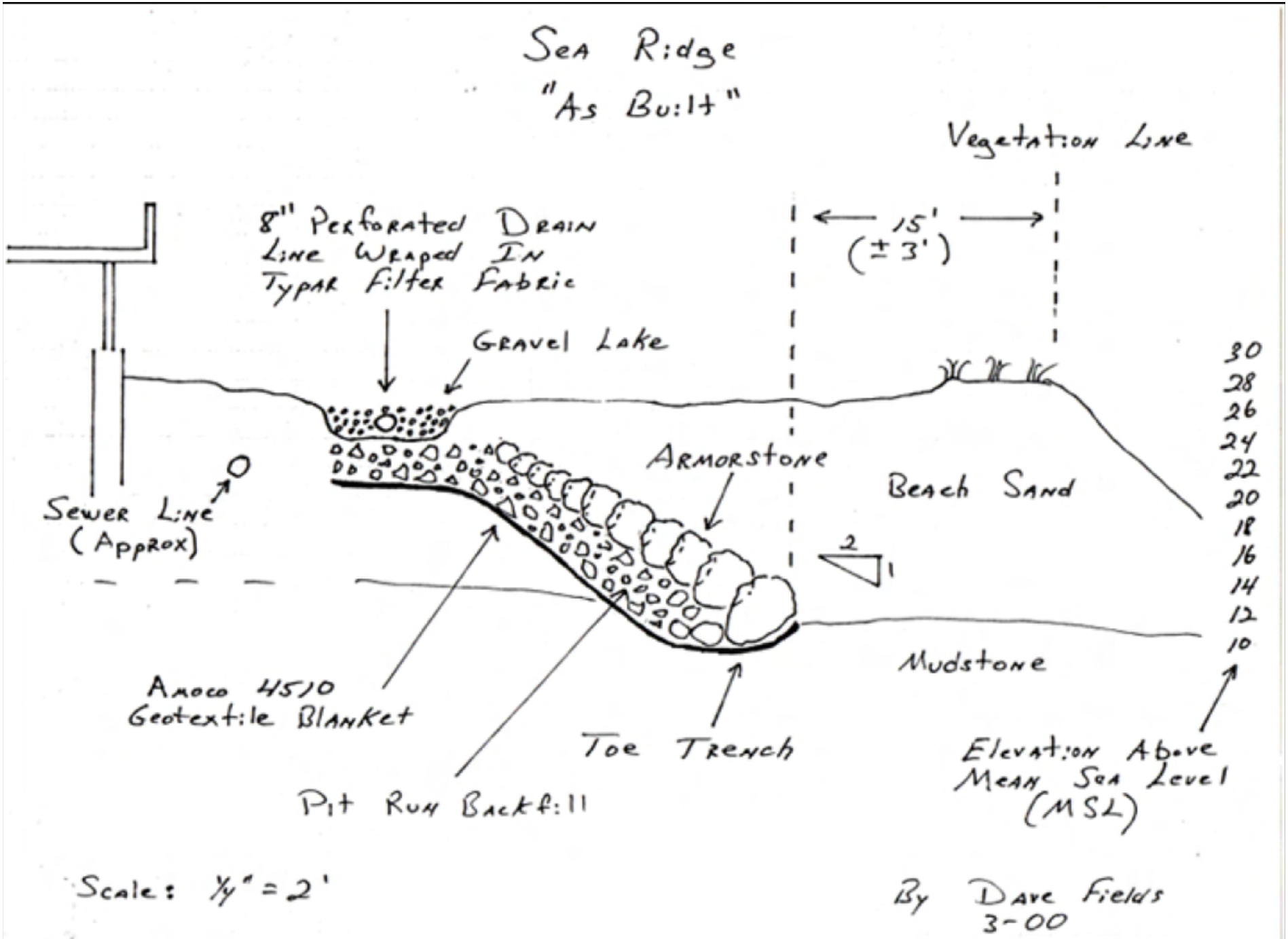
Gleneden Sanitary District
Sewer Collection System Map
April 2013

- Pump Station
- Gravity Sewer
- Forcemain
- Tax Lot

ACE Consultants, Inc.
Beaverton, Oregon (503) 626-2320

HGSA #Y214577 Appendix E-Figure 1

Modified From 2013 KGBLB sewer district pipe map



HGSA #Y214577 Appendix E - Figure 2

Appendix F
- Staircase Design and Calculations by Field Engineering -

SPECIAL NOTE:

CONSTRUCTION OF THESE STAIRS IS TO BE COORDINATED WITH CONSTRUCTION OF THE RIPRAP REVETMENT. SEE GEOTECHNICAL REPORT AND PLAN FOR SPECIFIC SUPPORTING FILL TYPE AND PLACEMENT.

TOPOGRAPHIC SURVEY PREPARED FOR
H.G. SCHLICKER AND ASSOCIATES
SEARIDGE CONDOMINIUMS
LOCATED IN THE NW 1/4, SECTION 28, T8S, R11W, W.M.
(08-11-28-BA TAX LOT 9000)
DATE SURVEYED: MAY 2022

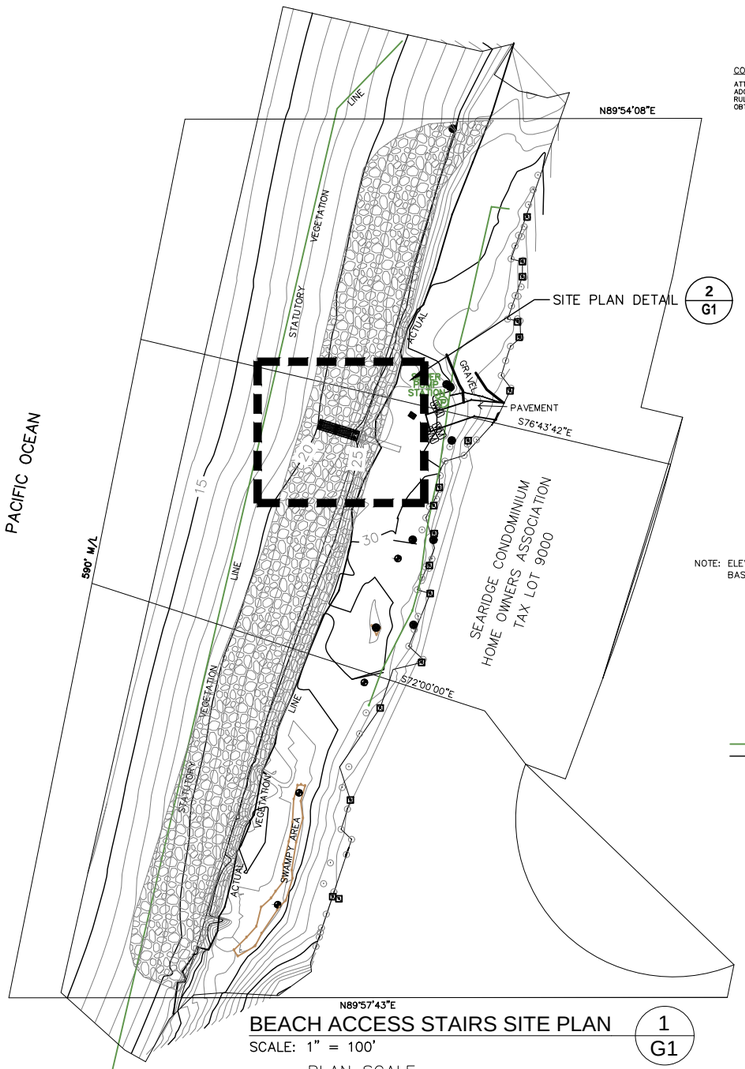
UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
1-800-332-2344
CALL TWO BUSINESS DAYS BEFORE YOU DIG

OR

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG

CONTRACTORS NOTIFICATION REQUIREMENTS LAW

ATTENTION: OREGON LAW REQUIRES YOU TO FOLLOW RULES ADOPTED BY THE OREGON UTILITY NOTIFICATION CENTER. THOSE RULES ARE SET FORTH IN OAR-952-001-0090. YOU MAY OBTAIN COPIES OF THE RULES BY CALLING THE CENTER.



BEACH ACCESS STAIRS SITE PLAN 1/G1
SCALE: 1" = 100'

PLAN SCALE
50' 0 50' 100'

STEVEN N YHUS

SCALE
1"=50'

NOTE: ELEVATIONS ARE TRUE ON NAVD 1988 DATUM BASED ON GNSS OBSERVATIONS

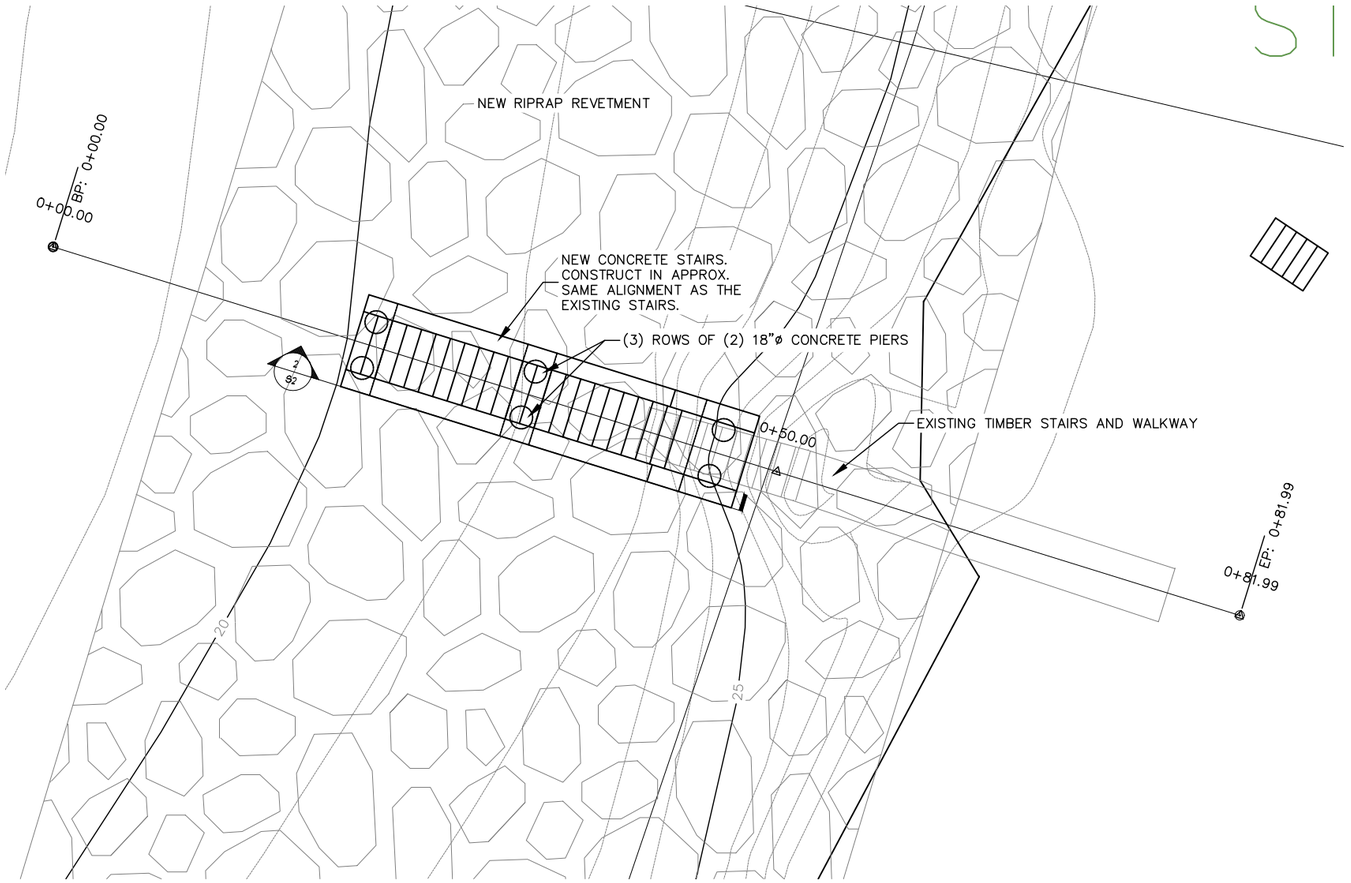
LEGEND:
- BUILDING SUPPORT PIER
- STORMWATER DRAIN
- GUTTER
- CATCH BASIN
- WM WATER METER
- SANITARY SEWER LINE
- POWER LINE
- CURTAIN DRAIN CLEANOUT

PROJECT LOCATION:
SEARIDGE CONDOMINIUMS
4175 US-101
DEPOE BY, OREGON

PROPERTY OWNER:
SEARIDGE HOA

PROJECT ENGINEER:
FIELD ENGINEERING
320 NW 56TH ST.
NEWPORT, OREGON 97365
(541) 265-2896
(541) 961-3596 CELL

INDEX



BEACH ACCESS STAIRS SITE PLAN - DETAIL 2/G1
SCALE: 1" = 10'

PLAN SCALE
5' 0 5' 10'

CORROSION

ALL HARDWARE AND FASTENERS SHALL BE 316 STAINLESS STEEL.

CONCRETE:

1. MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

REINFORCING:

1. GRADE:
   A. DEFORMED BARS ASTM A615, GRADE 60.
   B. WELDED WIRE FABRIC PER ASTM A185.

2. PROVIDE BENT CORNER BARS TO MATCH AND LAP WITH HORIZONTAL BARS AT CORNERS AND INTERSECTIONS.

3. SECURELY TIE ALL BARS IN LOCATION BEFORE PLACING CONCRETE.

4. CLEAR CONCRETE COVERAGE SHALL BE 3" MINIMUM

5. LAP LENGTHS SHALL BE 50db MIN AS FOLLOWS:
   #4'S ----------25'
   #5'S ----------32'
   #6'S ----------38'
   #7'S ----------44'
   #8'S ----------50'

GENERALNOTES:

1. THE CONTRACT STRUCTURAL DRAWINGS AND SPECIFICATIONS REPRESENT THE FINISHED STRUCTURE. THEY DO NOT INDICATE THE METHOD OF CONSTRUCTION, OR EVERY FRAMING OR CONSTRUCTION DETAIL. THE CONTRACTOR SHALL CONSTRUCT THE STRUCTURE USING ESTABLISHED FRAMING/CONSTRUCTION METHODS AND SHALL BE RESPONSIBLE FOR FINAL CONSTRUCTION, FITMENT AND FINISHING. THE CONTRACTOR SHALL PROVIDE ALL MEASURES NECESSARY TO PROTECT THE STRUCTURE AND PUBLIC/WORKER SAFETY DURING CONSTRUCTION - SUCH MEASURES SHALL INCLUDE, BUT NOT BE LIMITED TO, BRACING, SHORING OF THE LOADS DUE TO CONSTRUCTION EQUIPMENT, ETC. OBSERVATION VISITS TO THE SITE BY THE A/E SHALL NOT INCLUDE INSPECTION OF THE ABOVE ITEMS.

2. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF ALL DIMENSIONS WITH ENGINEERING/PROJECT DRAWINGS PRIOR TO START OF CONSTRUCTION. RESOLVE ANY DISCREPANCY WITH A/E.

4. WHERE REFERENCE IS MADE TO VARIOUS TEST STANDARDS FOR MATERIALS, SUCH STANDARDS SHALL BE THE LATEST EDITION AND/OR ADDENDUM.

5. WHERE ANY DISCREPANCIES OCCUR BETWEEN PLANS, DETAILS, GENERAL STRUCTURAL NOTES AND SPECIFICATIONS, THE GREATER REQUIREMENTS SHALL GOVERN.

