

Geotechnical Report

Scatchet Head Community Slope Assessment

September 30, 2018

Prepared for:

Scatchet Head Community Club

Prepared by:



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September 30, 2018

Mr. Peter Sprinz
Scatchet Head Community Club
3742 Driftwood Dr.
Clinton, WA 98236
sprinzpt@gmail.com

RE: Geotechnical Report
George and Driftwood Drive • Clinton, WA 98236
PGC Project 18012

Dear Mr. Sprinz:

Palmer Geotechnical Consultants, Inc. (PGC) is pleased to present this geotechnical report regarding monitoring of slopes at the subject property. This report was prepared in accordance with our proposal dated February 21, 2018.

We appreciate the opportunity to be of service to you. If you have questions regarding this report please do not hesitate to call.

Sincerely,

Palmer Geotechnical Consultants, Inc.

A handwritten signature in blue ink, appearing to read 'Scott Palmer', is written over a light blue horizontal line.

Scott Palmer, P.E.
President



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1.0 Introduction

A geotechnical report has been prepared regarding inspections along the steep slopes of George Drive and Driftwood Drive in Clinton, Washington that lie within the Scatchet Head Community Club (SHCC) (Figure 1). The purpose of our scope was to characterize existing conditions of the steep slopes, with respect to Island County's critical area ordinance, Island County Code (ICC) 11.02.140.

We understand that the SHCC is responsible for maintenance of land and stormwater utilities along George Drive and Driftwood Drive in Clinton, Washington. The inspection area begins at George Drive and traverses southeast to the intersection with Driftwood Drive. The inspection area continues along Driftwood Drive, turning south-southwest. The total distance is approximately three-quarters of a mile. Within this section, steep slopes are located along the west side of George Drive that descend to the banks of Sweetwater Creek and above the north side of Driftwood Drive. PGC has been asked to perform a minimum of bi-annual inspections throughout the alignment, including south of Whales Tail Lane.

2.0 Project Description

The purpose of our scope was to evaluate areas of the slopes adjacent to George Drive and Driftwood Drive and provide geotechnical comment.

3.0 Scope of Services

Geotechnical Data Review

For our use we were provided a report prepared by Anchor Environmental, LLC (AE) dated March 2008. This report identifies several areas of concern throughout the community regarding geotechnical issues, especially slope stability and drainage. Using this report and other available geotechnical data we developed a site inspection plan to focus on site specific features and areas of concern that are highlighted in the historic and current data. Below we discuss the previously defined areas as well as some new areas identified during our site visits.

Initial Inspection

We visited the site for an initial inspection to survey the site and develop an inspection checklist. During this time we observed and documented existing conditions. Specific locations within the



inspection area were photographed.

4.0 Site Description and Slope Conditions

The area of the study is adjacent to George Drive and between Whales Tail Lane and Driftwood Drive located in the SHCC in Clinton, Washington (Figure 1). The previous report prepared by AE identified six areas of concern, identified as items 1 through 6 in Section 1.2. PGC was contracted to evaluate and provide recommendations on the following areas:

George Drive & Sweetwater Creek

Development Practices above Bluffs

Slopes above Driftwood Drive West (Lots 22 to 77) See Figure 2.

Slopes above Driftwood Drive East (Lots 34 to 39) See Figure 2.

4.1 Current Conditions

Sweetwater Creek parallels George Drive along the west side of the road embankment approximately 20 feet below. The sidewalls of the creek are moderately vegetated with mature evergreen and deciduous trees and a healthy understory of native vegetation. The banks of the creek are moderately vegetated with nettles, horsetail, and blackberries and large areas of exposed slopes. Large pieces of the creek sidewalls were observed within the stream bed that had toppled down. Trees were observed in reclined positions, toppled over, or undercut along the slope face and crest. Specifically, a large alder at the turn in the creek near the west bank slope crest is gravely undercut with exposed roots (Appendix A, Photo 6).

PGC walked both the toe and the crest of the 150 to 200-foot tall slope bordered by Driftwood Drive to the south and Whales Tail Lane to the north. A drainage ditch parallels the north side of Driftwood Drive along the toe of the slope. While the majority of the toe is well vegetated, near the west end at a storm drain vegetation is sparse and consists of bamboo. In addition, large amounts of sand have eroded from upslope and are inundating the storm drain (Photo 7). Moving north upslope vegetation is moderate consisting of mature Alders with a heavy understory of blackberries, nettles and other native underbrush. This was observed among much of the lower third of the slope along with many downed trees. Along the western extent a ravine with running water has been cut into the landscape. The middle third of the slope is comprised of exposed soils across much of the slope face. Soils consisted of gray sand with some silt and



gravel with a few native weeds throughout. The west end of the exposed face was comprised of a dark brown laminated silt that has free flowing water cascading from above, down the slope face and into the ravine. Large toppled masses of this material were observed throughout the area (Photos 8-10). At the top of the middle third the topography moderated becoming gentle with increased vegetation consisting of heavy weeds and underbrush that gradually became a dense canopy of mature evergreen and deciduous trees. The upper third of the slope, to approximately 150 feet above mean sea level (AMSL) was sparsely vegetated with a concave appearance to the slope face. The crest is lined with single family residences set approximately 30 to 50 feet back, though many outdoor living spaces or gardens were observed within 5 to 10 feet of the crest. The western extent of the slope extends to approximately 200 feet AMSL composed of exposed yellow-brown silty sand soils that are near vertical with almost no vegetation (Photos 11-14).

