District of SECHELT

REQUEST FOR DECISION

TO: Mayor and Council **MEETING DATE:** August 3, 2022

FROM: Development Planning Manager

SUBJECT: **Development Permit for 5038 Laurel Avenue (Homei – Havies Subdivision)**

FILE NO: 3060-2022-17

RECOMMENDATIONS

1. **That the report from the Development Planning Manager regarding the Development Permit for 5038 Laurel Avenue (Homei – Havies Subdivision) application be received.**
2. **That Council approve Development Permit 2022-17 (Homei – Havies Subdivision).**

PURPOSE

The purpose of this report is to present for Council consideration a development permit application for the proposed 99-lot subdivision at 5038 Laurel Avenue between Nestman Road and Havies Road.

OPTIONS

1. Adopt the above recommendations.
2. Defer the application pending additional information, as directed.
3. Reject the application.

BACKGROUND

A concurrent subdivision application process is underway dating back to 2016, though the current revised subdivision proposal is from 2021 with additional changes in 2022.

Table 1: Site Information	
Applicant	JB Coast Consulting / 1320881 B.C. LTD., INC. NO. BC1320881
Owner	1320881 B.C. LTD., INC. NO. BC1320881
Civic Address	5038 Laurel Avenue
Legal Description	Block A, District Lot 1379, Plan VAP1938
Size of Property	~105,463 m^2
DP Areas	DPA 2: Riparian and Flood / DPA 5: Steep Slopes / DPA 8: Intensive Residential
Zoning Designation	Existing: R-1
OCP Designation	Existing: Low Density Residential

The subdivision application is subject to Development Permit Areas (DPA) No. 2, 5, and 8. While DPA No. 2 and 5 generally do not require Council approval, DPA No. 8 does, and given the scale of the application, it also exceeds the delegated authority parameters for other DPAs.



Figure 1 Location Map

Proposal

The proposed subdivision includes 99 lots and a dedicated park space. The lot sizes range from ~500 m^2 up to ~900 m^2.

Information Update

Along with the original site plan showing the house type locations, the applicant has submitted a new landscape plan, and revised architectural renderings of the house types. Additional roof style options were created for each of the six house types. A streetscape rendering is also in production and will be presented at the meeting by the applicants. This will provide a visual representation of the streetscape and positioning of the homes with one on Betty Rd and one on Laurel Ave.

Legislative Context

Local governments have the authority to establish objectives for the form and character of intensive residential development within the Official Community Plan. Guidelines are provided for developers to meet the objectives.

It is a discretionary decision by Council to determine if guidelines have been sufficiently addressed to meet the objectives of the development permit area. However, the applicability or importance of guidelines can vary depending on the context and form of the development.

The review of development permit applications is restricted to consideration of guidelines and objectives in relation to the proposed development. The level of density or use of the land may not be regulated through the development permit process.

The *Local Government Act* limits that development permits may only include requirements respecting the character of the development, including landscaping, siting, form, exterior design and finish of buildings and other structures.

DISCUSSION

Development Permit Area 2: (DPA 2)

DPA 2 is established to protect the natural environment, its ecosystems and biodiversity and to protect development from hazardous conditions. It implements the Riparian Areas Regulation and addresses habitat protection and creek hazards.

Guidelines in DPA 2 are categorized as follows:

- Habitat Protection
- Creek Hazards

Development Permit Area 5: (DPA 5)

Objectives

DPA 5 has the following goals and objectives:

- To minimize the impact of development on hillsides and steeply sloped lands.
- To retain the natural features of sloped lands.
- To support low impact and innovative development approaches to minimize long-term infrastructure maintenance costs on steeply sloped lands.

Guidelines in DPA 5 are categorized as follows:

- Basic Design Principles
- Natural Areas/Vegetation
- Building Sites
- Building Heights and Massing
- Driveways and Garages
- Retaining Walls
- Site Grading
- Road Design
- Stormwater Management
- Parks and Trails

Development Permit Area 8: (DPA 8)

Objectives

DPA 8 has the following goals and objectives:

- To create a variety of compact housing forms with a high standard of urban design and livability, designed for durability and an attractive appearance over the long term.
- To integrate new infill development with the surrounding neighbourhood.
- To provide new housing forms which are affordable and appropriate to the needs of different groups of the population.
- To control design of new development and the provision of amenities.

Guidelines in DPA 8 are categorized as follows:

- Site Planning
- Building Scale, Form and Character
- Small Lot Subdivisions
- Sustainability
- Lighting
- Coach Houses
- Parking and Access
- Servicing
- Waterfront Infill

The guidelines for DPA 2 and 5 have been met and staff consider that the proposed subdivision and development substantially meets the guidelines and objectives of DPA 8. Ordinarily a permit subject to DPA 2 and 5 is issued by the Director of Planning and Development, however DPA 8 does require Council approval. Staff have sought comments from the APC regarding how the application meets the DPA 8 guidelines. The development permit application is one of many conditions for the subdivision application.

