



April 30, 2010

Project No.: 103-93128.000

Mr. Anders Kruus  
Lily Point at Point Roberts  
8015 SE 28<sup>th</sup> Street  
Mercer Island, Washington 98040

**RE: BEACH ACCESS RECOMMENDATIONS  
LILY POINT AT POINT ROBERTS  
POINT ROBERTS, WASHINGTON**

Dear Mr. Kruus:

Golder Associates Inc. (Golder) is pleased to present this letter report to Lily Point at Point Roberts summarizing our geotechnical recommendations for the proposed beach access points for the Lily Point project in Point Roberts, Whatcom County, Washington.

## 1.0 PROJECT UNDERSTANDING

The project site is located at the southeast corner of the intersection of APA Road and Paul's Road in Point Roberts, Washington. The project site is bordered to the west by Paul's Road, to the north by APA Road, to the east by a single-family residential property, and to the south by South Beach/Boundary Bay (Strait of Georgia). Figure 1 shows a vicinity map. The subject site consists of a relatively square-shaped parcel and is approximately 60 acres in size. Relatively steep slopes and near vertical bluffs run west to east, approximately along the south property line. The slopes and bluffs separate the project from the beach. Figure 2 shows a site plan of the project site. We understand you want to develop two pedestrian access points down the bluff to the beach consisting of at-grade trails.

Golder has previously completed a preliminary geotechnical study in 2006 and geologically critical areas and hydrogeologic assessment in 2007 at the project site.

## 2.0 SCOPE OF SERVICES

Our proposed scope of services consisted of the following:

1. Develop design criteria for an at-grade trail.
2. Using topographic information from Core Design, identify preferred locations for the beach access points.
3. Discuss potential issues that might impact slope stability and provide mitigations for minimizing impacts to slopes.
4. Prepare a letter report documenting our recommendations.

Our scope of service did not include any subsurface investigation, laboratory testing, site visits, or meetings. We relied on the existing data we have collected during previous phases of work on the site.

## 3.0 DOCUMENT AND RESOURCE REVIEW

### 3.1 Golder Reports

Golder reviewed the two reports we prepared for the Point Roberts project. The reports are:

- *"Report on Preliminary Geotechnical Investigation, Pauls Road and APA Road, Point Roberts, Washington (Golder project number 063-1162-100.000), dated June 28, 2006, submitted to Stanton Properties, LLC."*

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- "Report on Geologically Critical Areas and Hydrogeologic Assessment, The Point Robert's Beach Club, Paul's Road and APA Road, Whatcom County, Washington (Golder project number 063-1162-200.000), dated April 17, 2007, submitted to Stanton Properties, LLC."

Based on our review of our previous reports, the slopes and bluff along the beach are geologically active with slumps and erosion occurring as a result of beach erosion at the toe.

### 3.2 Online Resources

Golder reviewed several trail design, construction, and maintenance resources available to the public. The resources we reviewed included the following online publications. We recommend the trail designer review the publications for information valuable to the trail design and layout.

- *Trail Construction and Maintenance Notebook, 2007 Edition*, Publication #0723-2806-MTDC, United States Department of Agriculture, Forest Service, Technology & Development Program, in Cooperation with United States Department of Transportation, Federal Highway Administration (<http://www.fhwa.dot.gov/environment/fspubs/07232806/index.htm>)
- US Forest Service National Trail Drawings and Specifications (<http://www.fs.fed.us/database/acad/dev/trails/trails.htm>)
- Trails Management Handbook, Forest Service Handbook (FSH) 2309.18 ([http://www.fs.fed.us/cgi-bin/Directives/get\\_dirs/fsh?2309.18](http://www.fs.fed.us/cgi-bin/Directives/get_dirs/fsh?2309.18))
- *Trail Design Guidelines, Regional Trails, Natural Areas and Developed Parks, April 2009*, Portland Parks & Recreation (<http://atfiles.org/files/pdf/DesignGuidelinesPortland09.pdf>)

Based on our review of the above resources, surface water erosion will likely have the largest impact (other than existing slope instability) on the performance and long term maintenance of the beach access trails. If designed correctly to minimize the impacts of surface water erosion, trail maintenance will be reduced.

### 4.0 POTENTIAL ISSUES, MITIGATIONS, AND DESIGN CRITERIA

The slopes and bluffs along the beach are geologically active. Golder has noted numerous slides, slumps, and areas of severe erosion along the slope. The location of these features can change since the erosion forces along the shoreline are not constant. Construction of at-grade beach access trails will not stabilize the slopes or bluffs. The geologic activity will influence the degree of long term trail maintenance. Surface water erosion of the trail and slope can be negatively impacted by the trail design and layout. If the trail is constructed incorrectly, then erosion of the slopes could increase. In order to minimize surface water erosion, we recommend the following design criteria:

1. Limit slope of the at-grade trail to a maximum of 10%, wherever possible.
2. Grade trail to prevent collection and concentration of surface water.
  - a. Use the "half-rule" to prevent trail from becoming a ditch. The "half rule" has the trail grade at less than or equal to "half" the sideslope grade (see Figure 3).
  - b. Outslope trail surface to shed water and minimize concentration of water on inboard side of trail (see Figure 3).
3. Minimize disturbance of existing vegetation.

