

DEVELOPMENT VARIANCE PERMIT NO. 2024-04

1. This Development Variance Permit is issued to:

Ken and Noreen Moss

21756 – 122nd Avenue

Maple Ridge, BC V2X 3W9

2. This Development Variance Permit is issued subject to compliance with all the applicable Bylaws of the District of Sechelt except as specifically varied or supplemented by this Permit.
3. This Development Variance Permit applies to, and only to, the property within the District of Sechelt as described below, and all building structures and other developments thereon:

Parcel Identifier: PID 008-530-327

Legal Description: LOT 20 DISTRICT LOT 6214 PLAN VAP13644

Addressed as: 7071 Porpoise Drive

4. Bylaws of the District enacted under Section 479 of the *Local Government Act*, as amended from time to time, are varied or supplemented as described below.
 - (a) Zoning Bylaw No. 580, 2022 is varied for the property noted above to achieve conformance for the retaining walls shown on Attachment 2.

The variance is as follows:

- i. Section 2.13.1 – to increase the maximum height of a retaining wall from 1.2 m to up to 5 m in some sections as indicated on the drawings included as Attachment 2.
- ii. Section 2.13.2 – to reduce the height ratio for a combined system of retaining walls to less than 2 horizontal to 1 vertical as indicated on the drawings included as Attachment 2.
- iii. Section 1.1.4 – to reduce the minimum setback for an accessory structure for an exterior side parcel lines from 3 m down to 0 m as indicated on the drawings included as Attachment 2.

CONDITIONS OF PERMIT

5. The Property and the works shall be developed strictly in accordance with the following terms, conditions and provisions of this Development Variance Permit and any plans and specifications attached to this Development Variance Permit shall form part of this Development Variance Permit:
 - a) Attachment 1 – Property Location
 - b) Attachment 2 – Site Plan, Elevations, and Cross Sections
 - c) Attachment 3 – Geotechnical Assessment
 - d) Attachment 4 – Revegetation Plan
6. Notice of this permit shall be filed at the Land Titles Office under the authority of Section 503 of the *Local Government Act* and upon such filing, the terms of this permit or any amendment hereto shall be binding on all persons who acquire an interest in the lands affected by this permit.
7. **THIS PERMIT IS NOT A BUILDING PERMIT.**
8. **THIS PERMIT IS NOT A DEVELOPMENT PERMIT.**

Authorizing Signature:

Authorizing Resolution:

Date of Approval:


Date of Issue:

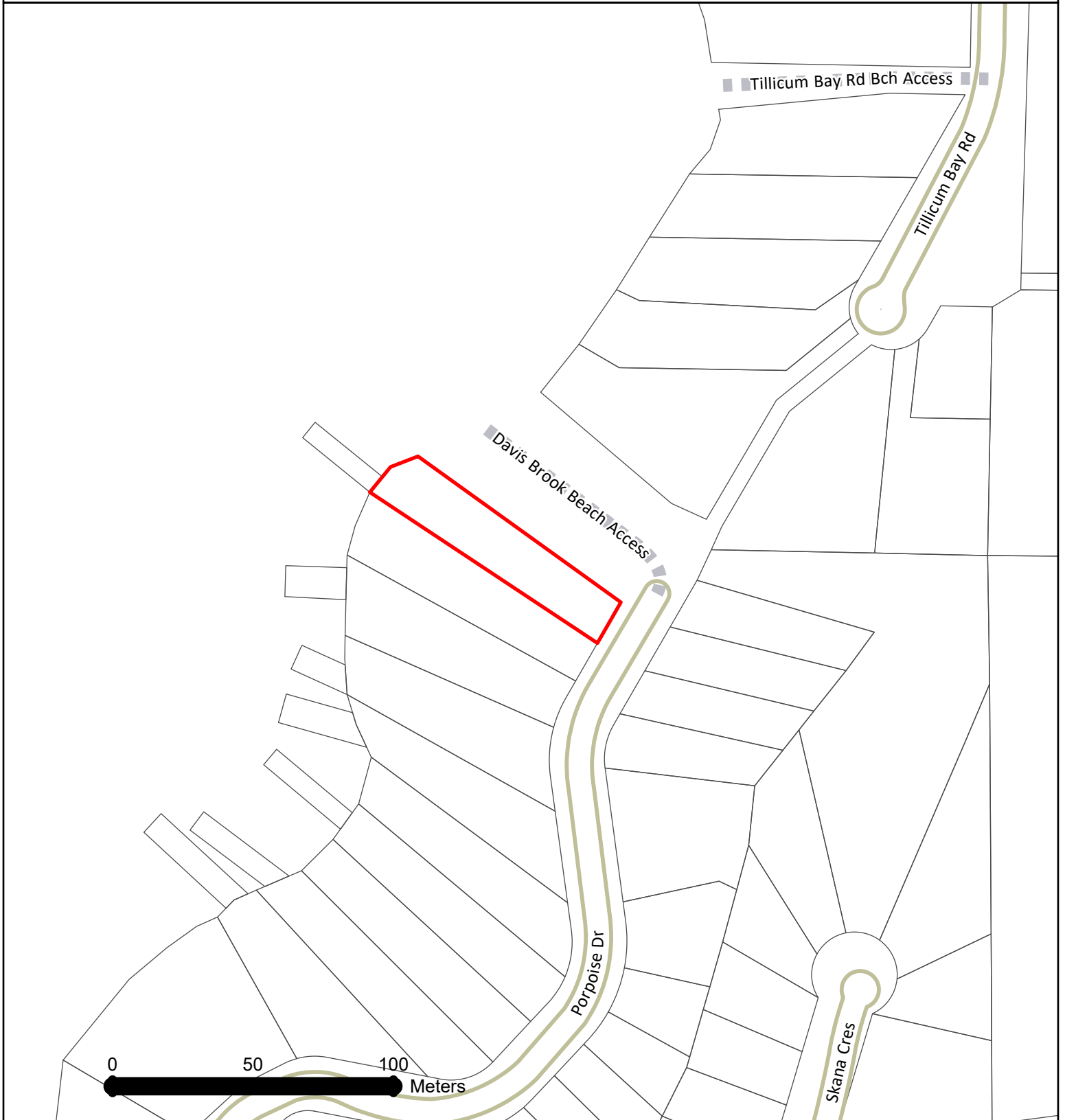
Andrew Allen

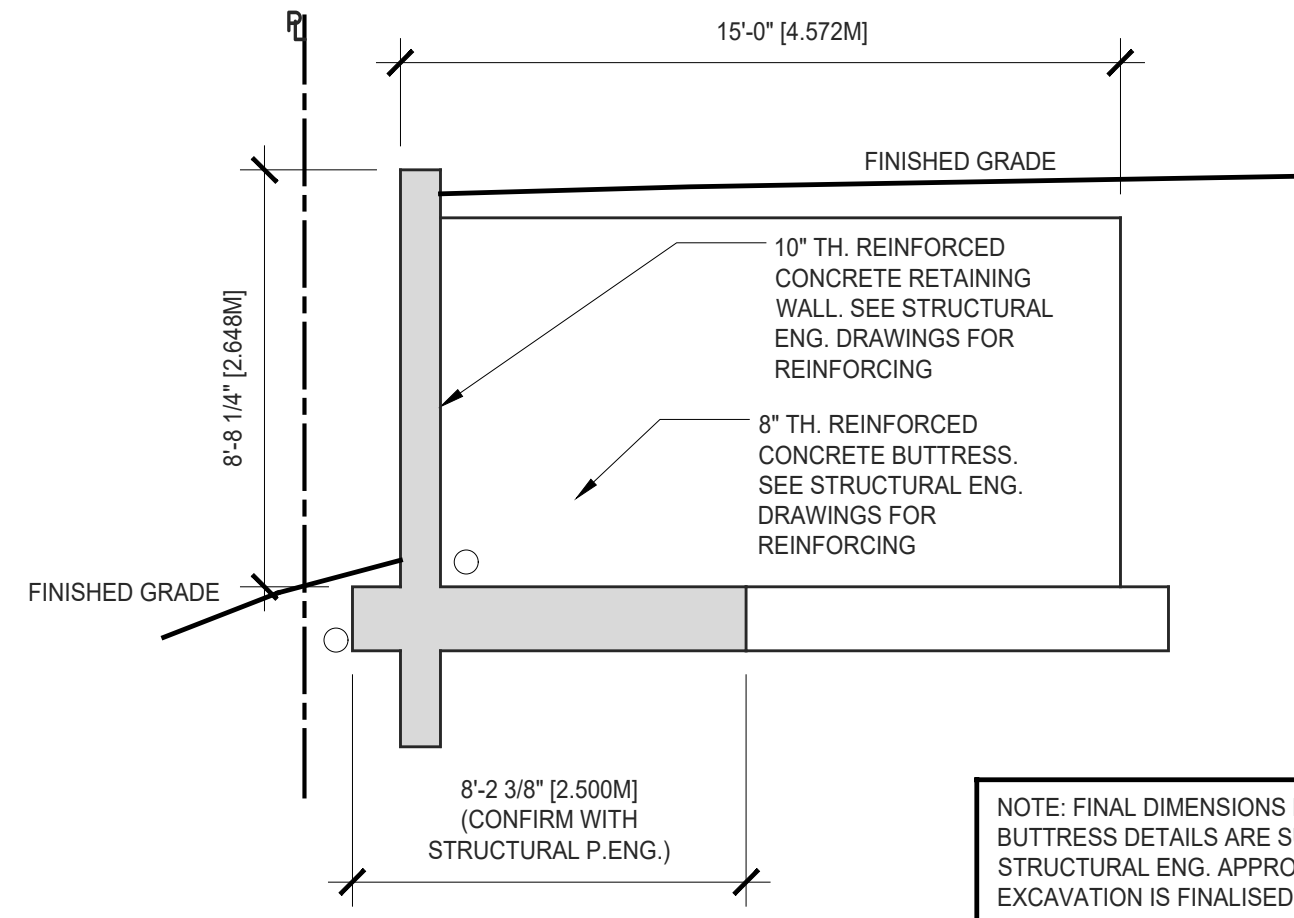
Director of Planning & Development



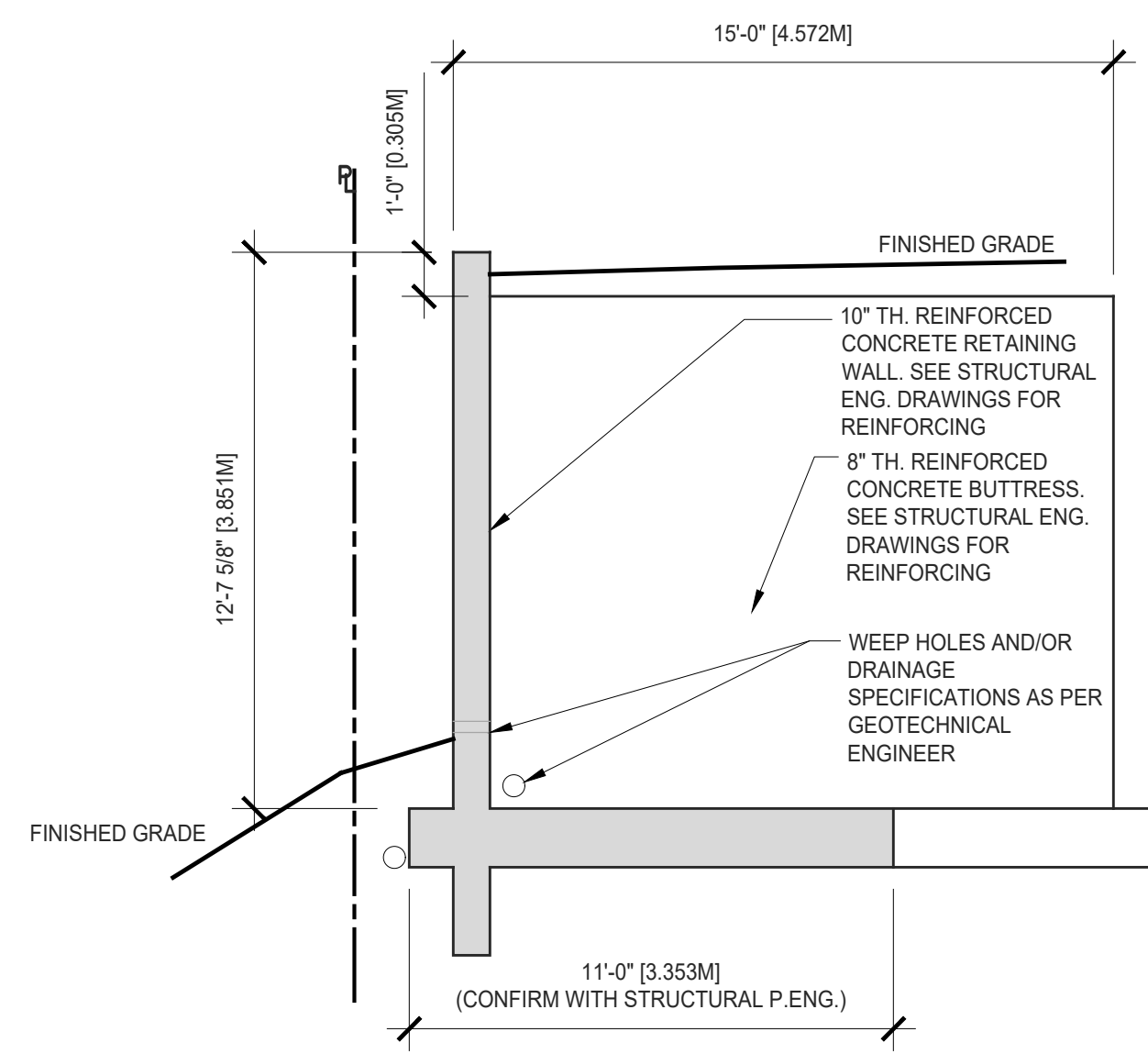
CIVIC: 7071 Porpoise Drive
LEGAL:
LOT 20 DISTRICT LOT 6214 PLAN VAP13644, PID 008-530-327

 Subject Property





C SECTION AT UPPER BUTTRESS
SCALE: 1/4" = 1'-0"

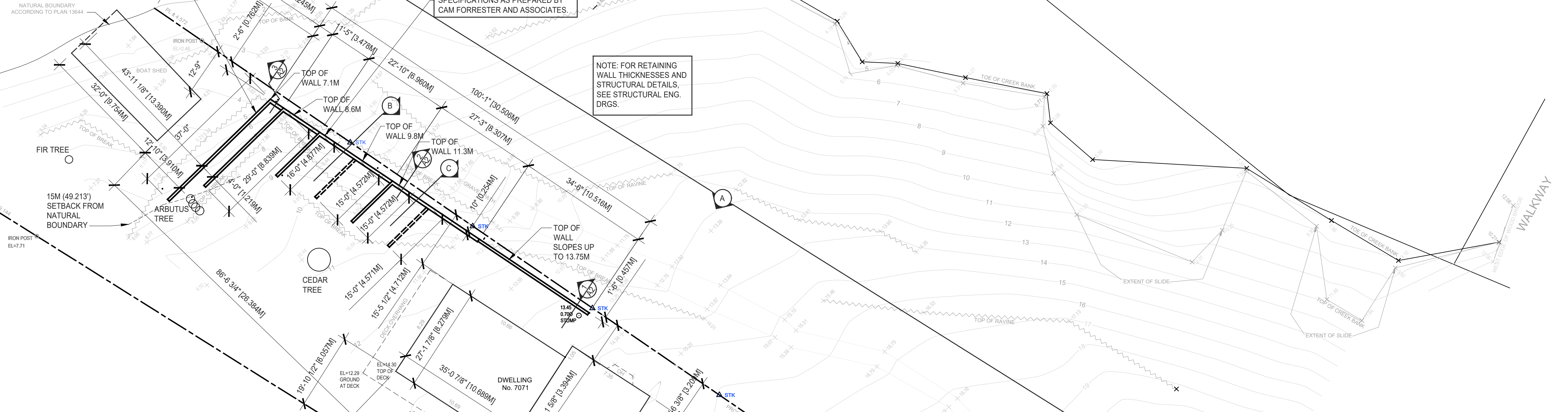


B SECTION AT LOWER BUTTRESS
SCALE: 1/4" = 1'-0"

NOTE: AREA OF EXPOSED TOP SURFACE OF RETAINING WALLS = 140.6 ft²

NOTE: REVEGETATION AT WALL BASE TO BE IN ACCORDANCE WITH REVEGETATION PLAN AND SPECIFICATIONS AS PREPARED BY CAM FORRESTER AND ASSOCIATES.