6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR UTILITY LOCATES PER OREGON STATE LAW AND SHALL CALL IN UTILITY LOCATES BEFORE ANY CONSTRUCTION ACTIVITIES.

REGISTERED PROFESSIONAL ENGINEER
76978PE
OREGON
SEPT. 13, 2005
MICHAEL K. FIELD
EXPIRES: 12-31-2023

SUBMITTED BY: _____ DATE: _____

APPROVED BY: _____ DATE: _____

REVISIONS				
REVISED	DESCRIPTION	SUBMIT.	APPR'D.	DATE

DESIGNED: MKF
DRAWN: MKF
CHECKED:
APPROVED:

FIELD ENGINEERING
MICHAEL K. FIELD, P.E.
320 NW 56TH ST.
NEWPORT, OR 97365
(541) 265-2896
(541) 961-3596 cell

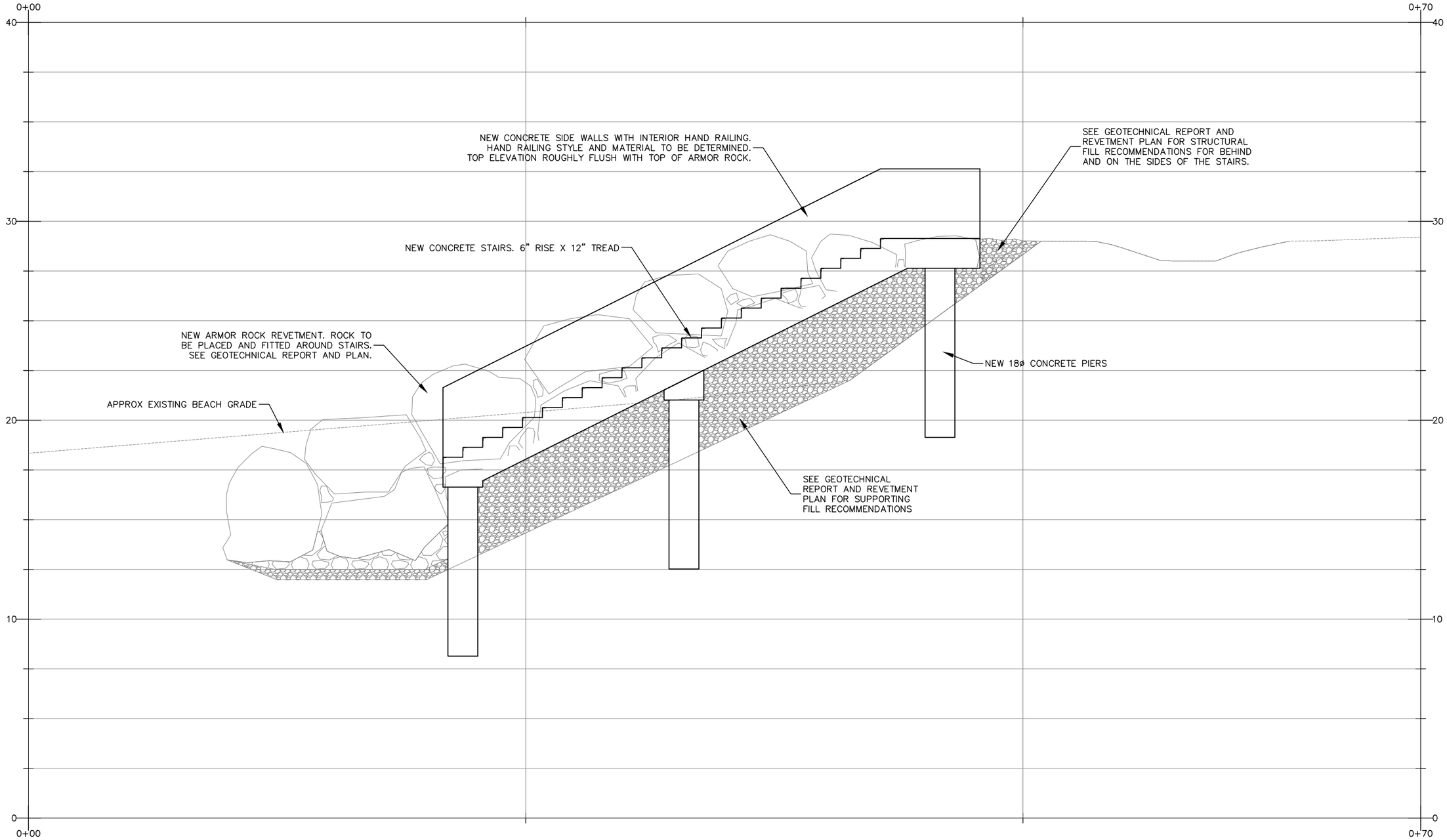
LINE IS 1 INCH AT FULL SCALE
IF NOT 1-INCH - SCALE ACCORDINGLY

SEARIDGE CONDOMINIUMS
DEPOE BAY, OREGON

BEACH ACCESS STAIRS SITE PLAN

PROJECT NO.	DRAWING NO.
202.21	G1
DATE	SHEET NO.
JUNE 2023	1 OF 4

PLOT DATE AND TIME: 6/16/2023 4:13:45 PM
SAVE DATE AND TIME: 6/16/2023 4:13:21 PM
FILE NAME:202.21 searidge condos beach access stairs.dwg



BEACH ACCESS STAIRS SITE SECTION (1/S1)
SCALE: 1" = 5'

PLAN SCALE
2.5' 0 2.5' 5'

REGISTERED PROFESSIONAL ENGINEER
76978PE
OREGON
SEPT. 13, 2005
MICHAEL K. FIELD
EXPIRES: 12-31-2023

SUBMITTED BY: _____ DATE: _____
APPROVED BY: _____ DATE: _____

REVISIONS				
REVISED	DESCRIPTION	SUBMIT.	APPR'D.	DATE

DESIGNED: MKF
DRAWN: MKF
CHECKED:
APPROVED:

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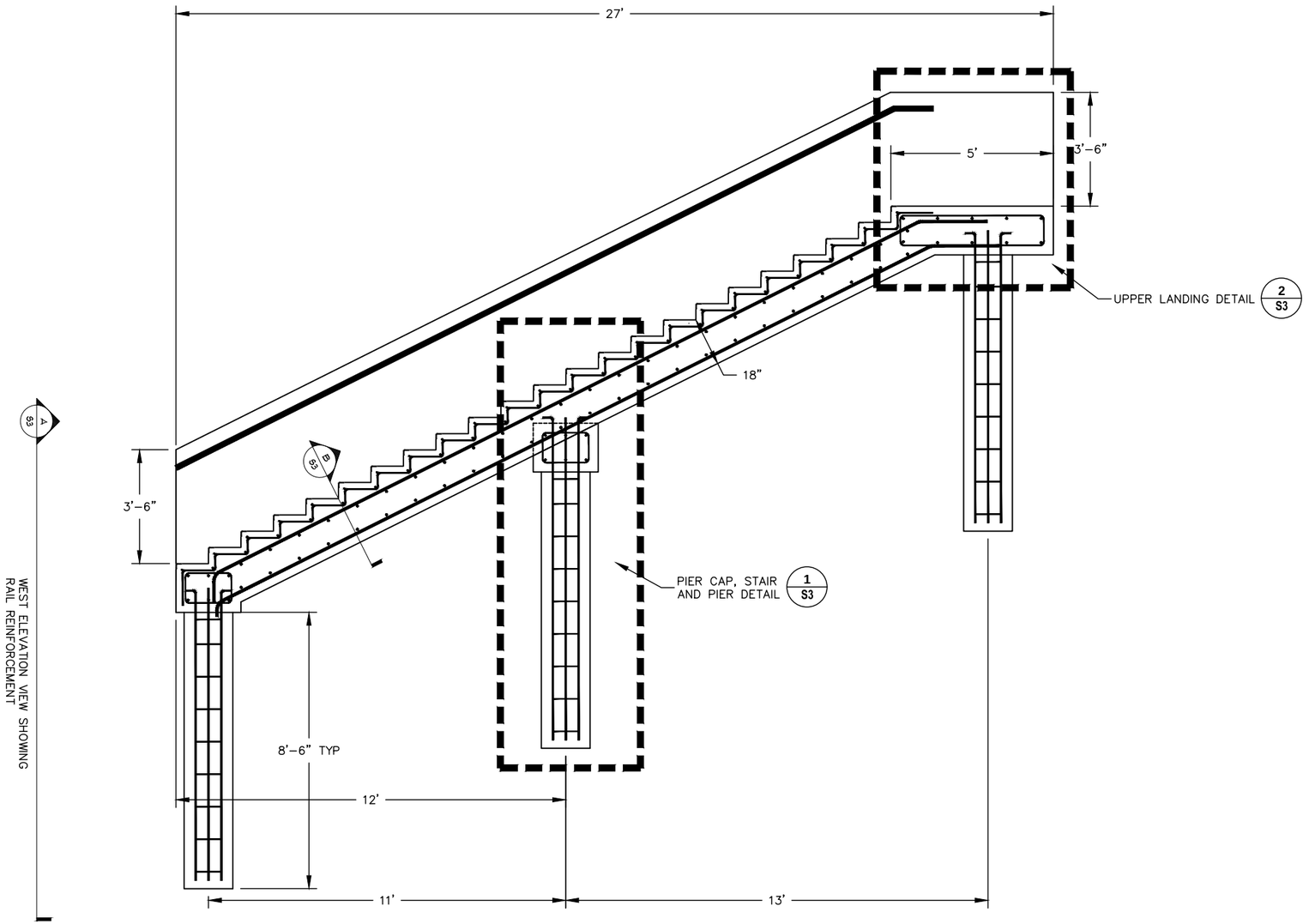
SEARIDGE CONDOMINIUMS
DEPOE BAY, OREGON

BEACH ACCESS STAIRS
SITE SECTION

PROJECT NO.	DRAWING NO.
202.21	S1
DATE	SHEET NO.
MAY 2023	2 OF 4



WEST ELEVATION VIEW SHOWING RAIL REINFORCEMENT

STAIRS STRUCTURAL SECTION 1/S2

SCALE: $\frac{1}{4}$" = 1.0'

PLAN SCALE

24" 0 24" 48"

REGISTERED PROFESSIONAL ENGINEER
76978PE
OREGON
SEPT. 13, 2005
MICHAEL K. FIELD
EXPIRES: 12-31-2023

SUBMITTED BY: _____ DATE: _____

APPROVED BY: _____ DATE: _____

REVISIONS				
REVISED	DESCRIPTION	SUBMIT.	APPR'D.	DATE

DESIGNED: MKF
DRAWN: MKF
CHECKED:
APPROVED:

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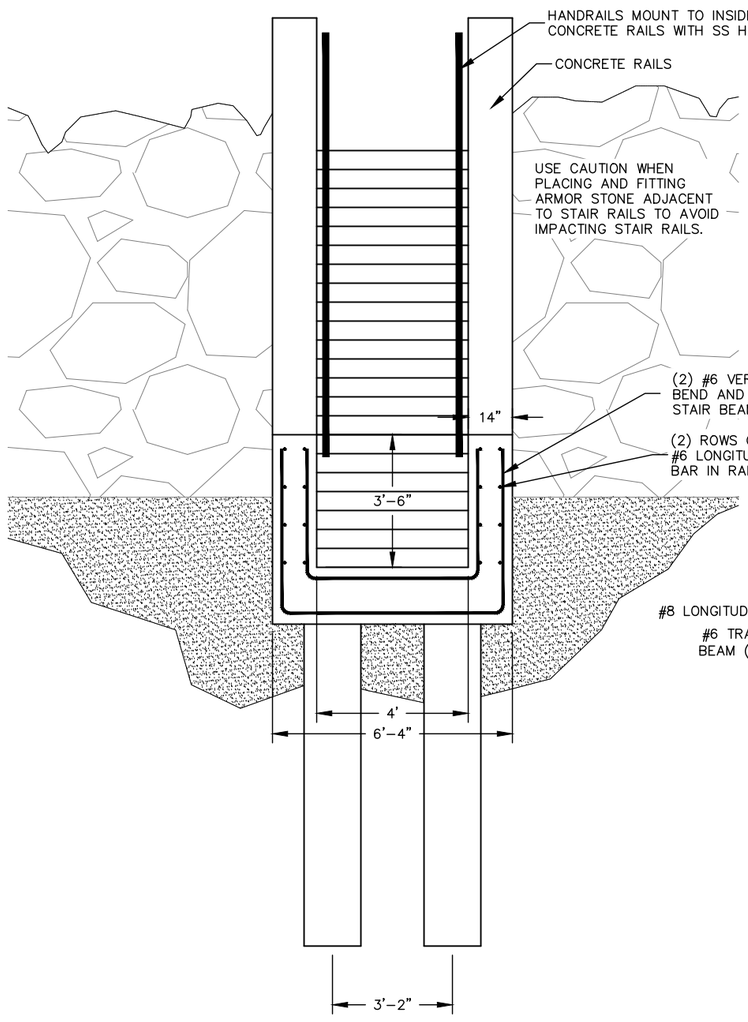
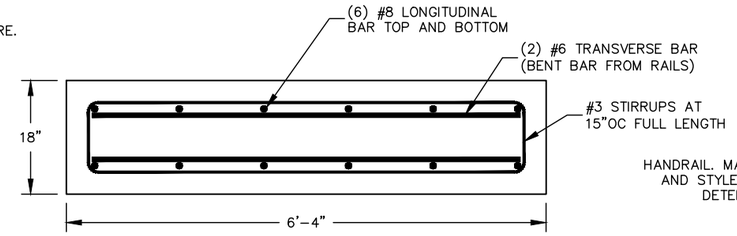
SEARIDGE CONDOMINIUMS
DEPOE BAY, OREGON

BEACH ACCESS STAIRS
STRUCTURAL SECTION

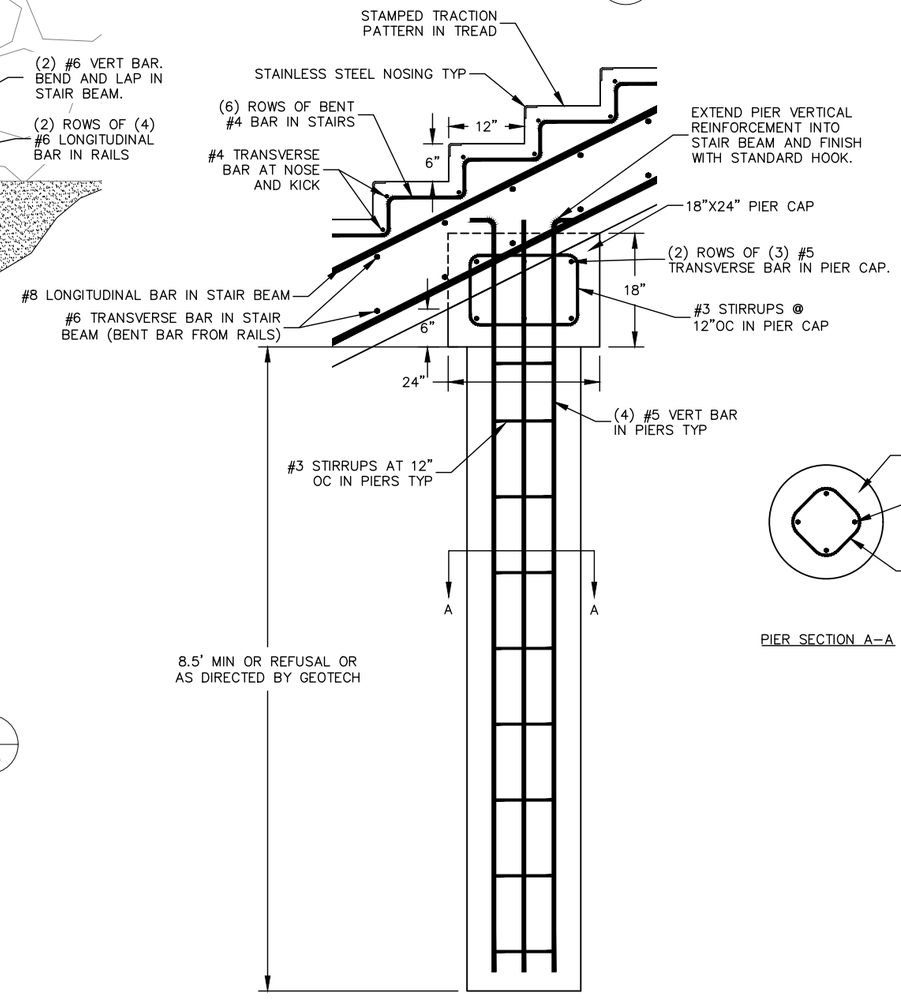
PROJECT NO.	DRAWING NO.
202.21	S2
DATE	SHEET NO.
JUNE 2023	3 OF 4