Development Permit Area No. 8 Review

- Site Planning
- Building Scale, Form and Character
- Small Lot Subdivisions
- Sustainability
- Lighting
- Parking and Access
    - Overall, the guidelines of all the above categories have been met.
- Coach Houses
    - Not applicable.
- Servicing
    - Not applicable.
- Waterfront Infill
    - Not applicable.

Referral Comments

The proposed development permit application (the DPA No. 8 aspect) was referred to the Advisory Planning Commission (APC) for comment. It was reviewed at two public meetings on June 7 and July 5, 2022. The APC minutes from June 7 and July 5 are attached to this report (Attachment 2). The applicant has updated their plans and drawings to address the comments and recommendations from the APC meeting of July 5, 2022.

The subdivision application has a separate referral process to external agencies and internal departments to address the other subdivision and servicing issues.

STRATEGIC PLAN

The application supports the following Council strategic priorities:

Enhancing Community Livability

The proposed subdivision would support priority 3.1 and 3.2:

> *Planning neighbourhoods to enable all residents to meet their daily needs easily, safely, and conveniently by linking neighbourhoods with pathways, sidewalks, bicycle lanes and transit routes.*
> *Providing a mix of housing types throughout the District that provide options for a range of needs and incomes.*

POLICY IMPLICATIONS

Integrated Community Sustainability Plan (ICSP)

The development meets many of the sustainability objectives included in the ICSP particularly by providing housing options in the downtown centre close to services and transit.

Housing Needs Report

This application is supported by recommendations made in the 2020 Sunshine Coast Housing Needs Report which noted the high demand for rental housing and the relative lack of supply.

The report noted the need for smaller units (studio and two-bedrooms) to meet the needs of seniors living alone or couples without children.

SUSTAINABILITY PLAN IMPLICATIONS

The application may support the following goal in the Integrated Community Sustainability Plan:

> ***6.0 Sustainable Community Growth & Development***
>
> *Sechelt ensures that growth and development is planned and managed in a sustainable manner. Sechelt seeks to limit sprawl and will support approaches to development, including redevelopment, renewal and adaptive reuse, that will create a more compact and well- designed community.*

FINANCIAL IMPLICATIONS

Landscape Deposit

Landscaping security will be dealt with as part of the subdivision servicing agreement - streetscape requirements. The development permit will require the standard $10,000 security for performance against the conditions.

Development Cost Charges (DCCs)

Table 4: Development Cost Charges						
Use	**Water (SCRD)**	**Drainage**	**Sewer**	**Roads**	**Parks**	**Total**
Single family lots	$3,632	$3,088	$844	$14,222	$4,295	$26,081

All developments are required to pay DCCs at the time of subdivision or building permit as required by District of Sechelt Development Cost Charges Bylaw No. 544 and Sunshine Coast Regional District Development Cost Charges Bylaw No. 693.

DCCs for Sunshine Coast Regional District and District of Sechelt must be paid prior to considering final approval of the subdivision. DCCs will be approx. $2.55 million for this application.

COMMUNICATIONS

Next steps include additional formal subdivision referrals, and application for and review of a Servicing Agreement for on-site works and services and a Servicing Agreement off-site works and services (sewer extension).

Respectfully submitted,

Ian Holl, MCIP, RPP
Development Planning Manager

Attachments:

1 - Guidelines Review Checklist
2 - APC Minutes – June 7, 2022 and July 5, 2022
3 - Development Permit 2022-17

Reviewed by: I. Holl, Acting Director of Planning & Development	**X**
Reviewed by: K. Dhillon, Director of Engineering & Operations	**X**
Reviewed by: B. Smith, Acting Director of Financial Services	**X**
Reviewed by: L. Vickers, Communications Manager	**X**
Reviewed by: J. Frank, Corporate Officer	**X**
Approved by: A. Yeates, Chief Administrative Officer	**X**

ATTACHMENT 1

DISTRICT OF SECHELT
MINUTES OF THE ADVISORY PLANNING COMMISSION MEETING
Community Meeting Room
1st Floor, 5797 Cowrie St., Sechelt
In-Person Seating Available
and
Via Zoom Online Meeting Platform
Tuesday, June 7, 2022
6:00pm

PRESENT Commissioners Randy Knill (Chair), Darryl Brin, Archie Maclean, Joanne Van Ginkel, Dana Caple, Scott Hanna (online), Michael Allan (online) and Ken King (online).

REGRETS Commissioners Ken Crozier, Sharif Senbel and Javier Siu.

STAFF Director of Planning and Development, A. Allen; Development Planning Manager, I. Holl; Recording Secretary, M. Sugars.

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1. CALL TO ORDER

The Chair called the Advisory Planning Commission Meeting to order at 5:59 pm.