NOTE: FOR RETAINING WALL THICKNESSES AND STRUCTURAL DETAILS, SEE STRUCTURAL ENG. DRGS.

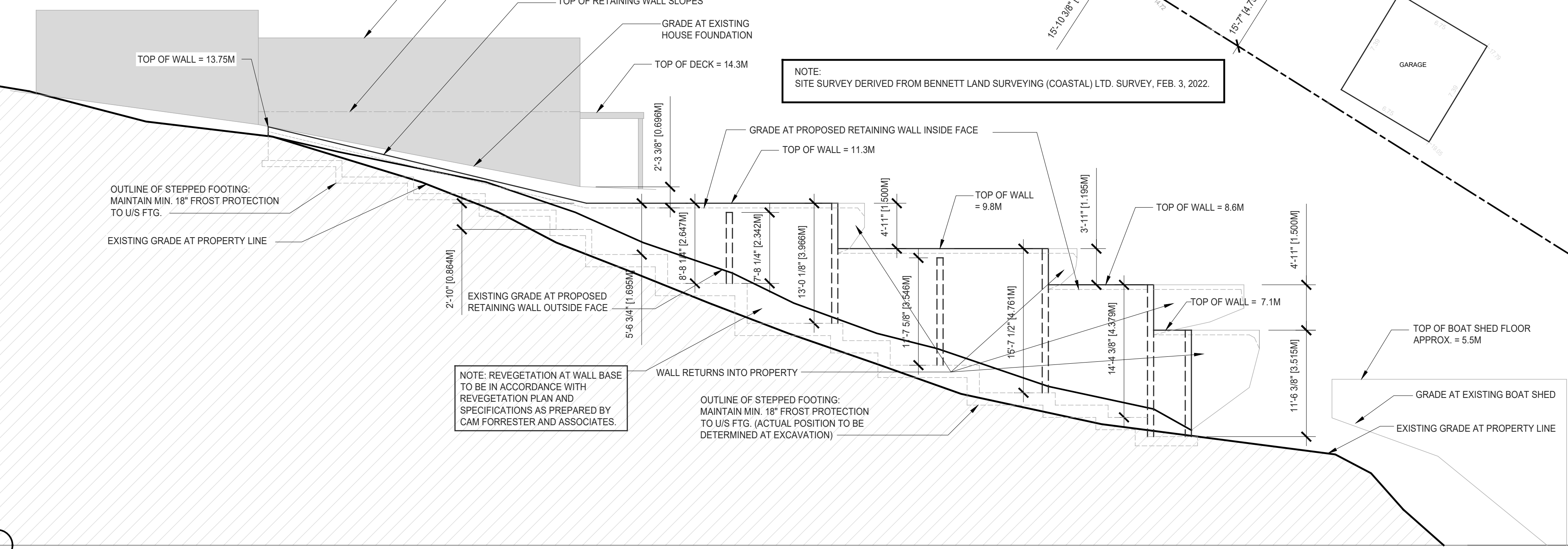


SITE PLAN
SCALE: 1/16" = 1'-0"
CIVIC ADDRESS: 7071 PORPOISE BAY DR., SECHELT
SURFACE AREA OF PROPOSED RETAINING WALL = 133 ft²

NOTE: SITE SURVEY DERIVED FROM BENNETT LAND SURVEYING (COASTAL) LTD. SURVEY, FEB. 3, 2022.

NOTE: REVEGETATION AT WALL BASE TO BE IN ACCORDANCE WITH REVEGETATION PLAN AND SPECIFICATIONS AS PREPARED BY CAM FORRESTER AND ASSOCIATES.

OUTLINE OF STEPPED FOOTING: MAINTAIN MIN. 18" FROST PROTECTION TO U/S FTG. (ACTUAL POSITION TO BE DETERMINED AT EXCAVATION)



A SECTION / ELEVATION AT NORTH PROPERTY LINE
SCALE: 1/8" = 1'-0"

| REVISIONS: | | |
|------------|---------------------------|-----------|
| No: | DESCRIPTION: | DATE: |
| 9 | RE-ISSUED FOR DEV. PERMIT | JULY 4/24 |
| 8 | ISSUED FOR DEV. PERMIT | JUNE 9/22 |
| 7 | REVISED (IMP) | MAY 17/22 |
| 6 | REVISED (IMP) | MAY 9/22 |
| 5 | REVISED (IMP) | MAY 8/22 |
| 4 | REVISED PRELIMINARY (IMP) | APR.22/22 |
| 3 | REVISED PRELIMINARY (IMP) | FEB.17/22 |

| REVISIONS: | | |
|------------|---------------------------|------------|
| No: | DESCRIPTION: | DATE: |
| 1 | PRELIMINARY (IMP) | JAN. 21/22 |
| 2 | REVISED PRELIMINARY (IMP) | JAN. 21/22 |

BANDSTAND VENTURES LTD.
200A 1180 Kingsway Ave.
Port Coquitlam, B.C. Canada
V5C 6N7
PH: 604 - 614 - 6052
E-mail: tom@psdbc.com

RENOVATION:
MOSS RESIDENCE
7071 PORPOISE DRIVE,
SECHELT, B.C.

SITE PLAN/ NORTH ELEVATION

Job No.: 2206

Page No.: A1 OF 2



July 16, 2024 (Version 4)
Project No.: K-221144-00

Ken Moss
21756 122nd Avenue
Maple Ridge, B.C.
V2X 3W9

Attention: Ken Moss
ken@reflectionstruckbody.com

**RE: Geotechnical Assessment
Proposed Concrete Retaining Structure
7071 Porpoise Drive, Sechelt, B.C.**

Dear Mr. Moss,

1.0 INTRODUCTION

In accordance with your recent authorization, Kontur Geotechnical Consultants Inc. (Kontur) has completed this geotechnical assessment for the above-referenced project. The purposes of this study were to characterize the site from a geotechnical point-of-view and to provide comments and recommendations with respect to site development and retaining wall foundation design.

This letter, which summarizes the findings of the assessment, has been prepared in accordance with standard and widely accepted geotechnical engineering principles and practices for similar projects in this region. This letter does not address any environmental issues or considerations related to the proposed project.

Review and use of this letter should be completed in accordance with the attached *Interpretation and Use of Study and Report* document. It is included as an integral part of this letter and should be read in conjunction with all parts of this letter.

2.0 UNDERSTANDING OF PROJECT

It is Kontur's understanding that it is planned to construct a concrete retaining wall at the above-referenced property. Preliminary design drawings indicate that the wall is proposed to be constructed along the north boundary of the lot. The drawings indicate two (2) short return walls, about 4.6m in length, near the middle of the wall, and two longer return walls, about 11m in length, at the west end of the wall.

It is understood that as the subject property is within the District of Sechelt (District) *Development Permit Area 4: Rocky Beach Front, Escarpments, and Slope Hazards* as indicated in the District's Official Community Plan, and as such a landslide hazard assessment and a *Schedule D (Landslide Assessment Assurance Statement)* must be completed and issued in conjunction with this report.



3.0 SOURCES OF INFORMATION

The following sources of information were reviewed as part of this study:

- Drawing titled *Moss Residence Site Plan* issued by Bandstand Ventures Ltd., dated January 21, 2022;
- Information obtained from Kontur's in-house geotechnical database of nearby projects and personnel experience during construction of the subdivision;
- Published surficial geology maps of the area; and,
- Relevant information obtained from the District of Sechelt's online web-mapping application.

Kontur completed a site reconnaissance on January 13th, 2022. The site reconnaissance was completed by a Senior Geotechnical staff member who traversed the limits of the property and surrounding area by foot to visually assess the area for features of geotechnical engineering significance. Detailed topographical surveys and/or geotechnical explorations (i.e. test pits or testholes) were not completed at this time.

4.0 SITE CONDITIONS

General and Surface Conditions. The subject site is situated in the residential area above (to the east) of Porpoise Bay, in Sechelt, B.C. The property is roughly rectangular in shape and covers an area of about 0.17ha (0.4 acres). The property is about 95m long (east-west) and 20m wide (north-south). The property is bound by a public access footpath and Davis Brook to the north, a developed single family residential property to the south, Porpoise Drive to the east and the Natural Boundary of the Sea (Porpoise Bay) to the south.

In general, from the Natural Boundary of the Sea, the ground surface rises up to the east at an average inclination of about 4(H):1(V) (Horizontal:Vertical) over a series of benches to the east property boundary. The benches are generally separated by landscaped gardens and slopes. The west and east property boundaries are located at an elevation of about 2 and 24m, geodetic, respectively. Steeper sections of slopes that separate the benches located within the property range from an average inclination of about 2.5(H):1(V) to 2(H):1(V). The benches or gently sloped terraces are moderately wide, ranging from about 10 to 15m in length.

At the time of the site visit, no significant signs of potential deep-seated slope instability or wide-spread mass-wasting were observed. However, signs of localized slope instability and/or erosion were noted along the slope above the Natural Boundary and the slopes along the outer edge of the bench below the existing house (west and north sides). The property is generally covered with a mixture of small- to medium-sized coniferous and deciduous trees with some dense brush and vegetation along the north property line.

Subsurface Conditions. Interpretation of subsurface conditions at the site is based on the published surficial geology map of the area, observations of soil or bedrock outcrops within the property, and Kontur's nearby and relevant experience. A subsurface geotechnical exploration was not included as part of the scope of work of this report.

According to *Figure 1 – Surficial Geology Sunshine Coast Area* published by the Ministry of Mines and Petroleum Resources BC, the site is underlain by Capilano Sediments consisting of fluvial deltaic, fan and



channel deposits of cobbles, gravel, sand and silt. Irregular bedrock outcrops are known to occur within the vicinity of the site and may be encountered beneath the Capilano Sediment deposits at shallow depths; however, bedrock outcrops within and around the subject property were absent. The observations made during the site reconnaissance are considered to be consistent with the published surficial geology maps of the area.

No signs of significant groundwater seepage (except along the slope near the northern side of the existing building) and/or surface water runoff were observed at the time of the site visit. It is noted that the District of Sechelt had recently completed repairs to the watermain beneath Porpoise Drive nearby, and it was reported to Kontur that the seepage had ceased. It should be anticipated that local groundwater levels at the site vary and are typically influenced by periods of prolonged or intense rainfall, rapid snowmelt, and/or influences from nearby developments.

Subsurface Variability. It is important to note that subsurface conditions anticipated and described above are based on the information described herein (published surficial geology maps, Kontur's nearby experience, and an assumed horizontal continuity). Actual conditions should be expected to vary. Confirmation of the assumed conditions at this site can be completed during construction at the time of bulk excavation or site preparation of the proposed retaining walls. Kontur should be notified if conditions vary significantly from those described in this letter.

5.0 COMMENTS AND RECOMMENDATIONS

General. Based on the observations, information, and findings presented above, the following sections outline Kontur's geotechnical comments and recommendations.

All retaining walls over 1.2m (including terraced retaining walls) must be designed in accordance with the 2018 British Columbia Building Code (2018 BCBC) and the Engineers and Geoscientists of British Columbia (EGBC) guidelines for *Retaining Wall Design* version 1.1 dated February 2020.

Seismic Considerations. According to the 2018BCBC, the *Site Classification* for this property can be taken as *C – Very Dense Soil and Soft Rock*. As interpolated from the 2015 National Building Code of Canada's Seismic Hazard Calculation for firm ground at this site (with coordinates 49.528N and 123.766W), for a 2% probability of exceedance in 50 years, the *Peak Ground Acceleration* (PGA) may be taken as 0.35g and the Spectral Acceleration values may be taken from the attached *2015 National Building Code Seismic Hazard Calculation* sheet.

Geotechnical Hazards. The project site is located within the District of Sechelt's *Development Permit Area 4: Rocky Beach Front, Escarpments, and Slope Hazards*. It is noted that that the District has not adopted a level of 'landslide safety'; however, references a 2% in 50 year for both 'seismic and slope stability hazards'.

Based on the site reconnaissance and that the overall ground surface is sloped at an inclination of about 2.5(H):1(V), it is Kontur's opinion that the property is not subject to naturally occurring and large-scale and/or widespread rock falls/topples/slides, debris flows, avalanches, or other deep seated slope instabilities. It is Kontur's opinion that the subject property may be susceptible to potential localized slope instability (shallow sloughing, sliding, and/or surficial soil creep) and erosion, along the slope above the Natural Boundary of Porpoise Bay and the unsupported slopes between the lower and upper benches at



the west and north sides of the property. Localized slope instability can generally be defined as movement of soil within the outer 1.5 to 3m of soil along the shoreline and/or slopes on the property.

In this report, and as defined by the *APEGBC Guidelines for Legislated Landslide Assessments for Residential Developments in BC (May 2010 version)*, the term 'Landslide Risk' is defined as a combination of the probability of occurrence of a landslide and the consequence of the landslide (i.e. damage to property, injury or loss of life). As defined by the guideline, the term 'Landslide' refers to 'any movement of rock, debris, or earth down a slope'. The qualitative *Landslide Assessment* completed as part of the study presented herein is based on the site reconnaissance and desk study completed as described in this letter, sound engineering judgement, and Kontur's local and regional experience with landslide hazards, in accordance with widely accepted geotechnical practice in this region.

