Tillamook County

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

1510 – B Third Street
Tillamook, Oregon 97141
www.tillamook.or.us

Building (503) 842-3407
Planning (503) 842-3408
On-Site Sanitation (503) 842-3409
FAX (503) 842-1819
Toll Free 1 (800) 488-8280

Land of Cheese, Trees and Ocean Breeze

ADMINISTRATIVE REVIEW 851-16-000149-PLNG:
PASTEGA OCEANFRONT SETBACK LINE DETERMINATION
Decision Date: January 5, 2017

Decision: APPROVED WITH CONDITIONS

(This is not Building or Placement Permit Approval)

Report Prepared by: Sarah Absher, CFM, Senior Planner

I. GENERAL INFORMATION:

Request: An administrative review request for an Oceanfront Setback Line determination for the remodel or replacement of an existing single family (Exhibit B).

Location: Located within the Oceanside Community Boundary, the subject property is at 1816 Maxwell Mountain Road, a County road, the subject property is designated as Tax Lot 2200 of Section 25AA, Township 1 South, Range 11 West of the Willamette Meridian, Tillamook County, Oregon.

Zone: Planned Development (PD) Zone

Applicant: C. Wayne Cook, PLS, 3180 Aldercrest Rd, Tillamook, OR 97141

Property Owner: Dennis Pastega, Trustee, P.O. Box 94, Oceanside, OR 97134

Property Description: The subject property is located east of the Maxwell Point headland and lies on a generally southwest-facing hillside and small headland (Maxwell Point). The subject property is improved with structures once operated as a motel and now converted into residential use. Portions of the subject property are cleared of vegetation and the undeveloped portions of the subject property are densely vegetated. The subject property is accessed via Maxwell Mountain Road, a County road, which abuts the property to the east. The subject property is bordered by residential properties to the north and south, and Maxwell Point to the west (Exhibit A).

II. APPLICABLE ORDINANCE AND COMPREHENSIVE PLAN PROVISIONS:

The desired use is governed through the following Sections of the Tillamook County Land Use Ordinance (TCLUO). The suitability of the proposed use, in light of these criteria, is discussed in Section III of this report:

III. ANALYSIS:

A. TCLUO Section 3.530(4)(a)(1)(c):

(1) The Oceanfront Setback Line (OSL) determines how close to the ocean any structure other than an approved structure for oceanfront protection or stabilization or for beach access may be located, subject to any additional setback necessary to meet site-specific hazard concerns.

The OSL is landward of the crest of the active foredune and is approximately parallel to the Oregon Coordinate Line. In all cases, the OSL is measured from the most ocean ward point of a structure which is higher than three feet from existing grade.

The exact location of the OSL depends on the location of oceanfront buildings near the proposed structure and upon the location and orientation of the Oregon Coordinate Line. For purposes of determining the OSL, "building" shall be limited to a permanent residential, commercial or industrial structure attached to a fixed foundation, and located within 500 feet of the Oregon Coordinate Line. Accessory structures or RV's shall not be used in making this determination.

(a) If there are legally constructed buildings within 300 feet of the exterior boundary of the subject property to both the north and the south, the OSL is a line drawn between the most ocean ward point of any legally constructed portion of the nearest building to the north and the nearest building to the south.

(b) If there are legally constructed buildings within 300 feet to the north only or to the south only, the OSL is the average setback from the Oregon Coordinate Line of all such buildings.

(c) If there are no legally constructed buildings within 300 feet to either the north or south on oceanfront lots, the OSL is the average oceanfront setback from the Oregon Coordinate Line of the nearest two such existing buildings.

(2) In cases where the above method of OSL determination requires development to be set back further from the Beach Zone line than is required by geologic hazards or protection of the ocean view of existing development on oceanfront property, the Planning Director may determine the setback distance which will apply. The intent of this provision is to limit this application of the Director's discretion to those rare and unusual circumstances where the above method of determining the OSL produces an unreasonable and inequitable result. In such instances, a public meeting for purposes of discussing the proposed setback shall be held and recorded. Notice shall be given to surrounding property owners and persons requesting notice pursuant to the notice requirements set forth in Article 10 of this ordinance.

Findings: This request was noticed on May 20, 2016 in accordance with Article 10 and a public meeting was held in the Community of Oceanside on June 4, 2016 during a regularly scheduled Oceanside Neighborhood Association (CAC) meeting. Those present included members of the community, DCD staff, Mike Dowd (architect for Mr. Pastega) and C. Wayne Cook (surveyor). Main comments received at this meeting included safety concerns about construction above the public beach and stability of the site.

An updated geotechnical report was received by the Department on November 30, 2016. The report was prepared by J. Douglas Gless, MSc, RG, CEG, LHG of H.G. Schlicker and Associates to address concerns about stability of the site and acceptable construction practices for re-development of this property. The report outlines the following:

- Three drilled exploratory borings to depths of up to 26.5 feet below ground surface were performed during a site visit on September 5, 2013. The contents of those borings are described in the July 2014 geotechnical report (HGSA Y#123599). Free groundwater was not encountered in the borings.
- There are two mapped faults which cut Maxwell Point and are located near the site. There are no indications of recent activity on these faults.
- A soldier pile retaining wall and erosion control measures were constructed around/early 1990's to stabilize a portion of the northern slope. Site visit observations by HGSA representatives were that the fluff slope at the site has been receding slowly and intermittently due to shallow sliding. The report notes that this is a common and ongoing process along bluff slopes in the Oceanside area.
- Land sliding near the southwest corner of the western building at the site has resulted in bluff recession. The upper edge of the bluff at this location is now approximately 6.5 feet from the structure at its closest point, to more than 36 feet along the slope north of the building. A scarp approximately 10 to 17 feet high is present at the southwest building corner as a result of frequent shallow sliding.

As outlined in the geotechnical report, the main engineering geologic concerns at the site are:

- Bluff slope recession.
- The small distance between the location of existing structures and the upper edge of the bluff slope, particularly in the southwest corner of the western building where the foundation lies 6.5 feet from the failing bluff edge.
- Oregon State Parks and Recreation Department (OPRD) will require removal of any structural elements such as the previously proposed soldier pile wall at the southwest corner of the western building or even foundation elements that extend into State Park's jurisdictional area. It is not known at this time where the location of the statutory vegetation line would be determined today.
- Excavation of the Maxwell Point tunnel entrance can contribute to destabilization of the slope.
- Inherent regional risk of earthquakes and tsunamis along the Oregon Coast.

The geotechnical report outlines standards for site preparation, structural fill, wet weather grading, cut and fill slopes, erosion control, dewatering of excavations, foundations, piles, retaining walls, seismic consideration, and site drainage. The geotechnical report recommends a minimum setback of 30-feet from the upper bluff edge for all foundations.

Staff finds that previous approval allowed for a 20-foot rear yard setback. In conversations with OPRD, an Ocean Shore Permit may be required for development. Provided that a 20-foot setback from the westerly property line(s) is maintained as discussed, OPRD does not have any concerns with the proposed development. OPRD is also agreeable to some sort of barrier along/up to the Pastega property line (post and cable or fencing as discussed).

V. CONCLUSION

Based upon the information received and comments received from affected agencies and the public, the Department finds that a reasonable Oceanfront Setback Line can be established on the subject property. The Oceanfront Setback Line shall be measured 20-feet from the western property line and 20-feet from those property lines fronting and abutting land under Oregon State Parks jurisidction. As recommended in the H.G. Schlicker & Associates geotechnical report dated November 30, 2016, a minimum 30-foot setback for all foundations shall be maintained from the upper bluff edge. An OPRD approved barrier may be constructed along the property lines. Geotechnical review is required for any ground disturbance.

Appeal of this decision. This decision may be appealed to the Tillamook County Planning Commission, who will hold a public hearing. The forms and fees must be filed in the office of this Department before **4:00 PM on January 17, 2017.**

VI. CONDITIONS OF APPROVAL:

1. The applicant/property owner shall obtain all Federal, State, and Local permits, as applicable, prior to construction/development.

2. An updated Geologic Hazard Report in accordance with TCLUO Section 4.130 shall be submitted to the Department prior to or at the time of submittal for Zoning and Building Permits. The updated Geologic Hazard Report shall detail building/construction and site preparation requirements/recommendations. An inclometer shall be installed at the southwest corner of the foundation as recommended in the H.G. Schlicker and Associates November 16, 2016 geotechnical report.

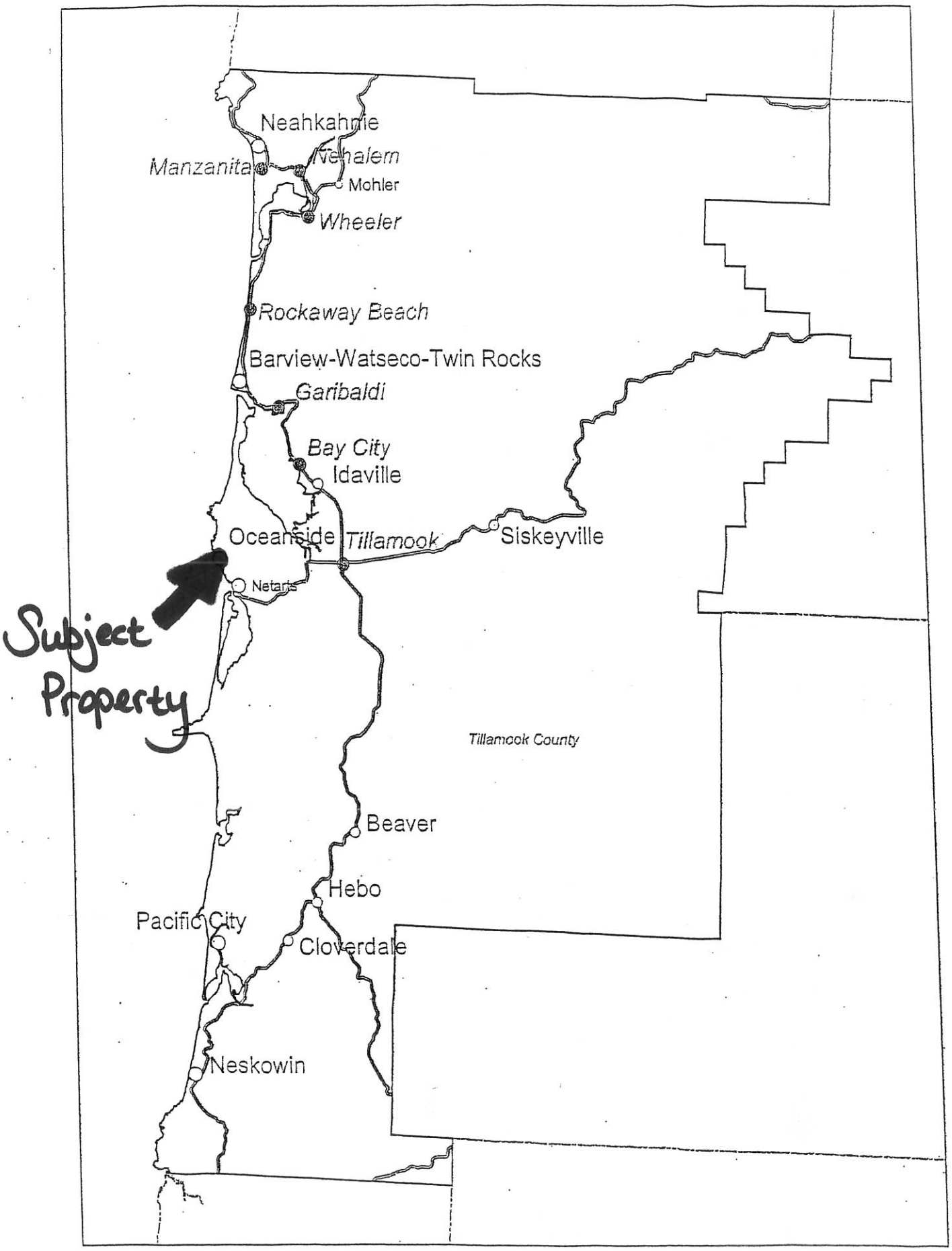
3. The applicant/property owner shall not site any structures west of the approved Ocean Setback Line, measured 20-feet from the western property line and 20-feet from those property lines fronting and abutting land under Oregon State Parks jurisidction. All foundations shall be setback at least 30-feet from the upper bluff edge.

4. Fencing or a safety barrier constructed within the 20-foot setback is subject to review and approval from the Oregon State Parks and Recreation Department (OPRD). A letter from OPRD shall be submitted to the Department of Community Development prior to construction/installation, confirming the proposed materials and location of the fending/safety barrier is acceptable. A letter of conformance from the geotechnical professional is required prior to construction/installation of the fencing/safety barrier, confirming that the location and proposed construction methods are consistent with the development recommendations outlined in the Geologic Hazard Report.