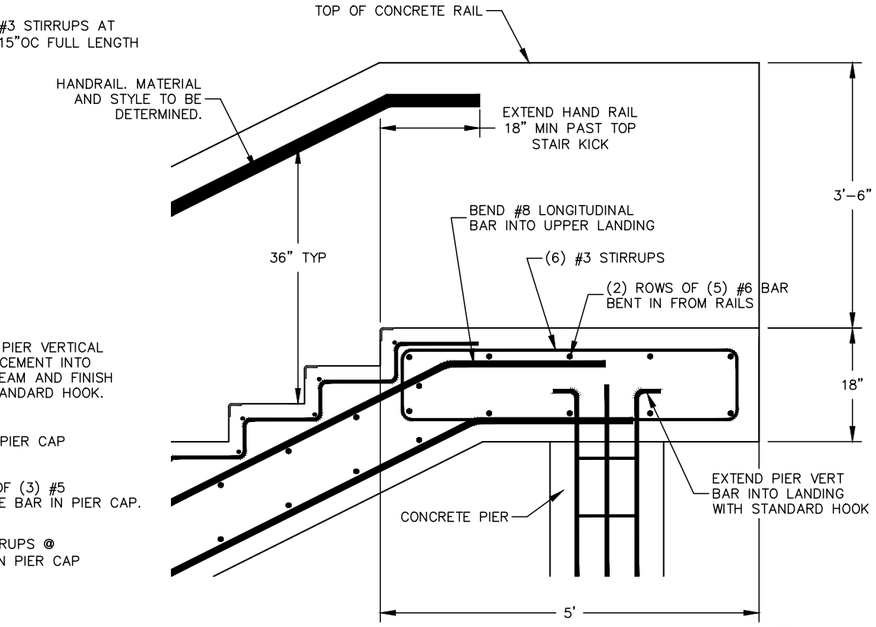
SECTION AT WEST END - RAIL REIFORCEMENT (A / S3)
SCALE: 1/4" = 1'



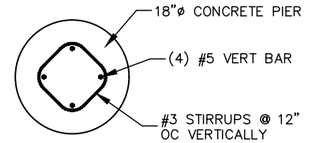
STAIR MAIN BEAM SECTION (B / S3)
SCALE: 1/2" = 1'



STAIRS, PIER CAP AND PIER DETAIL (1 / S3)
SCALE: 1/2" = 1'



UPPER LANDING DETAIL (2 / S3)
SCALE: 1/2" = 1'



PIER SECTION A–A

REGISTERED PROFESSIONAL ENGINEER
76978PE
OREGON
SEPT. 13, 2005
MICHAEL K. FIELD
EXPIRES: 12–31–2023

SUBMITTED BY: _____ DATE: _____
APPROVED BY: _____ DATE: _____

REVISIONS				
REVISED	DESCRIPTION	SUBMIT.	APPR'D.	DATE

DESIGNED: MKF
DRAWN: MKF
CHECKED:
APPROVED:

FIELD ENGINEERING
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SEARIDGE CONDOMINIUMS
DEPOE BAY, OREGON

BEACH ACCESS STAIRS
STRUCTURAL DETAILS

PROJECT NO.	DRAWING NO.
202.21	S3
DATE	SHEET NO.
JUNE 2023	4 OF 4

Field Engineering

June 16, 2023

Searidge Condominiums Baech Access Stairs
Depoe Bay, Oregon
Structural Engineering Calculations

Prepared for:
Searidge Condominiums HOA

Prepared by:
Michael K. Field, P.E.
Field Engineering
320 NW 56th St.
Newport, OR 97365
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Michael K. Field, PE
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Field Engineering

PROJECT SUMMARY

Project Description:

The project consists of design of reinforced concrete beach access stairs. Design and construction to be coordinated with Geotechnical Report and Revetment Plan prepared by H.G, Schlicker and Associates.

Analysis Methodology:

LRFD

Applied Codes and References:

ACI 318-19, IBC 2021, ASCE 7-16

Materials:

Reinforcement: Fy = 60ksi
Concrete: Minimum 28 Day Compressive Strength = 3,000 psi, Density = 150 pcf
Fasteners and Hardware: 316 Stainless Steel

Design Factors:

Applied Surcharge Load (Armor Stone):	1,000 psf
Breaking Wave Pressure:	1,000 plf
Live Load:	100 plf
Soil Friction Angle:	30 degrees
Soil Density:	110 pcf
Soil Bearing Capacity:	2,000 psf

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Field Engineering

CALCULATIONS AND ATTACHMENTS

Hand calculations backup
Stair Main Beam
Stair Rails
Piers

Michael K. Field, PE
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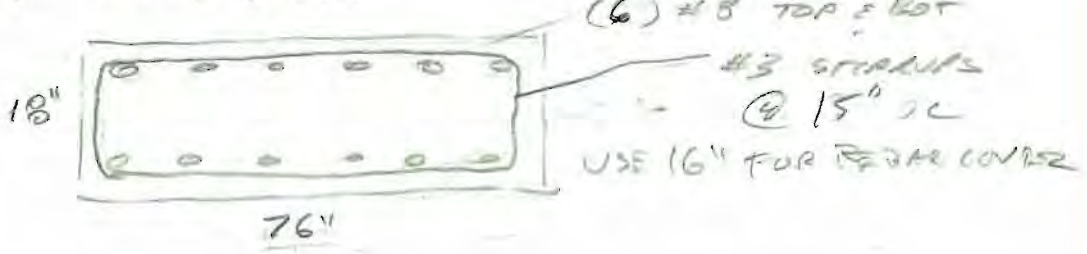
1. LOOK AT STAIRS AS CONCRETE BEAM

ASSUME LL: 100 PSF AND WAVE IMPACT LOAD AT CENTER SPAN OF 1.0 KSF

SPAN = 22.5 FT (ASSUME UNSUPPORTED)

DO NOT COUNT RAILS.



LIVE:

LOADING = 100 PSF X (5.7) FT = 570 PLF

WAVE POINT LOAD = (1000 PSF)(6.33)(5)
ASSUME 5' WIDE ZONE = 31,650 LB

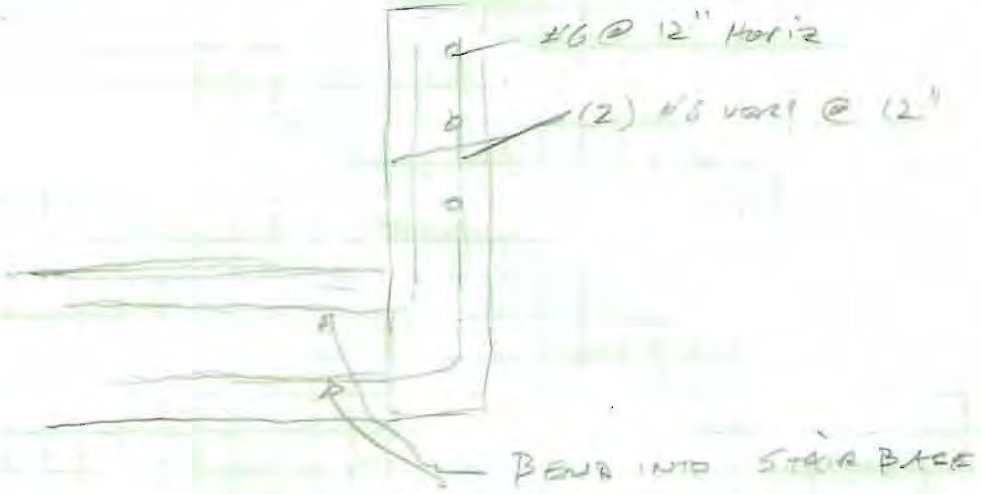
LOOK AT CONCRETE RAILS -

ASSUME 48" CANTILEVER RETAINING WALL

10 TON ROCK COULD BE IN CONTACT WITH STAIRS

USE 1000 PSF SEISM LOADING NOTE: IGNORE OVERTURNING

USE #6 VERT @ 12" OC.



LOOK at PILES.

16" ⌀ 60" DEPTH

LOADING FOR MIDDLE PILES W/ WAVE IMPACT.

WEIGHT OF STAIRS / FOOT

RAILS $\frac{14" \times 42"}{144} = (4.1\,SF)(150\,PSF) = 615\,LB/FT$

X 2 RAILS = 1230 PLF

STAIRS: X-SECTION AREA = 280 SI ≈ 2.0 SF

WIDTH = (14)(2) + 48) = 76 IN = 6.33 FT

∴ (2)(6.33)(150) = 1899 PLF

PILE CAP - X-SECTION AREA = 288 SI = 2 SF

∴ (2)(6.33)(150) = 1899 PLF

TOTAL = 1230 + 1899 + 1899 = 5028 LB

TRIB WIDTH = $\frac{24'}{2}$ = 12 FT

∴ (5028)(12) = 60,336 LB

(2) PILES ∴ 60336/2 = 30168/PILE = D

LIVE LOAD = (12)(400) = 4800/2 = 2400/PILE

WAVE LOAD = (1,000 PSF)(4 + (2)(1.17)) = 6340/2 = 15,850/PILE

5' WIDE MAT ∴ $\frac{(6340)5}{2}$ = 15850 6.34

FACTORED LOAD/PILE

$(1.2)(30168) + (1.6)2400 + \frac{15850}{2} = 47966.6 \approx 48.K$

16" ⌀ = 11' DEEP 18" ⌀ = 8.5 FT DEEP.

Project Title: Searidge Condominiums Beach Access Stairs
Engineer: Michael K Field
Project ID: 202.21
Project Descr:

Concrete Beam

Project File: 202.21 searidge condos beach access stairs.ec6

DESCRIPTION: beach stairs beam design

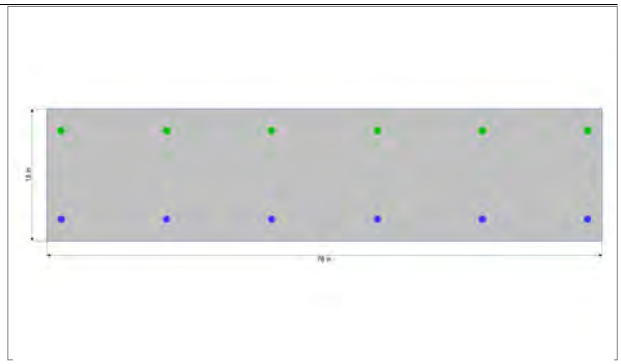
CODE REFERENCES

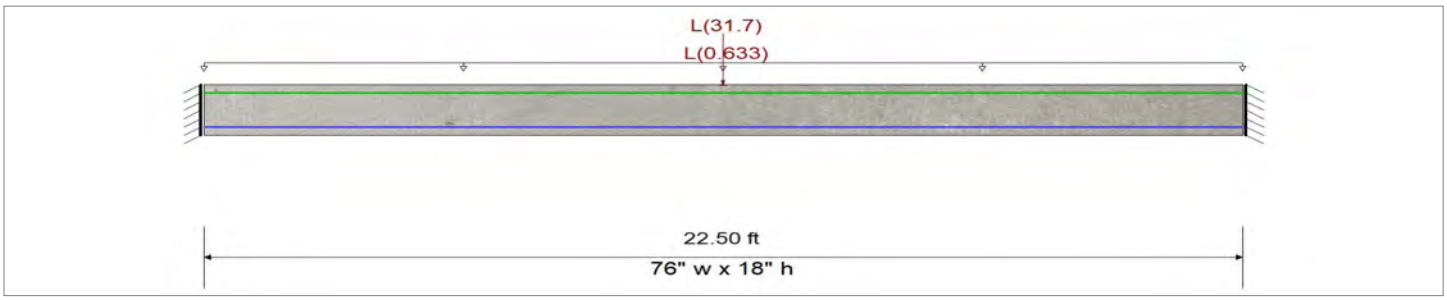
Calculations per ACI 318-19, IBC 2021, ASCE 7-16
Load Combination Set : ASCE 7-16

General Information

f'c	= 3.0 ksi	ϕ Phi Values	Flexure :	0.90
fr = f'c^1/2 * 7.50	= 410.792 psi		Shear :	0.750
ψ Density	= 145.0 pcf	β 1	=	0.850
λ LtWt Factor	= 1.0			
Elastic Modulus	= 3,122.0 ksi	Fy - Stirrups		40.0 ksi
fy - Main Rebar	= 60.0 ksi	E - Stirrups	=	29,000.0 ksi
E - Main Rebar	= 29,000.0 ksi	Stirrup Bar Size #		3
		Number of Resisting Legs Per Stirrup	=	2

Seismic Design Category = C





Cross Section & Reinforcing Details

Rectangular Section, Width = 76.0 in, Height = 18.0 in
Span #1 Reinforcing....
6-#8 at 3.0 in from Bottom, from 0.0 to 22.50 ft in this span
6-#8 at 3.0 in from Top, from 0.0 to 22.50 ft in this span

Beam self weight calculated and added to loads
Load for Span Number 1
Uniform Load : L = 0.10 ksf, Tributary Width = 6.330 ft, (live loads)
Point Load : L = 31.70 k @ 11.250 ft, (wave impact)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.811** : 1	
Section used for this span	**Typical Section**	
Mu : Applied	-255.111	k-ft
Mn * Phi : Allowable	314.423	k-ft
Location of maximum on span	22.500	ft
Span # where maximum occurs	Span # 1	

Maximum Deflection

Max Downward Transient Deflection	0.034 in	Ratio =	7828	>=360.0	L Only
Max Upward Transient Deflection	0.000 in	Ratio =	0	<360.0	L Only
Max Downward Total Deflection	0.053 in	Ratio =	5108	>=180.0	Span: 1 : +D+L
Max Upward Total Deflection	0.000 in	Ratio =	0	<180.0	Span: 1 : +D+L

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	38.468	38.468
Max Upward from Load Combinations	38.468	38.468
Max Upward from Load Cases	22.971	22.971
D Only	15.497	15.497
+D+L	38.468	38.468
+D+0.750L	32.725	32.725

Project Title: Searidge Condominiums Beach Access Stairs
Engineer: Michael K Field
Project ID: 202.21
Project Descr:

Concrete Beam

Project File: 202.21 searidge condos beach access stairs.ec6

DESCRIPTION: beach stairs beam design

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
+0.60D	9.298	9.298
L Only	22.971	22.971