This terminology or criterion is like that defined by many other jurisdictions in the region, such as those established by the British Columbia Ministry of Transportation and Infrastructure (BCMOTI) and a 1993 report entitled *Hazard Acceptability Thresholds for Development Approvals by Local Government* prepared by Dr. Peter W. Cave. These guidelines may differ from the requirements of the approving authority (District of Sechelt) and should be compared to acceptability guidelines considered appropriate by the approving authority.

The BCMOTI Hazard Acceptability guidelines consider two different types of events: damaging events and life-threatening events. For damaging events, the guidelines indicate a probability of occurrence should be no less than 1 in 475 years for landslide hazards, 1 in 200 years for flood hazards, 1 in 300 for snow avalanche hazards, and 1 in 10,000 years for life-threatening catastrophic events. It is noted that as mentioned by the District of Sechelt, for both 'seismic and slope instability' hazards, a probability of occurrence of 2% in 50 year (or 1 in 2,475 years) should be used as the minimum standard.

Following the BCMOTI guidelines for subdivision approval, the following terms have been referenced. It should be noted that these guidelines do not constitute conditions for geological hazard acceptability. The frequency or probability of occurrence of Landslide Hazards can be defined by the following table (Table 1) based on a reference provided by the Resource Inventory Committee, Government of British Columbia Slope Task Force (1996).

Table 1 – Relative Terms and Ranges of Probability of Occurrence

| Relative Term of Probability of Occurrence | Estimated Annual Probability of Occurrence | Comments |
|--------------------------------------------|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Very Low | < 1 in 2500 Years | - |
| Low | 1 in 2500 to 1 in 500 years | Indicates the hazard is of uncertain significance. |
| Moderate | 1 in 500 to 1 in 100 years | Indicates the hazard within a given lifetime is not likely, but possible. Signs of previous events, such as vegetation damage may not be easily noted. |
| High | 1 in 100 to 1 in 20 years | Indicates that the hazard can happen within the lifetime of a person or typical structure. Events are clearly identifiable from deposits and vegetation but may not appear fresh |
| Very High | > 1 in 20 years | Indicates the hazard is imminent and well within the lifetime of a person or typical structure. Events occurring with a return period of 1 in 20 years or less generally have clear and fresh signs of disturbance. |



Estimation of the annual return frequencies (probability of occurrence of a landslide) is very complex. In accordance with standard geotechnical and geological engineering practices for this area and type of development, the quantification of these values is based on the qualitative and observational information, sound engineering judgement, and all the information available to Kontur at the time this study was completed.

Based on the observations, interpretations, and findings made by Kontur, the following estimates of annual probability of natural geological hazard occurrences influencing the proposed development are provided (Table 2).

Table 2 – Estimated Probability of Occurrences

| Hazard | Relative Term of Probability |
|---------------------------------------------------------------------------------------------------------------|------------------------------|
| Localized and Shallow Slope Instability and/or Erosion. | Moderate to High |
| Large-scale or wide-spread Rock Falls/Topples/Slides, Avalanche, large-scale land slip, debris flows/torrents | Very Low or Negligible |

It is Kontur’s opinion that the landslide hazards identified above are generally limited to the slope above the Natural Boundary of Porpoise Bay and slopes that are inclined steeper than about 1.5H:1V (and/or a zone immediately above or below these slopes).

Provided the recommendations herein are implemented, namely that the unsupported slopes described above (and below the house) are permanently supported and protected against erosion (slope stabilization measures), it is Kontur’s opinion that the required level of ‘landslide safety’ can be achieved and the relative hazard rating for small-scale and localized slope instability may be reduced to *Low*.

Slope Stabilization Measures. To mitigate the localized slope instability and/or erosion that were noted along the slope above the Natural Boundary and the slopes along the outer edge of the bench below the existing house (west and north sides), the slopes should be permanently supported and protected against erosion. This may be completed by constructing permanent retaining walls, re-grading the benches and/or slopes to a stable configuration, and or deepening existing building foundations below the ‘critical slip surface’ associated with the potential slope instability on the subject property that could influence the building. From a geotechnical point-of-view, constructing a permanent retaining wall is considered the most robust and feasible solution. A permanent retaining wall would stabilize the slope and decrease the risk of localized slope instability to the existing house. It would also improve the public access footpath to the north of the property, as it would offer additional protection against erosion. Other configurations where the retaining walls are setback further from the exterior lot line and the present natural boundary of the sea would not be as effective, as it would not target the areas that require slope stabilization measures. Other configurations would also require significant excavation and temporary underpinning and/or excavation support. Whereas this retaining wall configuration would minimize and retain as much in-situ soil as possible by limiting excavation.

Retaining Wall Bylaw Exemption. The District of Sechelt’s Bylaw No. 580, 2022 Section 2.13 Retaining Walls states that:

2.13.1 A single retaining wall may not exceed 1.2m in height.



- 2.13.2 A combined system of retaining walls may exceed 1.2m in height, provided that it is stepped and has a ratio not of less than 2 horizontal to 1 vertical in height.
- 2.13.3 Any retaining wall including any fence portion situated on top of the retaining wall cannot exceed 2.0 m in combined height from the lowest natural grade. Guardrails required by the applicable building code are not considered to be a fence in this circumstance.

It is important to note that the proposed retaining wall has been designed to match the existing topography as best as possible to minimize alternation of the lands, minimize excavation volumes, and to protect existing infrastructure (i.e. septic field and house) and the environment (natural boundary buffer zone and existing vegetation/trees).

In the west to east direction, the proposed retaining wall meets the intent of Section 2.13.2 of the bylaw. The proposed retaining wall does not meet the intent of Section 2.13.1 and 2.13.3 at the west and north sides. To meet the intent of Section 2.13.1 and 2.13.3 of the bylaw, significant excavation into the subject property would be required. The limits of a safe and stable excavation would extend about a horizontal distance of 7.5 to 10m into the subject property or more, based on these requirements and the existing topography of the site and surrounding lands. Relocation or temporary underpinning of the existing septic field, removal of the existing large Cedar Tree, and removal of the majority of existing yard, garden, and vegetation, would be required to facilitate this design.

From a geotechnical point-of-view, it is stressed, that a key design criterion is to minimize the volume and extent of excavation and construct a new retaining wall to stabilize the existing slope. Large and deep excavations are more prone to instability and/or erosion. Unsupported steep slopes should be considered unstable and may retrogress over time and influence existing lands, infrastructure, and/or buildings.

Based on the site constraints (existing topography, vegetation/trees, infrastructure, and buildings), the proposed retaining wall configuration is considered appropriate from a geotechnical point-of-view. Other retaining wall configurations, that require significant excavation, are not recommended.

See attached Figures G100 and G101, illustrating the anticipated excavation limits for the proposed reinforced concrete retaining wall and the alternative Mechanically-Stabilized Earth (MSE) retaining wall.

Retaining Wall Design. Provided all comments and recommendations presented herein are addressed and implemented, conventional shallow foundations (strip footings) are considered suitable to support the proposed retaining wall without appreciable ground settlements. All foundations must be designed and constructed in accordance with the 2018 British Columbia Building Code (2018BCBC).

For retaining wall footings placed on undisturbed native granular soils, or *Engineered Fill* placed and compacted thereon, for Serviceability Limit State (SLS), a maximum 'allowable' bearing resistance of 150kPa may be used. For Ultimate Limit State (ULS), a factored ultimate bearing resistance of 225kPa may be used. SLS values are based on a total estimated settlement of about 20mm with a differential of about 12.5mm over a horizontal distance of about 10m.

The base of the wall should be keyed-into the subgrade surface a minimum of 450mm for confinement and frost protection purposes. Where bedrock is encountered and sloping away from the wall, additional measures to prevent basal sliding may be necessary. This may include pinning the footings to the bedrock surface for additional shear resistance. Retaining wall foundations should be set back a minimum distance



of 2(H):1(V) from any adjacent footing, utility service, or toe of a retaining wall unless added surcharge pressures are factored into the design.

A minimum 450mm wide chimney drainage zone of 19mm clear crushed gravel should be placed immediately behind the retaining wall and extend up to within 450mm of the finished ground surface. A 'low-fines' capping of soil may then be placed on a layer of filter fabric placed thereon. A drain consisting of a minimum 100mm diameter perforated pipe in a minimum 150mm thick surround of 19mm clear crushed gravel wrapped in filter fabric (i.e. Nilex 4551 or approved equivalent) should be placed at the heel of the wall and connected to an appropriately located storm sewer, rock pit, or drainage ditch. Drainage is not permitted to flow in an uncontrolled manner behind any retaining wall, or towards another building without special provisions as directed by the Geotechnical Engineer.

Retaining walls should be adequately designed to resist the lateral earth pressure acting upon them. It is recommended that an equivalent fluid unit weight of 5.5kPa/m (for 'active' conditions) and 8kPa/m (for 'at-rest' conditions) be used for lateral earth pressures based on a triangular pressure distribution. An increment of 5kPa/m based on an inverted triangular pressure distribution should be added to this value for seismic conditions. The resultant seismic force may be taken to act at an elevation of about two thirds the height of the wall. All retaining walls should be designed to no less than 20kPa to account for compaction-induced pressures. These values assume no build-up of hydrostatic pressure due to a chimney drain placed against the height of the wall and connected to the retaining wall footing drainage system.

See attached Drawings prepared by Bandstand Ventures Ltd.

Revegetation Plan. It is Kontur's understanding that Cam Forrester & Associates Ltd. prepared the revegetation plan for the site. The revegetation plan was required for the Development Variance Permit (DVP) application, as there were geotechnical site constraints that required deviation from the District of Sechelt's Retaining Wall Bylaw requirements.

Based on the observations and information described above, the following geotechnical comments and recommendations are provided:

1. Any large trees should not be planted near the base of the wall, as these will influence the stability of the wall and slopes in the long-term.
2. If large trees are planted, they must be set back away from the wall and buildings.
3. The low shrubs/brush would be acceptable within close proximity to the wall.
4. The revegetation plan to-date conforms to Kontur's general recommendations and is satisfactory.

See attached

Erosion and Sediment Control Plan. Kontur has prepared an Erosion and Sediment Control Plan for this project to address erosion and sediment control during excavation and construction activities. All sediment laden water should be prevented from being discharged into Sechelt Inlet or Davis Brook.

Constructability Considerations. Temporary excavation may require specialized means and methods such as rock hammering, splitting, and/or blasting, if bedrock is encountered within the excavation. Conventional excavation methods are considered suitable for the overlying granular soils. For planning



purposes at this site, temporary excavated slopes in undisturbed granular soils may be inclined 3/4(H):4(V) to a maximum slope height of 3m. For unsupported slopes greater than 3m, temporary unsupported slopes should be flattened to no steeper than about 1(H):1(V). Where seepage is encountered, temporary excavated slopes may need to be flattened, depending on the findings of the Geotechnical Engineer.

All WorkSafeBC Regulations, Guidelines, and Best Practices, for safe and stable excavations should be implemented by the Contractor. An initial review by the Geotechnical Engineer should be completed for any excavation deeper than 1.2m below the surrounding ground surface or prior to any excavation within a 2(H):1(V) gradient line projected down from the foundation of any building or structure.

The excavated surface must be protected and kept dry during construction. Depending on the time of year construction takes place, it should be expected that some groundwater (perched) may be encountered in the excavation. Water accumulations in the excavation are anticipated to be able to be controlled with conventional swales, shallow sumps, and pumps. It is the responsibility of the contractor to protect and provide a dry environment for the placement and compaction fills and/or concrete. Contractors should make their own assessment and are responsible for selecting the appropriate methods to control groundwater during construction at this site.

Areas immediately beneath the wall foundation should be stripped and cleared of all unsuitable material including loose/saturated/organic soil/rock, or other deleterious material, to expose a suitable and undisturbed subgrade surface. The excavated subgrade surface should be reviewed and approved by the Geotechnical Engineer prior to placement of any *Engineered Fill* or concrete.

Where *Engineered Fill* is required to achieve design grades, the material should consist of an approved granular soil such as a 75mm minus crushed gravel with no more than 5% fines passing the No.200 (0.075mm) sieve or approved equivalent. *Engineered Fill* should extend at least 450mm beyond the edges of the proposed foundation or at least a horizontal distance equal to the thickness of the fill, whichever is greater.

All *Engineered Fill* materials must be placed and compacted in lifts no thicker than 300mm. The material should be near its optimum moisture content and be compacted to at least 95% of the material's *Modified Proctor Maximum Dry Density* (MPMDD) value. Field Density Test reports should be forwarded to the Geotechnical Engineer for review and approval of compacted fill zones, or the Geotechnical Engineer should observe and witness placement and compaction of the material.

For non-structural areas, backfills may be placed and compacted as described above except to no less than 85% of the material's MPMDD value. Excavated material and/or existing fill materials may be reused in non-structural areas for general site grading purposes. These materials are not suitable for use as *Engineered Fill* in structural areas.

6.0 FIELD REVIEW

To sign-off on the work, Kontur must complete the necessary field reviews during the construction stage of the project. Field reviews may be required, but are not limited to, the following stages:

- Bulk excavation, stripping and final excavation;
- Subgrade and bearing surface review and approvals;



- Placement and compaction of fills; and/or,
- Installation of perimeter and/or site drainage.

Kontur requires at least 48 hours of advanced notice to visit the site when the work is ready for review.

7.0 CLOSURE

The comments and recommendations presented in this letter are based on the referenced information and Kontur's understanding of the project as described herein. If site conditions or project parameters differ from those described in this letter, Kontur should be notified promptly to review geotechnical aspects of the project and provide additional or modified comments and recommendations, as deemed appropriate. Contractors should make their own assessments of subsurface conditions at this site and select the construction means and methods that are most appropriate for encountered site conditions.

Provided all the comments and recommendations presented above are addressed and implemented, the site may be safely used for its intended purpose, that being a single-family residential building.

This letter has been prepared for the exclusive use of Mr. Ken Moss, the District of Sechelt, and/or their designated agents or consultants. Any use of the information contained in this letter for other than its intended purpose or by any other party must first be verified in writing by Kontur. Kontur does not accept any responsibility or damages because of any other party relying on or using the information, interpretations, opinions, comments, and/or recommendations that are contained in this letter.

Kontur trusts that the information described above meets your current requirements. If you should have any concerns or questions, please do not hesitate to contact the undersigned.