2. ADOPTION OF AGENDA

Recommendation No. 1 – Agenda

Moved/Seconded

That the Agenda be adopted.

CARRIED

3. ADOPTION OF MINUTES

3.1 Minutes of the May 3, 2022 Advisory Planning Commission Meeting

Recommendation No. 2 – Minutes

Moved/Seconded.

That the minutes of May 3, 2022 Advisory Planning Commission meeting be adopted as presented.

CARRIED

4. INTRODUCTION TO AGENDA ITEMS

5. APPOINTMENTS AND DELEGATIONS

Kia Zahrabi, JB Coast Consulting Inc., introduced himself and noted that he was in attendance to answer any questions the Commission may have. He provided a brief summary of the subdivision application and added the Engineer of Record, Jurek Janota Bzowski, was available via speaker phone additionally to provide input.

6. BUSINESS ITEMS AND REPORTS

6.1 3060-2022-14 Development Permit for Havies Rd Subdivision (Homei)

The Development Planner Manager provided an overview of the proposal and noted:

- The Official Community Plan (OCP) designates the area as Low Density Residential.
- The property is currently zoned Residential 1 (R-1).
- The property contains Development Permit Areas (DPA's) 2, 5 and 8.
- The developer has proposed a sewer extension to the property.
- The proposal is for 99 single family lots.
- A new public park is included within the proposal.
- Development Permits (DPs) are requirements of the Preliminary Layout Review (PLR), which must be approved before the subdivision can be finalized.
- DPA 8 affects the subdivision by considering the issues around small lot subdivision and siting and sizing of housing, as well as streetscape issues and its intent to make subdivisions more people focused.
- DPA 8 affects housing design by including general siting and sizing parameters that have been incorporated into previous development permits.
- Council has endorsed the creation of a new sewer service area for this property.
- DP's are only one condition of subdivision.

APC Members discussed the following regarding site plan, landscaping and park location:

- The park size appears small given the number of proposed units.
- Two smaller parks throughout the development may be more accessible for all residents.
- The houses seem to take up a larger than average percentage of the lot, leaving limited green space per unit.

- Park space is a necessity, the increase in connectivity will be beneficial.
- Many of the proposed streets are straight, and may encourage speeding.

Audio connection was lost at 6:43 pm and restored at 6:44 pm.

- Some houses appear to be very close to their neighbours. How is this being mitigated?
- The proposed development conforms to existing zoning; however, further density could have been considered, such as townhouses.
- More pedestrian friendly options for walking and cycling around and through the subdivision would be beneficial.

Staff clarified the following:

- The minimum required park dedication is 5% of the property size. This requirement has been met.
- Parks staff have been involved regarding the proposed park. Staff have concluded that a single, larger, cohesive piece of park is ideal for future maintenance and development.
- The horizontal footprint of the houses do not exceed allowable size (R-1 zone has a maximum lot coverage of 35%).
- Items such as traffic safety would come into effect at the Servicing Agreement stage.
- The location of the proposed park has standing water on it, but will be graded, leveled and developed appropriately with the installation of a retaining wall, by the developer.
- Future development of the Park would be the responsibility of the Sechelt Parks Department.
- Laurel Avenue is a designated collector road, and therefore a multiuse pathway is required and will connect to Nestman Rd down to the highway as required by bylaw. Sidewalks will be required down Havies Rd.
- Laneway standards are outlined in District bylaws:
    - Parking isn't required or allowed within a laneway due to their width.
    - Waste pickup would ideally be collected via the laneway for those homes.
- The OCP designates this a low-density residential rather than multi-family.

The applicant's representatives further noted:

- The park will be raised with structural fill to accommodate future development such as a tennis or a pickleball court.
- There will also be access to trails on the east side of the property which contains green space.
- Traffic safety will be further considered within the road design.
- Street trees are not shown on the provided plan; however, they will be shown on the landscape plan, once developed. A professional landscaper has been retained to develop the plan.

- The homes are staggered to limit views into neighbouring homes. Additionally, homes will be placed on a slope in relation to other units.
- Part of the landscape plan is to provide off-street parking between driveways along with the addition of pathways along Betty Rd and roads A, B and C.
- Betty Rd is designed as a half road.
- Parking will be on the east side of Betty Rd.
- Rollover curbs will be shown in the landscape plan and will show parking within the corridor off the road, with pathways, trees, and lighting.

Recommendation No. 3 – Site Plan for Havies Rd Subdivision (Homei)

Moved/Seconded

That the Landscape Plan and revised civil plan for the Homei subdivision be brought back to the Advisory Planning Commission, responding to the following discussed concerns:

- Pedestrian and bike connectivity
- Street trees
- Park landscape
- Parking; and
- Traffic safety.