Black corrugated drain pipes were observed traversing the slope. We understand that this is part of a catch basin and “funnel” pipe system. Due to the heavy vegetation growth we could not confirm the placement of the catch basins during our exploration. However, the western most tightline was observed with sections either disconnected or filled with granular material, with greatly reduced functionality. A tightline to the east was observed that was discharging directly onto the slope face.

5.0 Recommendations

Based on our observations during field exploration, PGC provides the following recommendations.

5.1 George Drive and Sweetwater Creek

During our site visit we observed that Sweetwater Creek near George Drive appeared to have experienced significant erosion of the deeply incised banks. This area should be monitored frequently especially in winter months. If areas of erosional scarring or vegetation (tree) loss become worse additional measures may need to be enacted including capturing drainage from George Drive. This may be accomplished by installing a drainage ditch or pipe with a series of catch basins which capture flows from George Drive down to an energy dissipater then to the culvert near Driftwood Drive (Appendix B).

A certified arborist should be consulted to remove any undercut or off-vertical trees along the banks of the creek. Specifically, along the west bank at the turn and near the crest of the east bank.

5.2 Development Practices above Bluffs

As described in the previous AE report, three distinct geologic layers are present. Pleistocene Glacial Till (Qgt) overlies sandy Pleistocene Advance Outwash (Qga) with fine-grained Pleistocene Whidbey Formation at the base.

The Qga unit has the higher permeability of the three units, thus a higher risk of failure when exposed to elevated moisture content. Whales Tail Lane is constructed near the contact of Qgt and Qga. PGC recommends ensuring all residences along Whales Tail Lane maintain a minimum vegetative buffer of 5 feet from the slope crest. As well, we recommend species with a mature height of 15 feet or more should be avoided on the slope face or within 10 feet of the crest. Table 1 below from “*Slope Stabilization and Erosion Control Using Vegetation*” (Myers, 1993) highlights vegetation that provide increased slope stability.

Table 1. Slope Stabilizing Vegetation

Common Name	Botanical Name	Deciduous/Evergreen	Mature Height (ft)
Vine Maple	Acer cricinatum	Deciduous	10+
Oceanspray	Holodiscus discolor	Deciduous	10+
Willow	Salix spp.	Deciduous	10+
Snowberry	Symphoricarpos albus	Deciduous	3+
Rose	Rose spp.	Deciduous	2-10
Salmonberry	Rubus spectabilis	Deciduous	To 12
Salal	Gaultheria shallon	Evergreen	To 4
Oregon grape	Mahonia spp.	Evergreen	To 6
Red huckleberry	Vaccinium parvifolium	Deciduous	To 12
Evergreen	Vaccinium ovatum	Evergreen	To 8
Serviceberry	Amelanchier alnifolia	Deciduous	12+

Additionally, fences, outdoor living spaces including patios or decks should not be constructed within 20 feet of the slope crest. All residences should ensure that no water is capable of sheet



flowing down the slope face. Therefore, any gardens or other plants that require regular irrigation should be planted no closer than 10 feet of the slope crest.

Each residence should ensure that all gutter and footing drain outfalls are positively tightlined to either Whales Tail Lane stormwater systems or to Driftwood Drive below. See Section 5.3 for tightline recommendations.

5.3 Slope above Driftwood Drive West (Lots 22 to 77)

A large seepage face and landslide has developed approximately two-thirds of the way up the slope on Lot 70. Additionally, several Alder trees have been knocked down during recent soil movement. We recommend that a tree professional is retained to comment on the likelihood of these trees to remain in place. If the trees are likely to fall in the coming winter months we recommend they are removed. Photos 1 to 5 (Appendix A) show a slope activity that has occurred throughout the years. It is our opinion that this mass wasting events were exacerbated by:

- seepage on the slope face and
- distressed trees falling and damaging other trees.

Existing tightlines “funnels” are constructed out of corrugated PVC pipe with connectors at each intersection. This material no longer meets Island County Code. Additionally, in our experience this material is prone to failure in areas where erosion is continuously occurring and where vegetation is capable of toppling or overgrowing the tightline.

PGC recommends replacing all existing tightlines with High Density Polyethylene (HDPE) pipe. PGC recommends ensuring that the connections are watertight and sealed, routine maintenance is conducted of the length of pipe, inspection risers are installed, appropriate termination utilities are installed such as a splash block or diffuser tee at the slope toe, and that the outfall does not discharge directly on the toe (Appendix B). Additionally, when renovations begin, that the tightline is not damaged during construction and is sufficient to carry the proposed runoff.

PGC also recommends vegetative buffers a minimum if 5 feet on either side are installed and maintained to allow ease of access for inspection and to prevent trees or other vegetation from over taking or toppling and causing damage to the pipe. Vegetative buffers should consist of a slope stabilizing fabric with appropriate root anchoring plants throughout.