Shear Stirrup Requirements

Between 0.00 to 3.16 ft, Phi*lambda*sqrt(f'c)*bw*d < Vu <= Phi*Vc, Req'd Vs = Min per 9.6.3.1, use #3 stirrups spaced at 2.000 in
Between 3.20 to 19.30 ft, Vu <= Phi*lambda*sqrt(f'c)*bw*d, Req'd Vs = Not Reqd per 9.3.6.1, Stirrups are not required.
Between 19.34 to 22.46 ft, Phi*lambda*sqrt(f'c)*bw*d < Vu <= Phi*Vc, Req'd Vs = Min per 9.6.3.1, use #3 stirrups spaced at 2.000 in

Detailed Shear Information

Load Combination	Span Number	Distance (ft)	'd' (in)	Vu Actual	(k) Design	Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in) Req'd
+1.20D+1.60L	1	0.00	15.00	55.35	55.35	255.11	0.27	93.66	Phi*lambda*sqrt	lin per 9.6.	143.2	2.3
+1.20D+1.60L	1	0.25	15.00	54.69	54.69	241.58	0.28	93.66	Phi*lambda*sqrt	lin per 9.6.	143.2	2.3
+1.20D+1.60L	1	0.49	15.00	54.04	54.04	228.21	0.30	93.66	Phi*lambda*sqrt	lin per 9.6.	143.2	2.3
+1.20D+1.60L	1	0.74	15.00	53.38	53.38	215.00	0.31	93.66	Phi*lambda*sqrt	lin per 9.6.	143.2	2.3
+1.20D+1.60L	1	0.98	15.00	52.73	52.73	201.96	0.33	93.66	Phi*lambda*sqrt	lin per 9.6.	143.2	2.3
+1.20D+1.60L	1	1.23	15.00	52.07	52.07	189.07	0.34	93.66	Phi*lambda*sqrt	lin per 9.6.	143.2	2.3
+1.20D+1.60L	1	1.48	15.00	51.42	51.42	176.35	0.36	93.66	Phi*lambda*sqrt	lin per 9.6.	143.2	2.3
+1.20D+1.60L	1	1.72	15.00	50.76	50.76	163.79	0.39	93.66	Phi*lambda*sqrt	lin per 9.6.	143.2	2.3
+1.20D+1.60L	1	1.97	15.00	50.11	50.11	151.38	0.41	93.66	Phi*lambda*sqrt	lin per 9.6.	143.2	2.3
+1.20D+1.60L	1	2.21	15.00	49.45	49.45	139.14	0.44	93.66	Phi*lambda*sqrt	lin per 9.6.	143.2	2.3
+1.20D+1.60L	1	2.46	15.00	48.80	48.80	127.06	0.48	93.66	Phi*lambda*sqrt	lin per 9.6.	143.2	2.3
+1.20D+1.60L	1	2.70	15.00	48.14	48.14	115.15	0.52	93.66	Phi*lambda*sqrt	lin per 9.6.	143.2	2.3
+1.20D+1.60L	1	2.95	15.00	47.48	47.48	103.39	0.57	93.66	Phi*lambda*sqrt	lin per 9.6.	143.2	2.3
+1.20D+1.60L	1	3.20	15.00	46.83	46.83	91.79	0.64	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	3.44	15.00	46.17	46.17	80.36	0.72	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	3.69	15.00	45.52	45.52	69.08	0.82	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	3.93	15.00	44.86	44.86	57.97	0.97	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	4.18	15.00	44.21	44.21	47.02	1.00	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	4.43	15.00	43.55	43.55	36.23	1.00	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	4.67	15.00	42.90	42.90	25.60	1.00	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	4.92	15.00	42.24	42.24	15.14	1.00	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	5.16	15.00	41.58	41.58	4.83	1.00	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	5.41	15.00	40.93	40.93	5.32	1.00	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	5.66	15.00	40.27	40.27	15.30	1.00	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	5.90	15.00	39.62	39.62	25.12	1.00	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	6.15	15.00	38.96	38.96	34.78	1.00	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	6.39	15.00	38.31	38.31	44.28	1.00	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	6.64	15.00	37.65	37.65	53.62	0.88	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	6.89	15.00	37.00	37.00	62.80	0.74	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	7.13	15.00	36.34	36.34	71.82	0.63	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	7.38	15.00	35.68	35.68	80.67	0.55	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	7.62	15.00	35.03	35.03	89.37	0.49	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	7.87	15.00	34.37	34.37	97.90	0.44	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	8.11	15.00	33.72	33.72	106.27	0.40	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	8.36	15.00	33.06	33.06	114.48	0.36	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	8.61	15.00	32.41	32.41	122.53	0.33	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	8.85	15.00	31.75	31.75	130.42	0.30	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	9.10	15.00	31.10	31.10	138.15	0.28	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	9.34	15.00	30.44	30.44	145.71	0.26	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	9.59	15.00	29.78	29.78	153.12	0.24	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	9.84	15.00	29.13	29.13	160.36	0.23	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	10.08	15.00	28.47	28.47	167.44	0.21	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	10.33	15.00	27.82	27.82	174.37	0.20	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	10.57	15.00	27.16	27.16	181.13	0.19	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	10.82	15.00	26.51	26.51	187.72	0.18	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	11.07	15.00	25.85	25.85	194.16	0.17	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	11.31	15.00	-25.52	25.52	197.32	0.16	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	11.56	15.00	-26.18	26.18	190.96	0.17	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0
+1.20D+1.60L	1	11.80	15.00	-26.83	26.83	184.44	0.18	53.88	Vu <= Phi*lambd	t Reqd pe	53.9	0.0

Project Title: Searidge Condominiums Beach Access Stairs
Engineer: Michael K Field
Project ID: 202.21
Project Descr:

Concrete Beam

Project File: 202.21 searidge condos beach access stairs.ec6

LIC# : KW-06011486, Build:20.23.05.22 Field Engineering (c) ENERCALC INC 1983-2023

DESCRIPTION: beach stairs beam design

Detailed Shear Information

Load Combination	Span Number	Distance (ft)	'd' (in)	Vu Actual	(k) Design	Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in) Req'd
+1.20D+1.60L	1	12.05	15.00	-27.49	27.49	177.77	0.19	53.88	Vu <= Phi*lambda*t	Reqd pe	53.9	0.0
+1.20D+1.60L	1	12.30	15.00	-28.15	28.15	170.92	0.21	53.88	Vu <= Phi*lambda*t	Reqd pe	53.9	0.0
+1.20D+1.60L	1	12.54	15.00	-28.80	28.80	163.92	0.22	53.88	Vu <= Phi*lambda*t	Reqd pe	53.9	0.0
+1.20D+1.60L	1	12.79	15.00	-29.46	29.46	156.76	0.23	53.88	Vu <= Phi*lambda*t	Reqd pe	53.9	0.0
+1.20D+1.60L	1	13.03	15.00	-30.11	30.11	149.44	0.25	53.88	Vu <= Phi*lambda*t	Reqd pe	53.9	0.0
+1.20D+1.60L	1	13.28	15.00	-30.77	30.77	141.95	0.27	53.88	Vu <= Phi*lambda*t	Reqd pe	53.9	0.0
+1.20D+1.60L	1	13.52	15.00	-31.42	31.42	134.30	0.29	53.88	Vu <= Phi*lambda*t	Reqd pe	53.9	0.0
+1.20D+1.60L	1	13.77	15.00	-32.08	32.08	126.50	0.32	53.88	Vu <= Phi*lambda*t	Reqd pe	53.9	0.0
+1.20D+1.60L	1	14.02	15.00	-32.73	32.73	118.53	0.35	53.88	Vu <= Phi*lambda*t	Reqd pe	53.9	0.0
+1.20D+1.60L	1	14.26	15.00	-33.39	33.39	110.40	0.38	53.88	Vu <= Phi*lambda*t	Reqd pe	53.9	0.0
+1.20D+1.60L	1	14.51	15.00	-34.05	34.05	102.11	0.42	53.88	Vu <= Phi*lambda*t	Reqd pe	53.9	0.0
+1.20D+1.60L	1	14.75	15.00	-34.70	34.70	93.65	0.46	53.88	Vu <= Phi*lambda*t	Reqd pe	53.9	0.0
+1.20D+1.60L	1	15.00	15.00	-35.36	35.36	85.04	0.52	53.88	Vu <= Phi*lambda*t	Reqd pe	53.9	0.0
+1.20D+1.60L	1	15.25	15.00	-36.01	36.01	76.27	0.59	53.88	Vu <= Phi*lambda*t	Reqd pe	53.9	0.0
+1.20D+1.60L	1	15.49	15.00	-36.67	36.67	67.33	0.68	53.88	Vu <= Phi*lambda*t	Reqd pe	53.9	0.0
+1.20D+1.60L	1	15.74	15.00	-37.32	37.32	58.23	0.80	53.88	Vu <= Phi*lambda*t	Reqd pe	53.9	0.0
+1.20D+1.60L	1	15.98	15.00	-37.98	37.98	48.97	0.97	53.88	Vu <= Phi*lambda*t	Reqd pe	53.9	0.0
+1.20D+1.60L	1	16.23	15.00	-38.63	38.63	39.55	1.00	53.88	Vu <= Phi*lambda*t	Reqd pe	53.9	0.0
+1.20D+1.60L	1	16.48	15.00	-39.29	39.29	29.97	1.00	53.88	Vu <= Phi*lambda*t	Reqd pe	53.9	0.0
+1.20D+1.60L	1	16.72	15.00	-39.95	39.95	20.23	1.00	53.88	Vu <= Phi*lambda*t	Reqd pe	53.9	0.0
+1.20D+1.60L	1	16.97	15.00	-40.60	40.60	10.33	1.00	53.88	Vu <= Phi*lambda*t	Reqd pe	53.9	0.0
+1.20D+1.60L	1	17.21	15.00	-41.26	41.26	0.26	1.00	53.88	Vu <= Phi*lambda*t	Reqd pe	53.9	0.0
+1.20D+1.60L	1	17.46	15.00	-41.91	41.91	9.96	1.00	53.88	Vu <= Phi*lambda*t	Reqd pe	53.9	0.0
+1.20D+1.60L	1	17.70	15.00	-42.57	42.57	20.35	1.00	53.88	Vu <= Phi*lambda*t	Reqd pe	53.9	0.0
+1.20D+1.60L	1	17.95	15.00	-43.22	43.22	30.90	1.00	53.88	Vu <= Phi*lambda*t	Reqd pe	53.9	0.0
+1.20D+1.60L	1	18.20	15.00	-43.88	43.88	41.61	1.00	53.88	Vu <= Phi*lambda*t	Reqd pe	53.9	0.0
+1.20D+1.60L	1	18.44	15.00	-44.53	44.53	52.48	1.00	53.88	Vu <= Phi*lambda*t	Reqd pe	53.9	0.0
+1.20D+1.60L	1	18.69	15.00	-45.19	45.19	63.51	0.89	53.88	Vu <= Phi*lambda*t	Reqd pe	53.9	0.0
+1.20D+1.60L	1	18.93	15.00	-45.85	45.85	74.70	0.77	53.88	Vu <= Phi*lambda*t	Reqd pe	53.9	0.0
+1.20D+1.60L	1	19.18	15.00	-46.50	46.50	86.06	0.68	53.88	Vu <= Phi*lambda*t	Reqd pe	53.9	0.0
+1.20D+1.60L	1	19.43	15.00	-47.16	47.16	97.57	0.60	93.66	Phi*lambda*sqrt	lin per 9.6.	143.2	2.3
+1.20D+1.60L	1	19.67	15.00	-47.81	47.81	109.25	0.55	93.66	Phi*lambda*sqrt	lin per 9.6.	143.2	2.3
+1.20D+1.60L	1	19.92	15.00	-48.47	48.47	121.08	0.50	93.66	Phi*lambda*sqrt	lin per 9.6.	143.2	2.3
+1.20D+1.60L	1	20.16	15.00	-49.12	49.12	133.08	0.46	93.66	Phi*lambda*sqrt	lin per 9.6.	143.2	2.3
+1.20D+1.60L	1	20.41	15.00	-49.78	49.78	145.24	0.43	93.66	Phi*lambda*sqrt	lin per 9.6.	143.2	2.3
+1.20D+1.60L	1	20.66	15.00	-50.43	50.43	157.56	0.40	93.66	Phi*lambda*sqrt	lin per 9.6.	143.2	2.3
+1.20D+1.60L	1	20.90	15.00	-51.09	51.09	170.05	0.38	93.66	Phi*lambda*sqrt	lin per 9.6.	143.2	2.3
+1.20D+1.60L	1	21.15	15.00	-51.74	51.74	182.69	0.35	93.66	Phi*lambda*sqrt	lin per 9.6.	143.2	2.3
+1.20D+1.60L	1	21.39	15.00	-52.40	52.40	195.50	0.34	93.66	Phi*lambda*sqrt	lin per 9.6.	143.2	2.3
+1.20D+1.60L	1	21.64	15.00	-53.06	53.06	208.46	0.32	93.66	Phi*lambda*sqrt	lin per 9.6.	143.2	2.3
+1.20D+1.60L	1	21.89	15.00	-53.71	53.71	221.59	0.30	93.66	Phi*lambda*sqrt	lin per 9.6.	143.2	2.3
+1.20D+1.60L	1	22.13	15.00	-54.37	54.37	234.88	0.29	93.66	Phi*lambda*sqrt	lin per 9.6.	143.2	2.3
+1.20D+1.60L	1	22.38	15.00	-55.02	55.02	248.33	0.28	93.66	Phi*lambda*sqrt	lin per 9.6.	143.2	2.3

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft) Mu : Max	Phi*Mnx	Stress Ratio
MAXimum BENDING Envelope					
Span # 1	1	22.500	-255.11	314.42	0.81
+1.40D					
Span # 1	1	22.500	-81.36	314.42	0.26
+1.20D+1.60L					
Span # 1	1	22.500	-255.11	314.42	0.81
+1.20D+L					
Span # 1	1	22.500	-185.60	314.42	0.59
+1.20D					
Span # 1	1	22.500	-69.74	314.42	0.22
+0.90D					
Span # 1	1	22.500	-52.30	314.42	0.17

Project Title: Searidge Condominiums Beach Access Stairs
Engineer: Michael K Field
Project ID: 202.21
Project Descr:

Concrete Beam

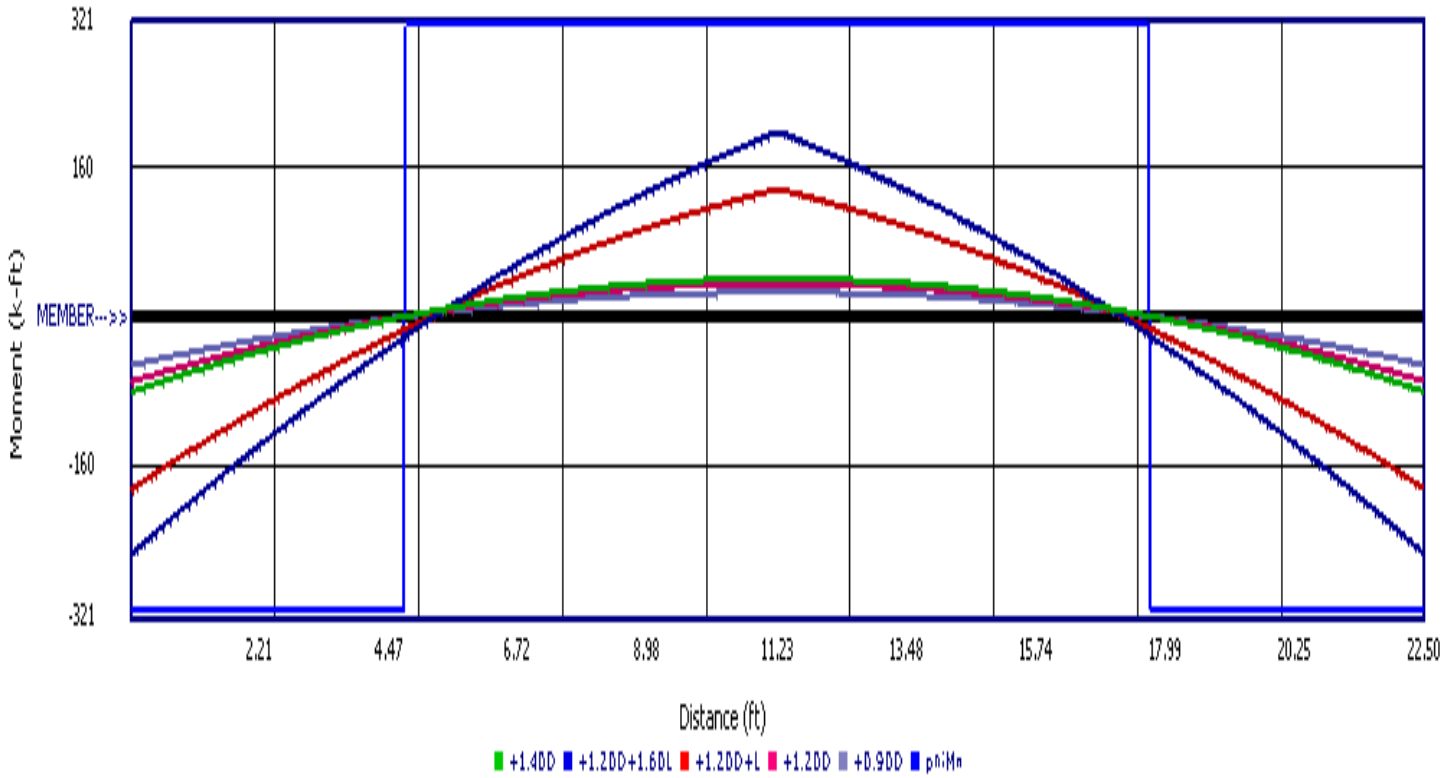
Project File: 202.21 searidge condos beach access stairs.ec6

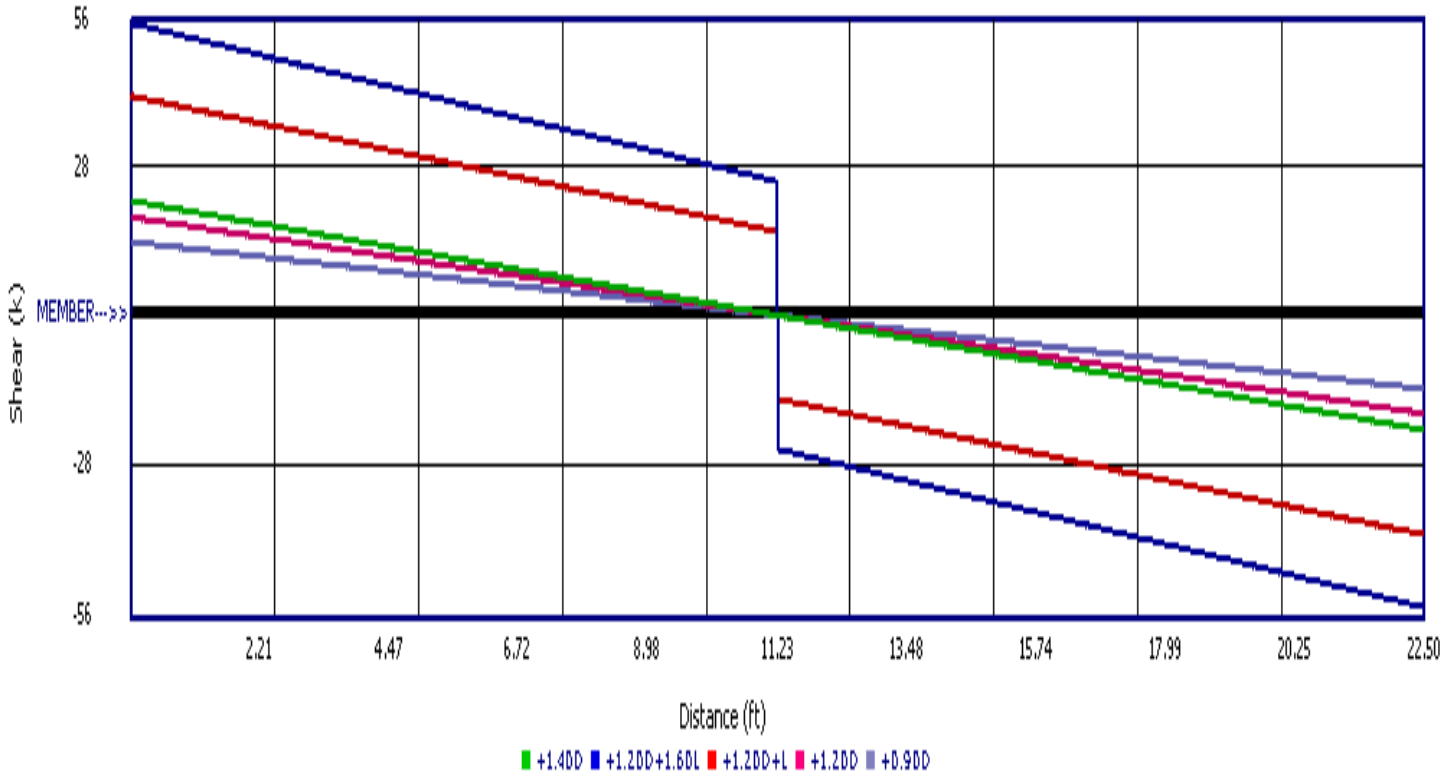
LIC# : KW-06011486, Build:20.23.05.22 Field Engineering (c) ENERCALC INC 1983-2023

DESCRIPTION: beach stairs beam design

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft	Load Combination	Max. "+" Defl (in)	Location in Span (ft
+D+L	1	0.0528	11.250		0.0000	0.000





Project Title: Searidge Condominiums Beach Access Stairs
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Concrete Beam

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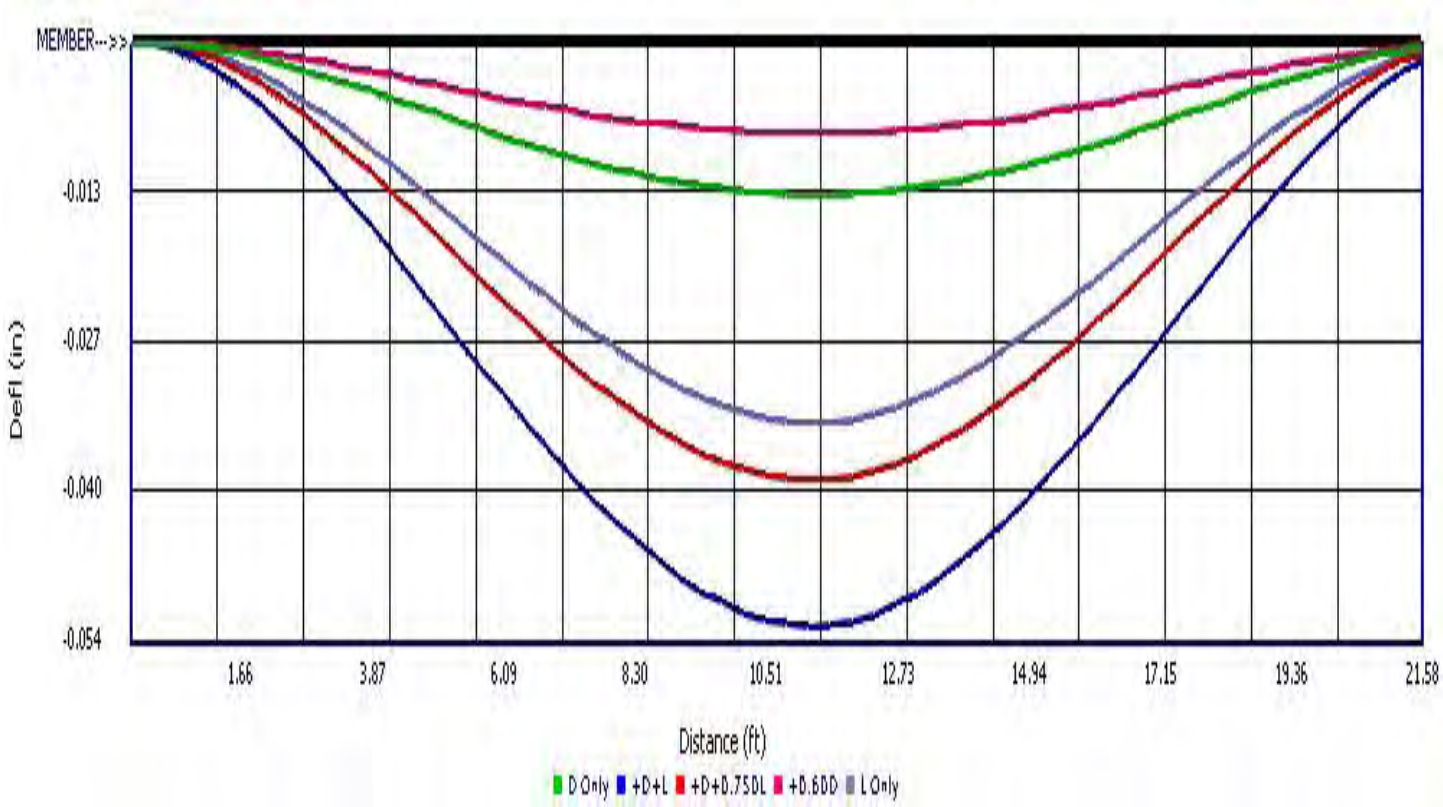
DESCRIPTION: beach stairs beam design



Project Title: Searidge Condominiums Beach Access Stairs
Engineer: Michael K Field
Project ID: 202.21
Project Descr:

Cantilevered Retaining Wall

Project File: 202.21 searidge condos beach access stairs.ec6

DESCRIPTION: concrete stair rails

Code Reference

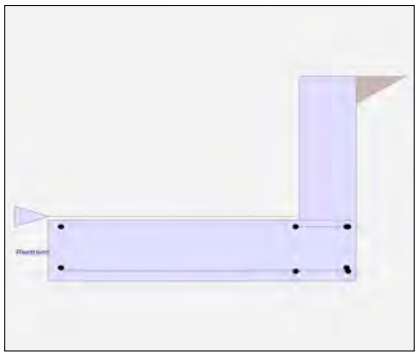
Calculations per IBC 2021 1807.3, ASCE 7-16

Criteria

Retained Height	=	3.50 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	0.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	1,000.0 #/ft
...Height to Top	=	3.50 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Earth (H) (Service Level)
Wind on Exposed Stem (Strength Level)	=	0.0 psf

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type		Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Project Title: Searidge Condominiums Beach Access Stairs
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Project ID: 202.21
Project Descr:

Cantilevered Retaining Wall

Project File: 202.21 searidge condos beach access stairs.ec6

DESCRIPTION: concrete stair rails

Design Summary

Wall Stability Ratios

Overturning	=	0.66	UNSTABLE!
Slab Resists All Sliding !			
Global Stability	=	2.75	
Total Bearing Load	=	2,038 lbs	
...resultant ecc.	=	61.97 in	
Soil Pressure @ Toe	=	0 psf	OK
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	2,000 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	0 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	6.1 psi	OK
Footing Shear @ Heel	=	0.0 psi	OK
Allowable	=	82.2 psi	

Sliding Calcs

Lateral Sliding Force	=	3,937.5 lbs

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

		Bottom		
		Stem OK		
Design Height Above Ftg	ft =	0.00		
Wall Material Above "Ht"	=	Concrete		
Design Method	=	SD	SD	SD
Thickness	=	14.00		
Rebar Size	=	# 6		
Rebar Spacing	=	12.00		
Rebar Placed at	=	Edge		
Design Data				
fb/FB + fa/Fa	=	**0.460**		
Total Force @ Section				
Service Level	lbs =			
Strength Level	lbs =	5,943.0		
Moment....Actual				
Service Level	ft-# =			
Strength Level	ft-# =	10,200.2		
Moment.....Allowable	=	22,160.8		
Shear.....Actual				
Service Level	psi =			
Strength Level	psi =	42.6		
Shear.....Allowable	psi =	46.3		
Anet (Masonry)	in2 =			
Wall Weight	psf =	175.0		
Rebar Depth 'd'	in =	11.63		

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	3,000.0
Fy	psi =	60,000.0

Project Title: Searidge Condominiums Beach Access Stairs
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Cantilevered Retaining Wall

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DESCRIPTION: concrete stair rails

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.2005 in2/ft		
0.0018bh : 0.0018(12)(14) :	0.3024 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.3024 in2/ft	#4@ 7.94 in	#4@ 15.87 in
Provided Area :	0.44 in2/ft	#5@ 12.30 in	#5@ 24.60 in
Maximum Area :	1.8898 in2/ft	#6@ 17.46 in	#6@ 34.92 in

Footing Data

Toe Width	=	5.17 ft
Heel Width	=	1.17
Total Footing Width	=	6.33
Footing Thickness	=	18.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft

f'c = 3,000 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	0	0 psf
Mu' : Upward	=	0	0 ft-#
Mu' : Downward	=	3,604	0 ft-#
Mu: Design	=	-3,604 OK	0 ft-#
phiMn	=	48,794	OK - Flush
Actual 1-Way Shear	=	6.14	0.00 psi
Allow 1-Way Shear	=	82.16	0.00 psi

Toe Reinforcing = # 8 @ 12.00 in
Heel Reinforcing = Flush heel condition. No reinforcing required.
Key Reinforcing = None Spec'd
Footing Torsion, Tu = 0.00 ft-lbs
Footing Allow. Torsion, phi Tu = 0.00 ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 6.17 in, #5@ 9.56 in, #6@ 13.58 in, #7@ 18.51 in, #8@ 24.38 in, #9@ 30.86 in, #10@ 39.19 in

Heel: Flush heel condition. No reinforcing required.