CARRIED

APC Members discussed the following regarding the overall layout, design, streetscape, and appearance, noting:

- There appears to be two distinct housing types, a smaller craftsman style, and larger west coast modern style.
- The renderings appear to be missing streetscape views
- The repetitive nature of the houses is not encouraged within the OCP and DPA guidelines.
- A lively and interesting streetscape is encouraged.
- The proposed row of identical houses is a concern.
- Houses can be personalized even if the house floor plan is the same.
- Variation in unit style could be achieved using:
    - Colour
    - Roof style and fascia
    - Landscape / trees
    - Fenestration and trim details
    - Column style, support brackets or
    - Overhangs

The applicant's representatives further noted:

- Unit styles A and B are a smaller, craftsman style. The applicant envisioned this style with a single-story layout for the development.
- The larger units are considered a west coast modern style.
- The road orientation has changed since the initial proposal. The current design of the roads follows OCP guidelines and the natural contours of the site.
- Streetscaping will be included within the next design and further landscape design.
- The houses will be staggered and therefore will not be a straight row of houses. The different setbacks will help create variation.

Recommendation No. 4 – Layout Design for Havies Rd Subdivision (Homei)

Moved/Seconded.

That the applicant provide additional details and streetscape renderings to the Advisory Planning Commission which differentiates units, without modification of general floor plan, demonstrating the following considerations:

- Windows and trim;
- Column style;
- Roof style;
- Overhangs; and
- Colour.

CARRIED

APC Members discussed the following regarding specific items and unit types:

- Some of the floorplans have two kitchens. Is this floorplan meant to encourage secondary suites?
- The current housing shortage on the Sunshine Coast would support higher density.
- A secondary suite would mean twice as many waste disposal bins; Residential designs must accommodate storage for the large number of bins, especially without a lane.
- A central collection area could be considered for recycling.

Staff clarified that the current zoning allows for secondary suites. Parking requirements would need to be addressed if secondary suites were to be included. Additionally, planning staff will engage with engineering staff regarding additional waste bins and report back to the APC.

The Applicant's representatives noted that they will work with staff to find a productive solution for additional waste bins.

APC Members asked the applicant's representatives if any sustainability measures were being considered, who responded:

- Rainwater harvesting/barrels are being considered.
- Electric charging capabilities are located in the garages.

They additionally noted that the BC Building Code is currently at Step Code 1; However, will likely be at Step 3 by the time of construction, which the applicant has taken into account.

APC members inquired about the community amenity fund, and asked if this development is required to contribute to this fund. Staff clarified that this development is not seeking rezoning, and therefore doesn't apply. This development does qualify for the payment of development cost charges.

8. ADJOURNMENT

The Advisory Planning Commission meeting of June 7, 2022 was adjourned at 7:24 pm.

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Randy Knill, Chair Jo-Anne Frank, Corporate Officer

DISTRICT OF SECHELT
MINUTES OF THE ADVISORY PLANNING COMMISSION MEETING
Community Meeting Room
1st Floor, 5797 Cowrie St., Sechelt
In-Person Seating Available
and
Via Zoom Online Meeting Platform
Tuesday, July 5, 2022
6:00pm

PRESENT	**Commissioners** Randy Knill (Chair), Ken Crozier, Archie Maclean, Sharif Senbel, Javier Siu, Joanne Van Ginkel, Dana Caple, and Ken King
REGRETS	**Commissioners** Darryl Brin, Scott Hanna, and Michael Allan
STAFF	Development Planning Manager, I. Holl; Recording Secretary, M. Sugars

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1. CALL TO ORDER

The Chair called the Advisory Planning Commission Meeting to order at 6:09 pm.

2. ADOPTION OF AGENDA

Recommendation No. 1 – Agenda

Moved/Seconded

That the agenda be adopted.

CARRIED

3. ADOPTION OF MINUTES

3.1 Minutes of the June 7, 2022 Advisory Planning Commission Meeting

Recommendation No. 2 – Minutes of the June 7, 2022 Advisory Planning Commission Meeting

Moved/Seconded.

That the minutes of June 7, 2022 Advisory Planning Commission meeting be adopted.

CARRIED

4. INTRODUCTION TO AGENDA ITEMS

5. APPOINTMENTS AND DELEGATIONS

None.

6. BUSINESS ITEMS AND REPORTS

6.1 Development Permit for 5038 Laurel Avenue (Homei)

The Development Planning Manager provided an overview of the proposal and noted:

- The developer has provided a landscape plan, streetscape renderings, and updated building renderings.
- Different roof styles and colours have been incorporated into the house type options.
- House type E's second story square footage, in ratio to the first story, exceeds what staff would consider to be compliant with DPA 8 guidelines. For all other proposed house types, the second story is between 60 - 70% of the first story square footage.

It was noted that the developers' representatives were in attendance to answer questions.