Sincerely,

Kontur Geotechnical Consultants Inc.
EGBC Permit to Practice #1000925

Per:

Reviewed by:

Dave Silveira
Senior Geotechnical Technician

Matthew Yip MEng PEng
Principal | Geotechnical Engineer

Attachments: Interpretation and Use of Study and Report Document
Site Layout Sketch
Photograph
2015 National Building Code of Canada Seismic Hazard Calculation Sheet



INTERPRETATION AND USE OF STUDY AND REPORT DOCUMENT

1.0 STANDARD OF CARE

This study and Report have been prepared in accordance with generally accepted engineering consulting practices in this area. No other warranty, expressed or implied, is made. Engineering studies and reports do not include environmental engineering or consulting.

2.0 COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report which is of a summary nature and is not intended to stand alone without reference to the instructions given to us by the Client, communications between us and the Client, and to any other reports, writings, proposals or documents prepared by us for the Client relative to the specific site described herein, all of which constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. WE CANNOT BE RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

3.0 BASIS OF THE REPORT

The Report has been prepared for the specific site, development, building, design or building assessment objectives and purpose that were described to us by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the document are only valid to the extent that there has been no material alteration to or variation from any of the said descriptions provided to us unless we are specifically requested by the Client to review and revise the Report in light of such alteration or variation.

4.0 USE OF THE REPORT

The information and opinions expressed in the Report, or any document forming the Report, are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT OUR WRITTEN CONSENT. WE WILL CONSENT TO ANY REASONABLE REQUEST BY THE CLIENT TO APPROVE THE USE OF THIS REPORT BY OTHER PARTIES AS "APPROVED USERS". The contents of the Report remain our copyright property and we authorise only the Client and Approved Users to make copies of the Report only in such quantities as are reasonably necessary for the use of the Report by those parties. The Client and Approved Users may not give, lend, sell or otherwise make the Report, or any portion thereof, available to any party without our written permission. Any use which a third party makes of the Report, or any portion of the Report, are the sole responsibility of such third parties. We accept no responsibility for damages suffered by any third party resulting from unauthorised use of the Report.

5.0 INTERPRETATION OF THE REPORT

Nature and Exactness of Descriptions: Classification and identification of soils, rocks, geological units, contaminant materials, building envelopment assessments, and engineering estimates have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature and even comprehensive sampling and testing programs, implemented with the appropriate equipment by experienced personnel, may fail to locate some conditions. All investigations, or building envelope descriptions, utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarising such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and all persons making use of such documents or records should be aware of, and accept, this risk. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. Where special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.

Reliance on Provided information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to us. We have relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, we cannot accept responsibility for any deficiency, misstatement or inaccuracy contained in the report as a result of misstatements, omissions, misrepresentations or fraudulent acts of persons providing information.

To avoid misunderstandings, KONTUR should be retained to work with the other design professionals to explain relevant engineering findings and to review their plans, drawings, and specifications relative to engineering issues pertaining to consulting services provided by KONTUR. Further, KONTUR should be retained to provide field reviews during the construction, consistent with building codes guidelines and generally accepted practices. Where applicable, the field services recommended for the project are the minimum necessary to ascertain that the Contractor's work is being carried out in general conformity with KONTUR's recommendations. Any reduction from the level of services normally recommended will result in KONTUR providing qualified opinions regarding adequacy of the work.

6.0 ALTERNATE REPORT FORMAT

When KONTUR submits both electronic file and hard copies of reports, drawings and other documents and deliverables (KONTUR's instruments of professional service), the Client agrees that only the signed and sealed hard copy versions shall be considered final and legally binding. The hard copy versions submitted by KONTUR shall be the original documents for record and working purposes, and, in the event of a dispute or discrepancy, the hard copy versions shall govern over the electronic versions. Furthermore, the Client agrees and waives all future right of dispute that the original hard copy signed version archived by KONTUR shall be deemed to be the overall original for the Project.

The Client agrees that both electronic file and hard copy versions of KONTUR's instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except KONTUR. The Client warrants that KONTUR's instruments of professional service will be used only and exactly as submitted by KONTUR.

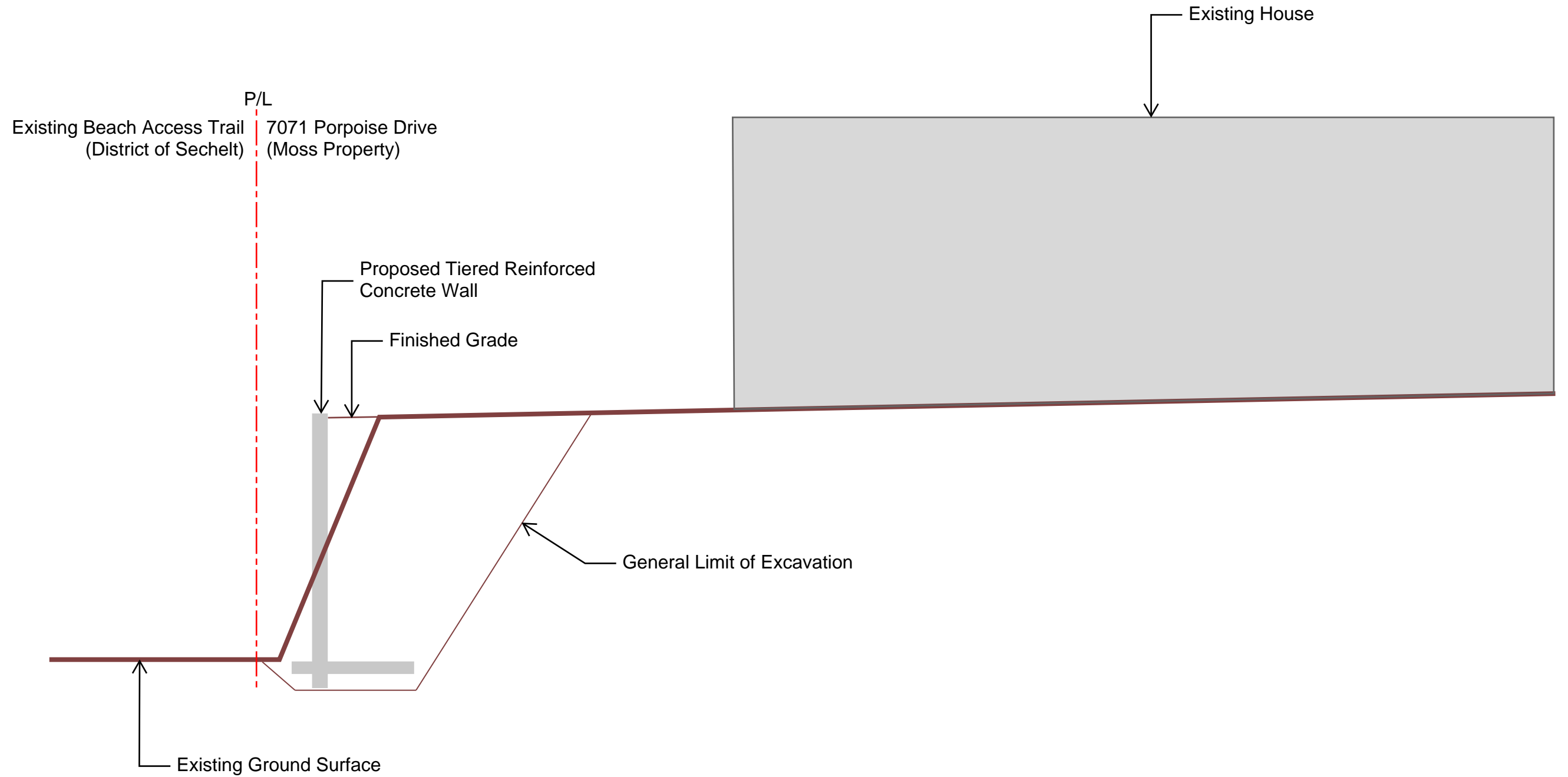
The Client recognizes and agrees that electronic files submitted by KONTUR have been prepared and submitted using specific software and hardware systems. KONTUR makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.



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Photograph 1. Slope below bench below existing house (northwest side of lot in area of proposed retaining wall).

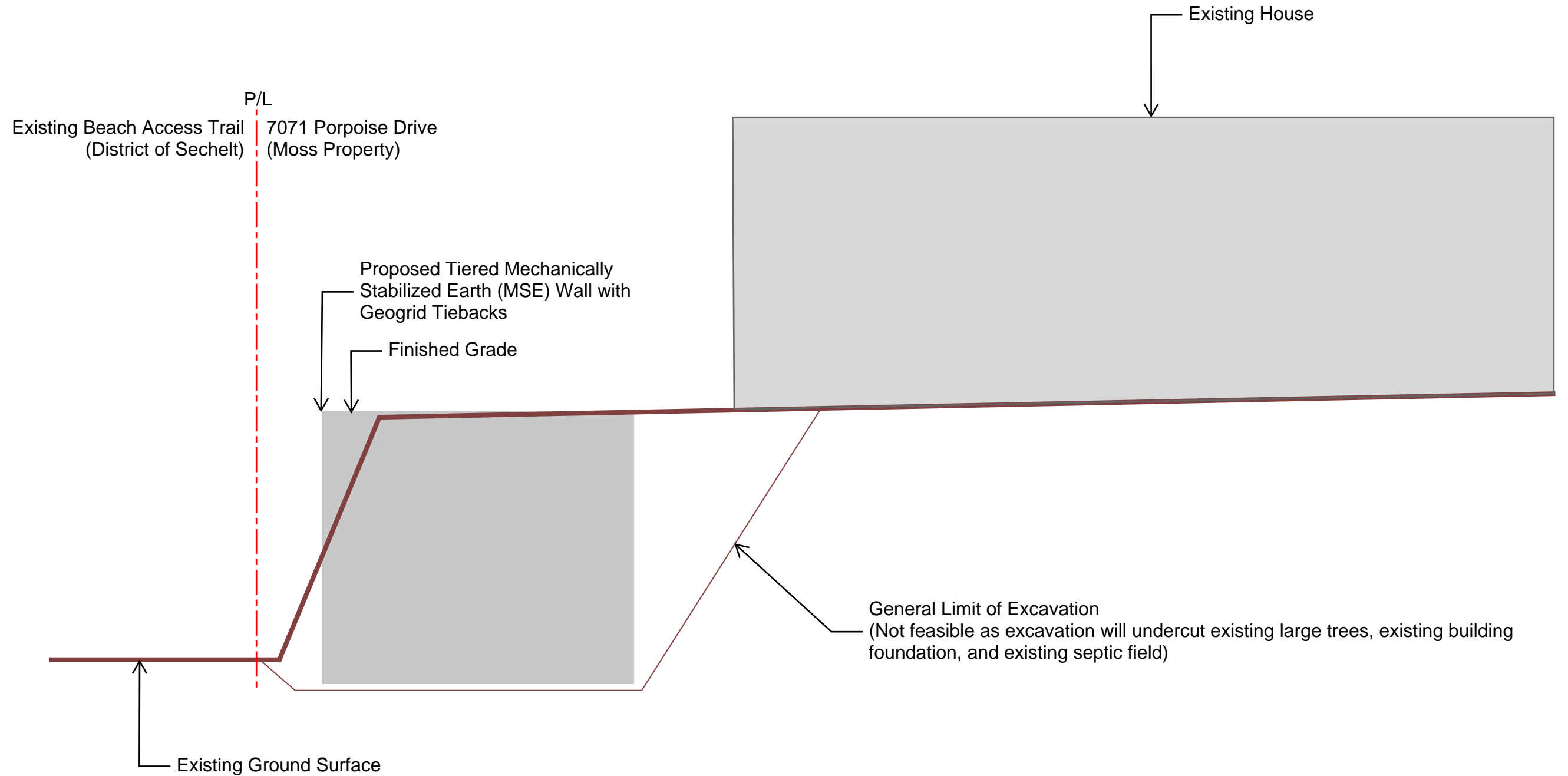


September 16, 2020 3:47:05 PM



Unit 65, 1833 Coast Meridian Road, Port Coquitlam, B.C. V3C 6G5
 t. 1 (778) 730 1747 | toll-free. +1 (833) 301 7575 | e. info@kontur.ca | www.kontur.ca

| | | | | | | | |
|------|----------|-------------------|------------|---------------------------------------------------------------|--------------|---------|----------|
| SEAL | VERSIONS | | | TITLE | PROJECT NO.: | | |
| | NO | DESCRIPTION | DATE | Proposed Retaining Wall and Excavation Limits (Proposed Wall) | K-221144-00 | | |
| | 0 | Issued for Report | 2024-07-16 | CLIENT | DATE: | SCALE: | DWG NO.: |
| | | | | Ken Moss | 2024-07-16 | N.T.S. | G100 |
| | | | | PROJECT LOCATION | DRAFT: | DESIGN: | CHECK: |
| | | | | 7071 Porpoise Drive, Sechelt B.C. | SD | - | MY |



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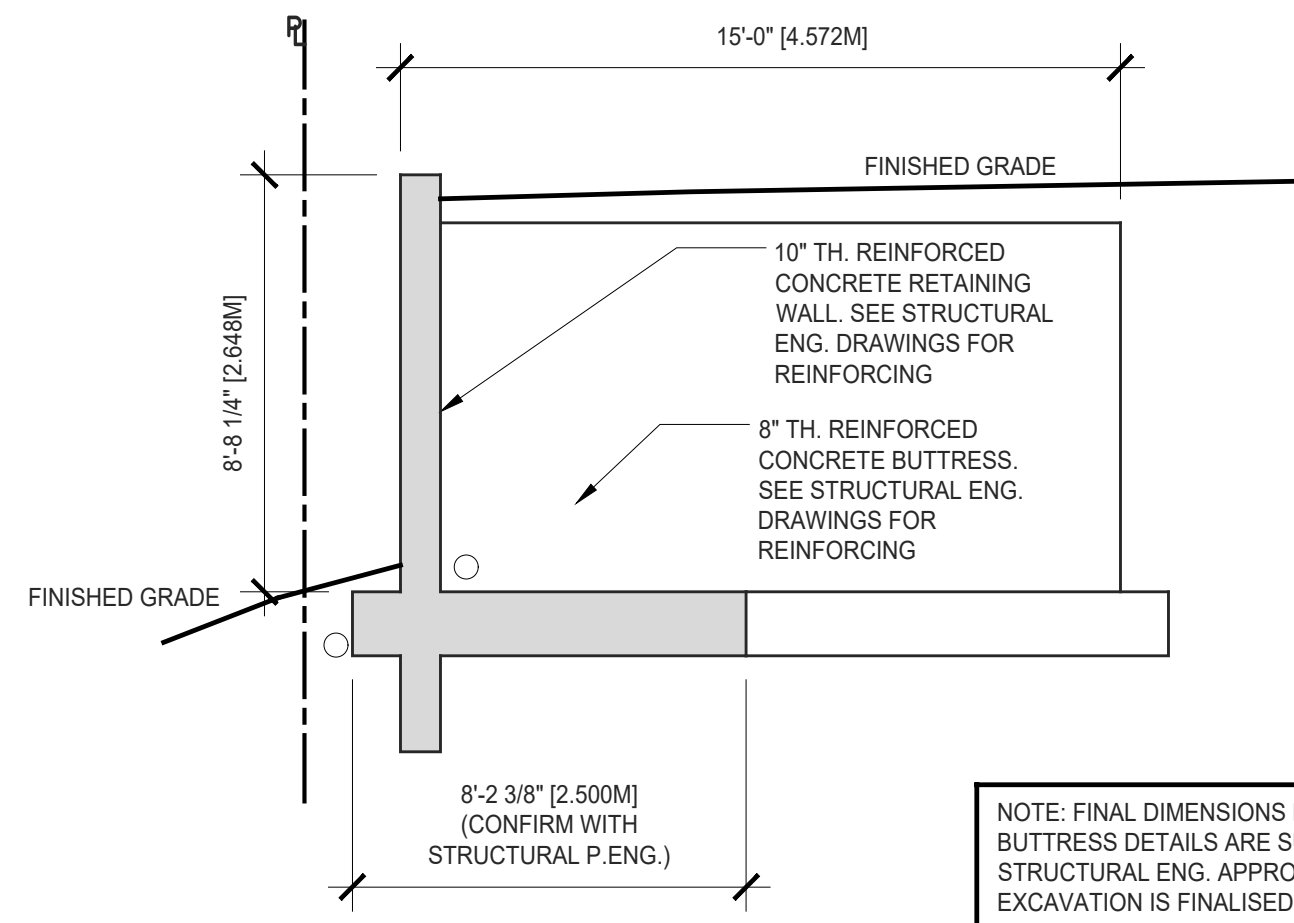
Unit 65, 1833 Coast Meridian Road, Port Coquitlam, B.C. V3C 6G5
 t. 1 (778) 730 1747 | toll-free. +1 (833) 301 7575 | e. info@kontur.ca | www.kontur.ca