VI. EXHIBITS

All Exhibits referred to herein are, by this reference, made a part hereof:

A. Location map, Assessor map, Zoning map, Aerial Photograph, and Assessor's Summary Report
B. Applicants/Property Owner's submittal
C. Public / Agency comments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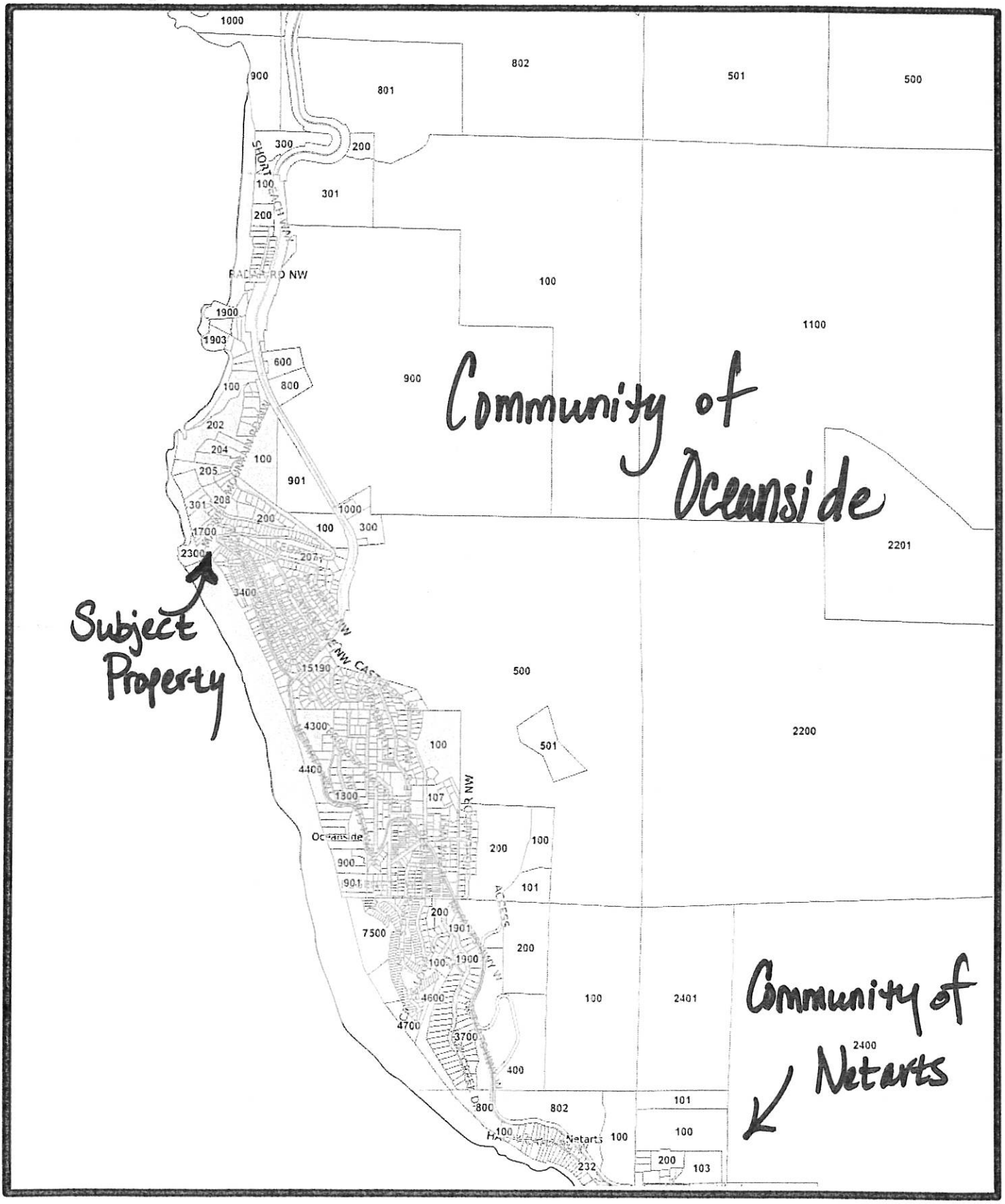
Manzanita
Nehalem
Mohler
Wheeler
Rockaway Beach
Barview-Watseco-Twin Rocks
Garibaldi
Bay City
Idaville
Oceanside
Tillamook
Siskeyville
Netarts
Subject Property
Tillamook County
Beaver
Hebo
Pacific City
Cloverdale
Neskowin

EXHIBIT A

Map



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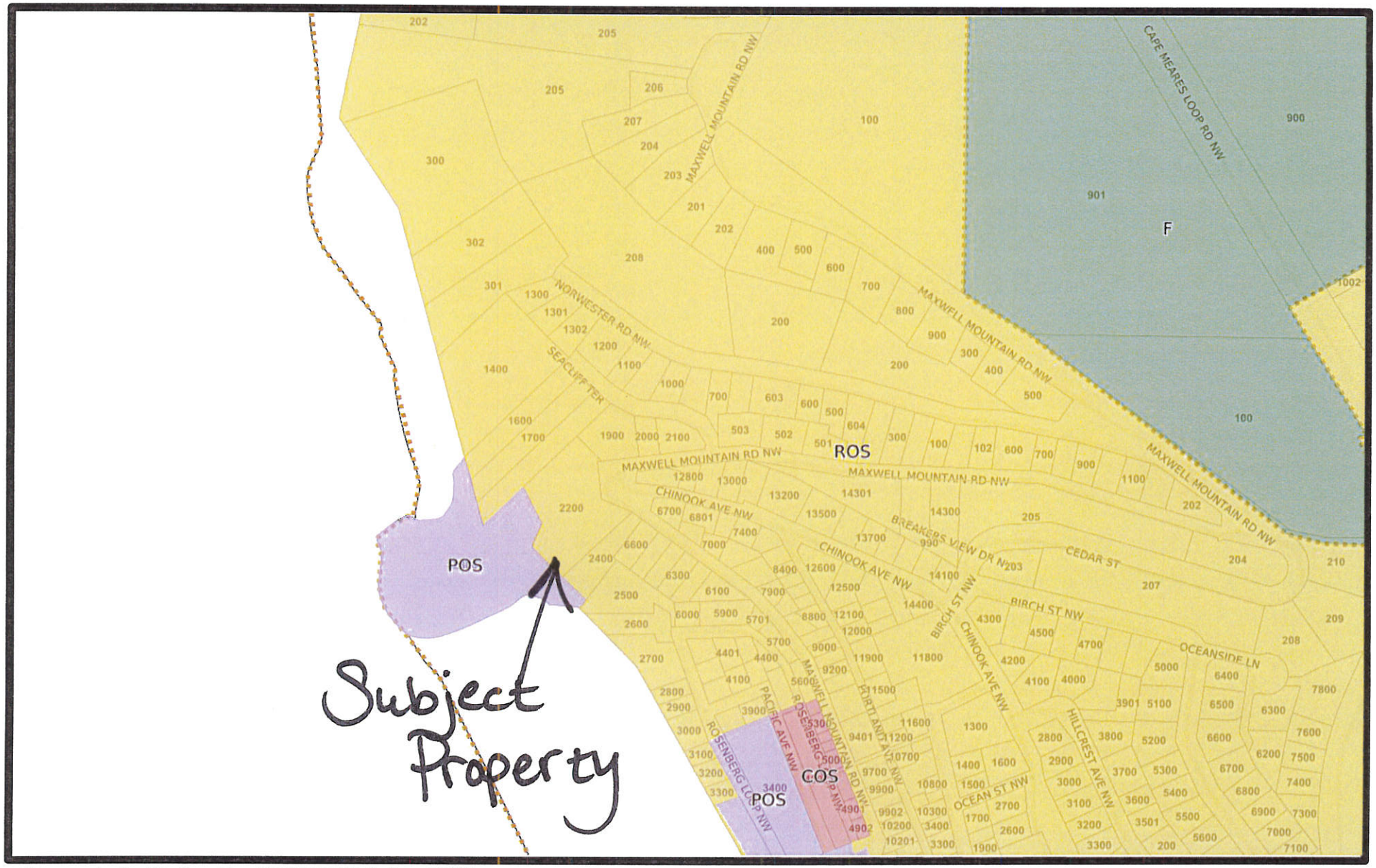
Map



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

PLANNING APPLICATION

OFFICE USE ONLY
Date Stamp
RECEIVED
APR 13 2016
By MS

☐Approved ☐Denied
Received by: MS
Receipt #:
Fees: $409.00
Permit No:
851-16-000149-PLNG

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

Name: C. Wayne Cook Phone: 503 842 8380
Address: 3180 Aldercrest Rd.
City: Tillamook State: OR Zip: 97141
Email: cwaynecook@charter.net

Property Owner

Name: Denny Pastega Phone: 5038428281
Address: 2001 Blue Heron Dr., Hwy 101 N.
City: Tillamook State: OR Zip: 97141
Email: dennypastega@gmail.com

Request: See Attached For OSL

Type II	Type III	Type IV
☐ Farm/Forest Review	☐ Appeal of Director's Decision	☐ Appeal of Planning Commission Decision
☐ Conditional Use Review	☐ Extension of Time	☐ Ordinance Amendment
☐ Variance	☐ Detailed Hazard Report	☐ Large-Scale Zoning Map Amendment
☐ Exception to Resource or Riparian Setback	☐ Conditional Use (As deemed by Director)	☐ Plan and/or Code Text Amendment
☐ Nonconforming Review (Major or Minor)	☐ Ordinance Amendment	
☐ Development Permit Review for Estuary Development	☐ Map Amendment	
☒ Administrative Review	☐ Goal Exception	
☐ Foredune Grading Permit Review		

Location:

Site Address:

Map Number: 1S (Township) 11W (Range) 25AA (Section) 2300 (Tax Lot(s))

Clerk's Instrument #: _____

Authorization

This permit application does not assure permit approval. The applicant and/or property owner shall be responsible for obtaining any other necessary federal, state, and local permits. The applicant verifies that the information submitted is complete, accurate, and consistent with other information submitted with this application.