5.4 Slope above Driftwood Drive East (Lots 34 to 39)

A drainage ditch was observed at the base of the slope near lot 39. This ditch appeared to functioning although somewhat slowly. The flow in this ditch should be monitored especially in winter months to confirm positive drainage of the slope. If water appears cloudy or exhibits other signs of erosion this ditch may need to be encapsulated in a pipe or pumped to a suitable discharge point near driftwood drive. Although the slope in this area is fairly steep it was observed to be well vegetated during our visit. We recommend that the vegetation is monitored and if local trees show signs of distress they are evaluated by a tree professional.

6.0 General Comments

The analysis and recommendations presented in this report are based upon the data obtained from our site visits, available public records, and from other information and sources discussed in this report. This report does not reflect variations that may occur between known data points, across the site, or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until construction begins or is completed. Should variations appear that differ from the data and recommendations contained within this report, PGC should be immediately notified so that further evaluation and supplemental recommendations can be provided. PGC is not responsible for ensuring that other members of the project team implement our recommendations.

The scope of our services does not include services related to construction safety precautions or dewatering operations. Our recommendations are not intended to direct the contractor's methods, techniques, sequences or procedures, except as specifically described in our report for consideration in design.

Within the limitations of scope, schedule, and budget, our services have been executed in accordance with the generally accepted practices. This report has been prepared for the exclusive use of our client, and their representatives, for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices in this area at the time this report was prepared. No warranties, either expressed or implied, are intended or made. Site safety and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless PGC reviews the changes and either verifies or modifies the conclusions of this report in writing.

Closure

If you have questions regarding this report please feel free to contact me at 360-929-5676 or spalmer@palmergeo.com.

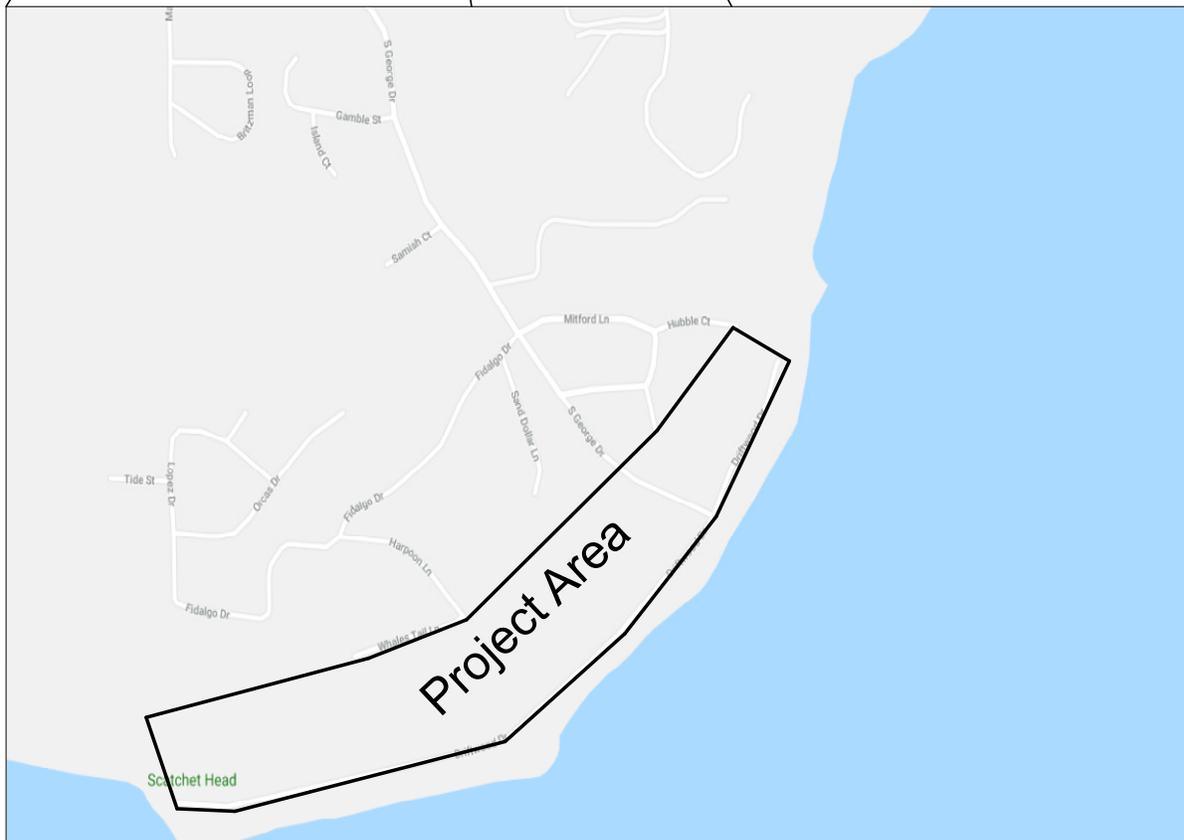
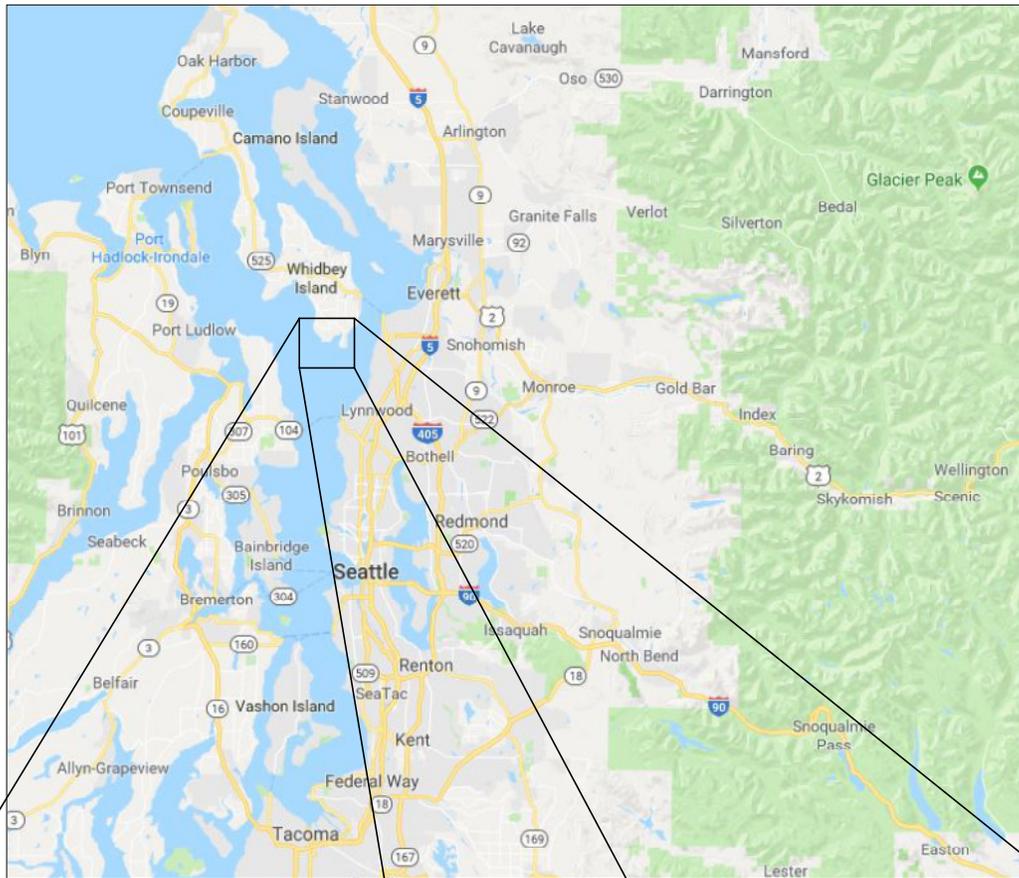
Sincerely,