SEAL

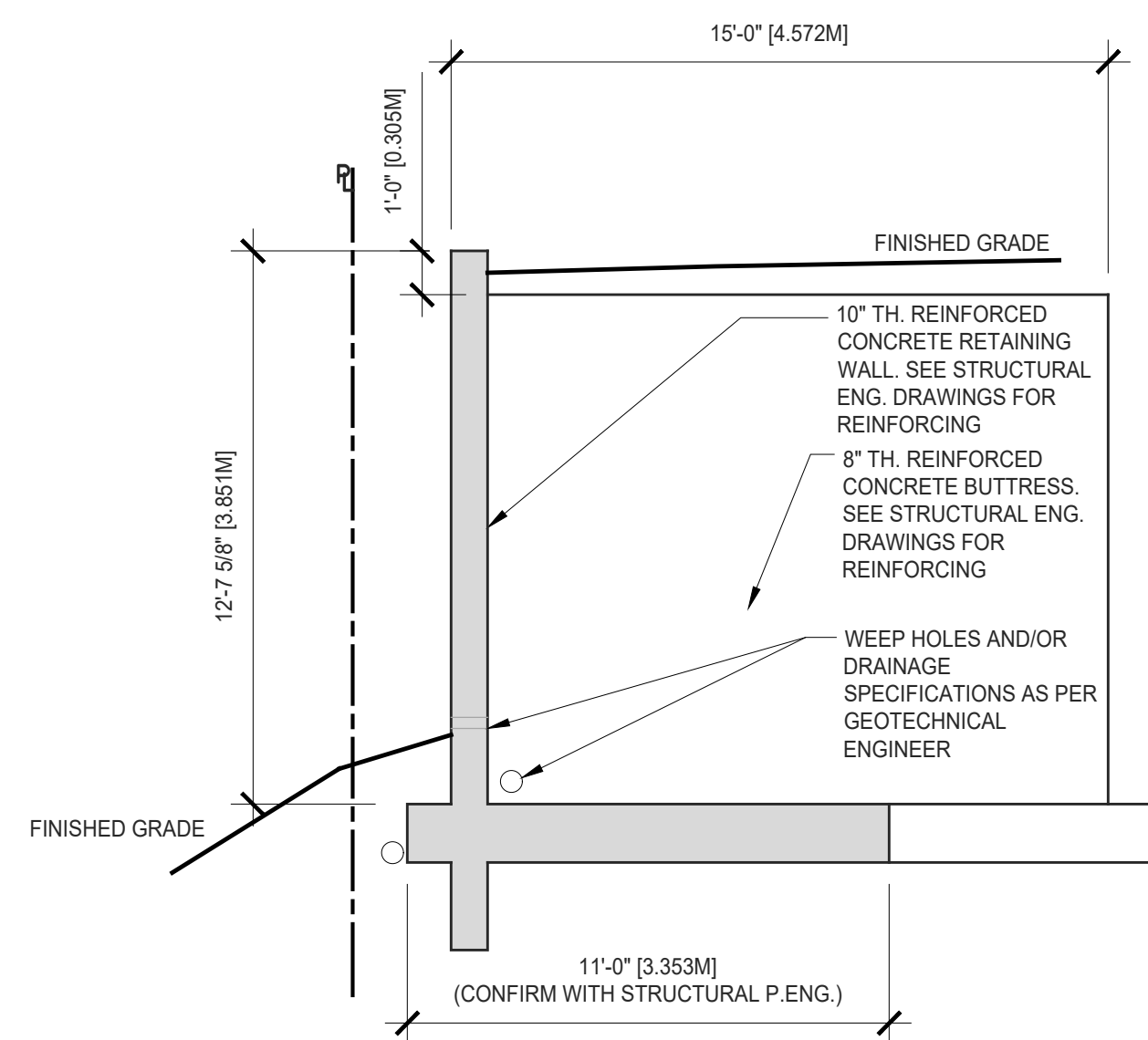
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| NO | DESCRIPTION | DATE |
| 0 | Issued for Report | 2024-07-16 |
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| | | |

| | | | |
|------------------|----------------------------------------------------------------------|--|--|
| TITLE | Proposed Retaining Wall and Excavation Limits (Alternative MSE Wall) | | |
| CLIENT | Ken Moss | | |
| PROJECT LOCATION | 7071 Porpoise Drive, Sechelt B.C. | | |

| | | | | | |
|--------------|---------|----------|-------------|---------|----------|
| PROJECT NO.: | | | K-221144-00 | | |
| DATE: | SCALE: | DWG NO.: | DATE: | SCALE: | DWG NO.: |
| 2024-07-16 | N.T.S. | G101 | 2024-07-16 | N.T.S. | G101 |
| DRAFT: | DESIGN: | CHECK: | DRAFT: | DESIGN: | CHECK: |
| SD | - | MY | SD | - | MY |



C SECTION AT UPPER BUTTRESS
SCALE: 1/4" = 1'-0"



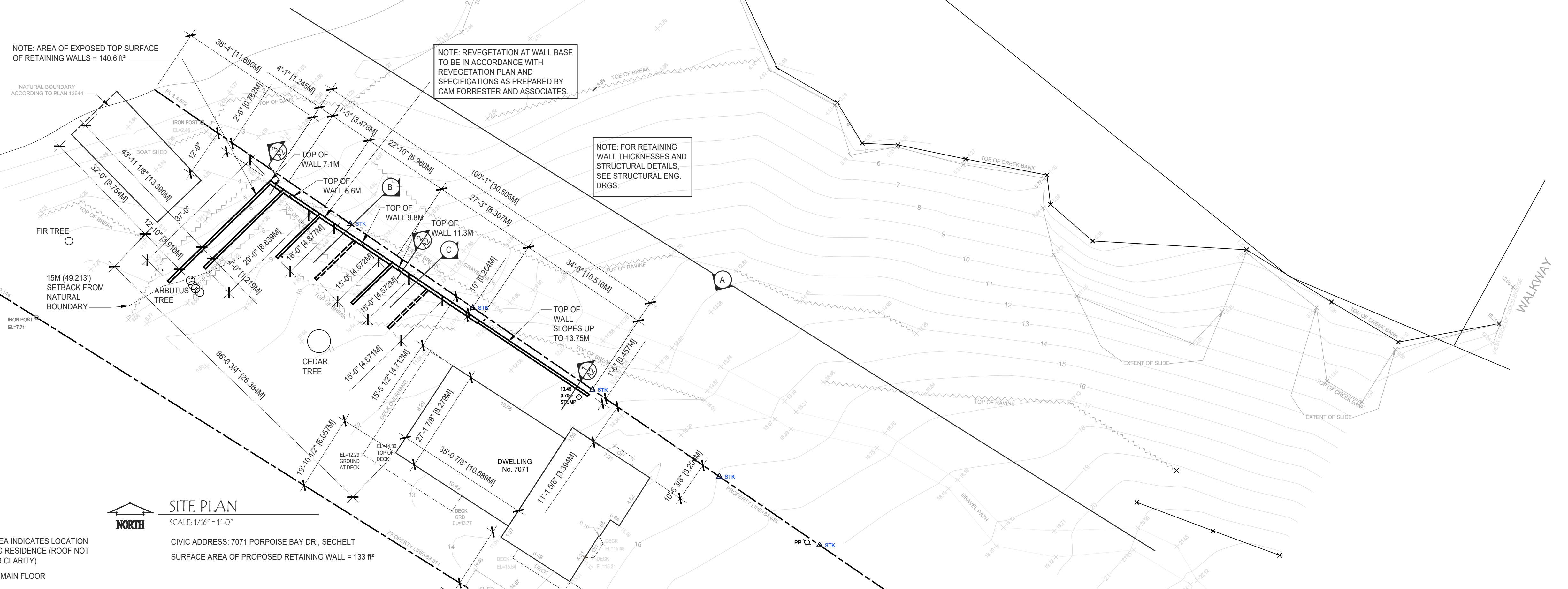
B SECTION AT LOWER BUTTRESS
SCALE: 1/4" = 1'-0"

PORPOISE BAY
SECHELT INLET

NOTE: AREA OF EXPOSED TOP SURFACE OF RETAINING WALLS = 140.6 ft²

NOTE: REVEGETATION AT WALL BASE TO BE IN ACCORDANCE WITH REVEGETATION PLAN AND SPECIFICATIONS AS PREPARED BY CAM FORRESTER AND ASSOCIATES.

NOTE: FOR RETAINING WALL THICKNESSES AND STRUCTURAL DETAILS, SEE STRUCTURAL ENG. DRGS.



SITE PLAN
SCALE: 1/16" = 1'-0"
CIVIC ADDRESS: 7071 PORPOISE BAY DR., SECHELT
SURFACE AREA OF PROPOSED RETAINING WALL = 133 ft²

SHADED AREA INDICATES LOCATION OF EXISTING RESIDENCE (ROOF NOT SHOWN FOR CLARITY)

TOP OF MAIN FLOOR

TOP OF RETAINING WALL SLOPES

GRADE AT EXISTING HOUSE FOUNDATION

TOP OF DECK = 14.3M

GRADE AT PROPOSED RETAINING WALL INSIDE FACE

TOP OF WALL = 11.3M

TOP OF WALL = 9.8M

TOP OF WALL = 8.6M

TOP OF WALL = 7.1M

TOP OF BOAT SHED FLOOR APPROX. = 5.5M

GRADE AT EXISTING BOAT SHED

EXISTING GRADE AT PROPERTY LINE

WALL RETURNS INTO PROPERTY

OUTLINE OF STEPPED FOOTING: MAINTAIN MIN. 18" FROST PROTECTION TO U/S FTG. (ACTUAL POSITION TO BE DETERMINED AT EXCAVATION)

NOTE: REVEGETATION AT WALL BASE TO BE IN ACCORDANCE WITH REVEGETATION PLAN AND SPECIFICATIONS AS PREPARED BY CAM FORRESTER AND ASSOCIATES.

| | | |
|---|---------------------------|-----------|
| 9 | RE-ISSUED FOR DEV. PERMIT | JULY 4/24 |
| 8 | ISSUED FOR DEV. PERMIT | JUNE 9/22 |
| 7 | REVISED (IMP) | MAY 17/22 |
| 6 | REVISED (IMP) | MAY 9/22 |
| 5 | REVISED (IMP) | MAY 8/22 |
| 4 | REVISED PRELIMINARY (IMP) | APR.22/22 |
| 3 | REVISED PRELIMINARY (IMP) | FEB.17/22 |

| REVISIONS: | | |
|------------|---------------------------|------------|
| No: | DESCRIPTION: | DATE: |
| 1 | PRELIMINARY (IMP) | JAN. 21/22 |
| 2 | REVISED PRELIMINARY (IMP) | JAN. 21/22 |

BANDSTAND VENTURES LTD.
200A 1180 Kingsway Ave.
Port Coquitlam, B.C. Canada
V5C 6N7
PH: 604 - 614 - 6052
E-mail: tom@psdbc.com

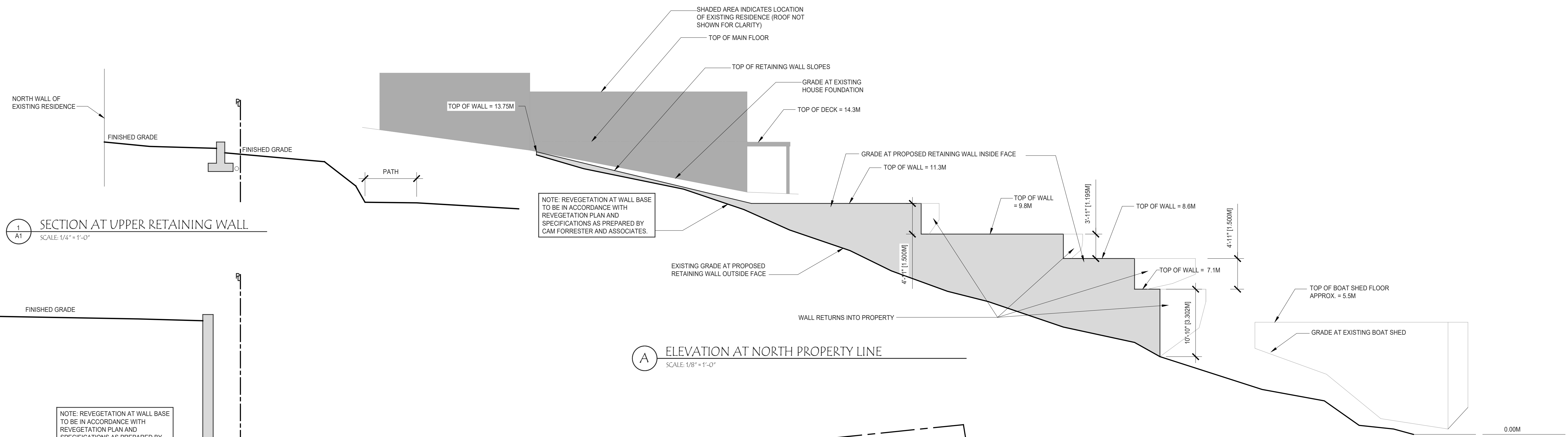
RENOVATION:
MOSS RESIDENCE
7071 PORPOISE DRIVE,
SECHELT, B.C.