Property Owner Signature (Required) — Date: 4-12-2016

Applicant Signature: C. Wayne Cook — Date: 4/12/16

EXHIBIT B

PHONE 503*842-8380
IF NO ANSWER 503*842-4787
FAX 503*842-1761

MEMBER

SERVING THE COMMUNITY
SINCE 1977

C. WAYNE COOK LAND SURVEYING

3180 ALDERCREST, TILLAMOOK, OREGON 97141

Email cwaynecook@charter.net

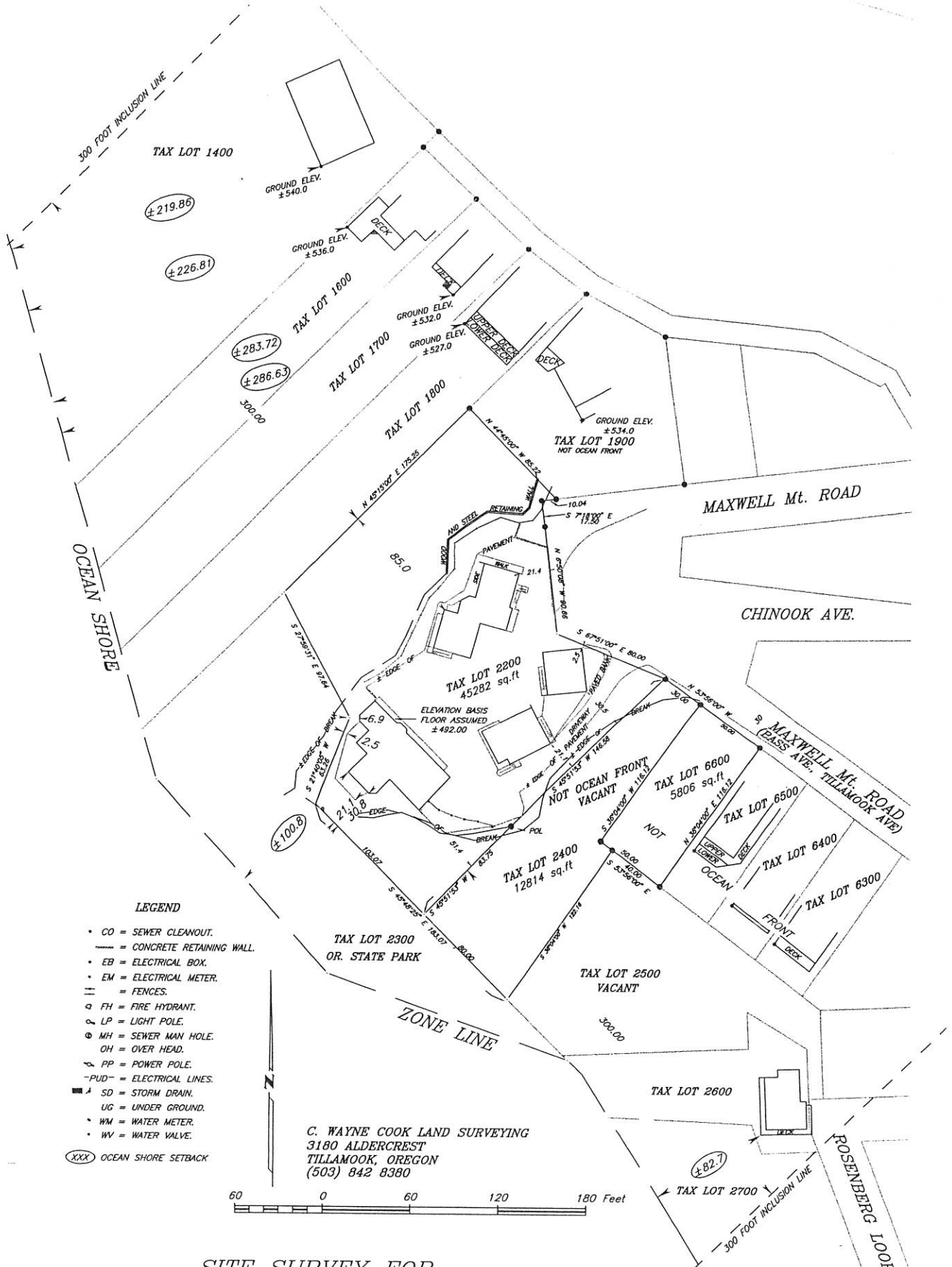
April 12, 2016

Attachment to, Tillamook County Department of Community Development Planning Application for Administrative Review for Tillamook County Tax Lot 1S11W-25AA-2200.

Request: Remodel the most Westerly structure on the subject property, to expand the existing second story deck on the Southwesterly portion of the subject structure.

C. Wayne Cook

C. Wayne Cook, Applicant



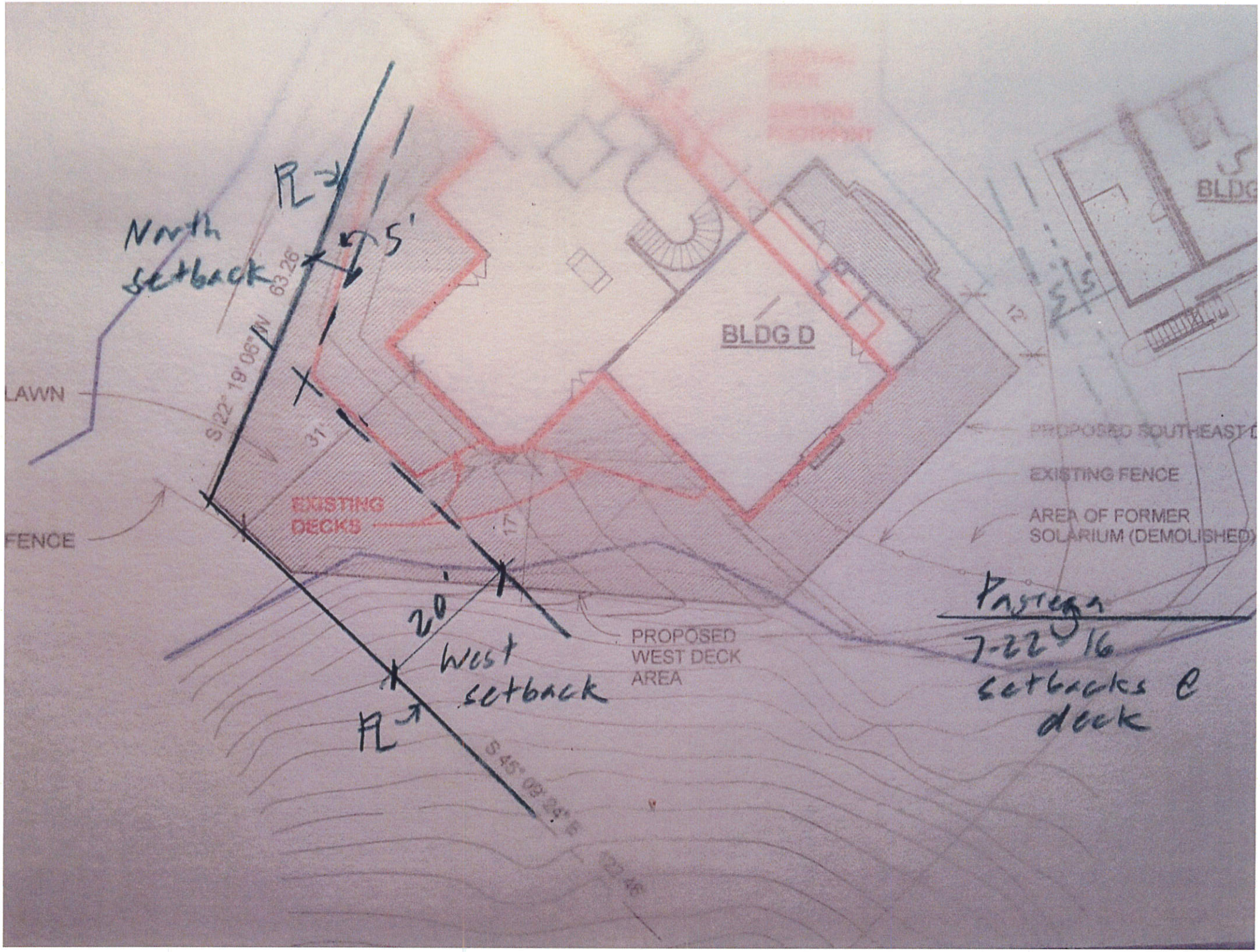
SITE SURVEY FOR
DENNY PASTEGA
TAX LOT 1S10W-25AA-2200 & 2400
TILLAMOOK COUNTY, OREGON
APRIL 4, 2016

RESISTERED
PROFESSIONAL
LAND SURVEYOR

C. Wayne Cook

OREGON
JULY 22, 1977
C. WAYNE COOK
1098

RENEWAL DATE 12-31-17


North setback
5'
BLDG D
EXISTING DECKS
PROPOSED WEST DECK AREA
West setback
20'
LAWN
FENCE
EXISTING FENCE
AREA OF FORMER SOLARIUM (DEMOLISHED)
Pasiega
7-22-16
setbacks @ deck

Update To A
Geologic Hazards Study and Geotechnical Report
Tax Lots 2200 and 2400, Map 1S-11-25AA
1816 Maxwell Mountain Road
Oceanside, Tillamook County, Oregon

Prepared for:

Mr. Denny Pastega
10255 Fairview Road
Tillamook, Oregon 97141

November 21, 2016
Project #Y163980

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

Update To A
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(503) 655-8113 · FAX (503) 655-8173

Project #Y163980

November 21, 2016

To: **Mr. Denny Pastega**
10255 Fairview Road
Tillamook, Oregon 97141

Subject: **Update To A Geologic Hazards Study and Geotechnical Report**
Tax Lots 2200 and 2400, Map 1S-11-25AA
1816 Maxwell Mountain Road
Oceanside, Tillamook County, Oregon

Dear Mr. Pastega:

The accompanying report presents the results of our update to a geologic hazards study and geotechnical report for the above subject site.

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.

J. Douglas Gless, MSc, RG, CEG, LHG
President/Principal Engineering Geologist

JDG:cjh

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H.G. Schlicker & Associates, Inc.
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Project #Y163980

November 21, 2016

To: **Mr. Denny Pastega**
10255 Fairview Road
Tillamook, Oregon 97141

Subject: **Update To A Geologic Hazards Study and Geotechnical Report**
Tax Lots 2200 and 2400, Map 1S-11-25AA
1816 Maxwell Mountain Road
Oceanside, Tillamook County, Oregon

Dear Mr. Pastega:

1.0 Introduction

At your request and authorization, the undersigned representative of H.G. Schlicker and Associates, Inc. (HGSA) visited the subject site on November 8, 2016 to complete an update to a geologic hazards study and geotechnical report for the former Clifftop Inn, consisting of Tax Lots 2200 and 2400, Map 1S-11-25AA located at 1816 Maxwell Mountain Road in Oceanside, Oregon (Figures 1, 2, and 3; Appendix A). We understand that you propose to renovate and remodel the existing buildings at the site.

This report addresses the geotechnics and geologic hazards at the site with respect to the proposed construction (refer to Section 2.1 below). The scope of our work consisted of site visit observations, review of previous work at the site including our May 2012 Geologic Hazards Study (HGSA #Y123565) and July 2014 Geotechnical Investigation report (HGSA #Y123599), a limited review of the geologic literature, interpretation of geologic and topographic maps, interpretation of stereo aerial photography and lidar, geotechnical analysis, and preparation of this report with our findings, conclusions and recommendations for new construction.

2.0 Site Description

The subject site is located immediately east of the Maxwell Point headland in Oceanside, Oregon and consists of two adjoining, irregular shaped lots totaling approximately 1.33 acres (Figures 1, 2, and 3; Appendix A). The site has existing structures consisting of 5 buildings on slabs, and a soldier pile retaining wall at the northern part of the property (Figure 4). The site has been used as a commercial motel in the past but is zoned residential (Melissa Stresing, Tillamook County Planning Department personal communication, November 2016). The site lies on a generally southwest-facing hillside and small headland (Maxwell Point). A pedestrian access tunnel projects north-south through Maxwell Point at beach level, just west of the subject property.

The site is sparsely to densely vegetated with grass, ornamentals, shore pine trees, salal, blackberry and other brush; however, most of the area of Tax Lot 2200 is paved. The site is bound to its east and northeast by Maxwell Mountain Road which provides access, to its west by Maxwell Point and southwest by the slope break of Maxwell Point and the Pacific Ocean, and to its southeast, north and northwest by adjacent lots on steep slopes which are unstable in areas. State Park lands border the subject property along its west side.

2.1 Proposed Project

We understand that you plan to redevelop the site by remodeling the existing western building (Figure 4). The proposed remodel as shown on the site plan will mostly use the existing building footprint, but the eastern side will be extended further east, and decks extending to the north, south and west are proposed.

3.0 Geologic Hazards Analysis

Our geologic hazards analysis is presented below.

3.1 Bedrock, Soil Types, and Structures

The site lies in an area which has been mapped as Miocene volcanic rocks consisting of massive basaltic breccia, basaltic flow rocks, palagonitic breccias and pillow basalts (Schlicker et al., 1972). These basaltic units are chemically indistinguishable from lava flows of the Columbia River Basalt Group and are believed to be part of this formation (Beeson et al., 1979). The Columbia River Basalt Group consists of flood-basalts which were erupted from fissures in eastern Oregon and Washington and western Idaho from approximately 16.5 to 6 million years ago.

Much of Oceanside lies in an area mapped as landslide topography, and ancient landsliding has disturbed many of the volcanic rock units in the area. Relatively undisturbed basaltic rock is exposed in outcrops along the hillside east of the site, consisting of weathered, fractured, moderately vesicular basalt; the rock appears relatively fresh to highly weathered which indicates highly variable weathering conditions caused, in part, by joints and fracturing patterns within the rock structure. Rock in the Maxwell Point cliffside (observed from beach level) partly consists of colluvium and landslide debris, underlain by weathered and fractured, vesicular basalt and basaltic breccia; and exposed basalt, basaltic breccia and palagonite materials where vegetation has been removed by landsliding.

At the time of our September 5, 2013 site visit we explored subsurface conditions by advancing three drilled exploratory borings to depths of up to 26.5 feet below the ground surface (bgs). Drilling was accomplished using a Diedrich D-25 drill rig with the rotary wash method. Standard Penetration Tests (SPTs) were conducted at select depth intervals to obtain in situ soil strength data based on penetration resistance (blow counts or "N" values) and samples were collected for later observation. Samples were visually

classified in the field by a geologist from our office according to the Unified Soil Classification System (USCS) and U.S. Bureau of Reclamation (USBR, 1998) standards for Rock. Approximate locations of the borings are shown on Figure 4, and detailed logs are provided in Appendix B of our July 2014 site geotechnical report (HGSA #Y123599).