Key: No key defined

Min footing T&S reinf Area 2.46 in2
Min footing T&S reinf Area per foot 0.39 in2 /ft

If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 6.17 in	#4@ 12.35 in
#5@ 9.57 in	#5@ 19.14 in
#6@ 13.58 in	#6@ 27.16 in

Project Title: Searidge Condominiums Beach Access Stairs
Engineer: Michael K Field
Project ID: 202.21
Project Descr:

Cantilevered Retaining Wall

Project File: 202.21 searidge condos beach access stairs.ec6

DESCRIPTION: concrete stair rails

Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)		437.5	1.67	729.2	Soil Over HL (ab. water tbl)			
HL Act Pres (be water tbl)					Soil Over HL (bel. water tbl)			
Hydrostatic Force					Water Table			
Buoyant Force	=				Sloped Soil Over Heel	=		
Surcharge over Heel	=				Surcharge Over Heel	=		
Surcharge Over Toe	=				Adjacent Footing Load	=		
Adjacent Footing Load	=				Axial Dead Load on Stem	=		
Added Lateral Load	=	3,500.0	3.25	11,375.0	* Axial Live Load on Stem	=		
Load @ Stem Above Soil	=				Soil Over Toe	=		
	=				Surcharge Over Toe	=		
					Stem Weight(s)	=	612.5	5.75	3,522.1
					Earth @ Stem Transitions	=		
					Footing Weight	=	1,425.1	3.17	4,513.0
					Key Weight	=			
					Vert. Component	=			
Total	=	3,937.5	**O.T.M.** =	12,104.2	**Total =**		2,037.6 lbs	**R.M.=**	8,035.1

Resisting/Overturning Ratio = **0.66**
Vertical Loads used for Soil Pressure = 2,037.6 lbs

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.000	in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

Cantilevered Retaining Wall

DESCRIPTION: concrete stair rails

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

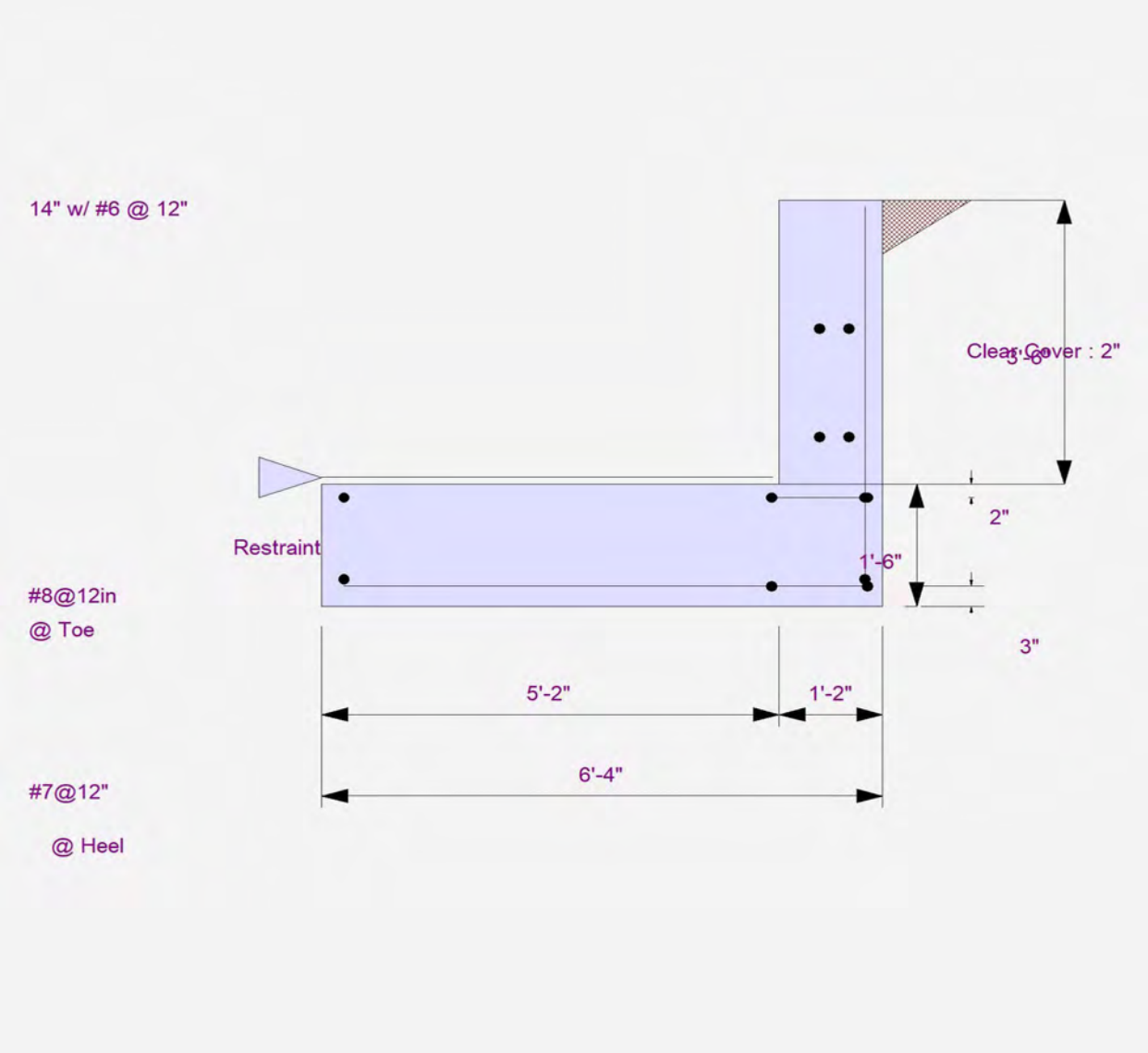
Lap Splice length for #6 bar specified in this stem design segment (25.4.2.4a) =	25.63 in
Development length for #6 bar specified in this stem design segment =	19.72 in
Hooked embedment length into footing for #6 bar specified in this stem design segment =	11.50 in
As Provided =	0.4400 in2/ft
As Required =	0.3024 in2/ft

Project Title: Searidge Condominiums Beach Access Stairs
Engineer: Michael K Field
Project ID: 202.21
Project Descr:

Cantilevered Retaining Wall

Project File: 202.21 searidge condos beach access stairs.ec6

DESCRIPTION: concrete stair rails

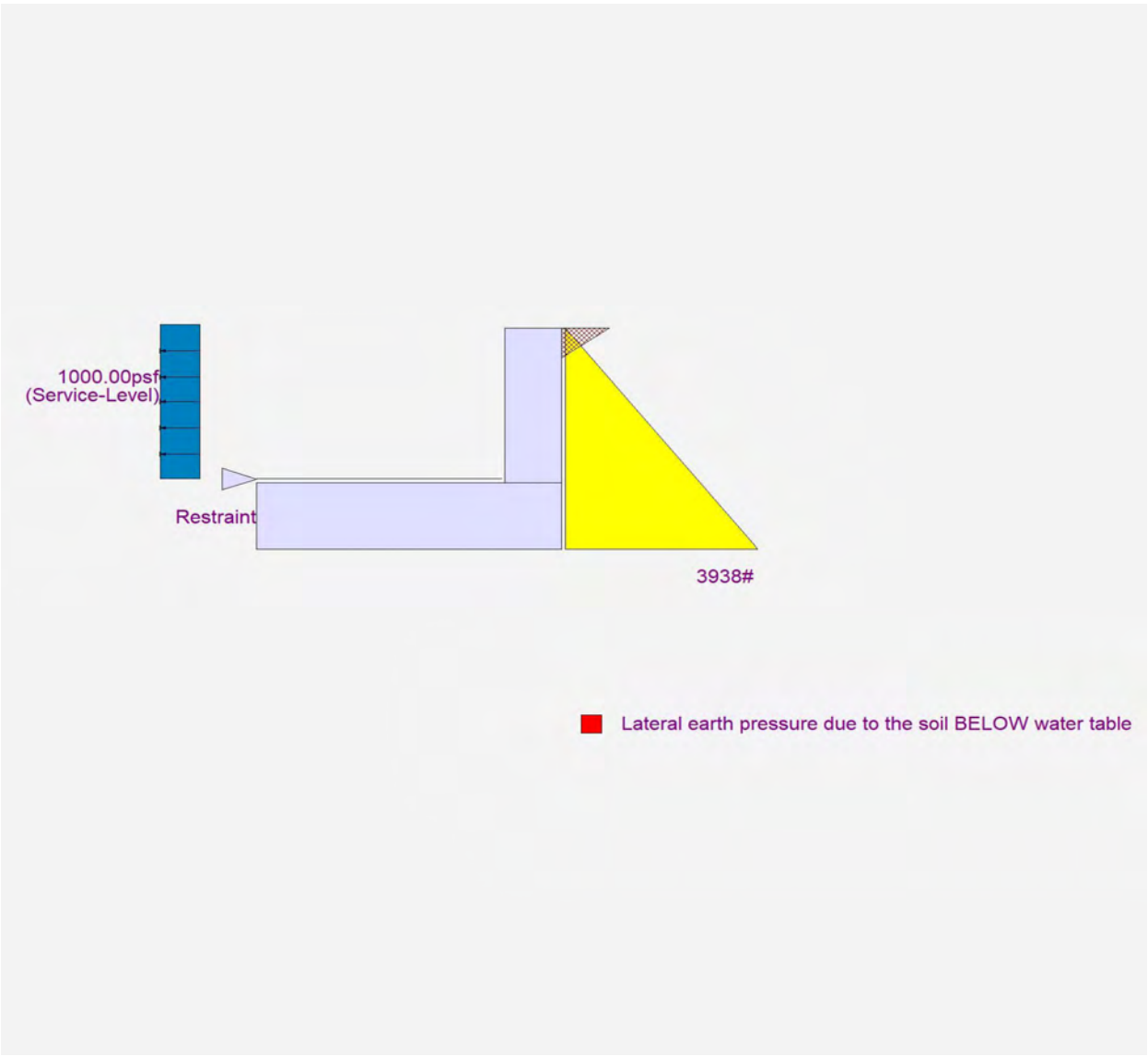


Project Title: Searidge Condominiums Beach Access Stairs
Engineer: Michael K Field
Project ID: 202.21
Project Descr:

Cantilevered Retaining Wall

Project File: 202.21 searidge condos beach access stairs.ec6

DESCRIPTION: concrete stair rails



Project #Y214577

Appendix G
- Beach Grass Planting Specifications -

When To Plant Sand-Stilling Grasses

European and American beachgrass and American dunegrass should be planted when temperatures are between 32 and 60 °F. No planting should be done unless moisture is found within a depth of 3 inches of the dune surface. Most plantings are made during the cool, wet months from late fall through early spring (November 1 to April 15).

Proper temperature is critical. Work done by Brown (1942) at the Warrenton Project indicates erratic survival rates if temperature exceeds 60 °F within a 72-hour period after planting. The effect of warm temperatures late in the planting season can be somewhat minimized by planting at night. All transplanting stock is either stored at 35 °F or shade frames are placed 12 inches above the tops of heeled-in culm bundles. If plantings must be made during warm daytime temperatures, then each bundle of beachgrass is dipped in water to keep it from drying out during the planting process. To ensure success and minimize planting costs, select planting dates well before warm spring days or well after cool fall temperatures have set in.

Planting is not done during freeze periods. Therefore, November, February, and March usually are the best months to plant.

Plantings are usually successful during cool weather in these 3 months, even without precipitation for prolonged periods. Low-lying sites that are moist into early summer may be planted more safely later in middle to late spring than the higher, drier sites.

Plantings for the construction of foredunes should be made in the early spring after danger from severe storms is over. Plantings made earlier can be destroyed by very high tides. Plantings made early in spring establish themselves before the warm weather and grow rapidly as new sand accumulates on the dune throughout the season. A good planting may accumulate as much as 2 feet of sand annually.

Areas that are subject to winter submergence should be planted in the spring as the water level recedes. Plantings that have not experienced one growing season fail to withstand extended submergence without damage.

Planting Stock

Commercial beachgrass stock may be obtained from nurseries or natural stands of proper age and quality. Nursery stock is dug at 2 years, and thus is designated "2-0" stock. Most natural stands will not produce quality stock; it is only

Shown here is a properly spaced planting of European beachgrass about 4 months after planting.

Beachgrass nursery stock usually originates from fertilized, relatively open, young stands where plants have room to grow and produce large, healthy culms.

where new sand deposits on existing grass are fertilized that quality stock is produced. This results in 1-0 (1-year-old) stock from plants buried the previous season. Quality planting stock consists of young, vigorous, live culms with one to three root nodes and a minimum of old, dead material. It is not possible to dig old stands because of the excessive cost of removing old dead parts of individual plants. Because of varying growing depths caused by new windblown sand deposits, no specific digging depth is recommended. The grass should be dug at a depth that will ensure that all culms have one to three live root nodes remaining.

After being dug, grass is shaken free of sand, dead trash is cleaned from culms, and the hill or clump is broken into small bunches. Underground stems are broken back to one or two nodes. For convenience in stock accounting and handling, culms are tied into bundles of 10 pounds. After tying, the tops of the stock are cut back with an ax until the overall length is about 20 inches. This gets rid of long leaves that offer more surface for moisture loss and that are subject to wind agitation that could loosen the planted stem from the sand.

In nurseries, stock can be dug each year if given an annual application of fertilizer. When properly fertilized, a new crop will come up from underground stems or rootstalks. Nursery areas can be 95 percent dug without damage to the vegetative cover. New culms quickly regenerate from rhizomes.

Stock is harvested during the planting season. Stock should be collected during the cool, wet months from late fall through early spring (November 1 to April 15), when the plant is most nearly dormant. American dunegrass must be harvested when completely dormant. Dormant stock will have the greatest amount of stored energy and will, therefore, be more vigorous than culms from plants that are actively growing. The beachgrasses (European and American), however, will survive whether or not they are dormant, as long as the stock is harvested and planted in cool weather.

Storing of grass stock is confined to "heeling-in" on the nursery or planting site. It is important when heeling-in to keep the beds narrow, not over two bundles wide, in order to avoid heating of the grass. Bundles should be buried in the trench to a depth of approximately one-half their length, and sand firmed around them. The grass should not be heeled-in where water will stand on the bed as this will cause decomposition of the basal buds of the stem. The heeling-in bed should be a well-drained, damp trench with the roots (nodes) covered to a depth of at least 8 inches. Stock should not be held in heeling-in beds for more than 2 weeks. If

A three-culm propagule is approximately 20 inches long.

planting is late in the season, then either shade frames over the heel-in beds or artificial cold storage at 35 °F is recommended.

Tools for Planting

The most widely used tool for handplanting of beachgrass is the D-handle tile spade with an 18-inch blade. This can be thrust directly to a depth of 12 inches into the sand and provides the best hole that can be achieved for easy planting of the beachgrass culms. Planters normally make several hundred holes with this tool before planting.

Steep slopes must be planted by hand. However, on the less sloping areas, transplanting machines have been used with success since 1960 for larger plantings of 5 acres or more from Santa Maria, California, to Westport, Washington (Ternyik 1979b).

The planting machines now used for large plantings are modified, commercial row crop transplanting machines. The planting shoe was redesigned to get the 12-inch depths specified for beachgrass plantings. Pulling these machines are small, crawler type tractors equipped with a rear-mounted hydraulic hitch. Two machines are now used behind each tractor, with four people on the machines. This combination will allow five people (including driver) to plant from 1 to 3 acres per day, depending on the conditions at the site. The primary conditions determining planting speed are weather, degree of slope, and type of sand.

Methods of Planting

Beachgrasses should be planted to a depth of 12 inches and the sand compacted to remove air around the roots and stem nodes. The top of the plant should be upright and extend approximately 8 inches above the ground.

Handplanting requires wet sand, otherwise holes are not open and the planters break the stock trying to force it into a closed hole. This results in high plant mortality. Transplanting machines can plant through 6 inches of dry sand. As a last resort, irrigation also can prepare a dry dune for planting.

For most sites along the Pacific coast, a hill spacing of 18 inches, with three culms per hill is sufficient. On sites exposed to more severe weathering, in areas surrounded by particularly valuable property, or on steep slopes or sand sea cliffs, closer planting with hill spacing approximately 12 inches and up to five culms per hill is needed. Well-protected sites can be stabilized by wider-than-normal spacings. A summary of planting rates that were found to be successful on the

A

B

C

A beachgrass hand-planting operation includes (a) opening a 12-inch-deep hole in wet sand with a tile spade, (b) placing a beachgrass propagule in the hole and leaving an 8-inch top, and (c) tamping sand around the propagule with the heel of a boot.

Clatsop Plains area are given in table 2. True economy in planting is achieved when hill spacing and the number of culms per hill are adjusted to the onsite conditions.

Fertilizing the Plantings

All planted areas should be fertilized with coarse-particle ammonium sulfate commercial fertilizer (N-P-K 21-0-0). This formulation should be applied at a rate of 42 pounds of available nitrogen per acre (200 pounds) during a period of light wind and steady rain. Rain is needed to thoroughly dissolve the fertilizer—a minimum of 4 hours of light rain or 2 hours of a downpour. If this is not done, fertilizer granules will be transported by winds, resulting in uneven distribution. Experience and weather forecasts are vital to ensure that the fertilizer is dissolved shortly after broadcasting. Irrigation may be substituted for rain, but usually is costly.