SITE PLAN/ NORTH ELEVATION

Job No.: 2206

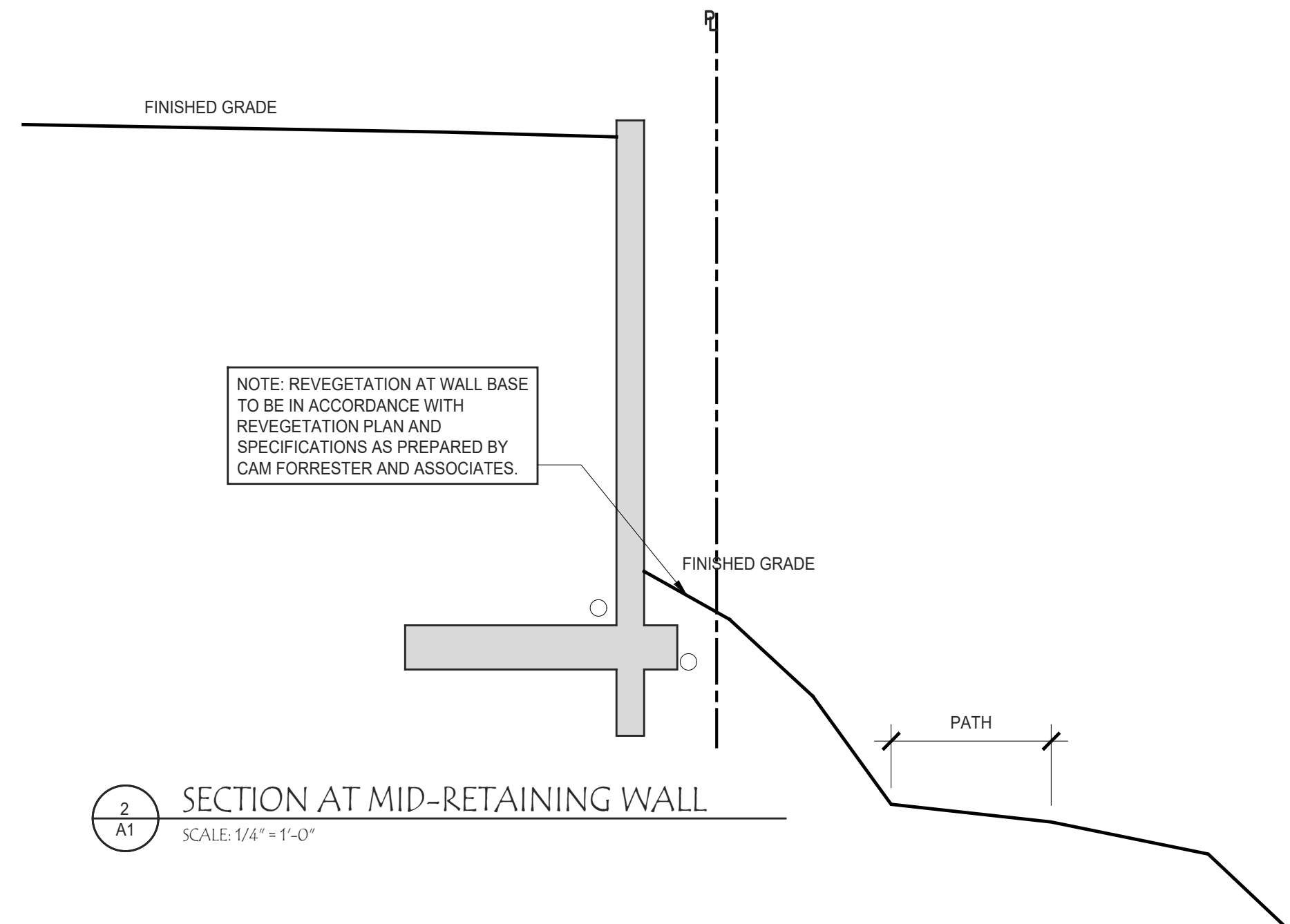
Page No.: A1 OF 2

A SECTION / ELEVATION AT NORTH PROPERTY LINE
SCALE: 1/8" = 1'-0"

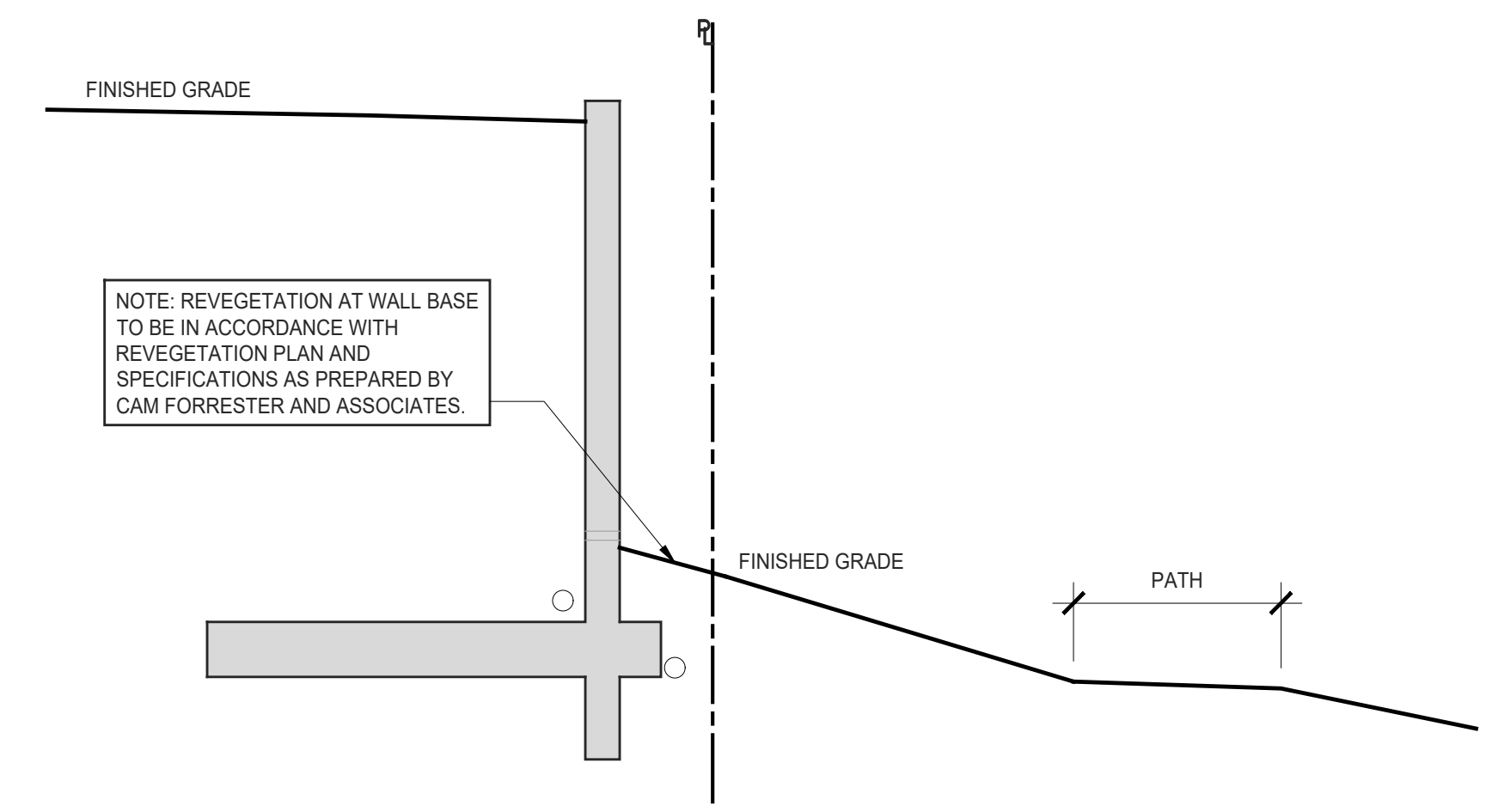


1 SECTION AT UPPER RETAINING WALL
SCALE: 1/4" = 1'-0"

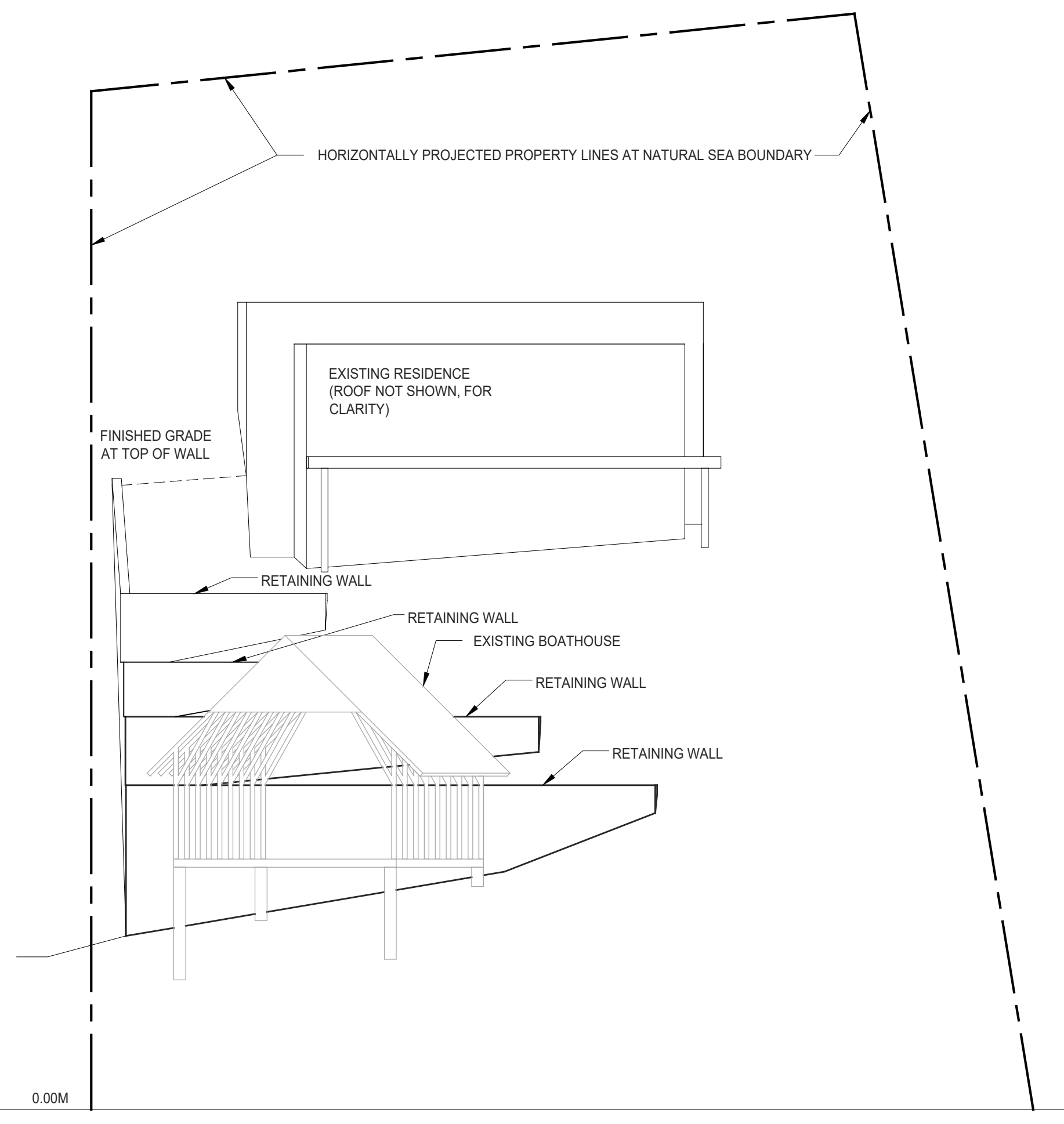
A ELEVATION AT NORTH PROPERTY LINE
SCALE: 1/8" = 1'-0"



2 SECTION AT MID-RETAINING WALL
SCALE: 1/4" = 1'-0"



3 SECTION AT LOWER RETAINING WALL
SCALE: 1/4" = 1'-0"



WEST ELEVATION
SCALE: 1/8" = 1'-0"



PHOTO LOOKING EAST

| | | |
|---|---------------------------|--------------|
| 9 | RE-ISSUED FOR DEV. PERMIT | JULY 4, 2024 |
| 8 | ISSUED FOR DEV. PERMIT | JUNE 9/22 |
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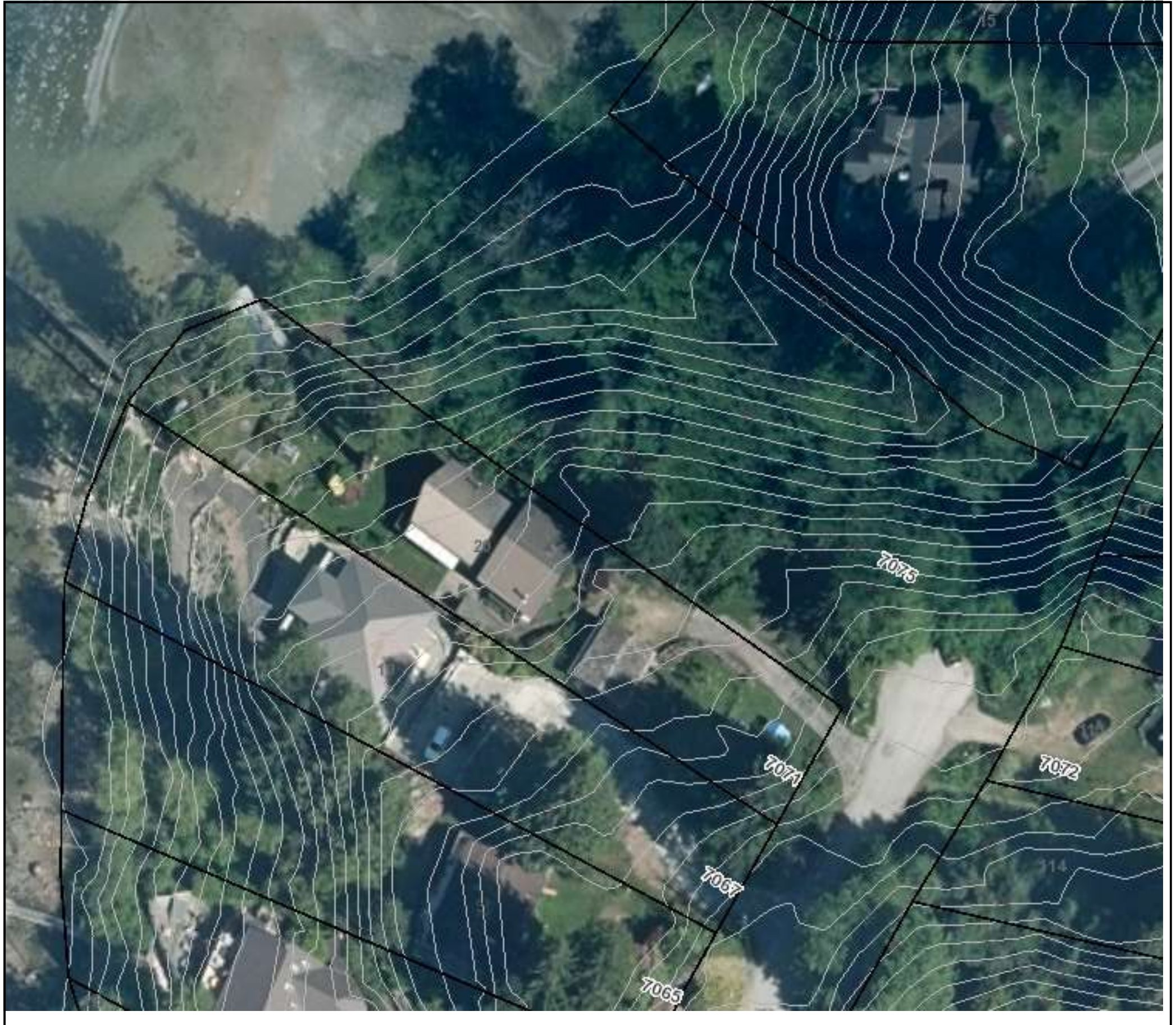
| REVISIONS: | | |
|------------|---------------------------|------------|
| No: | DESCRIPTION: | DATE: |
| 1 | PRELIMINARY (IMP) | JAN. 21/22 |
| 2 | REVISED PRELIMINARY (IMP) | JAN. 21/22 |

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 Port Coquitlam, B.C. Canada
 V5C 6N7
 PH: 604 - 614 - 6052
 E-mail: tom@psdbc.com

RENOVATION:
MOSS RESIDENCE
 7071 PORPOISE DRIVE,
 SECHÉLT, B.C.