APC Members discussed the following:

- Members agreed the massing of House Type E is acceptable in relation to the other building types.
- Cars appear to be parked within the roadway on Betty Road.
- The Laurel Avenue rendering shows people walking down a paved area.
- A grass pathway is shown on Betty Road.
    - A grass pathway could get muddy quickly during wet conditions.
    - A more pedestrian friendly material could be considered.
- If pathways are too narrow, pedestrians may wander onto the road to walk.
    - Traffic safety measures were discussed last meeting, but do not appear to be shown in updated submission.
    - The landscaping height is quite low, and large trees with high canopies are shown, leaving sufficient room for pedestrians to walk.
- Park landscaping was not shown in the recent submission.
- Streetscaping:
    - The District's horticulturist should be consulted regarding the use of Red Obelisk beech trees.
    - The repetition of landscaping throughout the layout will provide balance.
    - Members like the use of evergreen selections.

Staff clarified that:

- The developer is only required to seed the park area for future use and provide structural fill. They are not required to develop it, as the park will be maintained by District of Sechelt staff.
- Future District projects would need to be considered for parks planning and improvements.

The applicant's representatives further noted:

- A 3 m wide multi-use pathway is shown in the Laurel Avenue rendering which continues along the north side of Nestman Road down to the highway, with bump outs on the left for parking.
- On the Betty Road rendering, a 2.4 m bump out is shown; cars are not parked on the roadway. Offset trees and a 1.5 m stretch of grass are included before the property line.
    - The pathway can be changed to a different material to improve maintenance.

<u>Recommendation No. 3</u> – Site Plan for Development Permit for 5038 Laurel Avenue (Homei)

Moved/Seconded.

The APC recommends that the applicant incorporate the following into their proposal:

- A permeable asphalt pedestrian pathway, or alternative material recommended by the District of Sechelt to replace the existing proposed grass pathways; and
- Solutions to maintain a speed limit of 30 km/h on all local roads within the development to reduce potential safety risks, and include additional traffic calming measures.

CARRIED

APC Members discussed the following regarding the proposed house types:

- More variation is encouraged.
- The proposed colour options appear very similar.
- The proposed variations are too subtle.
- The site plan shows building types in the same locations as the previous submission.
    - The commission did not ask for a revised site plan last meeting.
- House type locations are governed by footprint and terrain.
- Members who attended the June 7th meeting noted that the developer had provided what the commission had requested.
- Building plans could be mirrored to provide further variation.
- Some house types have sufficient variation, while others require further options.
- Landscape plan provided doesn't show landscaping on individual lots.

Matthew Cheng, Architect for the developer was in attendance and presented 2D renderings of the building types, which better showed roof line variations and provided further clarification.

The applicant's representatives further noted:

- It is the understanding of the developer's representatives that the new owner will be able to choose their colour, building type and roof style.
- During discussion at the last APC meeting, commissioners did not request a change in building floor plans in order to provide variation.
- There are six building types, each type with a minimum of three roof style options.
- Building setbacks will be staggered to provide variation, and street scaping was improved.
    - These items will decrease building visibility from the street.
- Semi-mature trees are being proposed along the streets.
- The developer will be responsible to coordinate individual lot landscaping.
- 2D renderings show further roof line variation.

Recommendation No. 4 – Building Design for Development Permit for 5038 Laurel Avenue (Homei)

Moved/Seconded.

The APC recommends that the applicant incorporate the following into their proposal:

- Provide a wider variety of colour schemes for all house types and allow for mirror layouts of house types; and

- Provide a wider variety of roof styles and articulations for house types A, D, and E.

CARRIED

7. ADJOURNMENT

The Advisory Planning Commission meeting of July 5, 2022 was adjourned at 7:29 pm.

_____ _____

Randy Knill, Chair Jo-Anne Frank, Corporate Officer

ATTACHMENT 2

DPA 8 – Intensive Residential and Infill Housing

Project: **Homei - Havies Road Subdivision**

Drawings:
Kerr Wood Leidel / JB Coast Consulting Inc. - 4155.011 - PR-PLR-FIG 3 - B, May 26, 2022
Matthew Cheng Architect Inc. - 15VTH01 - A000, April 11, 2022
Matthew Cheng Architect Inc. - 15VTH01 - A101a, April 11, 2022
Matthew Cheng Architect Inc. - 15VTH01 - House Types A - F, February 23, 2022

Designation

Residential infill involves the densification of existing residential areas. Infill may occur incrementally on a lot-by-lot basis, often involving properties with unusual lot configurations and within close proximity to existing homes. Infill housing also occurs in new residential areas, where more compact housing forms are developed to increase housing choices and affordability within neighbourhoods.