If the forward slope is steep or if sand sea cliffs have been planted, fertilizer must be applied immediately after planting so that it can be caught in the footprints left by the planting operation. If not, the fertilizer will filter to the bottom of the slope as the sand dries and no growth will occur on upper slopes. It is recommended that fertilizer application on these steep banks be

doubled to 400 pounds of N-P-K 21-0-0 per acre. If necessary, irrigate lightly and long enough to dissolve the fertilizer.

In cases where planting stock is scarce, the use of fertilizer on plantings with wider-than-normal spacing may be cheaper than deferring planting until more stock becomes available.

Followup fertilization on established plantings is best done on the Pacific coast dunes when the most rapid spring growth begins. In Washington, this is April 1 to April 15; in Oregon, it is March 1 to April 1; and in California, it is February 15 to March 1. There is usually plenty of moisture at these times and this permits the fertilizer to penetrate to the grass root system.

This site needs fertilizer to maintain adequate cover.

Most fertilizer is applied by hand, out of buckets, or with hand-operated cyclone type spreaders. This is because newly planted beachgrass is severely damaged by tractor-mounted spreaders. Two-year-old, well-established beachgrass plantings can be fertilized with tractor-mounted spreaders with little damage. Fertilizer usually is not spread by airplane unless the almost ever-present winds, which tend to drift the fertilizer, are absent.

Maintaining Dunegrass Stands

In this initial stage of dune stabilization it is important to develop and maintain an even vegetal cover that is devoid of breaks until secondary or permanent cover is established. Some maintenance is usually necessary because of poor hill survival, excessively wide spacing, or failure to plant all exposed areas. This requires temporary brush mats in summer and prompt replanting in the winter. American beachgrass is the most satisfactory plant for such repair work because it competes better than European beachgrass with surrounding European beachgrass systems (McLaughlin and Brown 1942).

Table 2.—Hill spacing and culms per hill for European beachgrass

Site conditions	High-intensity stabilization		Moderate-intensity stabilization	
	Spacing	Culms	Spacing	Culms
	Inches	*Number*	*Inches*	*Number*
Steep slopes				
Windward				
Dry	12 by 12	3	18 by 18	5
Moist	18 by 18	5	18 by 18	3
Leeward				
Dry	18 by 18	5	18 by 18	3
Moist	18 by 18	3	24 by 24	5
Flat areas				
Exposed to high winds				
Dry	18 by 18	5	18 by 18	3
Moist	18 by 18	5	18 by 18	3
Exposed to moderate winds				
Dry	18 by 18	3	18 by 18	5
Moist	18 by 18	5	24 by 24	5
Irregular topography				
Exposed to high winds				
Dry	12 by 12	5	18 by 18	5
Moist	18 by 18	5	18 by 18	3
Exposed to moderate winds				
Dry	18 by 18	5	18 by 18	3
Moist	18 by 18	5	18 by 18	3

Project #Y214577

Appendix H
- Oregon Parks and Recreation Department -
Ocean Shore Permit Application Form

OREGON PARKS AND RECREATION DEPARTMENT
OCEAN SHORE PERMIT APPLICATION AND INSTRUCTIONS

SHORELINE PROTECTION STRUCTURE

In accordance with ORS 390.640, 390.715, and 390.725, no person shall make an alteration, or construct a pipeline, cable line or conduit or remove any natural product on any property that is within the ocean shore, without first obtaining a permit to do so from the Department.

Permit Instructions

An application is considered complete only when all required materials are received. This includes a completed Ocean Shore Permit Application and all additional required supporting documents, reports, drawings, affidavits, and fees. Incomplete applications will not be processed and will be returned to the applicant.

An Ocean Shore Permit Application and City/County Planning Department Affidavit shall be submitted for each individual tax lot and project.

To assist in submitting a complete application, please follow these step-by-step instructions:

Section 1. Proposed Project

Check appropriate box for the type of project. If the type of alteration project is not listed, provide a brief description on the line next to "Other."

Provide a brief description of the project in the box provided.

Provide estimated start and completion dates.

Section 2. Applicant Information

Owner: Provide the name, mailing address, phone number, fax number, and email address of the person who legally owns the property.

Agent: An agent is a person who is authorized by the owner to represent their interest during the permitting process with Oregon Parks and Recreation Department (OPRD). Examples of an agent may be another property owner, consultant, attorney or contractor. *Agents are optional*.

Primary Contact: If the legal owner has chosen to include an agent, indicate which party will act as the primary contact; owner or agent. This is the person OPRD will contact for any application questions or concerns.

Section 3. Property Location and Information

Provide situs address (physical address) of property. Provide the township, range, section, subsection, and tax lot number. (Do not list multiple tax lots in this section, as each individual tax lot requires a separate Ocean Shore Permit Application.)

Check the appropriate box to indicate the current use of the property.

Provide the zoning designation, the year in which the main structure was built.

Provide all lot dimensions and setbacks from property lines.

Provide the names, situs and mailing addresses of oceanfront landowners with property boundaries common to those of the property described in the application. For projects involving multiple tax lots, the most northern and southern oceanfront landowners of the entire project are all that is required.

If you do not know this information, it may be obtained from the county tax assessor's office and/or local planning office.

Section 4. Project Justification and Impacts

There shall be adequate justification for the proposed project to occur and alter the ocean shore area.

Provide a detailed description of the hazard and the threat it poses to the property to justify your request for alteration of the ocean shore area.

Describe all potential impacts this project may have in the short and long-term to neighboring properties, to recreation, scenic, safety, and natural resources of the ocean shore.

List the measures that will be taken to minimize those potential impacts. All projects will have some impact on the ocean shore; a "no impact" conclusion is not an appropriate answer.

Section 5. Project Details

Provide the total for the entire project, (this will include totals for all properties if the project includes multiple tax lots). Total length, height, width and slope specifics, and the total volume of all material and average rock size.

Your contractor or geologist should assist you with the specifics of all project materials, type, source, size, and amount.

Section 6. Analysis Of Hazard Avoidance

The application shall be accompanied by an analysis of hazard avoidance alternatives, including the relocation of existing buildings or other infrastructure. This analysis shall also describe why potential hazard avoidance alternatives are not feasible, or if tried why they were not successful. Relevant factors may include topographic limitations, the limitations of the area for relocation, or the cost. If the cost of moving a building or infrastructure is listed as a factor, the report shall include a cost estimate(s) from a licensed contractor specializing in building relocation.

Section 7. Geologic Report

Projects greater than 50 feet in length require a geologic report from a registered professional geologist experienced in coastal processes. This report should include:

- The potential impacts from the proposed project on sand source, supply, and movement on the affected beach as well as within the same littoral cell;
- The bank or bluff stability and erosion rates on the subject property and adjacent properties and the potential impacts of the proposed project on bluff stability and erosion rates on the subject and adjacent properties;
- A review of potential non-structural solutions, including, but not limited to, vegetative stabilization, non-structural dynamic revetments, and foredune enhancement. The review shall describe reasons why non-structural solutions were unsuccessful, if tried, or why they were considered unfeasible;
- The known or suspected geologic and seismic hazards in the project area and how the proposed project may affect or be impacted by those geologic and seismic hazards.

Section 8. Additional Permit Requirements

List any additional necessary permits and/or authorizations required by local, state, or federal agencies. Additional agencies may include city/county planning departments, Oregon Department of State Lands and/or U. S. Army Corps of Engineers.

Section 9. Signature Requirement

The owner's signature is required for acknowledgment and completion of the application. If an agent has been included, check the box authorizing the agent to act on your behalf with OPRD.

If an agent has been authorized, the agent's signature is also required for acknowledgment and completion of the application.

Section 10. Required Drawings

The application shall include a plot plan and a cross-section of the project, drawn to scale. Drawings shall be clear and concise and follow the format specifications outlined.

Section 11. Application Fees and Calculation Worksheet

Each application filed under ORS 390.640, for an alteration on the ocean shore shall be accompanied by a processing fee for the purpose of partial recovery to the department of its administrative costs.

The fee shall be determined according to the construction value of the project. Evidence the Department may consider in establishing the construction value of a project shall include: Itemized estimates from licensed, bonded, contractors; construction values accepted by the county or city for purposes of issuing local permits; itemized costs of equipment rental and other such charges if the project is completed by the property owner; estimates that reflect unit costs typically associated with the type, quality and standards of construction proposed in the application.

Complete the calculation worksheet based on construction value.

Additionally, the Department may require a cash bond, or other security acceptable to the Department, to ensure that the permittee complies with the terms of the permit.

City/County Planning Department Affidavit

Applicant and Property Details: The applicant shall complete all information in this section before submitting the affidavit to the appropriate city or county planning department for review and signature.

Planning Department Certification: This section is to be taken to the appropriate city or county Planning Department for completion and signature.

OREGON PARKS AND RECREATION DEPARTMENT
OCEAN SHORE PERMIT APPLICATION

SHORELINE PROTECTION STRUCTURES

FOR OFFICIAL USE ONLY

OPRD PERMIT #: _____
APPLICATION DATE: _____
DATE POSTED: _____
COORDINATOR: _____
60 DAY DUE DATE: _____

Section 1. Proposed Project

Project type:

☒ Riprap Revetment	☐ Vegetative Stabilization
☐ Seawall	☒ Other New Concrete Access Stairs

Provide a brief description of the project:

Build a riprap structure (and new integrated access stairs) ~ 600 feet in length with average height of ~24 ft and width of ~ 42 ft along dune and bluff at western side of SeaRidge Property, which is located at 4175 N Hwy 101, Depoe Bay, OR

Estimated project start date 10/18/23	Estimated project completion date 10/18/24

Section 2. Applicant Information

Owner SeaRidge Homeowners Association			Agent		
Mailing Address 4175 N. HWY 101			Mailing Address		
City Depoe Bay	State Oregon	Zip 97341	City	State	Zip
Phone (541) 805-6453	Fax		Phone	Fax	
Email searidgecondos@gmail.com			Email		

Primary Contact	☒ Owner	☐ Agent

Section 3. Property Location and Information

Situs Address 4175 N. HWY 101				
City/Town Depoe Bay		County Lincoln County		
Township 8S	Range 11W	Section 28	Subsection BA S1	Tax Lot Western 9000

Current Use

☐ Residential	☐ Commercial/Industrial	☐ Public
☒ Vacant (unbuilt)	☒ Other (explain) General Common Elements	

City/County Zoning Designation R-1, PD, RC	Year main structure was built Condos to the East ~1986

Lot Dimensions

Lot Size N/A	Oceanfront footage (in feet) ~613
Street front footage (in feet) None	East-West footage (in feet) ~277 (North) to ~499 (South)

Setbacks

Distance from eastern (or landward) property line to nearest building (in feet)	~60 feet to easternmost building
Distance from seaward dune crest or bluff edge to nearest building (in feet)	~18 feet to utility infrastructure
Approximate height of oceanfront bluff, dune or escarpment (in feet)	Variable, at times ~15 feet

List the names, situs and mailing addresses of oceanfront landowners with property boundaries common to those of the property or properties described in the application.

Name	Property situs address	Mailing address
Ruben J Menashe, Inc	No Situs Tax Lot 4700, Map 8-11-28BA	11359 NE Halsey Portland, OR 97230
SLAMA CAROL JEANNE TTEE & KLAMMER PETER JON TTEE &	4075 Lincoln Avenue Depoe Bay, Oregon	3343 NW Silktassel Drive Corvallis, OR 97330
KLAMMER JENNIFER AU TTEE ETAL		

Section 4. Project Justification and Impacts

Provide a detailed explanation of the hazards and threat to property:
See Engineering Geologic Investigation Report by HG Schlicker and Associates, Inc (HGSA #Y214577) and Supporting Application Documents

(Include documented supporting evidence, i.e. photographs, and/or chronology of bank retreat)

Attach additional pages as necessary

Describe all potential impacts:
See Engineering Geologic Investigation Report by HG Schlicker and Associates, Inc (HGSA #Y214577) and Supporting Application Documents

Attach additional pages as necessary

Describe measures that will be taken to minimize the impacts identified above:
See Engineering Geologic Investigation Report by HG Schlicker and Associates, Inc (HGSA #Y214577) and Supporting Application Documents

Attach additional pages as necessary

Section 5. Project Details

Total Length along shoreline (in feet)	~600	Height (in feet)	~24 feet
Total width of project (in feet)	~42		
Slope (ratio-horizontal to vertical)	outer face 2H:1V	Total volume of all material(s) (cubic yards)	8700

Riprap Specifications:

Armor stone type	Basalt	Armor stone source	TBD Upland Source
Diameter of armor stone (in feet)	3 to 7 feet	Amount of armor stone (cubic yards)	6600
Type of filter fabric	Mirafi 1100N or equivalent	Type of backing fill material	ODOT Class 200&Quarry-run
The amount of backing fill material (cubic yards)	2100	Will toe be keyed into bedrock?	☐ Yes ☐ No
Elevation of toe trench	~6 ft (NAVD 88)	Depth of toe trench	~14 ft

Section 6. Analysis Of Hazard Avoidance

Please verify that the attached hazard avoidance analysis includes:

☐ A list of hazard avoidance alternatives	
☐ A description of why hazard avoidance alternatives are not feasible	☒ If an alternative was tried, explain why it did not succeed

☐ Is the relocation cost estimate included? ***(If the cost of moving the building is listed as an unfeasible factor.)***

Section 7. Geologic Report

Please provide the following information:

Date of Report	7/31/23		Company	HG Schlicker and Associates, Inc.	
Geologist Name	Adam M Large		Geologist Certifications	RG, CEG	
Mailing Address	607 Main Street Suite 200				
City	Oregon City	State	Oregon	Zip	97045
Phone	(503) 655-8113	Fax	(503) 655-8113	Email address	hgsa@teleport.com

Please verify your geologic report contains all of the following information:

☒ The potential impacts from the proposed project on the sand source, supply, and movement on the affected beach as well as within the same littoral cell.	☐ A review of potential non-structural solutions, including, but not limited to: vegetative stabilization; non-structural dynamic revetments and foredune enhancement.
☐ The known or suspected geologic and seismic hazards in the project area and how the proposed project may affect or be impacted by those geologic and seismic hazards.	☐ The bank or bluff stability and erosion rates on the subject property and adjacent properties.

Section 8. Additional Permit Requirements

List the agency and type of permit required:

Lincoln County Flood Plain Development Permit

Lincoln County Building Permit for Access Stairs

☐ **No additional agency permit required**

Section 9. Signature Requirement

The application is hereby made for the ocean shore alteration described within this application. I certify that I am familiar with the information contained in this application, and, to the best of my knowledge and belief, this information is true, complete and accurate. I further certify that I possess the authority to undertake the proposed alteration.

I understand that the granting of an OPRD permit does not release me from obtaining any additional permits from any/all local, state, and/or federal agencies that may be required before commencing the project.

I understand that the payment of required OPRD processing fee does not guarantee the issuance of an approved permit.

Owner Signature Date

☐ *I (Owner) authorize the Agent included in this application to act on my behalf during this application process.*

Agent Signature Date

Section 10. Required Drawings

The submitted application shall be accompanied by a plan view and a cross-section of the proposed project. Neatness and accuracy are important in order for those reviewing the application to clearly understand the proposal. Copies of county assessor's maps may not be used as site plan maps.