ELEVATIONS, CROSS-SECTIONS

Site layout Sketch (Geotechnical) 7071 Porpoise Drive, Sechelt, BC



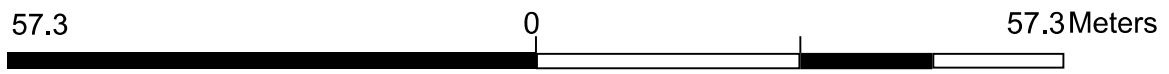
Index Map

This information has been compiled by the Sunshine Coast Regional District (SCRD) using data derived from a number of sources with varying levels of accuracy. The SCRCD disclaims all responsibility for the accuracy or completeness of this information.

- Parcel Boundaries
- Contours
- Unconstructed Roads
- Golf Courses
- Parks**
 - SCRCD Park
 - Recreation Site
 - Municipal Park
 - Provincial Park



3/22/2022
Scale 1: 1,128



2015 National Building Code Seismic Hazard Calculation

INFORMATION: Eastern Canada English (613) 995-5548 français (613) 995-0600 Facsimile (613) 992-8836
Western Canada English (250) 363-6500 Facsimile (250) 363-6565

Site: 49.500N 123.800W

User File Reference: Sechelt

2022-03-22 23:11 UT

| | | | | |
|---------------------------------------|----------|-------|--------|-------|
| Probability of exceedance per annum | 0.000404 | 0.001 | 0.0021 | 0.01 |
| Probability of exceedance in 50 years | 2 % | 5 % | 10 % | 40 % |
| Sa (0.05) | 0.428 | 0.295 | 0.210 | 0.089 |
| Sa (0.1) | 0.652 | 0.452 | 0.323 | 0.137 |
| Sa (0.2) | 0.808 | 0.565 | 0.406 | 0.172 |
| Sa (0.3) | 0.817 | 0.574 | 0.412 | 0.172 |
| Sa (0.5) | 0.730 | 0.506 | 0.358 | 0.142 |
| Sa (1.0) | 0.426 | 0.287 | 0.195 | 0.073 |
| Sa (2.0) | 0.262 | 0.171 | 0.113 | 0.040 |
| Sa (5.0) | 0.085 | 0.050 | 0.029 | 0.009 |
| Sa (10.0) | 0.030 | 0.018 | 0.010 | 0.004 |
| PGA (g) | 0.354 | 0.248 | 0.177 | 0.074 |
| PGV (m/s) | 0.544 | 0.366 | 0.250 | 0.089 |

Notes: Spectral ($S_a(T)$, where T is the period in seconds) and peak ground acceleration (PGA) values are given in units of g (9.81 m/s^2). Peak ground velocity is given in m/s . Values are for "firm ground" (NBCC2015 Site Class C, average shear wave velocity 450 m/s). NBCC2015 and CSAS6-14 values are highlighted in yellow. Three additional periods are provided - their use is discussed in the NBCC2015 Commentary. Only 2 significant figures are to be used. **These values have been interpolated from a 10-km-spaced grid of points. Depending on the gradient of the nearby points, values at this location calculated directly from the hazard program may vary. More than 95 percent of interpolated values are within 2 percent of the directly calculated values.**

References

National Building Code of Canada 2015 NRCC no. 56190; Appendix C: Table C-3, Seismic Design Data for Selected Locations in Canada

Structural Commentaries (User's Guide - NBC 2015: Part 4 of Division B)
Commentary J: Design for Seismic Effects

Geological Survey of Canada Open File 7893 Fifth Generation Seismic Hazard Model for Canada: Grid values of mean hazard to be used with the 2015 National Building Code of Canada

See the websites www.EarthquakesCanada.ca and www.nationalcodes.ca for more information


 Cam Forrester & Associates Ltd.

6231 Sunshine Coast Highway
 Sechelt, BC V0N 3A7
 phone/fax: 604.885.7112
 cam_forrester@telus.net

MEMO

TO: Ken Moss
 FROM: Cam Forrester, RPF
 SUBJECT: Revegetation Plan for 7071 Porpoise Dr, (Lot 20, DL 6214)
 DATE: Final. Jul 10, 2024
 CC: James Nyhus, Chief Building Official

Introduction

This revegetation plan is intended to address the revegetation requirements recommended in the accepted RAPR¹ (June 17, 2022) for 7071 Porpoise Drive (Lot 20 DL6214) for disturbance resulting from construction of a 30.5m long engineered retaining wall along the north boundary of Lot 20. The revegetation area is within the Riparian Assessment Area of the lower reach of Davis Brook Creek and straddles and includes a strip along two properties. The first being Lot 20 and the second the District of Sechelt (DoS) parks property along Davis Brook Creek (Lot B) – see Figure 1. The revegetation plan acknowledges consultation information received from the DoS (Attached) on species preferences.

In terms of permitting and planning, the area of this plan falls within multiple environmental and geotechnical DP areas. This revegetation prescription supports and aligns with commitments made in the Riparian Areas Assessment Report for construction in the Environmentally Sensitive Development Area – ‘stream riparian assessment area’. The accepted RAPR states that ‘after the construction of the proposed retaining wall is completed, we recommend a post-development report to be prepared once construction and landscaping are finalized.’ All post-development landscaping/revegetation should be completed using only native plant species commonly occurring in riparian areas typical of the Sunshine Coast. (One native species exception is suggested below as a measure to soften the final appearance of the concrete wall face.)

Construction and Disturbance

The retaining wall construction and design was summarized in the RAPR as follows:

The works are a “straight, 30.5 m long concrete retaining wall parallel to the North boundary line of the property. The Easternmost point of the wall will be located 45 cm (1’ 6”) South of the boundary line, while its Westernmost point will be 76 cm (2’ 6”) from the boundary line. The proposed design for the retaining wall includes two short return walls (4.8 m and 4.6 m) near the middle of the wall, and two longer return walls (8.8 m and 11.3 m), at the west end of the wall. The westernmost wall is proposed to be located on top of a second landscaped break from the marine shoreline. The proposed return walls will provide additional stability to the main wall while helping to create terraces (breaks) on the property.

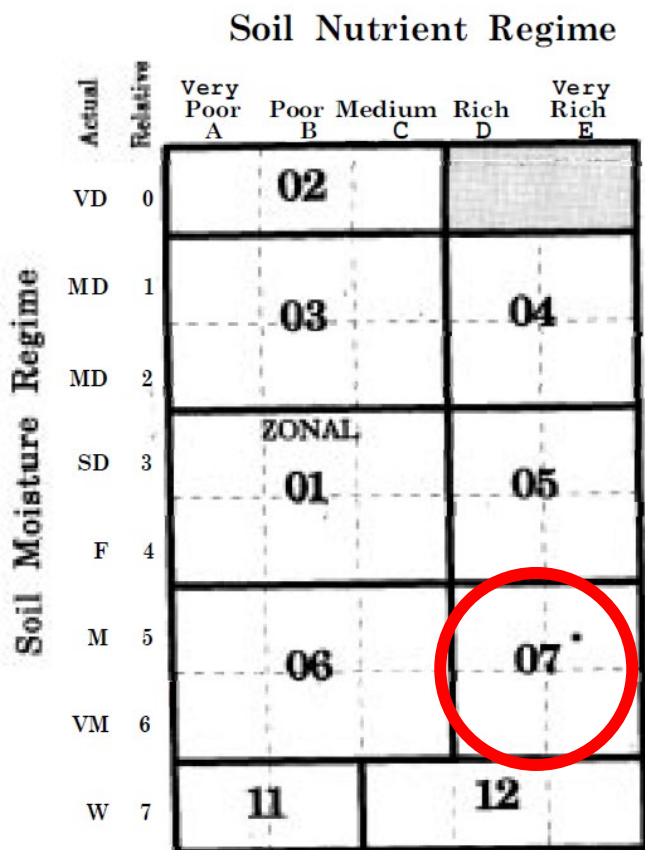
¹ Riparian Areas Protection Act Assessment Report, Hune 17, 2022. Cohen-Fernandez, Anayansi, RPBio.

These terraces, together with the construction and design consideration for optimum drainage and stability presented in Sections 4.4, 4.6 and 4.7 of this document (RAPR) will help to minimize the unintentional discharge of stormwater into the gravel path beside the property or the marine shore area. Detailed construction, design and slope stability consideration are presented on the Geotechnical Assessment Report prepared by Kontur Geotechnical Consultants, Inc. prepared for this project. The retaining wall is expected to have a variable height, between 3.5 m and 4.3 m depending on ground grade with cantilevers between 2.5 m to 3.3 m. The footprint of the proposed wall is expected to be 13.06 m² (140.6 sq ft).”

The significance of the retaining wall design relates to construction means and methods, where based on the proximity to the northern boundary of Lot 20, ground disturbance and vegetation removal is expected along the north side of the retaining wall. Working from the Lot 20 (south) side of the boundary, excavation, site preparation and backfill will extend across the boundary, encroaching into the adjacent DoS Lot B for 1-3m. That strip extending the length of the retaining wall is the subject area for this revegetation plan.

The area requiring revegetation will be the residual disturbance between the completed retaining wall and the outer extent of disturbance into Lot B, which is expected to be roughly bounded on the north side by the existing path, toe of slope or some point between those extents. The area is estimated at 120-180m².

Additionally, special consideration is given to measures using available planting techniques and species to soften the impact of the cast-in-place concrete wall structure to improve the overall site aesthetics.



Site Characterization

Referencing the BC Biogeoclimatic Classification System², the site is classified as the Coastal Western Hemlock Very Dry Maritime Subzone Site Series 05 Cedar-swordfern (SS-05) and is characterized as a High soil nutrient regime, and Moist-Wet soil moisture regime. Pre-existing plant diversity is moderately complex, characterized by a mixed overstory of western hemlock (*Tsuga heterophylla*), Douglas-fir (*Pseudotsuga menziesii*), bigleaf maple (*Acer macrophyllum*), western red cedar (*Thuja plicata*). There are also occasional scattered red alder (*alnus rubra*) and cherry (*Prunus virginiana*) present. Shrubs present are salal (*Gaultheria shallon*), red elderberry

² Land Management Handbook 28 (LMH28)

Figure 1. LMH 28 - Edatopic grid for the Coastal Western Hemlock Very Dry Maritime Subzone with generalized site series matrix for the revegetation area.

(*Sambucus racemosa*), red huckleberry (*Vaccinium parvifolium*), oceanspray (*Holodiscus discolor*). The main herb species occupying the bulk of the understory is sword fern (*Polystichum munitum*).

Site soils are characterized as well to moderately drained, with a well-developed organic layer with incorporation of organics into the mineral horizon. Texture is silt-very fine silts and sand, with approximately 30% coarse fragments.

Revegetation

The revegetation objectives for the site are two-fold. Firstly, to regenerate the disturbed ground overlapping into Lot B, and secondly to soften the industrial look of the finished wall. Plant species recommendations for this plan follows guidelines provided by the MFLNRO (Ministry of Water, Land and Air Protection, 20081F3 for riparian restoration. Specific revegetation species recommendations are aligned with the suite of ecologically native species observed on site and with the list of typical plants associated with SS-05 (LMH 28). Additionally, consideration is given to the DoS preferences for tree species (Attachment 1.) The DoS has offered preferences for tree species selection but not for shrub/herb understory revegetation.

The following table provides general guidance and intent for meeting DoS revegetation requirements. The goal is the successful establishment of suitable species at an acceptable mix and density comprised of a minimum of 10-15 trees and with an understory established where practicable. Final species mix will depend on planting stock source availability. The guidance provided here will provide flexibility and options for sourcing planting stock from commercial providers or from natural transplanting of locally sourced stock. The verified revegetation end-result combination is more important than a rigid plan. It is expected that the final densities established will be close to 1m x 1m spacing with no gaps or voids in the revegetated area > 2 planting spots.

Notes on revegetation measures to soften the impacts of the bare concrete wall surface

DoS review comments requesting efforts to soften the impact of the concrete wall can be accommodated with several focused techniques and species choices, which are as follows:

- Planting in front of the wall. The wall footing doesn't extend far enough out that it precludes planting within 1.5 – 2m as a visual screen. Planted species include any of the recommended native species, including evergreen tree species.
- 'Trailing over'. Planting species with a trailing growth form at the top of the wall will provide the effect of draping vegetation over the face of the wall. Kinnikinnick (*Arctostaphylos uva-ursi*) is recommended for these purposes as well as trailing blackberry (*Rubus ursinus*)
- Vines – it would be acceptable to establish several Virginia creeper (*Parthenocissus quinquefolia*) vines at 3-5m spacing along the wall. It is native to eastern and central

³ Riparian Restoration Guidelines, 2008, Ministry of Environment, Environmental Stewardship Lower Mainland Region

North America and with its vigorous growth form and self-adhesive climbing tendrils could be an effective means of colonizing the wall surface.