The borings encountered generally weathered basaltic rock and breccia of variable consistency, with minor sandy silt matrix encountered in split spoon samples retrieved from below 7.5 feet depth. Parking lot asphalt a few inches thick was present at the ground surface, overlying several inches of concrete slab in the area of the borings. Refusal on concrete/rock fragments was encountered at shallow depth in boring B-1, and change of location to boring B-2 approximately 4 feet northeast obtained refusal on basaltic rock at approximately 7.5 feet depth. Boring B-3 operations were terminated at 26.5 feet depth due to hazardous weather conditions (lightning) endangering the drilling crew and equipment. Free groundwater was not encountered in the borings.

3.1.2 Geologic Structures

Structural deformation and faulting along the Oregon Coast is dominated by the Cascadia Subduction Zone (CSZ) which is a convergent plate boundary extending for approximately 680 miles from northern Vancouver Island to northern California. 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 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).

Two generally northwest-southeast trending faults which cut Maxwell Point have been mapped at and near the site (Schlicker et al., 1972). These faults cut the Miocene aged volcanic rocks which underlie the site. There are no indications of recent activity on these faults. The nearest mapped potentially active fault is the Netarts Bay fault (also known as the Happy Camp fault) which lies at the north end of Netarts Bay, approximately 2.5 miles south of the site (Geomatrix, 1995). This fault is a west-northwest trending, high angle reverse fault which cuts Miocene basaltic and Pleistocene channel deposits. This fault is believed to have been active approximately 125,000 years ago, however it does not appear to cut 80,000 year old marine terrace deposits which suggests that the fault has not been active for at least 80,000 years (Geomatrix, 1995).

3.2 Slopes

The buildings at the site lie at an elevation of approximately 180 feet above beach level (Figure 1; Appendix A). As noted above, the site lies along the near vertical bluff slope and headland of Maxwell Point, west of a generally westerly-facing hillside, much of

which is mapped as ancient landslide terrain (Schlicker et al., 1972). Slope morphology in the general area of Oceanside is irregular and somewhat hummocky due to ancient landsliding. Slopes to the north generally vary from approximately 23 degrees to 48 degrees. Slopes at the southwest corner of Tax Lot 2200 are generally about 50 degrees to near vertical. Slopes on the southern part of Tax Lot 2400 are up to 34 degrees to the southeast; along the bluff to the west slopes are 40 degrees and steeper.

3.3 Orientation of Bedding Planes in Relation to the Dip of the Surface Slope

Determination of bedding plane orientations in the Miocene volcanic rocks which underlie the site is difficult due to irregular unit contacts, poor exposure, disturbance by ancient landsliding, and vegetative cover. The massive and brecciated nature of the mapped volcanic units in the area also masks bedding orientation. Mapping completed by Schlicker et al. (1972) does not provide bedding plane orientations for the volcanic rocks in the Oceanside area, possibly due to the difficulties in obtaining accurate orientations, as discussed above. Along this section of the Oregon coast Tertiary bedrock units in which bedding plane orientations can be obtained typically dip down toward the west from 5 to 20 degrees (Schlicker et al., 1972).

Surface slopes in the area of Oceanside and at the subject site are primarily controlled by the morphology of the ancient landslide which underlies Oceanside south of the subject site, and the more resistant rock which forms Maxwell Point. The presence of the landslide in the area, and the direction of slip, is likely in part controlled by the regional dip of the underlying rock units. The ancient landslide failed down toward the west-southwest which is consistent with west dipping bedrock units.

3.4 Site Surface Water Drainage Patterns

Surface water at the site generally flows from pavements toward the east to the stormwater system along Maxwell Mountain Road, toward the west/southwest to the bluff, and northerly and northwesterly to steep slopes. At the time of our site visit, we observed no springs or streams at or in the immediate vicinity of the site.

3.5 Slope Stability and Erosion

As discussed above, much of Oceanside lies in an area which has been mapped as landslide topography (Schlicker et al., 1972; Allan and Priest, 2001; Burns and Watzig, 2014). The area of mapped landslide topography extends from the south side of Maxwell Point at the north end of Oceanside south for approximately 1,000 feet, and from the coastline east for approximately 1,700 feet. At the time of our site visit we observed no indications of recent activity of this ancient landslide. The main landslide mass appears to have been inactive for at least hundreds, or perhaps thousands of years. Based on our review of aerial photography from 1967, 1971, 1973, 1978, 1982, 1984, 1986, 1994, 2000, 2005, 2011, 2012, and 2014, more recent landsliding appears to have occurred on the slopes of Maxwell Point above the south tunnel entrance and on the northern slopes of

the subject site. These failures have been shallow and generally consist of more weathered materials sloughing off of stronger, less weathered materials beneath. At the time of our 2013, 2014, and 2016 site visits we observed weathered rock and block fall as recent talus deposits at beach elevation along the toe of Maxwell Point's slopes (Appendix A). The subject site is also mapped in an area of high landslide susceptibility, based on the DOGAMI methodology (Burns, Mickelson, and Madin, 2016).

A soldier pile retaining wall was constructed around 1990 to stabilize a portion of the northern slope, and erosion control measures were completed in the early 1990s. Based on our site visit observations the bluff slope at the site has been receding slowly and intermittently due to shallow sliding. This is a common and ongoing process along bluff slopes in the Oceanside area. Landsliding near the southwest corner of the western building at the site has resulted in bluff recession. The upper edge of the bluff at this location is now approximately 6½ feet from the structure at its closest point, to more than 36 feet along the slope north of the building. A scarp approximately 10 to 17 feet high is present at the southwest building corner as a result of frequent shallow sliding.

3.6 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 9.0 (Clague et al., 2000).

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, 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).

As discussed in Section 3.1 above, the nearest mapped potentially active fault is the Netarts Bay fault approximately 2.5 miles south of the site (Geomatrix, 1995).

3.7 Flooding Hazards

Based on the 1978 Flood Insurance Rate Map (FIRM, Panel #4101960165A) the site lies in an area rated as Zone D which is defined as an area of undetermined, but possible, flood hazards. In areas designated as Zone D, no analysis of flood hazards has been conducted. Mandatory flood insurance purchase requirements do not apply, but coverage is available. The flood insurance rates for properties in Zone D are commensurate with the uncertainty of the flood risk. Most of the subject site lies approximately 180 feet above beach elevation. At the time of our site visit, we observed no streams in the vicinity that could cause flooding at the site.

Based on the Oregon Department of Geology and Mineral Industries mapping (DOGAMI, 2012) the site lies outside the tsunami inundation zone resulting from an approximately 9.0 magnitude, or greater, Cascadia Subduction Zone (CSZ) earthquake. The southwesternmost edge of the site along the lower bluff slope lies within the mapped tsunami hazard area. The 2012 DOGAMI mapping is based upon 5 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 event (discussed in Section 3.6 above) has been rated as an approximate 8.9 magnitude in DOGAMI's methodology. More distant earthquakes can also generate tsunamis.

3.8 Climate Change

According to most of the recent scientific studies, the Earth's climate is believed to be 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 and when the Earth's climate will respond to enhanced concentrations of greenhouse gases, scientific observations indicate that detectable changes are under way (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, erosion of beaches and bluffs, and saltwater contamination of fresh groundwater. Global climate change and the resultant sea level rise will likely impact the subject site through accelerated coastal erosion and more frequent and severe flooding. It can also lead to increased rainfall which can result in an increase in landslide occurrence.

4.0 Conclusions and Recommendations

The main engineering geologic concerns at the site are:

1. The site lies on and adjacent to a high, steep oceanfront bluff slope which is undergoing recession as a result of continuous wind and rain erosion, ocean wave erosion, and shallow landsliding. Due to the bluff's relatively strong weathered rock, much of the site should not be affected by this recession for tens to hundreds of years or more; however, risk remains of relatively rapid or intermittent recession, such as for example block fall and shallow sliding along the upper bluff edge, particularly along the south side of Maxwell Point.

2. There is a relatively small distance from some of the existing structures to the upper edge of the bluff slope, particularly the southwest corner of the western building where the foundation lies 6½ feet from the failing bluff edge.

3. It is our understanding that Oregon Parks and Recreation Department (OPRD) will require removal of any structural element such as the previously proposed soldier pile wall at the southwest corner of the western building, or even foundation elements that extend into State Parks' jurisdictional area. This is concerning because prior to 1984, there was a landslide which blocked the beach level tunnel through Maxwell Point and moved the actual vegetation line to the top of the bluff. We are uncertain as to where OPRD would locate the vegetation line today.

4. The Maxwell Point tunnel entrance area at beach elevation will require occasional excavation by OPRD to keep it clear. This can contribute to destabilization of the slope (see also Sections 4.14 and 6.5 below).

5. There is an inherent regional risk of earthquakes and tsunamis along the Oregon Coast which could cause harm, loss of life, and damage to structures. Past large earthquake events likely contributed to instability of the ancient complex landslide in the Oceanside area and could do so again. Lower elevations immediately southwest of the subject site on the lower bluff slope also lie in a mapped tsunami hazard zone. These risks must be accepted by the owner, future owners, developers and residents of the site.

Please note, the Oregon Coast is a dynamic and energetic environment. Most of the coastline is slowly receding and will continue to recede in the future. Geologic conditions and the rates of geologic processes can change in the future.

4.1 Site Preparation

Prior to any development of Tax Lot 2400, the site will need to be cleared of substantial brush to allow for more detailed observations. Also, it is likely that test pit and/or drilled

boring subsurface explorations will be needed on this lot to facilitate design of foundations and possibly earth retention structures. It is our understanding that there are no plans for development of Tax Lot 2400 at this time.

On Tax Lot 2200, the southwestern corner of the western building is at risk of being undermined as a result of bluff recession in this area. There are three likely options to mitigate for this bluff recession:

1. Stabilize the bluff slope. Costs for this would likely be $300,000 to $500,000 or more, and may not be permitted by regulatory agencies because of the sensitive location (it has been denied in the past).

2. Relocate the building.

3. Relocate the southwest part of the building and use a deep foundation system of drilled and grouted pile to support it.

Prior to grading, proposed building and pavement areas of the site should be cleared of existing fills, structures, pavement, and surface or buried obstructions and debris. Any areas to receive structural fills should also be cleared of vegetation, soft organic soils, and existing fills prior to new fill placement. Stripped areas should be observed by a representative of HGSA prior to placement of fill. Areas of the site that are not planned for immediate development are generally recommended to be left undisturbed to minimize erosion.

In general, it is anticipated that excavations at the site can be completed using conventional earth moving equipment.

4.2 Structural Fill

Structural fills supporting building loads should consist of granular material, free of organics and deleterious materials, and contain no particles greater than 1½ inches in diameter so that nuclear methods (ASTM D2922 & ASTM D3017) can be easily used for field density and moisture testing. All areas to receive fill should be stripped of all soft soils, organic soils, organic debris and existing fills. We anticipate stripping depths to generally reach 1½ feet below existing grades across much of the site, however in areas of uncontrolled fill materials on the eastern part of the site stripping depths of 2 to 3 feet may be necessary.

Proper test frequency and earthwork documentation usually requires daily observation during stripping, rough grading, and placement of structural fill. Field density testing should generally conform to ASTM D2922 and D3017, or D1556. To minimize the number of field and laboratory tests, fill materials should be from a single source and of a consistent character. Structural fill should be approved and periodically observed by HGSA and tested by a qualified testing firm. Test results will need to be reviewed and

approved by HGSA. We recommend that one density test be performed for at least every 18 inches of fill placed and every 200 cubic yards, whichever requires more testing. Because testing is performed on an on-call basis, we recommend that the contractor schedule the testing. Relatively more testing is typically necessary on smaller projects.

STRUCTURAL FILL	
Compaction Requirements	Minimum of 92% ASTM D1557 maximum dry density, compacted in 8 inch lifts maximum, at or near the optimum moisture content (± 2% of optimum).
Benching Requirements [a]	Slopes steeper than 5H:1V that are to receive fill should be benched. Fills should not be placed on slopes steeper than 3H:1V, unless approved by H.G. Schlicker & Associates, Inc.
[a] Benches should be cut into native, non-organic, stiff or dense soils. Benches should be a minimum of 6 feet wide with temporary side cuts no steeper than 1H:1V and no higher than 6 feet. The lowest bench should be keyed in a minimum of 2 feet into native, non-organic, stiff to dense soils.	

4.3 Wet Weather Grading

Wet weather grading is not generally recommended due to the fine-grained nature of some of the soils. If wet weather grading is unavoidable due to construction schedules, or if wet soil conditions are encountered, stabilization of the subgrade soils with aggregate will likely become necessary. The use of clean, well graded granular fill (containing less than 5 percent material passing the No. 200 sieve) is recommended. Thickness of applied granular fill should be sufficient to stabilize the subgrade soils. Applied thickness of granular fills may be reduced by the use of geotextiles.