09-30-2018

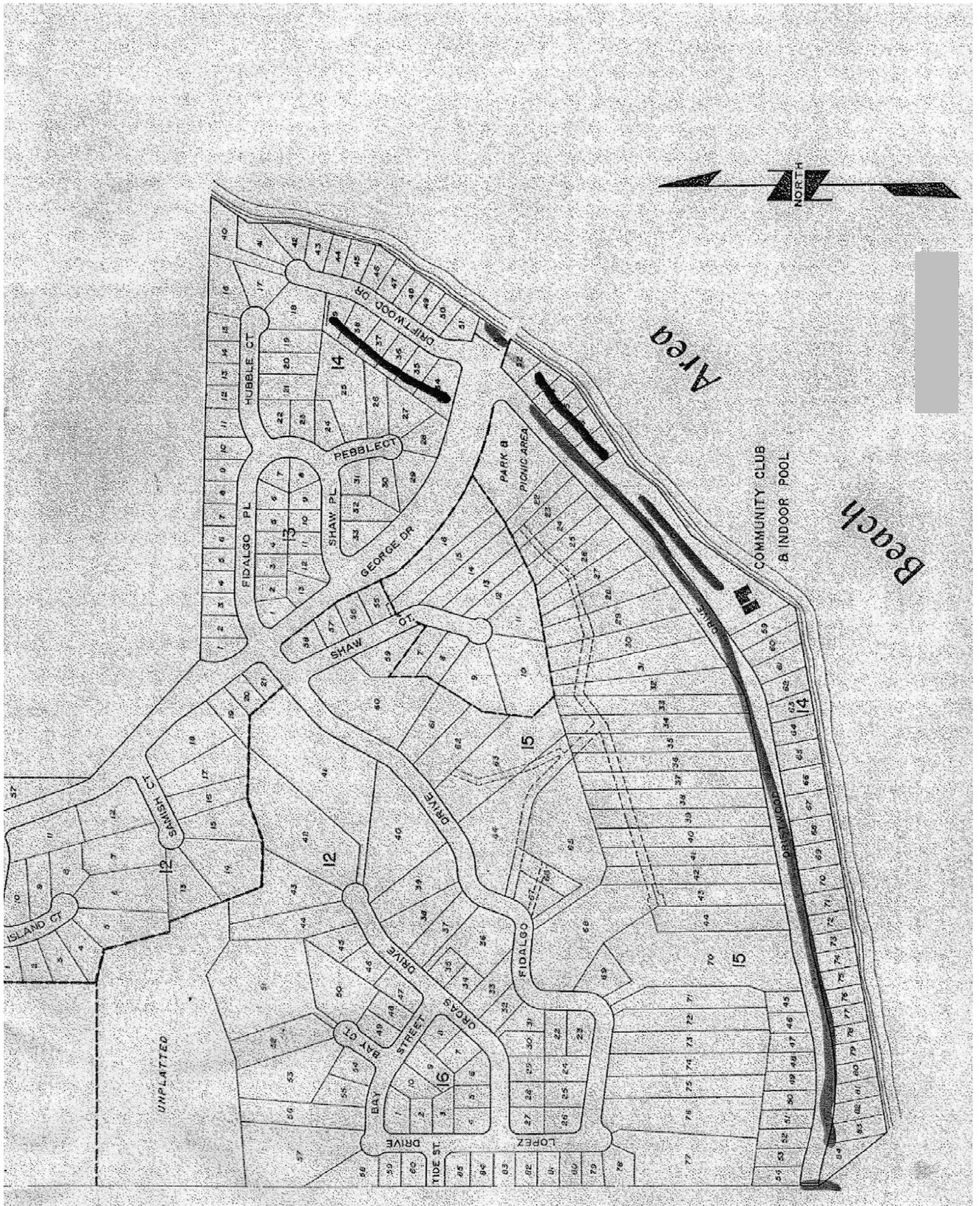
Scott A. Palmer, P.E.