DPA 8 applies to any property designated in the District of Sechelt OCP or zoned for:

1. small-lot residential subdivision with minimum lot sizes ranging from 300 - 600 sq.m.;
2. subdivision in Low Density Residential areas where average lot sizes are less than 2000 sq.m.;
3. cluster housing where two or more housing units are located on a parcel;
4. ground-oriented attached housing forms including duplex (two-family) or triplex use;
5. any new forms of infill development such as laneway housing, “granny flats/cottages”, coach house or carriage house over garages.

These uses are also permitted in the Multiple Family/Mixed Residential designation in the OCP. Infill housing is also supported within Special Infill Areas where the location makes increased density attractive, but where the scale and building form must fit with the existing character of the neighbourhood. Infill housing forms are also supported within the areas designated in the OCP as Residential, where a mix of housing types are encouraged on properties larger than 0.4 hectares (4000 sq.m.) in size.
Infill housing and more intensive residential development require careful design to ensure the new development respects the character of the neighbourhood and adjacent properties, and creates an attractive, livable environment. The DPA 8 guidelines apply to each of these housing types, with the goal of ensuring a good fit within the neighbourhood and minimizing the impacts of increased density.

Objectives

1. To support a variety of housing forms that provides appropriate and affordable housing for all segments of the population.
2. To ensure a high quality of urban design and livability for all higher- density housing.
3. To use distinctive design character to create identifiable neighbourhoods.
4. To ensure that new development is compatible with surrounding uses.

Instructions:	***Not Applicable***	***Required***	***Recommended***	***Optional***		***Guideline Evaluation***		***Staff Comments***	***Status***
Guidelines are provided below. Not all guidelines are applicable to all developments. Staff will assist in identifying the relevant guidelines. Not all guidelines are mandatory - some are recommendations or entirely optional.		x			*Please briefly describe features that have been incorporated into the development to address the specific guidelines. If you are referencing external supporting documents please be specific so Staff can easily find the documents.*		*Met*	*Planning staff will review and assess compliance with given guidelines. Where necessary additional information may be required.*	**Review Complete**

Guidelines

Site Planning	***Not Applicable***	***Required***	***Recommended***	***Optional***	***Features of the development that support the Site Planning guidelines:***	***Guideline Evaluation***		***Staff Comments***	***Status***
1. Assess natural site conditions of slope, landform, hydrology and other characteristics and design the housing to fit with these features.							*Met*		**Review Complete**
2. Retain existing mature vegetation and other natural features as part of the site layout. Arborist reports are required to confirm health of trees; replacement trees are required.							*Not Met*		**Review Complete**
3. Minimize parcel consolidation in order to retain a single-family appearance. Where infill development consists of more than three units, the front façade should be broken into smaller elements to give the impression of fewer units.							*Not Applicable*		**Review Complete**
4. Orient infill housing to minimize overlooking of adjacent residential properties through building heights, careful placement of windows and landscape screening.							*Not Applicable*		**Review Complete**
5. “Gated” communities are discouraged in favour of developments that face the street, encourage social interaction and integrate with the adjacent residential area. Design features such as front porches, wide steps and planters are encouraged.							*Met*		**Review Complete**
6. Use gateway features such as lighting, signage or landscape features if individual entries are not visible from the street.							*Partially Met*		**Review Complete**
7. Orient housing to maximize view opportunities while not compromising sightlines for adjacent neighbours.							*Partially Met*		**Review Complete**
8. Avoid overlooking of adjacent private rear yard areas.							*Partially Met*		**Review Complete**

Building Scale, Form and Character	***Not Applicable***	***Required***	***Recommended***	***Optional***	***Features of the development that support the Building Scale, Form and Character guidelines:***	***Guideline Evaluation***		***Staff Comments***	***Status***
9. Use varied appearances that reflect the character of surrounding neighbourhoods.							*Met*		**Review Complete**
10. Maintain a scale that is sensitive to surrounding homes. Heights should not exceed permitted height of adjacent properties.							*Met*		**Review Complete**
11. Use building setbacks similar to those of adjacent properties, particularly for front and side yard setbacks.							*Met*		**Review Complete**
12. Use building design, materials, colours and landscaping that reflects elements found in surrounding residential areas. This includes elements such as pitched roofs and detailed trims.							*Met*		**Review Complete**

13. Provide a clearly defined main entrance for each building that faces the public road. Features such as entry porches, wide steps and planters are encouraged where they are common features of the surrounding streetscape.							Met		Review Complete
14. A maximum of four attached units (fourplex) are permitted in existing residential areas.							Not Applicable		Review Complete
15. Front facades should be broken down to emphasize the appearance of individual units.							Not Applicable		Review Complete
16. Building height should not exceed the maximum permitted height in adjacent or surrounding residential properties, which is generally two storeys.							Met		Review Complete