4.4 Cut and Fill Slopes

Cut and fill slopes are not currently proposed or part of the project. Please contact HGSA for additional recommendations if project plans change.

4.5 Erosion Control

Vegetation should be removed only as necessary and exposed areas should be replanted following construction. Disturbed ground surfaces exposed during the wet season (November 1 through April 30) should be temporarily planted with grasses, or protected with erosion control blankets or hydromulch.

Temporary sediment fences should be installed downslope of any disturbed areas of the site until permanent vegetation cover can be established. Gravel stabilized site entry and exit points, and a tire wash is recommended to control movement of sediment off-site.

Exposed sloping areas steeper than 3 horizontal to 1 vertical (3H:1V) should be protected with a straw erosion control blanket (North American Green S150 or equivalent) to provide erosion protection until permanent vegetation can be established. Erosion control blankets should be installed as per the manufacturer's recommendations.

Erosion control plans should be developed by the project civil engineer, architect or his designate in order to meet current State, local and project requirements.

4.6 Dewatering of Excavations

In our subsurface explorations at the site we observed that soil conditions were generally moist above a depth of 3 feet and wet below a depth of 3 feet. Although it is unlikely, groundwater shallower than 5 feet may be encountered seasonally. When groundwater is encountered during excavation, dewatering of excavations will be required and should be the responsibility of the contractor.

4.7 Unanticipated Conditions

Unanticipated subsurface conditions are commonly encountered during site excavation and grading, particularly when groundwater is encountered or fills are present. Therefore, we should observe footing, slab and pavement excavations prior to placing fill, and/or forming and pouring concrete to assure that suitable bearing materials have been reached. At the time of our observations we may recommend additional excavation or specialized fill construction if suitable bearing materials have not been reached.

4.8 Foundations

Conventional Shallow Foundations

Setbacks from the upper bluff edge for all foundations should be a minimum of 30 feet.

Building loads may be supported on individual and continuous spread footings bearing in undisturbed, native, non-organic, firm soils or properly designed and compacted structural fill placed on these soils. All footing areas should be stripped of all organic soils, organic debris and existing fills. We anticipate that non-organic, firm soils will be encountered at depths of approximately 1½ to 2 feet, however depths may vary.

Care should be taken during excavation so that materials exposed in the excavation are not disturbed or softened. Protection of footing areas from deterioration may be necessary, and can be accomplished by placing 2 to 3 inches of crushed aggregate which is nominally compacted in footing areas.

Footings bearing in undisturbed, native, non-organic, firm soils or properly compacted structural fill placed on these soils may be designed for the following:

ALLOWABLE SOIL BEARING CAPACITIES	
Allowable Dead Plus Live Load Bearing Capacity[a]	1,500 psf
Passive Resistance	200 psf/ft embedment depth
Lateral Sliding Coefficient	0.30 0.35 on weathered rock
[a] Allowable bearing capacity may be increased by one-third for short term wind or seismic loads.	

Our recommended minimum footing widths and embedment depths are as follows:

MINIMUM FOOTING WIDTHS & EMBEDMENT DEPTHS			
Number of Stories	One	Two	Three
Minimum Footing Width	15 inches	18 inches	22 inches
Minimum Exterior Footing Embedment Depth[a]	18 inches	22 inches	24 inches
Minimum Interior Footing Embedment Depth[b]	6 inches	6 inches	6 inches

[a] All footings shall be embedded as specified above, or extend below the frost line as per Table R301.2(1) of the 2010 ORSC, whichever provides greater embedment. If foundations will be placed along or immediately adjacent to slopes steeper than 3H:1V, foundations will need to be embedded a minimum of 24 inches, or as approved by a representative of our firm.

[b] Interior footings should be embedded a minimum of 6 inches below the lowest adjacent finished grade, or as otherwise recommended by our firm. In general, interior footings placed on sloping or benched ground should be embedded or set back from cut slopes in such a manner as to provide a minimum horizontal distance between the foundation component and face of the slope of one foot per every foot of elevation change.

Foundations along the southwest corner of the western building should be placed on pile for additional protection when ground movement occurs. Pile should consist of a steel reinforced, bored and grouted micropile.

Slab-On-Ground Construction

All areas beneath slabs should be excavated a minimum of 6 inches into native, non-organic, firm soils. The exposed subgrade in the slab excavation should be cut smooth, without loose or disturbed soil and rock remaining in the excavation. The slab excavation should then be backfilled with a minimum of 6 inches of ¾ inch minus, clean, free-draining, crushed rock placed in 8 inch lifts maximum which are compacted to 90 percent of the Modified Proctor (ASTM D1557). Reinforcing of the slab is recommended and the slab should be fully waterproofed as per design recommendations to be provided by

the architect or engineer. An underslab drainage system is recommended for all below grade slabs, such as basement slabs, as per the architect's or engineer's recommendations. No below grade slabs are proposed at this time.

SLABS-ON-GROUND	
Minimum thickness of 3/4 inch minus crushed rock beneath slabs	6 inches
Compaction Requirements	90% ASTM D1557, compacted in 8 inch lifts maximum

4.9 Pile

As mentioned in Section 4.1 above, drilled and grouted piles can support the foundations at the southwest corner of the western building. This would involve drilling of deep holes along the bluff, then inserting steel reinforcement and grouting the holes. Currently the failure at the top of the bluff adjacent to the southwest corner of the western building has created a scarp that varies from approximately 10 to 17 feet high, on an approximately 180 feet high slope. We recommend that the pile be a minimum of 40 feet deep. The project structural engineer may want to use tiebacks on the pile to help with lateral forces, both static and dynamic.

The final design should consider structural needs and constructability. For long term monitoring of any slope movement, we recommend that an inclinometer be installed at the southwest corner of the western building.

A representative of HGSA should observe all pile construction and underpin installation operations to ensure that suitable bearing materials and capacities have been achieved (Appendix B).

4.10 Retaining Walls

At present, no retaining walls are likely to be constructed; however, we provide the following recommendations if plans change.

For static conditions free standing retaining walls should be designed for a lateral static active earth pressure expressed as an equivalent fluid density (EFD) of 35 pounds per cubic foot, assuming level backfill. An EFD of 45 pounds per cubic foot should be used assuming sloping backfill of 2H:1V.

Foundation and basement walls should be designed for a lateral at-rest pressure expressed as an equivalent fluid density (EFD) of 60 pounds per cubic foot, assuming level backfill behind the wall equal to a distance of at least half of the height of the wall. If foundation and basement walls will be designed as partially restrained retaining walls, an EFD of 45

pounds per cubic foot may be used, assuming level backfill. This requires that the wall be fully drained to prevent the build-up of hydrostatic pressures.

RETAINING WALL EARTH PRESSURE PARAMETERS	
Static Case, Active Wall (level backfill/grades)	35 pcf [a]
Static Case, Active Wall (2H:1V backfill/grades)	45 pcf [a]
Static Case, At-Rest Wall (level backfill/grades)	60 pcf [a]
Static Case, Partially Restrained Wall (level backfill/grades)	45 pcf [a]
Seismic Loading (level backfill/grades)	8.2 pcf $(H)^2$ [b]

[a] Earth pressure expressed as an equivalent fluid density (EFD).

[b] Seismic loading expressed as a pseudostatic force, where H is the height of the wall in feet. The location of the pseudostatic force can be assumed to act at a distance of 0.6H above the base of the wall.

The above equivalent fluid densities (EFDs) assume static conditions, and no surcharge loads from vehicles or structures. If surcharge loads will be applied to the retaining walls, forces on the walls resulting from these loads will need to be added to the pressures given above. For seismic loading, a unit pseudostatic force equal to 8.2 pcf $(H)^2$; where H is the height of the wall in feet, should be added to the static lateral earth pressure. The location of the pseudostatic force can be assumed to act at a distance of 0.6H above the base of the wall.

Backfill for walls should be placed in 8 inch horizontal lifts and machine compacted to 90 percent of the maximum dry density as determined by ASTM D1557. Compaction within 2 feet of the wall should be accomplished with light weight hand operated compaction equipment to avoid applying additional lateral pressure on the walls. Drainage of the retaining wall should consist of slotted drains placed at the base of the wall on the backfilled side and backfilled with free-draining crushed rock (less than 5% passing the 200 mesh sieve using a washed sieve method) protected by non-woven filter fabric (Mirafi® 140N or equivalent) placed between the native soil and the backfill. Filter fabric protected free-draining crushed rock should extend to within 2 feet of the ground surface behind the wall, and the filter fabric should be overlapped at the top per the manufacturer's recommendations. All walls should be fully drained to prevent the build-up of hydrostatic pressures. All retaining walls should have a minimum of 2 feet of embedment at the toe, or be designed without passive resistance.

4.11 Seismic Considerations

The structure and all structural elements should be designed to meet current Oregon Residential Specialty Code (ORSC) seismic requirements. Based on our knowledge of

subsurface conditions at the site, and our analysis using the guidelines recommended in the ORSC, the structure should be designed to meet the following seismic parameters:

SEISMIC DESIGN PARAMETERS	
Site Class	D
Seismic Design Category	D_2
Mapped Spectral Response Acceleration for Short Periods	S_S = 1.313 g
Mapped Spectral Response Acceleration for a 1-Second Period	S_1 = 0.683 g
Site Coefficients	F_a = 1.200 F_v = 1.700
Design Spectral Response Acceleration at Short Periods	S_{DS} = 1.050 g
Design Spectral Response Acceleration at 1-Second Period	S_{D1} = 0.774 g

4.12 Site Drainage

Surface water should be diverted from building foundations and walls to approved disposal points by grading the ground surface to slope away a minimum of 2 percent for 6 feet towards a suitable gravity outlet to prevent ponding near the structures. Permanent subsurface drainage of the building perimeter is recommended to prevent extreme seasonal variation in moisture content of subgrade materials and subjection of foundations and slabs to hydrostatic pressures.

Footing drains should be installed adjacent to the perimeter footings and sloped to drain. The footing drains should consist of a 4-inch diameter (minimum) perforated PVC pipe placed below the floor level on the outside of the footings (do not undermine footings). The pipe should be encased in open graded, free draining crushed rock or aggregate backfill which extends from the base of the footing to at least 4 inches beyond the outer edge of the drain pipe, or for a minimum width of at least 12 inches, whichever is greater. The aggregate should be encased in non-woven geotextile fabric to prevent contamination by fine-grained materials (silts and clays).

In addition to the perimeter footing drain system, drainage of any crawlspace areas is recommended. Each crawlspace should be graded to a low point for installation of a crawlspace drain that is tied into the perimeter footing drain and tightlined to an approved disposal point.

All roof drains should be collected and tightlined in a separate system independent of the footing drains, or an approved backflow prevention device shall be used. All roof and footing drains should be discharged to an approved disposal point. If water will be discharged to the ground surface, we recommend that energy dissipaters, such as splash blocks or a rock apron, be utilized at all pipe outfall locations. Water collected on the site should not be concentrated and discharged to adjacent properties.

4.13 Plan Review and Construction Observations

Prior to construction, HGSA should be provided the opportunity to review all site development, foundation, drainage, erosion control, and grading plans prior to construction to assure conformance with the intent of our recommendations (Appendix B). The plans, details and specifications should clearly show that the above recommendations have been implemented into the design.

A representative of HGSA should observe footing and slab excavations prior to placing structural fill, forming and pouring concrete to assure that suitable bearing materials have been reached (Appendix B). At the time of our observations we may recommend additional excavation if suitable bearing materials have not been reached. We should also observe retaining wall pile and underpinning installation operations (Appendix B). Please provide us with at least 5 (five) days notice prior to any needed site observations. There will be additional costs for these services.

4.14 Safety

All construction activities should be completed in accordance with OSHA standards, and all State and local laws, rules, regulations and codes.

A safety fence should be installed along the bluff to prevent any items from going over the bluff edge. Rockfall is a nearly continuous occurrence on the slope above the southern tunnel entrance of Maxwell Point. It is unlikely that construction activities would generate vibrations that would be damaging to the slope.

5.0 Additional Services

Design Review

This report pertains to a specific site and development. It is not applicable to adjacent sites nor is it valid for types of development other than that to which it refers. Any variation from the site or development plans necessitates a geotechnical review in order to determine the validity of the design concepts evolved herein.

Geotechnical review of final plans and specifications is necessary to determine whether the recommendations detailed in this report have been properly interpreted and incorporated in

the design and construction documents. At the completion of our review we will issue a letter of conformance to the client for the plans and specifications.