Figures:



Scatchet Head Community Club
Clinton, WA

Figure:
1



Appendix A: Photos



Photo 1. 1976 to 1977 photo from Department of Ecology Coastal Zone Atlas. Photo looking north shows subject area with sparse development. Note the lack of development above the bluff and the exposed soils along the bluff face.



Photo 2. 1992 to 1997 photo from Department of Ecology Coastal Zone Atlas. Photo looking north shows the area with increased development at the bluff crest. Additionally, vegetation has begun to repopulate the bluff crest with decreased exposed soils along the face.



Photo 3a. 2000 to 2002 photo from Department of Ecology Coastal Zone Atlas. Photo looking north shows the western extent of the subject area with increased development at the bluff crest. Additionally, note the continuously evolving vegetation and areas of exposed soils .



Photo 3b. 2000 to 2002 photo from Department of Ecology Coastal Zone Atlas. Photo looking north shows the eastern extent of the subject area with increased development at the bluff crest. Additionally, note the continuously evolving vegetation and areas of exposed soils .



Photo 4a. 2006 to 2007 photo from Department of Ecology Coastal Zone Atlas. Photo looking north shows the western extent of the subject area with increased development at the bluff crest. Additionally, note the increased and mature vegetation have begun to repopulate areas of exposed soils .



Photo 4a. 2006 to 2007 photo from Department of Ecology Coastal Zone Atlas. Photo looking north shows the eastern extent of the subject area with increased development at the bluff crest. Additionally, note the increased and mature vegetation have begun to repopulate areas of exposed soils .



Photo 5a. 2016 photo from Department of Ecology Coastal Zone Atlas. Photo looking north shows the western extent of the subject area with increased development at the bluff crest. Additionally, note the increased and mature vegetation have begun to repopulate areas of exposed soils, though new areas of failure on the lower third have appeared.

