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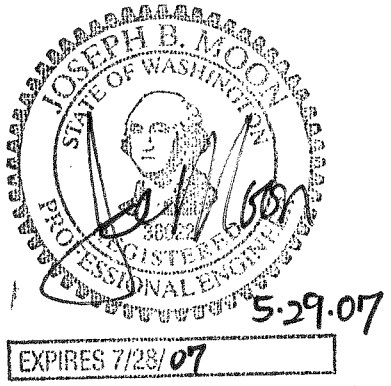
PRELIMINARY DRAINAGE REPORT

FOR

POINT ROBERTS BEACH CLUB

WHATCOM COUNTY, WASHINGTON



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1.0 PROJECT OVERVIEW

1.1 General Project Description

The subject property is located on the southeast shore of Point Roberts, Washington. The 103 acre site is bordered by Paul's Road (County Road #370) to the west, APA Road (County Road #540) to the north, Claire Lane to the east, and the Gulf of Georgia to the south. The proposed development is designed to accommodate 103 single-family homes and to create a residential resort community in a rural setting. To achieve this goal, the design has incorporated various Low Impact Development (LID) elements in order to create open spaces and to maintain natural features of the property.

1.2 Existing Site Conditions

The existing topography of the site slopes to the southwest towards the Gulf of Georgia with slopes ranging from approximately 5% to 10%. A steep bluff runs from west to east near the southern boundary of the site and ranges between 80' to 100' in height. According to the geotechnical report prepared by Golder Associates, site investigations revealed that there was one occupied residence in the southeast corner and three abandoned residences that had since been demolished. The northern half of the site is covered with evergreen trees, deciduous trees, and underbrush. The central portion of the site is cleared of trees and is mainly vegetated with tall grasses. The southern portion of the site is also vegetated with tall grasses and features some evergreen and deciduous trees along the top of the bluff.

Golder Associates examined the subsurface conditions of the site and developed geotechnical recommendations for the proposed development. The recommendations are summarized in their geotechnical report dated June 28, 2006. The report generalizes on-site soils to consist of up to three feet of topsoil, underlain by 6' of outwash native soils, and further underlain by glaciomarine subtidal deposits and till.

Groundwater seepage was encountered in eight of the eleven test pits excavated by Golder Associates. Groundwater encountered during construction will be diverted to the permanent drainage system for the site and safely conveyed to a stabilized discharge point.

1.3 Developed Site Conditions

The main access road (Road A) runs from north to south and divides the site into two drainage basins. Stormwater runoff will be collected in roadside swales along Road B to the west side of Road A (West Basin) and along Road C to the east side of Road A (East Basin). Each basin's series of roadside swales will convey stormwater runoff to two points near the top of the southern bluff. At these points, the swales will, respectively, tie into a 24-inch HDPE pipe, which will convey flows to the base of the slope and into the

Gulf of Georgia. The design of the energy dissipater for each pipe will be coordinated with Whatcom County, the Department of the Fish and Wildlife, and the Army Corp of Engineers.

Roof drains and footing drains from Lots 21-34 will be tight-lined to the HDPE for the West Basin to avoid destabilizing the existing bluff. Similarly, the roof drains and footing drains for the Community Center and Lots 35-44 will also be tight-lined to the HDPE for the East Basin.

1.4 Site Discharge into the Gulf of Georgia

Stormwater runoff collected from each basin will be conveyed to a 24" HDPE pipe near the top of the southern bluff. From here, the HDPE pipes will be installed overland, securely anchored to the ground, to the toe of the bluff. Each HDPE pipe has been located such that it traverses the flattest slopes along the bluff.

The energy dissipaters for each of the HDPE pipes is currently in preliminary design and will be coordinated with the Army Corp of Engineers, Whatcom County, and the Department of Fish and Wildlife. A couple of ideas under consideration at this time are as follows:

1. A stilling basin (i.e. buried large diameter manhole) to dissipate energy below ground and allow flows to "bubble up" through the top of structure.
2. A thick rip-rap pad with large boulders and woody debris to naturally integrate into the beachfront.

2.0 LOW IMPACT DEVELOPMENT

Considerable measures were taken in the design of this development to minimize alterations of the site's natural topography and hydrology. Such measures are becoming more prevalent in modern developments and are the basis of a new style of civil design that is commonly referred to as Low Impact Development (LID).

A primary principle of LID design is the conservation and use of on-site native soil and vegetation for stormwater management. The roads and lots have been strategically located based on this principle. By preserving a large percentage of forested and other vegetated areas, on-site flow volumes will be smaller and will reach their discharge point over a longer period of time.

Bio-retention swales are also used to slow down stormwater runoff. Instead of standard storm drain pipes, roadside bio-retention swales have been designed to collect and convey

stormwater runoff.

All grading and clearing has been limited to the roadway corridors. This measure will limit alterations to the natural topography and preserve the hydrologic functionality of the existing terrain. Limiting the clearing limits to the roadway corridors will also reduce the sediment yield from construction activities.

Aside from the environmentally friendly qualities of LID, an added benefit of this style of design is its aesthetic appeal. The goal of creating a rural atmosphere for this resort community has been effectively accomplished by incorporating LID elements into the design.

Following are a list of LID features incorporated into the project:

- Roads were designed to match existing grade as much as possible.
- Stormwater is collected in roadside bioretention swales to treat runoff and to reduce drainage infrastructure.
- In order to reduce impervious surfaces, no curb, gutter or sidewalk is proposed for the development.
- The first phase of the development is restricted to roadway and utility construction to avoid mass clearing and grading.
- Fifty percent (50%) of the site is reserved as undisturbed open space.
- Homes will share a common (dual) driveway to reduce impervious areas. Impervious paving for the driveways is under consideration at this time.
- Homes are clustered to reduce the amount of site disturbance.
- The site design reflects efforts to save existing trees and other native vegetation.
- Homeowners will be encouraged to minimize lot clearing and grading during the construction of their homes.
- Stormwater infiltration will be carefully managed to maximize water quality treatment/runoff control and to minimize adverse impacts to the existing steep slopes along the southern boundary of the site.

3.0 OFFSITE ANALYSIS

Based on current records and site observations, there is no off-site stormwater runoff tributary to the site.

4.0 EROSION AND SEDIMENT CONTROL ANALYSIS AND DESIGN

The purpose of the erosion and sedimentation control plan is to protect existing properties downstream of the site from sediment-laden runoff and erosion during construction. Because of the existing bluff along the southern edge of the development, the potential for erosion is a serious concern. For these reasons, the clearing and grading to develop the site has been phased to reduce the amount of disturbed area. The phasing will allow the Contractor to effectively manage stormwater during construction. The Temporary Erosion and Sediment Control Plan for the project consists of the following:

1. Perimeter Protection: Silt fence protection will be used for sediment control during construction. Hay bales will also be applied at the toe of steep slope areas to filter sediment and to slow flow velocities. Tree protection fencing will be used to prevent damage to existing trees.
2. Traffic Area Stabilization: A stabilized construction entrance is shown on the plans to minimize tracking dirt offsite.
3. Surface Water Control: Interceptor swales will be constructed to collect runoff from the site and convey flows to the sediment ponds for treatment.
4. Sediment Control: Sediment ponds will be used to remove sediment from stormwater runoff.
5. Stabilized Discharge of Stormwater Runoff: Treated stormwater will be conveyed to 24-inch HDPE pipes that will discharge flows into the Gulf of Georgia.
6. Dust Control: Water trucks will be used, as necessary, to control dust during construction.

Permanent erosion control measures consist of establishing vegetation in areas disturbed by construction and not surfaced by pavement or gravel.