Construction Monitoring

Because of the judgmental character of geotechnics, as well as the potential for adverse circumstances arising from construction activity, observations during site preparation, excavation, and construction will need to be carried out by a representative of HGSA or our designate. These observations may then serve as a basis for confirmation and/or alteration of geotechnical recommendations or design guidelines presented herein to the benefit of the project. Field observations become increasingly important should earthwork proceed during adverse weather conditions.

6.0 Summary Findings and Conclusions

Our summary findings and conclusions are presented below:

6.1 Proposed Use

The proposed project consists of renovation and remodeling of the existing buildings on the site. No additional roads are anticipated. No adverse impacts are anticipated to occur on adjacent lots as a result of development of this site, provided that the recommendations detailed in this report are adhered to.

6.2 Hazards to Life, Property, and the Environment

Hazards to life, property and the environment associated with this proposed use include storm water erosion, slope instability, and seismic hazards. Recommendations for mitigation of slope instability and storm water erosion has been incorporated into this report. Please note that the risk of these hazards is inherent with development and construction in this part of Tillamook County and must be assumed by the owner, future owners, developers, and residents.

6.3 Off-Site Protection

Protection of the surrounding areas from any adverse effects of this development will be minimized when all the storm water, foundation, vegetation and erosion control recommendations detailed in this report are adhered to.

6.4 Stabilization Programs

Stabilization programs for this site include vegetation and erosion stabilization as addressed in Sections 4.3 and 4.5 of this report; and surface water collection as addressed in Section 4.12 of this report. Based on our site observations and investigation, only small and localized disturbance is expected.

6.5 Conclusions Regarding Hazards and Adverse Environmental Effects

We observed indications of rockfall along the bluff slope. Based on our site observations, we do not anticipate that the observed rockfall will adversely affect the site, provided that the recommendations detailed in the report are adhered to during design and construction.

As discussed in Section 4.14 above, there is a rockfall hazard to persons on the beach below Maxwell Point which has resulted in OPRD closing of the tunnel in the past.

The site lies in an area which may be adversely affected in the event of an earthquake. The hazards associated with large earthquakes should be considered in light of the low probability of one occurring in any given year and the consequences resulting from ground shaking and landsliding.

Adverse environmental effects will be minimized by following the recommendations detailed in this report during the design and construction of the proposed project.

6.6 Recommendations for Further Work

No additional investigation or analysis is required by our firm other than review of site development plans, observation of any foundation excavations as detailed in Section 4.13 and Appendix B of this report, and observations of construction of the pile wall along the bluff.

7.0 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 be detrimental to 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 hazards 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/or this report may be necessary as time passes to assure its accuracy and adequacy.

The boring logs and related information depict 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 boring 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, budget and time constraints. 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.

8.0 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.

9.0 References Cited

Allan, J. C., and Priest, G. R., 2001, Evaluation of Coastal erosion hazard zones along dune and bluff backed shoreline in the Tillamook County, Oregon; Cascade Head to Cape Falcon: Oregon Department of Geology and Mineral Industries, Open-File Report O-01-03, 126 p.

Allan, J. C., Ruggiero, P., Garcia, G., O'Brien, F. E., Stimely, L. L. and Roberts, J. T., 2015, Coastal Flood Hazard Study, Tillamook County, Oregon: Oregon Department of Geology and Mineral Industries, Special Paper SP-47, 274 p.

Beeson, M. H., Perttu, R., and Perttu, J., 1979, The origin of the Miocene basalts of coastal Oregon and Washington: and alternative hypothesis: Oregon Geology, v. 41, No. 10, p. 159-166.

Burns, W. J. and Watzig, R. J., 2014, SLIDO-3.0, Statewide Landslide Information Database for Oregon, release 3.0, 35 p., maps, database.

Burns, W. J., Mickelson, K. A., and Madin, I. P., 2016, Landslide susceptibility overview map of Oregon: Oregon Department of Geology and Mineral Industries, Open-File Report O-16-02, 48 p., 1 plate.

Church, J. A., and White, N. J., 2006, A 20th century acceleration in global sea-level rise: Geophysical Research Letters, v. 22, LO1601, 4 p.

Clague, J. J., Atwater, B. F., Wang, K., Wang, Y., and Wong, I., 2000, Penrose Conference 2000 - Great Cascadia Earthquake Tricentennial, Programs Summary and Abstracts: Oregon Department of Geology and Mineral Industries, Special Paper 33, 156 p.

DOGAMI, 2012, Tsunami inundation maps for Netarts – Oceanside, Tillamook County, Oregon: Oregon Department of Geology and Mineral Industries, TIM-Till-09, maps.

EPA, 1998, Climate Change and Oregon; Environmental Protection Agency, EPA 236-98-007u, 4 p.

Geomatrix Consultants, 1995, Seismic design mapping, State of Oregon, final report: Prepared for the Oregon Department of Transportation, Project No. 2442.

Goldfinger, C., Nelson, C. H., Morey, A. E., Johnson, J. E., Patton, J. R., Karabanov, E., Gutiérrez-Pastor, J., Eriksson, A. T., Gràcia, E., Dunhill, G., Enkin, R. J., Dallimore, A., and Vallier, T., 2012, Turbidite event history—Methods and implications for Holocene paleoseismicity of the Cascadia subduction zone: U.S. Geological Survey Professional Paper 1661–F, 170 p.

Kelsey, H.M., Nelson, A.R., Hemphill-Haley, E., and Witter, R.C., 2005, Tsunami history of an Oregon coastal lake reveals a 4600 yr record of great earthquakes on the Cascadia subduction zone: Geological Society of America Bulletin, v. 117, no. 7/8, p. 1009-1032.

Leonard, L. J., Hyndman, R. D., and Mazzotti, S., 2004, Coseismic subisdence in the 1700 great Cascadia earthquake: Coastal estimates versus elastic dislocation models: Geological Society of America Bulletin, May/June 2004, v. 116, no. 5/6, pp. 655–670.

Oregon Seismic Safety Policy Advisory Commission (OSSPAC), February 2013, The Oregon Resilience Plan: Reducing Risk and Improving Recovery for the next Cascadia Earthquake and Tsunami—Report to the 77th Legislative Assembly: State of Oregon Office of Emergency Management, 341 p.

OSU News and Research Communications, May 24, 2010, Odds are 1-in-3 that a huge quake will hit Northwest in next 50 years: Oregon State University, Corvallis http://oregonstate.edu/ua/ncs/archives/2010/may/odds-huge-quake-Northwest-next-50-years

Personius, S. F., Dart, R. L., Bradley, L-A, Haller, K. M., 2003, Map and data for Quaternary faults and folds in Oregon: U.S. Geological Survey, Open-File Report 03-095, 556 p., map.

Priest, G. R., 1995, Tsunami Hazard Map of the Netarts Quadrangle, Tillamook County, Oregon: Oregon Department of Geology and Mineral Industries, Open-File Report O-95-20, map.

Priest, G. R., Myers, E., Baptista, A. M., Fleuck, P., Wang, K., Kamphaus, R. A., and Peterson, C. D., 1997, Cascadia Subduction Zone tsunamis: Hazard mapping at Yaquina Bay, Oregon, final technical report to the National Earthquake Hazard Reduction Program: Oregon Department of Geology and Mineral Industries, Open-File Report O-97-34.

Rogers, A. M., Walsh, T. J., Kockelman, J., and Priest, G. R., 1996, Earthquake hazards in the Pacific Northwest - an overview: U.S. Geological Survey, Professional Paper 1560, p. 1-54.

Schlicker, H. G., Deacon, R. J., Beaulieu, J. D., and Olcott, G. W., 1972, Environmental geology of the coastal region of Tillamook and Clatsop Counties, Oregon: Oregon Department of Geology and Mineral Industries, Bulletin 74, 164 p., maps.

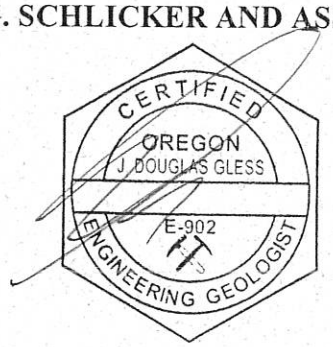
U.S. Department of the Interior, Bureau of Reclamation, 1998 (reprinted 2001), Engineering Geology Field Manual, Volume I – Second Edition: USBR, 432 p.

Witter, R.C., Kelsey, H.M., and Hemphill-Haley, E., 2003, Great Cascadia earthquakes and tsunamis of the past 6700 years, Coquille River estuary, southern coastal Oregon: Geological Society of America Bulletin, v. 115, p. 1289-1306.

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

Respectfully submitted,

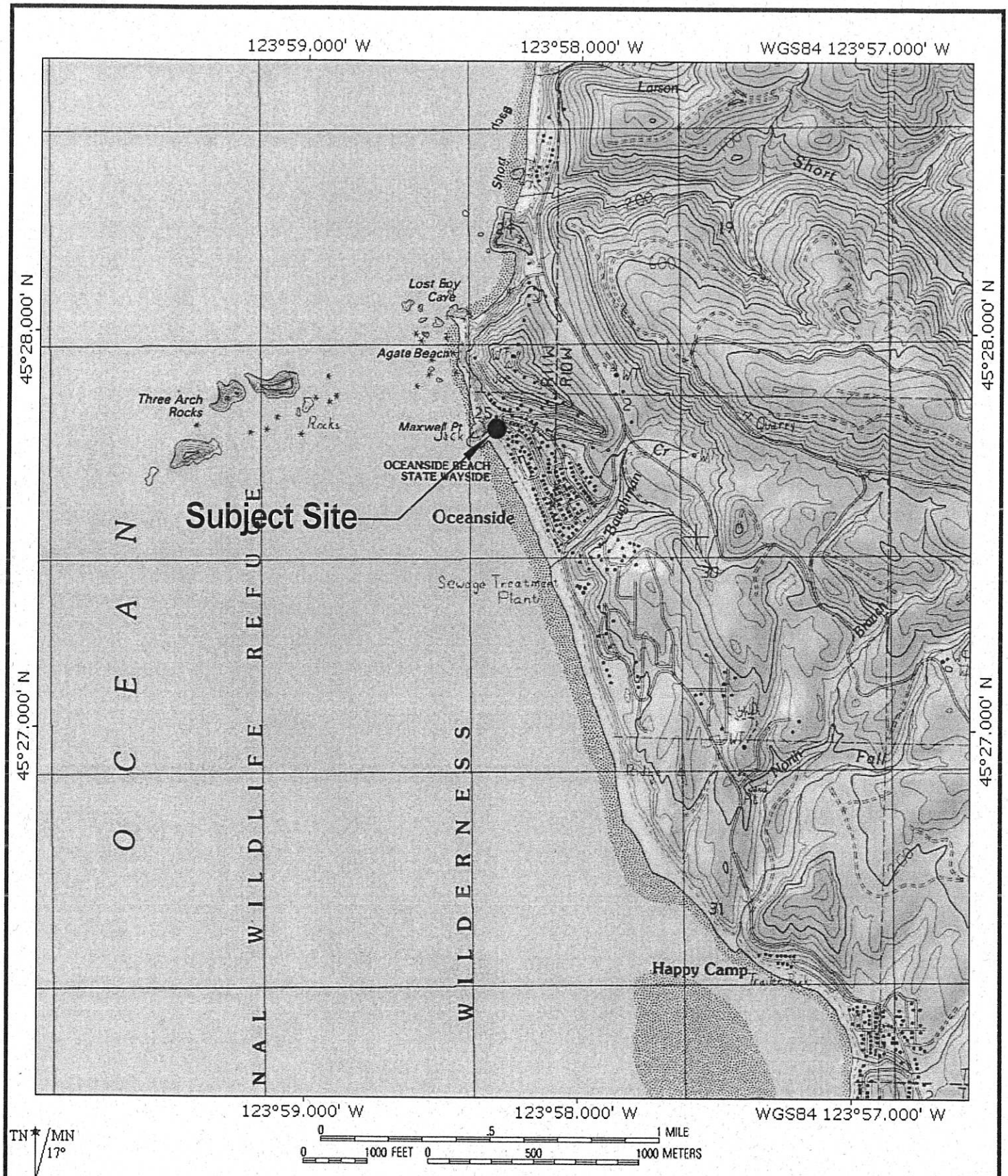
H.G. SCHLICKER AND ASSOCIATES, INC.