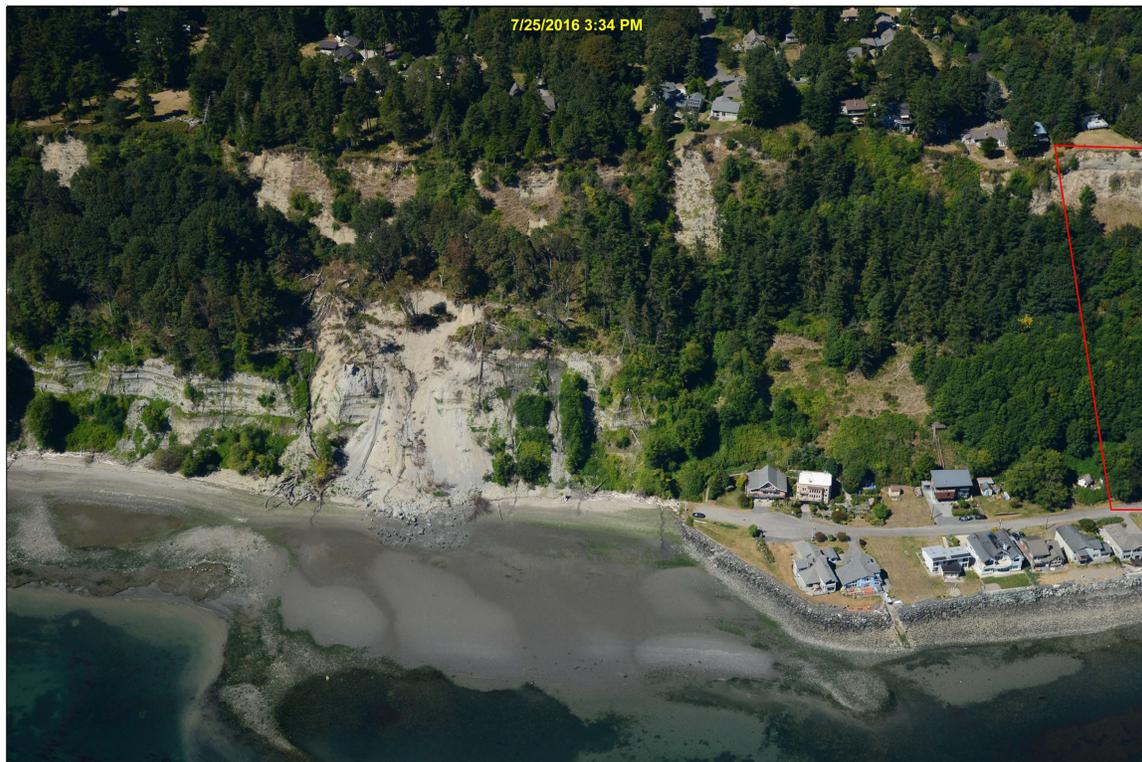


Photo 5b. 2016 photo from Department of Ecology Coastal Zone Atlas. Photo looking north shows the western extent of the subject area with increased development at the bluff crest west of the study area. Additionally, note areas of failure on the middle third of the slope.



Photo 6. Photo taken standing in the banks of Sweetwater Creek looking west up the slope at the bend in the creek. Note the severely undercut mature Alder that should be examined by a certified arborist for removal.

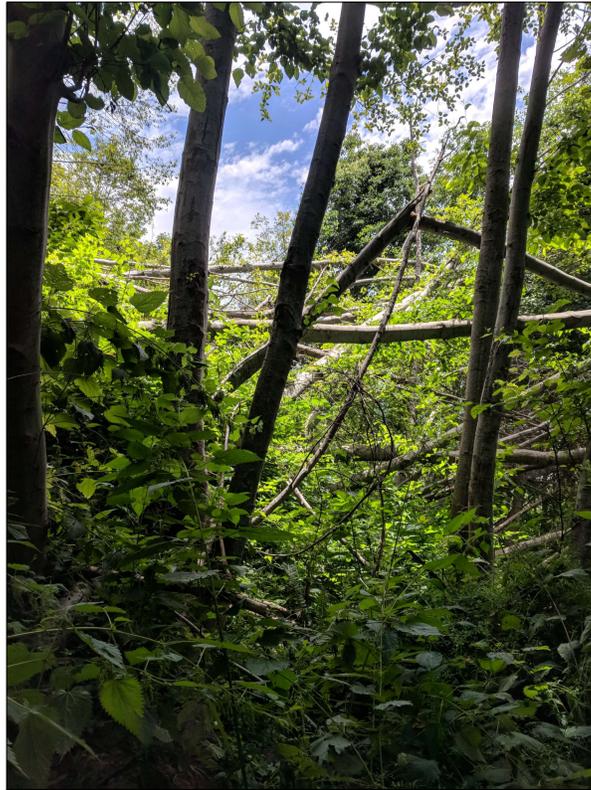


Photo 7. Photo taken standing in the lower third of the slope above Driftwood Drive looking east. Note the high number of fallen trees atop standing trees.



Photo 8. Photo taken standing on the middle third of the bluff above Driftwood Drive looking upslope. Note the extensive exposed soils, young vegetation on rilling within the slope face.



Photo 9. Photo taken standing in the middle third of the bluff above Driftwood Drive looking west. Note the blocky and laminated features of the exposed soils as well as the water cascading from the material and incising rills.



Photo 10. Photo taken standing in the middle third of the bluff above Driftwood Drive looking east. Note the exposed soils, seasonal and immature vegetation, and toppled trees.