Waterfront Infill	***Not Applicable***	***Required***	***Recommended***	***Optional***	***Features of the development that support the Waterfront Infill guidelines:***	***Guideline Evaluation***		***Staff Comments***	***Status***
~~17. Infill development on waterfront properties (Special Infill Areas #2 and #3) shall provide setbacks from the shoreline and public access in accordance with DPA 3.~~							Not Applicable		Review Complete
~~18. To respect the current "cottage" character, infill development on Trail Bay or Porpoise Bay shall be a maximum of two storeys directly adjacent to the waterfront or public walkways. Additional height up to four storeys may be considered for centre or rear portions of the site, where compatible with adjacent uses and view corridors.~~							Not Applicable		Review Complete

Coach Houses	***Not Applicable***	***Required***	***Recommended***	***Optional***	***Features of the development that support the Coach House guidelines:***	***Guideline Evaluation***		***Staff Comments***	***Status***
~~For infill areas such as the Downtown Village Residential Infill, coach houses provide an opportunity for additional housing units and affordability in a form that fits within the existing context.~~							Not Applicable		Review Complete
~~19. Use an architectural style that is complementary, but does not imitate the primary residence.~~							Not Applicable		Review Complete
~~20. Articulate facades to create depth and architectural interest.~~							Not Applicable		Review Complete
~~21. Locate coach houses in the rear yard of the lot. Entrances should face the street and have direct pedestrian access from the street. Windows should provide "eyes on the lane" for security.~~							Not Applicable		Review Complete
~~22. Setback second storeys at least 3m from the rear property line. Floor areas should be no more than 75% of the first floor area.~~							Not Applicable		Review Complete
~~23. Provide private outdoor space for the primary residence and coach house.~~							Not Applicable		Review Complete
~~24. Where rear lanes exist, provide parking and access via the lane.~~							Not Applicable		Review Complete
~~25. Where no rear lane exists, provide a shared driveway as well as separate pedestrian pathways to each entrance.~~							Not Applicable		Review Complete
~~26. To limit the bulk of buildings, enclosed parking spaces should be limited to two.~~							Not Applicable		Review Complete
~~27. All coach houses are encouraged to provide adaptable design and universal accessibility.~~							Not Applicable		Review Complete
~~28. Enclose all garbage areas.~~							Not Applicable		Review Complete

Small Lot Subdivisions	***Not Applicable***	***Required***	***Recommended***	***Optional***	***Features of the development that support the Small Lot Subdivision guidelines:***	***Guideline Evaluation***		***Staff Comments***	***Status***
29. Provide a comprehensive site plan with details of all natural site features, parcel boundaries, building setbacks, site coverage, and open space, landscaping and parking areas.							Met		Review Complete
30. Fee simple subdivisions are preferred to encourage continuity with adjacent areas.							Met		Review Complete
31. Provide additional building setbacks where located next to existing residential areas.							Met		Review Complete
32. Locate public open space (park dedication or common areas within a strata development) in prominent, visible locations within the subdivision, not at the perimeter, in order to visually break up the development and increase the sense of openness.							Met		Review Complete
33. As a general guide, lots should have a minimum width of 10 metres where rear lanes are provided or 14 metres with no rear lane. Cul-de-sacs should not be used. (Note: actual lot sizes to be determined at time of zoning).							Met		Review Complete
34. Secondary suites are not supported in small lot subdivisions.							Not Applicable		Review Complete
35. Maximum site coverage should be limited to 40% to ensure a small-scale "cottage" appearance.							Met		Review Complete
36. Houses should be 1 to 1 ½ storeys, with sizes typically ranging from 100-140 sq.m. gross floor area to ensure lots do not appear overbuilt.							Partially Met		Review Complete
37. Second storeys should be no more than 60% of the first storey, and be setback from the first storey.							Partially Met		Review Complete
38. A building scheme may be required to ensure follow-through on design details.							Not Met		Review Complete
39. Repetitious building designs such as "mirror image" front facades are not supported.							Not Met		Review Complete
40. Layout and building design should preserve private open space for each lot.							Met		Review Complete
41. All common areas should be landscaped with a mix of coniferous and deciduous species, featuring drought tolerant and native plants. Street trees are required along all road frontages.							Partially Met		Review Complete
42. All pedestrian routes shall be preplanned and integrate with surrounding areas. Strata developments may be required to provide public access for continuity through the neighbourhood.							Partially Met		Review Complete
43. Buildings should be consistent with the area's prevailing heights and setbacks.							Met		Review Complete
44. Windows, decks and balconies should be designed to provide privacy, adequate daylight and ventilation.							Met		Review Complete
45. Provide visitor parking at the entrance to, and within, the subdivision on public or private roads.							Partially Met		Review Complete
46. Storage areas for recreational vehicles or boats should be considered.							Not Met		Review Complete

Lighting	***Not Applicable***	***Required***	***Recommended***	***Optional***	***Features of the development that support the Lighting guidelines:***	***Guideline Evaluation***		***Staff Comments***	***Status***
47. Lighting should be pedestrian scale and unified throughout the subdivision or development.							Partially Met		Review Complete
48. Use full cut-off light fixtures to minimize glare, reduce light spill on adjacent areas and increase energy efficiency.							Partially Met		Review Complete