EXPIRES: 10/31/2017

J. Douglas Gless, MSc, RG, CEG, LHG
President/Principal Engineering Geologist

JDG:cjh

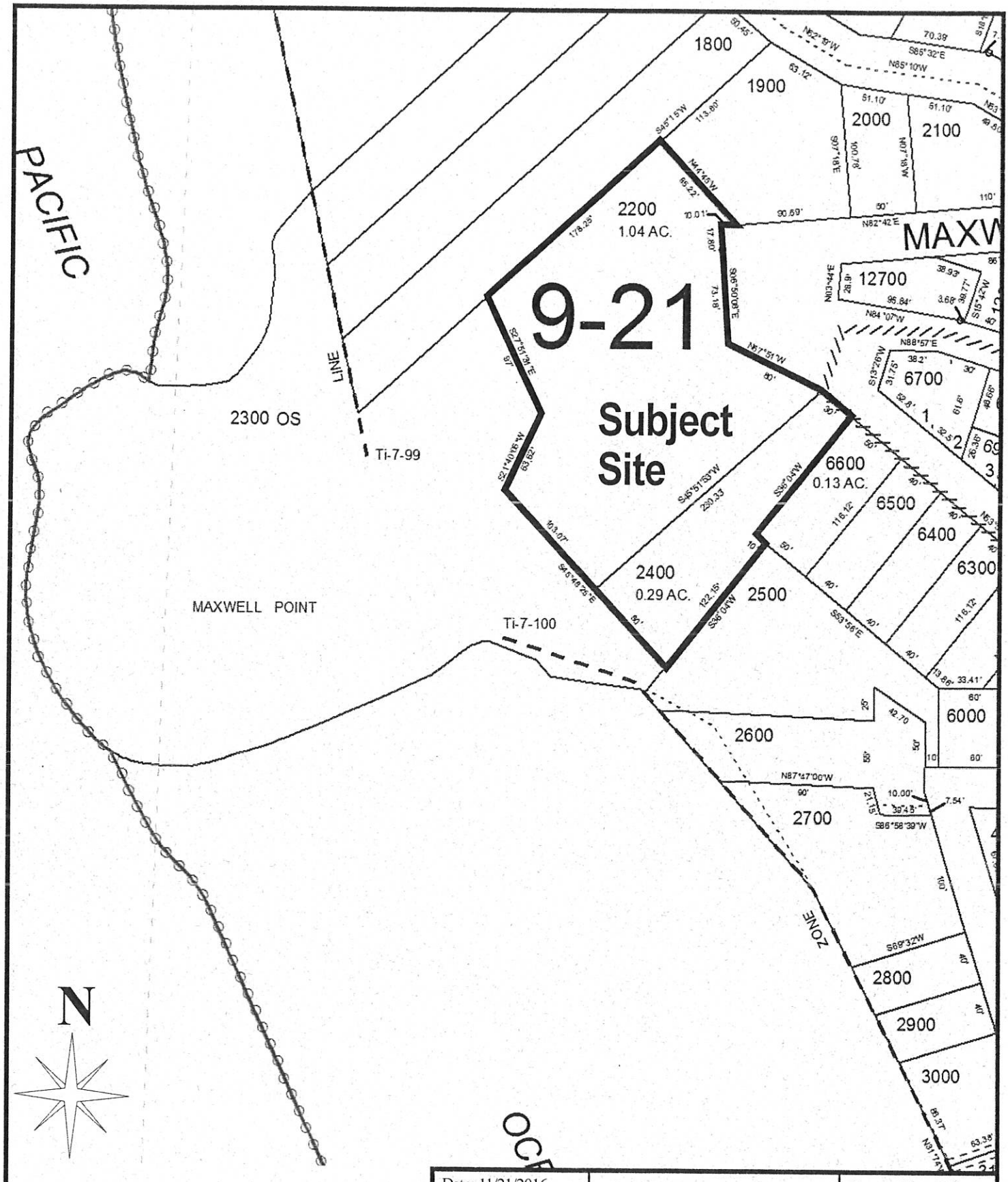


Date: 11/21/2016 Scale: 1" = 2,000'	**Project #Y163980**	Prepared by: CJH Approved by: JDG

Location Map
Tax Lots 2200 and 2400, Map 1S-11-25AA
1816 Maxwell Mountain Road, Oceanside, Oregon

H.G. Schlicker & Associates, Inc.

Figure 1



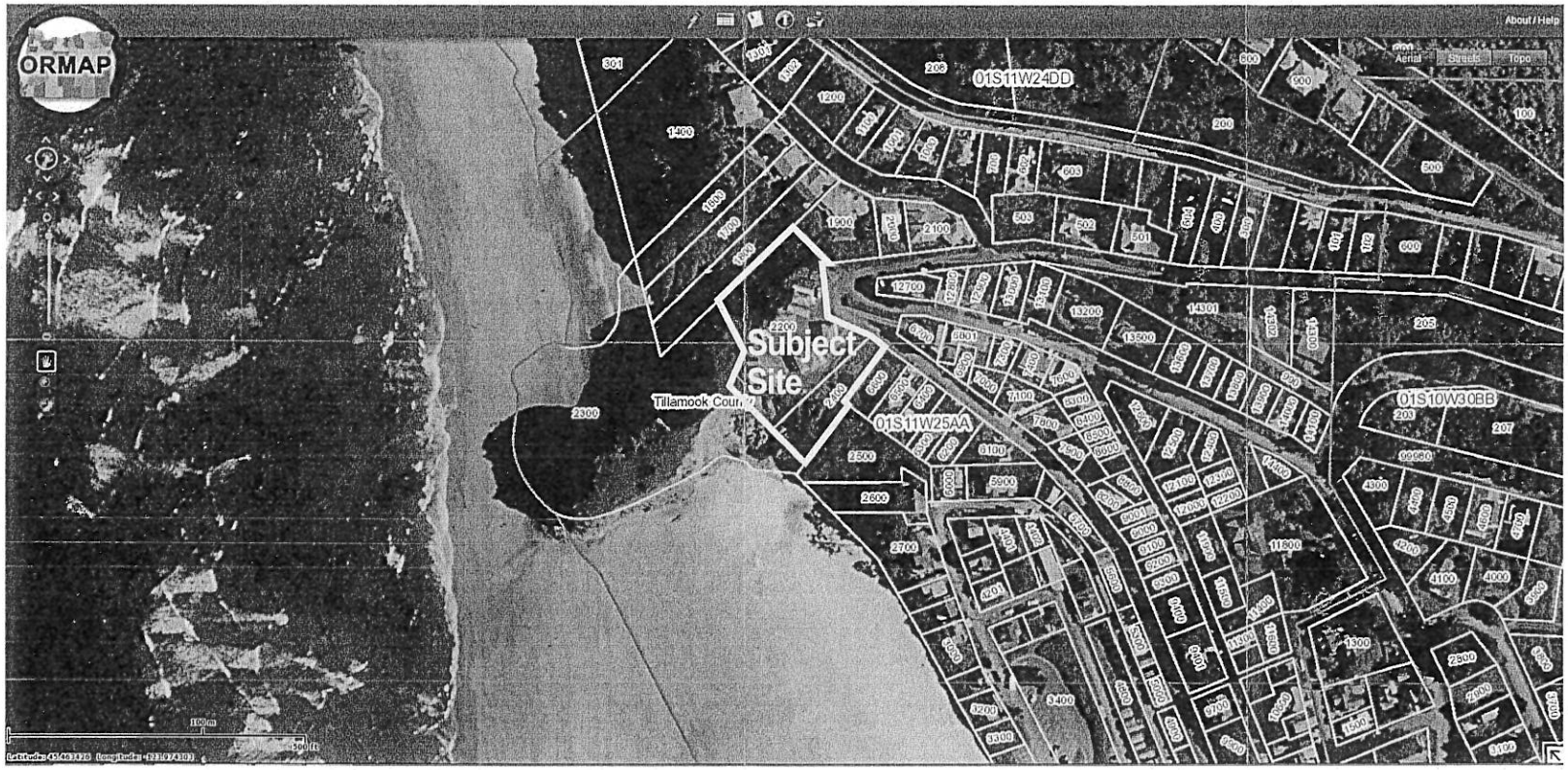
Date: 11/21/2016	**Project #Y163980**	Prepared by: CJH
Scale: 1" = 100'		Approved by: JDG

Plat Map
Tax Lots 2200 and 2400, Map 1S-11-25AA
1816 Maxwell Mountain Road, Oceanside, Oregon

H.G. Schlicker & Associates, Inc.

Figure 2

Modified from the Tillamook County assessor's plat
T1S, R11W, Sec. 25.
All locations and dimensions are approximate.



N

Modified from ORMAP online GIS mapping.
All locations and dimensions are approximate.

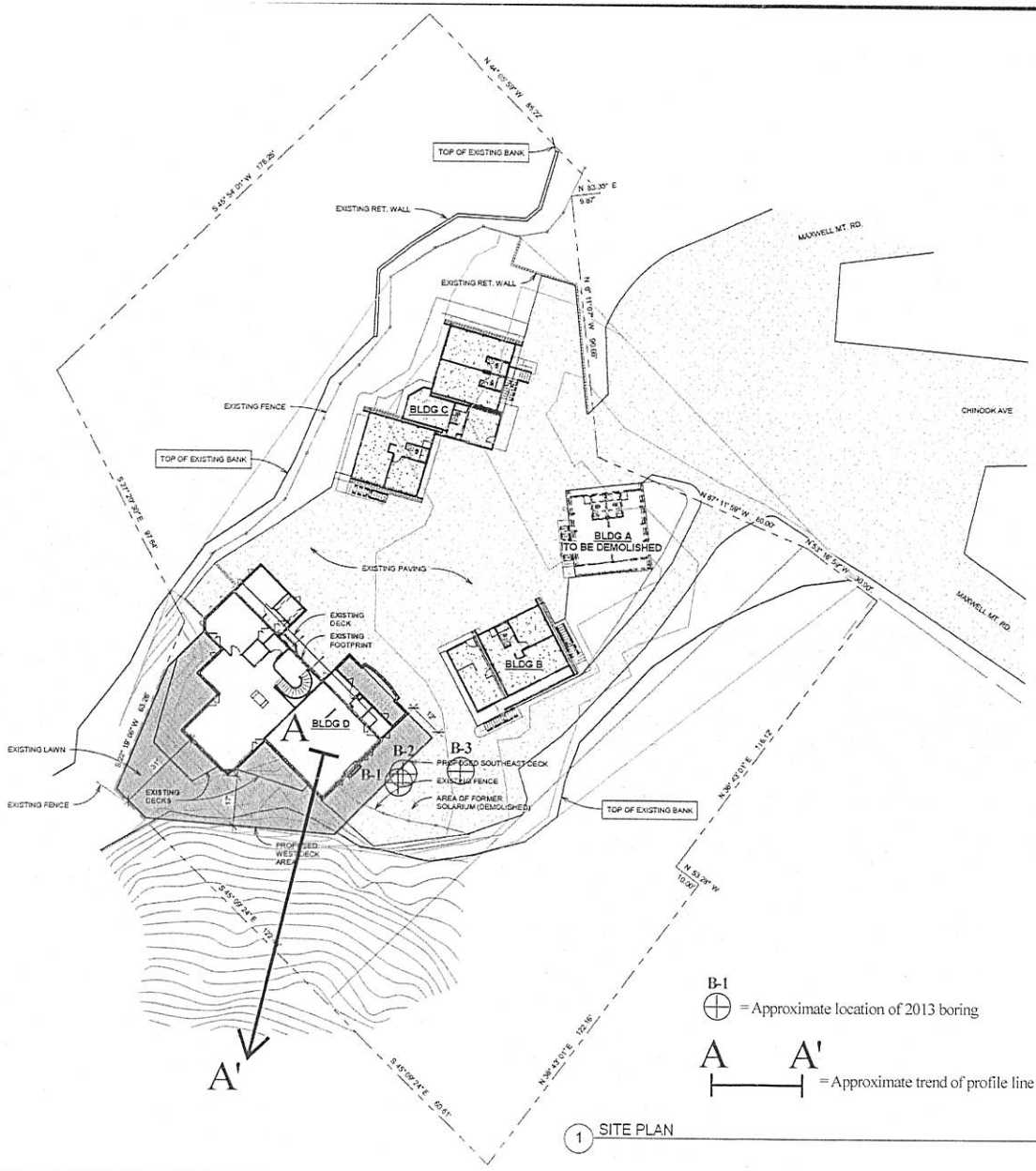
Date: 11/21/2016	Project #Y163980	Prepared by: CJH
Scale: 1" = 200'		Approved by: JDG

Site Vicinity Map
Tax Lots 2200 and 2400, Map 1S-11-25AA
1816 Maxwell Mountain Road, Oceanside, Oregon

H.G. Schlicker & Associates, Inc.