For consistency and quality please follow these format specifications:

- **All Drawings shall be:**
  - On 8.5 X 11 inch white paper
  - In black ink or clear legible photocopy of plan(s)
  - Printed or typed (no cursive) minimum size 10 point font
  - Drawn with a straight-edge and not freehanded.
  - Drawn accurately to scale
  - Be labeled appropriately

- **Plan view drawing shall include:**
  - Scale of drawing and north arrow
  - All lot lines with dimensions
  - Existing structures
  - Roads, driveways, etc. (existing, proposed, or temporary access roads)
  - Setback distance from nearest structure or infrastructure to upper edge of bluff or dune edge
  - Location of proposed improvements in relation to Statutory Vegetation Line and Actual Vegetation Line
  - Location of proposed project in relation to all property lines
  - Location of the proposed project in relation to the top of the bluff or dune and the existing toe of bluff or dune

- **Cross-section (side view) drawing shall include:**
  - Scale of drawing
  - Location of the existing base of bluff or dune
  - Location of top of bluff or dune
  - Location of proposed project in relation to base and top of bluff or dune
  - Approximate length, in feet, the project will occupy beyond the existing toe of bluff or dune, include buried toe of proposed shoreline protection structure.
  - Depth of toe trench or footing
  - Slope of the project (width/height ratio (i.e. 2:1))
  - Overall height of the project from bottom of buried toe to the top
  - Armor stone layer with rock size accurately depicted
  - Thickness of armor stone
  - Backing fill layer with thickness accurately depicted
  - Type of filter fabric, if applicable

Section 11. Application Fees and Calculation Worksheet (to be submitted with application)

Each application filed under ORS 390.640, for an alteration on the ocean shore shall be accompanied by a processing fee for the purpose of partial recovery to the Department of its administrative costs. The fee shall be determined according to the construction value of the project.

The application processing fee shall be:
(a) $400 for projects with a construction value less than $2,500; or
(b) $400 plus three percent of the construction value over $2,500 for projects with a construction value equal to or greater than $2,500.

Please use the formula below to determine total application fees.

Total construction value of project		$		
Base construction value (Subtractable allowance)	-	$	2500.00	
Subtotal (construction value minus base fee)	=	$		(x .03 =)
3% of subtotal		$		
Add Base Fee	+	$	400.00	
TOTAL APPLICATION FEE	=	$		

EXAMPLE

Total construction value of project		*$*	*10,000.00*	
Base construction value (Subtractable allowance)	-	*$*	*2,500.00*	
Subtotal (construction value minus base fee)	=	*$*	*7,500.00*	*(x .03 = 225.00)*
3% of subtotal		*$*	*225.00*	
Add Base Fee	+	*$*	*400.00*	
TOTAL APPLICATION FEE	=	*$*	*625.00*	

Submitted Ocean Shore Permit Application shall include this completed fee worksheet, as well as, evidence of construction value

CITY/COUNTY PLANNING DEPARTMENT AFFIDAVIT

Applicant

Last	First	MI
SeaRidge Homeowners Assc		

Property Details

Township	Range	Section	Subsection
8S	11W	28	BA Supp Map No. 1

Tax Lot 9000

County

☐ Clatsop	☐ Tillamook	☒ Lincoln	☒ Lane
☐ Douglas	☐ Coos	☒ Curry	

Project Type

☐ Shorefront Protection	☒ Access/Other Misc.	☐ Sand Alteration
☐ Pipeline/Cable/Conduit	☐ Natural Product Removal	

Planning Department Certification
(To be completed by local planning official)

Part I

In accordance with Statewide Planning Goal #18, Beaches and Dunes alteration permits for beachfront protective structures may be issued only where development existed on January 1, 1977, or where an exception to this Goal 18 implementation requirement has been approved by the appropriate local jurisdiction. For the purpose of this requirement, the definition of "development" means houses, commercial and industrial buildings, and vacant subdivision lots which are physically improved through the construction of streets and provisions of utilities to the lot.

Above property meets Goal 18 Eligibility? ☐ Yes ☐ No ☐ Not Applicable

Part II

I have reviewed the proposed project application and have determined that:

☐ This project is not regulated by the local comprehensive plan and zoning ordinances.

☐ This project has been reviewed and **is consistent** with the local comprehensive plan and zoning ordinance.

☐ This project has been reviewed and **is not consistent** with the local comprehensive plan and zoning ordinance.

☐ The consistency of this project with the local planning ordinance cannot be determined until the following local approvals are obtained:

☐ Conditional Use Approval ☐ Zone Change ☐ Plan Amendment
☐ Development Permit ☐ Other (Specify) _____

Comments:

Local Planning Official Name **(Please Print)** Title

Signature Date

The completed/signed form shall be submitted with the completed Ocean Shore Permit Application

Appendix I
- Lincoln County Flood Plain Development Permit -

DEPARTMENT OF PLANNING AND DEVELOPMENT
210 SW 2nd St., Newport, OR 97365
(541) 265-4192; Fax (541) 265-6945

FLOODPLAIN DEVELOPMENT PERMIT APPLICATION

FLOODPLAIN DEVELOPMENT PERMIT OVERVIEW

Lincoln County's Flood Hazard Management Code (LCC 1.2005 through 1.2275), provides that all *development* within a regulatory floodplain must receive a Floodplain Development Permit. Development is defined by Lincoln County Code as any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations, or the storage or equipment or materials. A regulatory floodplain is the Special Flood Hazard Area (SFHA) as defined on the currently effective Flood Insurance Rate Maps for the Lincoln County. These maps are prepared by FEMA and adopted by Lincoln County.

APPLICANT INFORMATION

Name(s) of Property Owner(s):*

SeaRidge Homeowner Association

Attn: Aboo Balgamwalla, President

Mailing Address: 4175 N. HWY 101

Depoe Bay, Oregon 97341

Phone number: 541-764-2995

Fax number: _____

Email: searidgecondos@gmail.com

☒ **Tick box if Property Owner is Applicant**

Applicant:

_____

Mailing Address: _____

_____

Phone number: _____

Fax number: _____

Email: _____

**All property owners must be listed.*

DEVELOPMENT LOCATION

Address of Property: 4175 N. HWY 101, Depoe Bay, Oregon 97341

Township, Range, Section, Tax Lot: Map: 8-11-28BA Supp Map No. 1, Tax Lot 9000

*** ATTENTION ***

A MAP OR DIAGRAM (SITE PLAN / PLOT PLAN) IS REQUIRED WITH THIS APPLICATION

To accurately process a Floodplain Development Application, the applicant is required to submit a map or diagram with this application that shows the location of all proposed development on the property described above. Lincoln County will apply the most restrictive regulatory floodplain standards affecting the property described above to any proposed development unless sufficient evidence is provided to demonstrate a lessor standard is applicable. It is the applicant's responsibility demonstrate precise locations of existing and proposed development along with accurate scale and dimension references.

STAFF USE ONLY

RECEIVED DATE: _____, PERMIT NUMBER: _____, **PAGE#** 1 of 3

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FLOODPLAIN DEVELOPMENT PERMIT APPLICATION

PROJECT DESCRIPTION

STRUCTURAL DEVELOPMENT *(Check all that apply)*

Activity

☐ New Structure ☐ Addition *
☐ Alteration (*includes repairs or improvements*) *
☐ Relocation ** ☐ Demolition
☐ Replacement ☐ Electrical/Mechanical

Structure Type

☐ Single-Family ☐ Two-Family
☐ Multi-Family (*3+*) ☐ Manufactured Home
☐ Commercial Occupancy

Structure Type (*continued*)

☐ Non-Habitable (*includes docks, decks, etc.*)
☐ Combined Use (*Residential and Non-Residential*)
☐ Recreational Vehicle (*Includes electrical service*)
☐ Garage: ☐ Attached, ☐ Detached
☐ Agricultural Structure (*not for residential use*)
☐ Accessory Structure (*< 200 square feet*)
☒ Other (*please specify*):
Riprap Revetment and Access Stairs

**An alternation includes the repair or improvement of a structure. If the value of an addition or alteration to a structure equals or exceeds 50% of the value of the structure before the addition or alteration, the entire structure must be treated a substantially improved structure.*
***A relocated structure must be treated as new construction.*

CONSTRUCTION VALUE REQUIRED FOR ALL OF THE ABOVE

$_____

(Include **Appendix A** with this application)

OTHER DEVELOPMENT *(Check all that apply)*

☐ Septic System Installation (*Includes standards systems and ATT systems*)
☐ Clearing ☐ Fill ☐ Mining ☐ Drilling (*includes wells*) ☐ Grading ☐ Utilities
☐ Excavation or Removal of Fill (*Except for Structural Development Checked Above*)
☐ Dredging or Watercourse Alteration ☐ Drainage Improvement (*including culvert work*)
☐ Road, Street, or Bridge Construction ☐ Fish habitat restoration or enhancement*
☐ Partition, Subdivision, Planned Unit Development (*including revisions and amendments*).
☐ Fence (*type and material*): _____
☐ Other (*Please Specify*): _____
☐ Temporary encroachment (*less than 30 days – outside of flood season – April 15 through October 15*)
**For habitat restoration projects a rise in elevation may be allowed if a CLOMR is approved by FEMA. Permit shall not be issued, until FEMA approval is received.*

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RECEIVED DATE: _____, PERMIT NUMBER: _____, **PAGE#** 2 of 3

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FLOODPLAIN DEVELOPMENT PERMIT APPLICATION

This application is for a Floodplain Development Permit. Building Permits and any other permits require separate applications. By signing this application, I/we certify that I/we have lawful authority to apply for this permit for the property described in this application. I/we represent that all development described in this permit will be done in accordance with the conditions and requirements of this permit, the requirements of LCC 1.2005 through 1.2275, and with all other applicable local, state and federal regulations. I acknowledge that this application does not create liability on the part of Lincoln County or any officer or employee thereof for any flood damage that results from reliance on this application or administrative decision made lawfully hereunder. I further acknowledge the following:

1. When the Lincoln County's floodplain regulatory standards apply to a proposed development activity, no work of any kind may begin in a regulatory floodplain area until a floodplain development permit is issued.
2. This Floodplain Development Permit may be revoked if any false statements are made. If revoked, all work must cease until a new permit has been issued.
3. This permit will expire if no work is commenced within 180 days of the date of issue.
4. This permit will not be issued until any other necessary local, state, or federal permits have been obtained (approved).

I/We hereby acknowledge that this application is not considered complete and/or filed with Lincoln County Planning and Development Department until all information required by the department has been submitted and acknowledged, all required fees have been paid in full.

PROPERTY OWNER(S) SIGNATURE(S) (*All property owners must sign this form; provide additional pages as necessary*)

Name: SeaRidge Homeowners Association - Aboo Balgamwalla, President

Signature: _____, Date: _____

Name: _____

Signature: _____, Date: _____

Name: _____

Signature: _____, Date: _____

APPLICANT SIGNATURE (☒ *Tick this box if the PROPERTY OWNER is the APPLICANT*)

Name: _____

Signature: _____, Date: _____

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RECEIVED DATE: _____, PERMIT NUMBER: _____, **PAGE#** 3 of 3

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FLOODPLAIN DEVELOPMENT PERMIT APPLICATION

PERMIT APPLICATION EVALUATION AND STAFF DETERMINATION FORM

(STAFF USE ONLY)

Date Application Received: 7/31/23 Initials: MH

Date Application Determined Complete: 8/10/23 Initials: MH

Date Applicant Notified of Completeness: 8/10/23 Initials: MH

Fee: $105 Date Paid: 8/10/23 Receipt No. 94574 Initials: MH

SECTION 1

1. Is the **property (parcel/lot)** where development is proposed at least partially within (horizontally within) the regulatory floodplain?
   - ☐ Yes
   - ☐ No, (If the answer is "No" then a floodplain development permit is NOT required)
2. Is the **site** where development is proposed at least partially within (horizontally within) the regulatory floodplain?
   - ☑ Yes
   - ☐ No, (If the answer is "No" then a floodplain development permit is NOT required)
3. Has the applicant provided a Letter of Map Change (LOMC) (i.e. LOMA, LOMR-F, LOMR), or has FEMA made a formal determination that this property or proposed development site is out of the regulatory floodplain?
   - ☐ Yes, (If the answer is "Yes" then a floodplain development permit is NOT required but a copy of the LOMC must be kept in the permitting records.)
   - ☑ No
4. The proposed development is located on FIRM Panel: 41041C0235E
   Dated: 10/18/2019
5. The proposed development is located partially or fully within the horizontal boundaries of the Special Flood Hazard Area, Zone(s): VE (A, AE, AO, V, or VE)

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6. The one-percent-annual chance (100 year) flood elevation at this site is: 38 ft NGVD 29 / NAVD 88 (circle the correct datum),

   Source: FEMA NFIP DATA 2019 ☐ None Available

7. Is the proposed development located partially or fully within a designated Floodway?
   ☐ **Yes** ☑ **No**

8. If "Yes" was answered to (7.) above, then is a "No Rise Certification" or "Step Back-Water Analysis" with supporting engineering hydrologic and hydraulic data required?
   ☐ **Yes** ☐ **No**

9. Are other federal, state, local permits required? ☐ **Yes** ☐ **No**

   If yes, which ones: OPRD Shoreline Alteration Permits

10. Is the application for a partition, subdivision, or planned unit development?
    ☐ **Yes** ☑ **No**

[SECTION 1 COMPLETED BY: Megan Hoff DATE: 8/16/23]

SECTION 2

SUBSTANTIAL IMPROVEMENT REVIEW

Market Value x 50% (.50) = Substantial Improvement Threshold

1. What is the market value (based on current Assessor data) of the existing structure prior to damage/improvement? $_____

2. What is 50% of the estimated market value of the existing structure prior to damage/ improvement (use the formula provided above) $_____

3. Has Appendix A been completed?
   ☐ **Yes** ☐ **No**

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4. Does the total cost of the proposed construction cost noted in Appendix A match the cost of the proposed construction provided in the Floodplain Development Permit Application?
   ☐ **Yes** ☐ **No**

5. Proposed construction cost $_____

6. Is the value listed in line "2." of this section, equal to or greater than the value listed in line "5."?
   ☐ **Yes**

   ☐ **No** (If "No", then the proposed development activity qualifies as a substantial improvement*).

7. Does the proposed development activity qualify as a substantial improvement**?
   ☐ **Yes** ☑ **No**

**Construction cost estimates must include all structural elements, interior finish elements, utility and service equipment, labor and other costs associated with demolishing, removing, or altering building components, and construction management. As well as any improvements being made to repair damage that go beyond just making repairs to return to pre-damaged conditions.*

***If the cost of the proposed construction equals or exceeds 50 percent of the market value of the structure, then the entire structure must be treated as a substantially improved structure and the substantial improvement provisions shall apply. See FEMA publication P-758, Substantial Improvement/Substantial Damage Desk Reference for more information regarding substantial improvement.*

Additional Information Required:

_____

_____

_____

_____

[SECTION 2 COMPLETED BY: Megan Hoff DATE: 8/16/23]

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FLOODPLAIN DEVELOPMENT PERMIT APPLICATION

SECTION 3

APPLICATION DETERMINATION

Are the proposed development activities determined to be in conformance with the provisions of the LCC 1.2005 through 1.2275? ☑ **YES** ☐ **NO**

If Yes, then this permit is issued, subject to the following conditions, attached to and made part of this permit:

Per the submitted Engineering Geologic Investigation Report prepared by H.G. Schlicker & Associates dated July 19, 2023, the proposed alterations of a revetment and staircase on the ocean shore front (i.e., primary frontal dune) is reasonably not anticipated to increase the potential for flood damage to adjacent sites and structures (LCC 1.2260(8)).

All activities authorized with this permit as represented by the applicant are subject to the jurisdiction and regulation of the Oregon Department of Parks and Recreation, Ocean Shores Division.

☐ **See attached conditions**

Planner/Floodplain Administrator: Megan Hoff

Signed: [redacted] Dated: 8/18/23

Date Applicant Notified of Application Determination: 8/18/23 Initials: MH