### 5.0 BEACH ACCESS POINTS

When selecting the route for the trail down the slope, careful consideration should be given to the resulting sideslope cuts from benching the slope for the trail establishment. The preferred location for the

trail will be areas where the existing slope is flattest. The flattest existing slopes will allow the minimum sideslope cuts to establish the trail. Figure 2 shows potential location for beach access trails.

In our report dated June 2008, we recommended maximum permanent cut slopes of 2H:1V assuming proper drainage and erosion control. Ideally, the trail can be routed such that the sideslope cuts are 2H:1V or flatter. Flatter slopes will allow for relatively easier maintenance and establishment of vegetation. If a route cannot be established without steeper than 2H:1V sideslope cuts, then more aggressive erosion control measures will be required.

## 6.0 CONCLUSION

Regardless of where the beach access trails are located, ongoing maintenance is likely to be required because of the geologically active slopes and bluffs. The at-grade trail provides a reasonable method of accessing the beach. Slope movements that impact the at-grade trail will likely be readily observable by trail users as compared to a structure that might obscure underlying lack of support.

## 7.0 USE OF REPORT

This letter report has been prepared exclusively for the use of Lily Point at Point Roberts and their consultants for the project site. The conclusions and recommendations presented in this report are based on our previous explorations and observations completed and conversations regarding the proposed site and are not intended, nor should they be construed to represent, a warranty regarding the proposed development, but are forwarded to assist in the planning and design process.

Judgment has been applied in interpreting and presenting the results. Variations in subsurface conditions outside the exploration locations are common. Actual conditions encountered during construction might be different from those observed in the explorations.


The scope of services was performed in general accordance with locally accepted geotechnical engineering practice, subject to the time limits and financial and physical constraints applicable to the services for this project, to provide information for the areas explored. There are possible variations in the subsurface conditions between the test locations and variations over time.

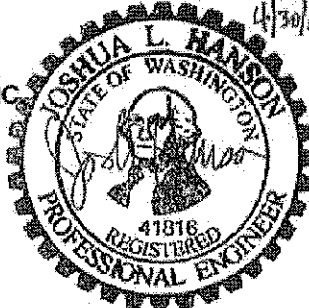
The professional services retained for this project include only the geotechnical aspects of the subsurface conditions at the site. The presence or implication(s) of possible surface and/or subsurface contamination resulting from previous site activities and/or resulting from the introduction of materials from off-site sources are outside the scope of services for this report and have not been investigated or addressed.


We appreciate the opportunity to work for Lily Point at Point Roberts. If you have any questions or comments about this proposal, please contact us at (425) 883-0777.

Sincerely,

GOLDER ASSOCIATES INC.