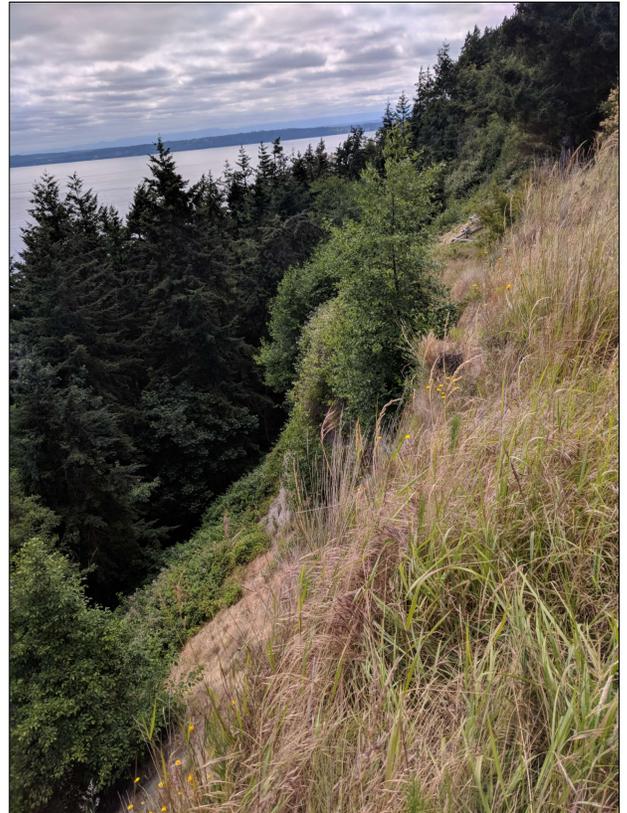
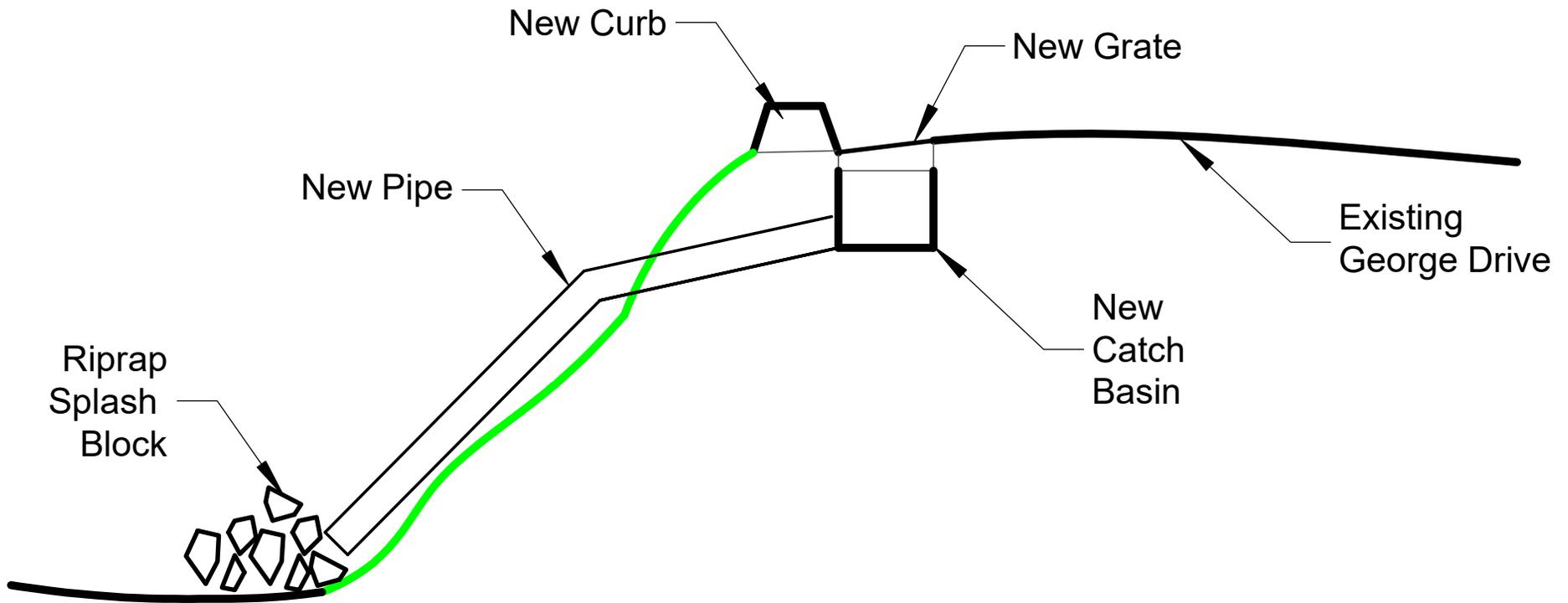
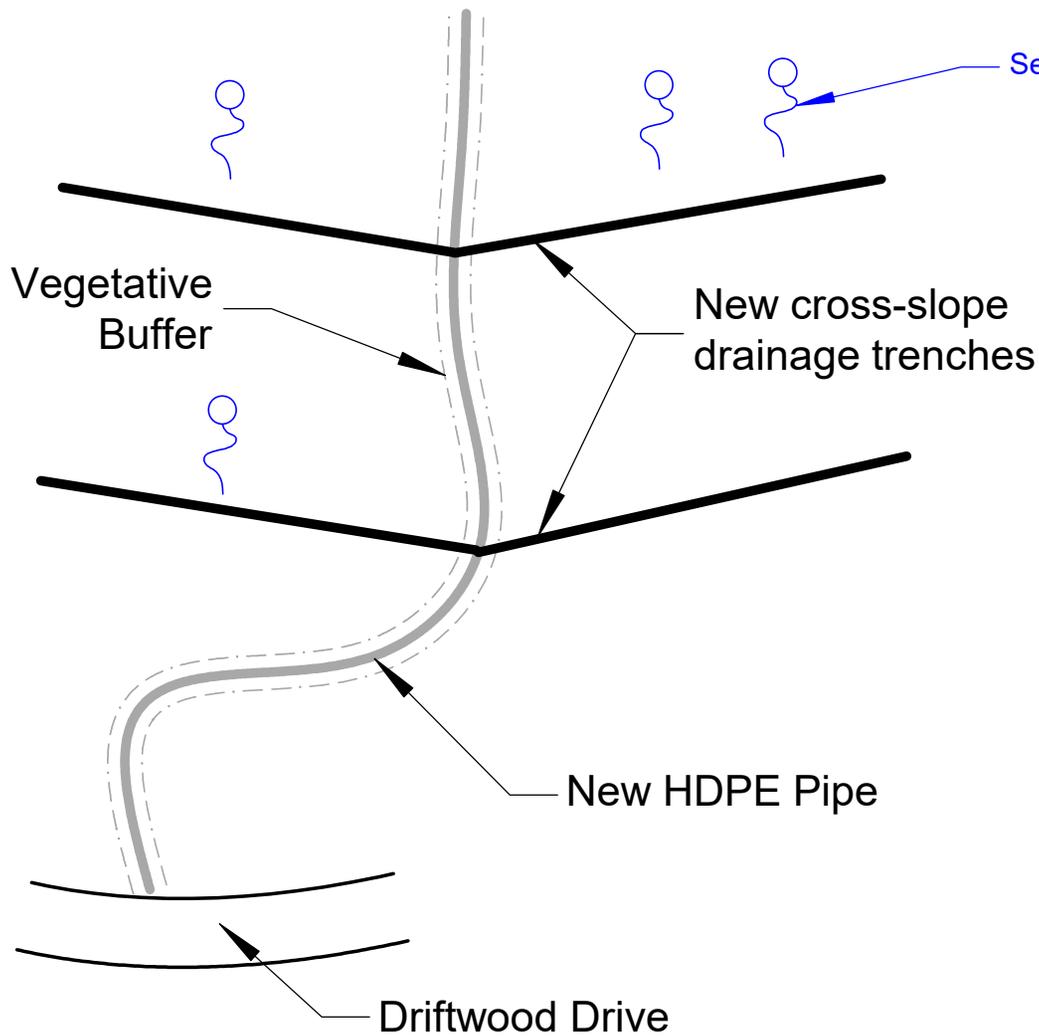