Figure 3

DRAWING LIST	
0.1	SITE PLAN - PROPOSED
D-3.1	BLDG D - FIRST FLOOR PLAN
D-3.2	BLDG D - 2ND FLOOR PLAN
D-3.3	BLDG D - ROOF PLAN
D-5.1	BLDG D - EXTERIOR ELEVATIONS
D-5.2	BLDG D - EXTERIOR ELEVATIONS
D-7.1	SECTIONS
D-7.2	SECTIONS
D-7.3	SECTIONS
D-7.4	SECTIONS
D-9.1	BLDG D - FIRST FLOOR RCP
D-9.2	BLDG D - SECOND FLOOR RCP



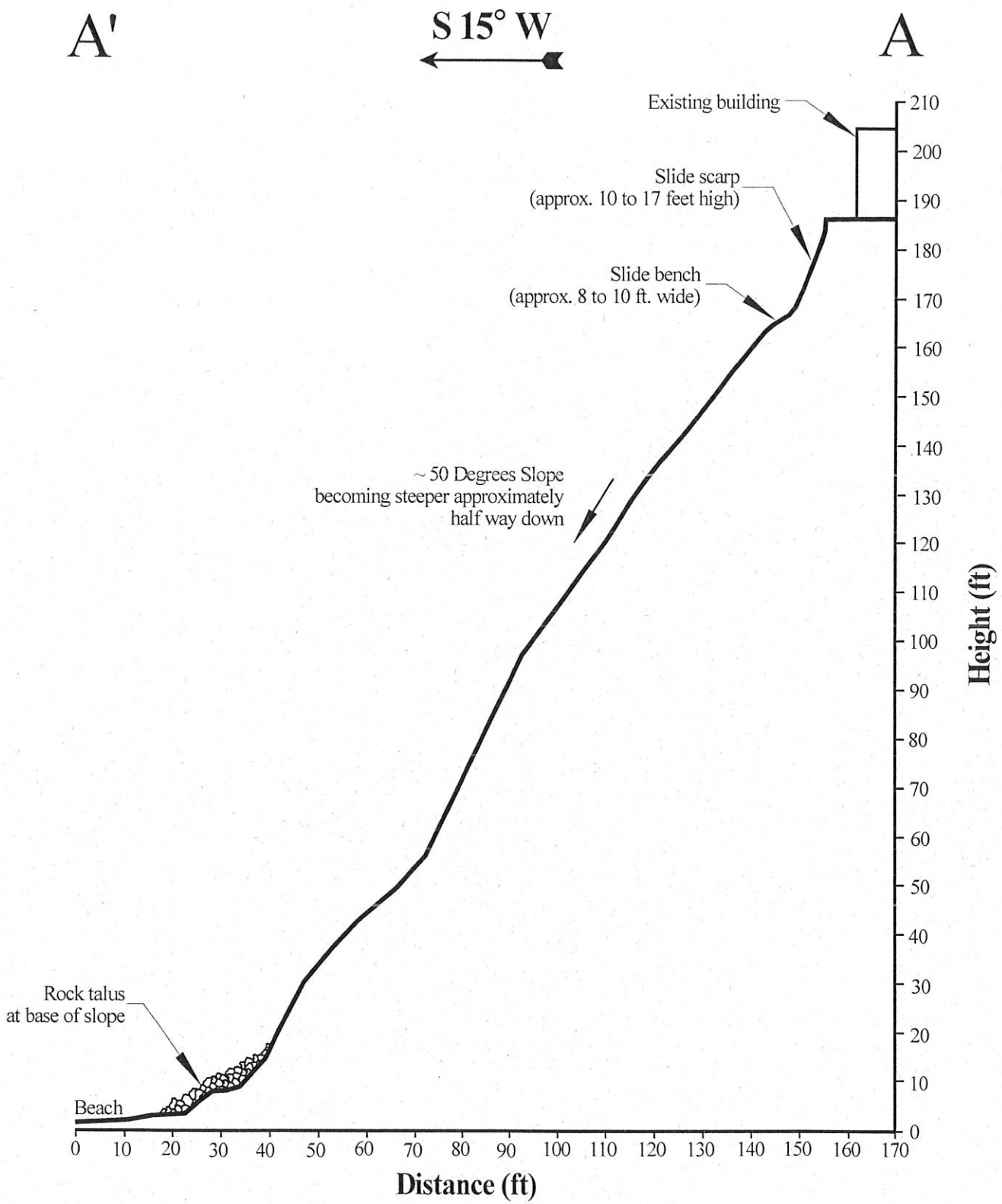
Modified from Dowd Architecture Inc. site plan drawing provided by Client. Topography of slope from 2001 survey by C. Wayne Cook Land Surveying. All locations and dimensions are approximate.

Date: 11/21/2016	Project #Y163980	Prepared by: CJH
Scale: 1" = 40'		Approved by: JDG

Site Plan
Tax Lots 2200 and 2400, Map 1S-11-25AA
1816 Maxell Mountain Road, Oceanside, Oregon

H.G. Schlicker & Associates, Inc.

Figure 4



Upper slope profile based on site measurements in 2013, 2014 and 2016.
Lower slope profile from prior work.
All dimensions and locations are approximate.

Date: 11/21/2016	Prepared by: CJH	**Project #Y163980**
Scale: 1" = 30'	Approved by: JDG	
H.G. Schlicker & Associates, Inc.	**Slope Profile A-A'** Tax Lots 2200 and 2400, Map 1S-11-25AA 1816 Maxell Mountain Road, Oceanside, Oregon	**Figure 5**

Appendix A
- Site Photographs -

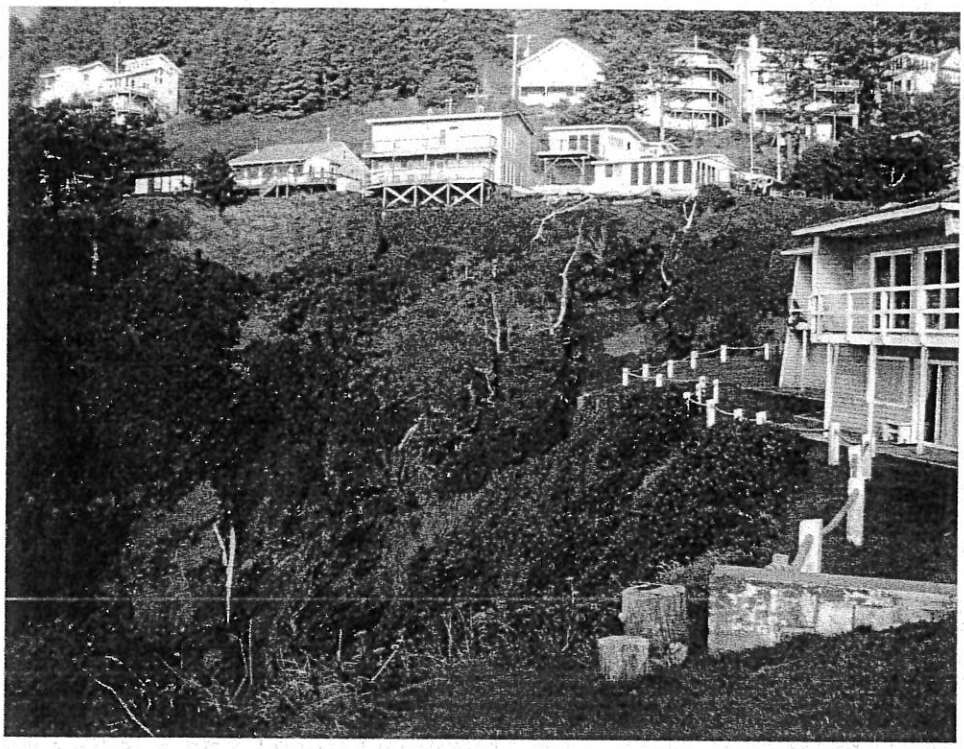


Photo 1 - Easterly view along the northern slope of Maxwell Point.

Photo 2 - Southeasterly view along the southern bluff slope.

Photo 3 - Looking northwest along the failing upper edge of the southern bluff slope.

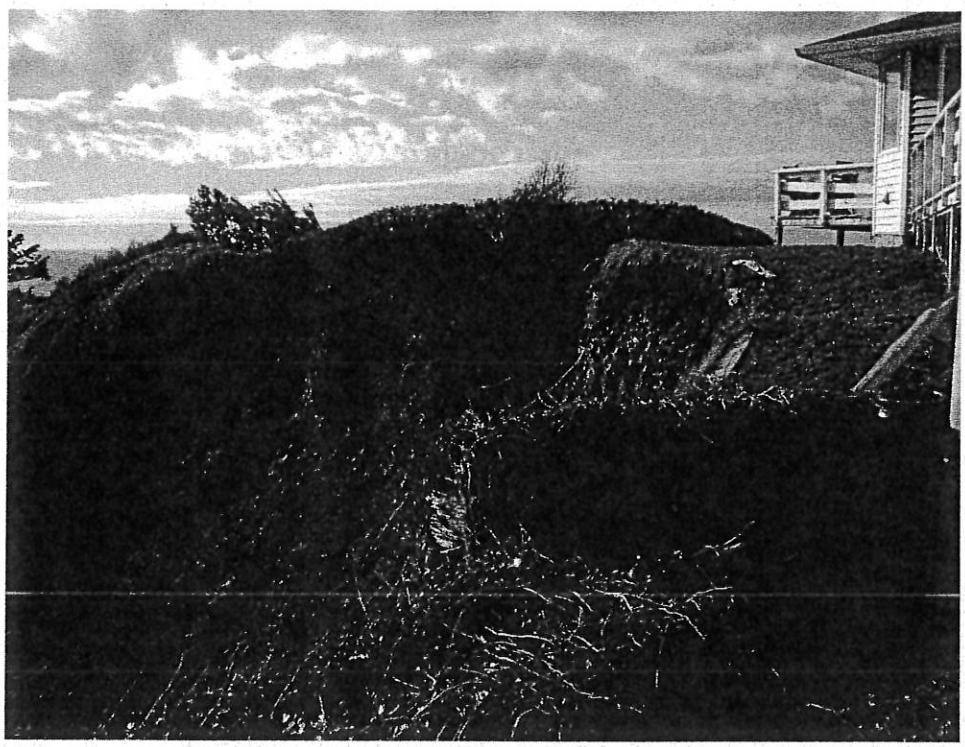


Photo 4 - Northwesterly view along the southern bluff. Southwest corner of existing building is at far lower right of photo.

Appendix B
- Checklist of Recommended Plan Reviews and Site Observations -

APPENDIX B
Checklist of Recommended Plan Reviews and Site Observations
To Be Completed by a Representative of H.G. Schlicker & Associates, Inc.

Item No.	Date Done	Procedure	Timing
1*		Review site development, foundation, drainage, grading and erosion control plans.	Prior to construction.
2*		Observe footing excavations and foundation setbacks.	Following excavation of foundations, and prior to placing fill, forming and pouring. **
3*		Observe pile construction operations.	During construction. **
4*		Review Proctor (ASTM D1557) and field density test results for all fills placed at the site.	During construction.

* There will be additional charges for these services.
** Please provide us with at least 5 days notice prior to all site observations.

Sarah Absher

From: Sarah Absher
Sent: Friday, July 29, 2016 9:49 AM
To: 'mike dowd'; Doug Gless; Denny Pastega (dennypastega@gmail.com)
Cc: jay.sennewald@oregon.gov
Subject: Oregon State Parks Update re Maxwell Point House in Oceanside

Importance: High

Good Morning Everyone;

I just visited with Alice from OPRD. Provided that a 20-foot setback from the westerly property line(s) is maintained as discussed, OPRD does not have any concerns with the proposed development. Alice is also agreeable to some sort of barrier along/up to the Pastega property line (post and cable or fencing as discussed). Provided setbacks are maintained, they also see no issue with the additional deck area proposed that connects the westerly and southerly deck. She is going to run the proposal by a couple of her staff people to confirm no one else has any issues with what is being proposed and will get back to me no later than Wednesday.

Alice did mention that an Ocean Shores Permit may be required and to contact Jay Sennewald, OPRD, for the determination. Jay and I work together on a regular basis and he is familiar with this area having formerly been the City planner for both Rockaway and Garibaldi. Alice will contact Jay directly.

Mike and Doug; Jay may want to visit with you about construction details. I have copied Jay on this email as well. Also, I have put a reminder on my calendar to follow up with Alice if I do not hear from her by Wednesday. I will need some sort of documentation from her for the file.

Sincerely,

Sarah Absher, CFM
Senior Planner
Department of Community Development
503-842-3408
sabsher@co.tillamook.or.us

EXHIBIT C