- Moss milkshake. For the more shaded parts of the wall, indigenous mosses can be established by applying a milkshake of yogurt mixed with locally sourced mosses sprayed or painted directly to the wall face. Several applications with regular misting may be required, and the applications should avoid droughty periods.

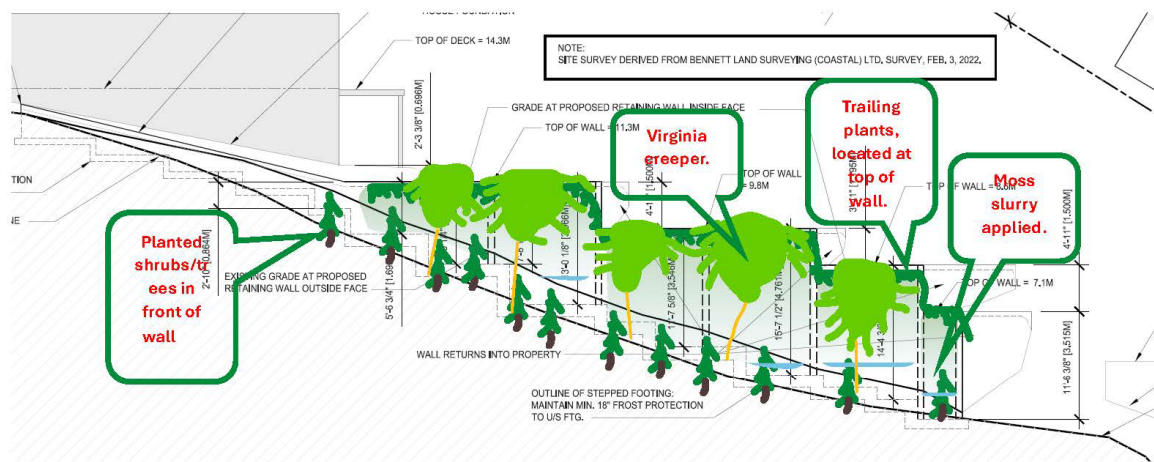


Figure 2. Concrete retaining wall profile, viewing south. Schematic representation of restoration/revegetation techniques to soften the concrete wall esthetics.

Table 1. A Summary of Recommended Native Species for the revegetation planting prescription

Deciduous Trees

| Botanical Name | Common Name | Mature Height (m) | Best Growth Conditions | # Plants | Comments |
|------------------------|--------------------|--------------------------|-------------------------------|-----------------|-------------------------------------------------------|
| <i>Acer circinatum</i> | vine maple | to 7 | m-w | 2 | Select deeper soil areas, lower third of slope |
| <i>Salix spp</i> | Scouler's willow | 18 | W-M | 10-50 | Lower slopes in obvious seepage and non-shaded zones. |
| <i>Alnus rubra</i> | Red alder | 25 | W-M | 10 | Expect natural in-fill |

Table 1. Continued.

Coniferous Trees

| Botanical Name | Common Name | Mature Height (m) | Best Growth Conditions | # Plants | Comments |
|------------------------------|---------------------|--------------------------|-------------------------------|-----------------|-----------------|
| <i>Pseudotsuga menziesii</i> | Coastal Douglas-fir | to 50 | M-D | 2 | |
| <i>Tsuga heterophylla</i> | Western hemlock | To 40 | m | 2 | |

Shrubs

| Botanical Name | Common Name | Mature Height (m) | Best Growth Conditions | # Plants | Comments |
|----------------------------|--------------------|--------------------------|-------------------------------|-----------------|-----------------|
| <i>Holodiscus discolor</i> | oceanspray | to 4 | d-m | 10-20 | |

| | | | | | |
|--------------------------------------------------|----------------------------|-------|--------------|----|---------------------------------------------------------|
| <i>Rubus parviflorus</i> | <i>thimbleberry</i> | 0.5-3 | <i>m</i> | 10 | |
| <i>Ribes sanguineum</i> | <i>flowering current</i> | 2.5-3 | <i>m</i> | 5 | |
| <i>Rubus spectabilis</i> | <i>salmonberry</i> | to 4 | <i>m-w</i> | 20 | |
| <i>Arctostaphylos uva-ursi</i> | <i>Kinnikinnick</i> | 0.5 | <i>d</i> | 20 | <i>Plant at top of wall as a trailing species.</i> |
| <i>Rubus ursinus</i> | <i>trailing blackberry</i> | 0.5 | <i>d-m</i> | 25 | <i>Plant at top of wall as a trailing species.</i> |
| <i>Sambucus racemosa</i> var. <i>arborescens</i> | <i>red elderberry</i> | to 6 | <i>m</i> | 10 | |
| <i>Vaccinium parvifolium</i> | <i>red huckleberry</i> | to 4 | <i>m</i> | 20 | |
| <i>Gaultheria shallon</i> | <i>salal</i> | 1-3 | <i>d-m-w</i> | 50 | <i>Approx 2m x 2m spacing intermixed with swordfern</i> |

Herbs

| Botanical Name | Common Name | Mature Height (m) | Best Growth Conditions | # Plants | Comments |
|----------------------------|--------------------|--------------------------|-------------------------------|-----------------|-----------------------------------------------------|
| <i>Polystichum munitum</i> | <i>swordfern</i> | to .5 | <i>d-m</i> | 50 | <i>Approx 2m x 2m spacing intermixed with salal</i> |

Non-native species (Optional)

| Botanical Name | Common Name | Mature Height (m) | Best Growth Conditions | # Plants | Comments |
|------------------------------------|-------------------------|--------------------------|-------------------------------|-----------------|-----------------------------------------------------------------------|
| <i>Parthenocissus quinquefolia</i> | <i>Virginia creeper</i> | <i>Climbing</i> | <i>d-m</i> | 10 | <i>An optional species suited to growing on and up the wall face.</i> |

Planting Practices

The following points represent several key considerations to follow to ensure revegetation success:

- Revegetation commitments will be monitored and overseen by a QEP.
- Topsoil and organics will be stripped, salvaged and stockpiled for use as top dressing to improve the planting substrate.
- Salvaging native plant species prior to stripping is recommended. Store salvaged stock in shaded and moist conditions with roots covered. Replant as soon as practicable.
- Plant any purchased stock within 2-3 days, keeping cool and moist prior to planting on site.
- Deer browse protection will be required on some of the planted stock.
- Plant stock to 1-3 inches above root collar and ensure the planting hole is closed and tamped down.
- Adjust species site selection to account for observed microsite variations in shade, drainage etc.
- Invasive species, mainly anticipated to be Himalayan blackberry and English ivy may be manually controlled to allow planted stock to establish.
- Irrigation/watering may be required during the first several growing seasons.
- The moss slurry technique is simply a blended mix of locally sourced ecologically suited mosses and plain yogurt, which can be painted onto the wall face, focusing on north facing, shaded areas. Establishment will be aided by regular misting.

Timing of Works

Restoration planting can be a fall or spring plant and should avoid seasonal summer drought. Ideally planting can commence any time after February and should be completed no later than April 15.

Monitoring

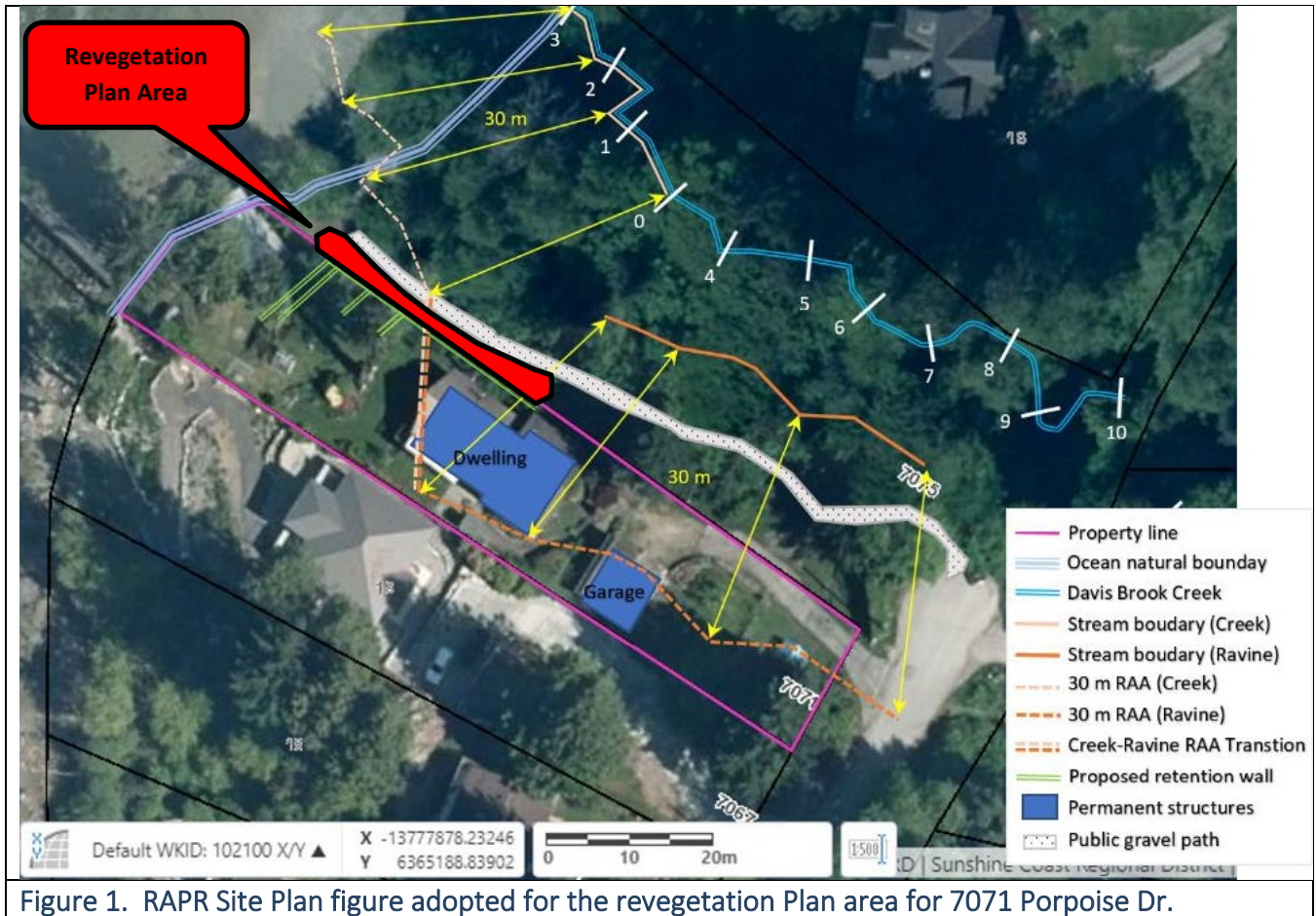
The restoration prescription relies on voluntary monitoring to identify potential plant survival or health issues as well as functioning of the riparian habitat, post-construction. Monitoring also requires a commitment by the proponent to make reasonable changes to mitigate negative outcomes and ensure that the vegetation is successfully established and that it is likely to function over time.

The primary concern of monitoring will be maintenance of vegetation survival and health conditions through verification that artificially and naturally established vegetation is healthy, vigorous, and likely to reach its potential. Specific monitoring criteria at this site will include:

- Conducting inventories of species composition, the prevalence of planted species, the ratio of non-native and invasive species to native species;
- Assessing soil moisture and the development of soil characteristics;
- Conducting general wildlife use observations within the planted area;
- Conducting photo studies to track vegetation establishment;
- Assessments will inform efforts to infill plant from the recommended species list where vegetation is slow to establish.
- Documentation of monitoring observations and corrective measures;
- If any of the restored area is assessed to not be regenerated adequately; and,
- Additional area or corrective measures will be prescribed at the discretion of the QEP.

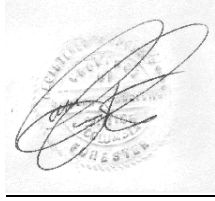
Monitoring is proposed to take place informally once in the first year after plant establishment and then again in the third year after establishment.

Monitoring notes will be available for validation purposes for each of the monitoring visits.



Qualified Environmental Professional Assurance

It is my opinion that the recommendations in this memo will achieve the revegetation objectives for the disturbance from retaining wall construction at 7071 Porpoise Dr, (Lot 20, DL 6214).



Cam Forrester, R.P.F.

2118

Date Signed – July 4, 2024

Attachment 1 – District of Sechelt Preferred Tree Species Comments (e-mail Taylor MacKay, January 11, 2024)

Fwd: Moss residence -7071 porpoise dr.

4 messages

Marc Chabot <marc@clarkhamilton.com>
To: "Cam Forrester (cam_forrester@telus.net)" <cam_forrester@telus.net>
Cc: "James clarkhamilton.com" <james@clarkhamilton.com>

Thu, Jan 11, 2024 at 4:10 PM

Hi Cam,
Here are the recommendations from DoS parks to note in your memo.
Thanks
Marc

Get [Outlook for iOS](#)

From: Taylor McKay <tmckay@sechelt.ca>
Sent: Wednesday, January 10, 2024 1:38:50 PM
To: Marc Chabot <marc@clarkhamilton.com>
Cc: Kevin Bradley <KBradley@sechelt.ca>; Siobhan Smith <ssmith@sechelt.ca>
Subject: Re: Moss residence -7071 porpoise dr.

Hi Marc,

Thanks for meeting with us yesterday.

In regards to the revegetation plan, tree species to avoid on this site would be Big Leaf Maple (*Acer macrophyllum*), Red Alder (*Alnus rubra*), and Western Red Cedar (*Thuja plicata*).

Western Hemlock (*Tsuga heterophylla*) could be a decent replacement given appropriate distance between the home and new planting location, but Douglas-fir (*Pseudotsuga menziesii*) would be preferred.

We did notice ivy originating from Ken's property and creeping into the beach access. It would be great if that could be removed and a native ground cover or shrub planted in it's place. Other than the species listed above, we are open to most BC native species for replacement.

Please let me know if I can be of any further help,
Thanks a lot.



Taylor McKay
Parks Arborist

Cell: 604-740-6705

PO Box 129 | 2nd Floor, 5797 Cowrie St. | Sechelt, BC | V0N 3A0

I acknowledge that I work on the unceded homelands of the shíshálh Nation

Photos



Photo 1. Viewing west, start of DoS trail above retaining wall development at Porpoise Dr.



Photo 2. Viewing east, revegetation area along retaining wall, note established plant cover.



Photo 3. Viewing east, revegetation area along retaining wall, note established plant cover.



Photo 4. Viewing east, revegetation area along retaining wall near ocean setback and western extent of retaining wall.