  
Joshua L. Hanson, P.E.  
Senior Project Engineer

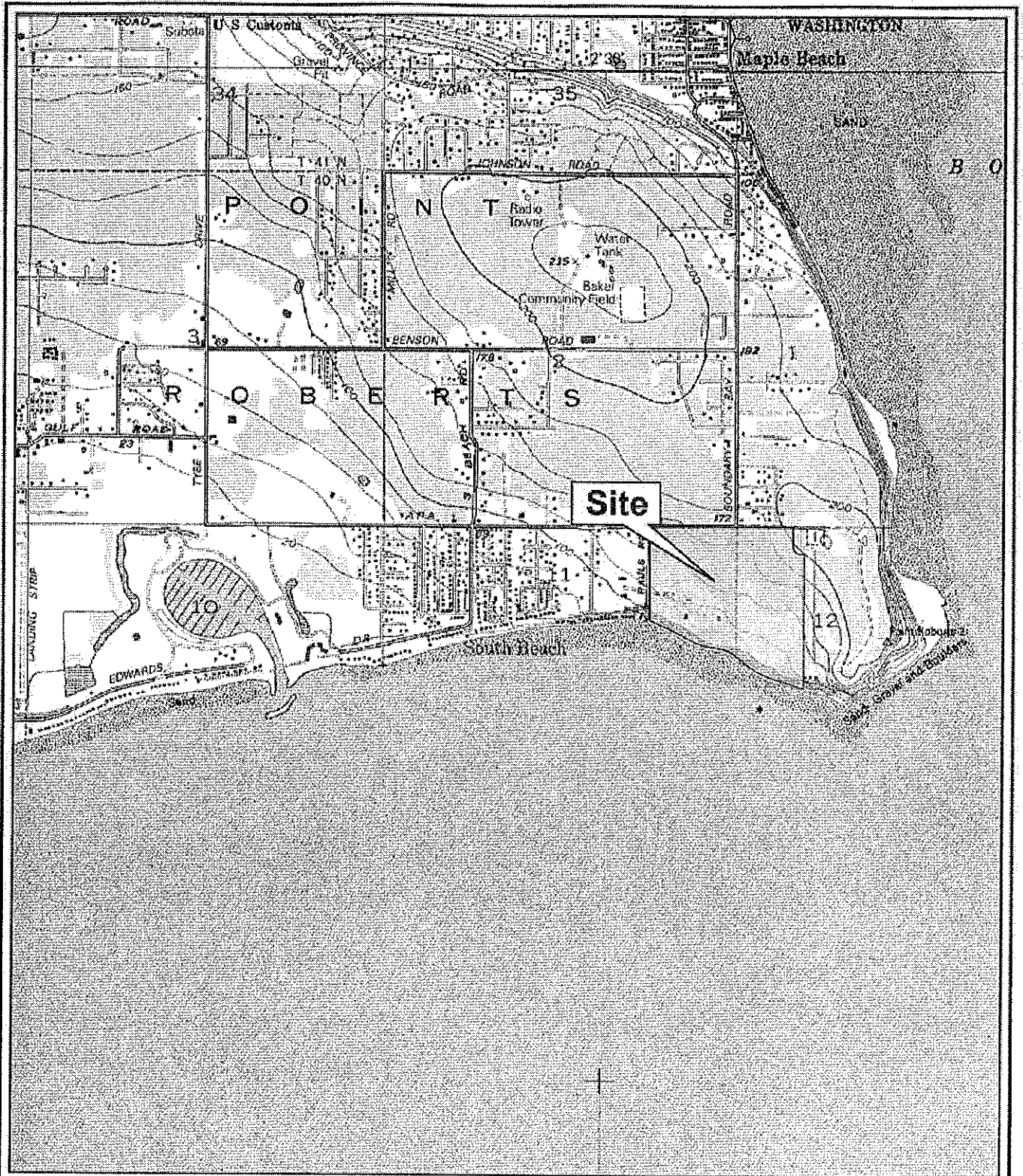


  
James G. Johnson, LG, LEG  
Principal and Senior Consultant

Attachments: Figure 1 – Vicinity Map  
Figure 2 - Plan View  
Figure 3 – Surface Water Details

JGJ/JLH/ngs

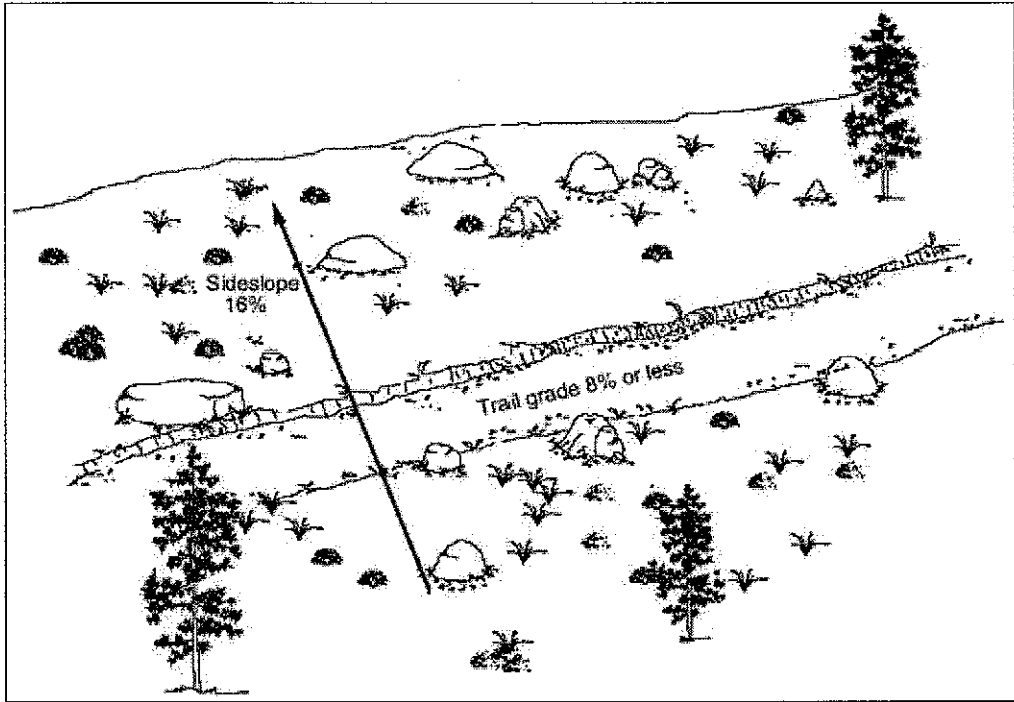
**FIGURES**



Source: USGS 7.5 Minute Topographic Quadrangle Map, Point Roberts, WA, 1994

FIGURE 1  
VICINITY MAP  
LILY POINT/PT ROBERTS BEACH ACCESS/WA





DRAWING FROM TRAIL CONSTRUCTION AND  
MAINTENANCE NOTEBOOK, 2007 EDITION



"HALF RULE"

BASE DRAWING FROM CORE DESIGN RECEIVED ELECTRONICALLY MARCH 29, 2010