Photo 11 through 14. Photos taken standing at the crest of the bluff from the residences along Whales Tail Lane. Photos taken looking west, southwest, southeast, and east (clockwise from top left). Photos show landscaping features near the slope crest, exposed soils, young vegetation, with few trees.

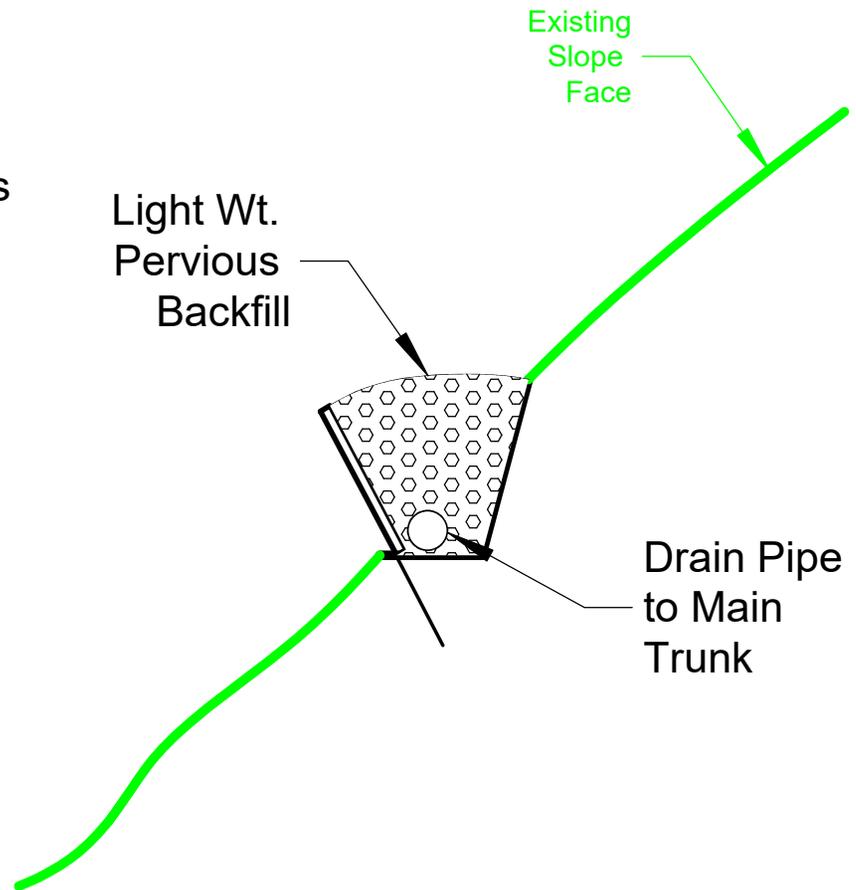
Appendix B: Concept Drawings



Section View



Plan View



Section View