49. All lighting systems are to be designed by a qualified engineer, and submissions to the District shall include luminance calculations and distribution diagrams.							Partially Met		Review Complete

Sustainability	***Not Applicable***	***Required***	***Recommended***	***Optional***	***Features of the development that support the Sustainability guidelines:***	***Guideline Evaluation***		***Staff Comments***	***Status***
50. Orient buildings to maximize opportunities for passive solar heating and natural lighting.							Partially Met		Review Complete
51. Use natural ventilation and cooling systems.							Partially Met		Review Complete
52. Provide for clothesline use in new developments.							Partially Met		Review Complete
53. Consider the use of green roof systems to reduce stormwater runoff, reduce energy costs and improve visual appearance.							Not Met		Review Complete
54. Limit the use of potable water for landscape irrigation. Once landscaping is established, limit the use of in-ground sprinkler/irrigation systems. Use captured water, recycled water and drought-resistant plants.							Partially Met		Review Complete
55. Use building products that demonstrate green technology.							Not Met		Review Complete
56. Provide natural filtration of rainwater into the site through techniques such as raingardens, rainwater collection systems, bioswales or rock pits and permeable paving for hard surfaces such as driveways.							Partially Met		Review Complete
57. Minimize the impacts of paved parking areas by installing oil/water separators and directing runoff to infiltration chambers or biofiltration strips.							Partially Met		Review Complete
58. Provide waste management plan; reduce or eliminate any on-site burning in favour of on-site chipping and/or reuse of site materials.							Partially Met		Review Complete
59. Developments are encouraged to apply for LEED certification (Leadership in Energy and Environmental Design green building rating system).							Not Met		Review Complete

Parking and Access	***Not Applicable***	***Required***	***Recommended***	***Optional***	***Features of the development that support the Parking and Access guidelines:***	***Guideline Evaluation***		***Staff Comments***	***Status***
60. Provide vehicle access via rear lanes.							Met		Review Complete
61. Shared driveways are encouraged to reduce paved surfaces.							Met		Review Complete
62. Where garages or carports are necessary, design them to be recessed within the building.							Met		Review Complete
63. Setback parking spaces and garages should not visually dominate the streetscape.							Met		Review Complete
64. Where modified road widths are proposed, pedestrian routes, visitor parking and emergency vehicle access must be predetermined.							Met		Review Complete
65. Provide sufficient parking for residents and visitors, located where it will not negatively affect existing residential areas.							Met		Review Complete
66. Garages and carports should be sufficiently setback from the roadway to prevent overhang on sidewalks or road allowance.							Met		Review Complete

Servicing	***Not Applicable***	***Required***	***Recommended***	***Optional***	***Features of the development that support the Servicing guidelines:***	***Guideline Evaluation***		***Staff Comments***	***Status***
67. Infill development should provide appropriate storage and collection areas for garbage and recycling.							Not Applicable		Review Complete
68. Services areas should be conveniently located for access, but well screened from adjacent properties or streets.							Not Applicable		Review Complete

District of SECHELT

604 885 1986
PO Box 129, 5797 Cowrie St,
2nd Floor
Sechelt, BC V0N 3A0
www.sechelt.ca

ATTACHMENT 3

DEVELOPMENT PERMIT NO. 2022 – 17

(1) This Development Permit is issued to:

1320881 B.C. LTD., INC. NO. BC1320881
2253 – 13353 COMMERCE PKY
RICHMOND, BC
V6C 3A1

(2) This permit applies to the lands within the District of Sechelt described below:

BLOCK A, DISTRICT LOT 1379, PLAN VAP1938, PID: 004-615-841
CIVIC ADDRESS: 5038 LAUREL AVENUE

(3) The Property is in Development Permit Area 2: Watercourse Habitat and Hazards, Development Permit Area No. 5: Steep Slopes, and Development Permit Area No. 8: Intensive Residential and Infill.

(4) This Permit authorizes the subdivision of the property into 99 lots and park dedication and associated works subject to signed servicing agreements for all onsite and offsite works and services.

CONDITIONS OF PERMIT

(5) The development must be completed strictly in accordance with the following plans and specifications:

(a) Subdivision Drawings, prepared by Kerr Wood Leidel and JB Coast Consulting Inc., dated July 8, 2022, attached as Schedule A.

(b) Landscape Plans prepared by PMG Landscape Architects, dated June 21, 2022, attached as Schedule B.

(c) Site and Housing Type Key Plan, Architectural Plans, and Housing Type Roof Styles and Colours, prepared by Matthew Cheng, Architect, attached as Schedule C.

(d) Geotechnical Assessment, prepared by Jason Tam, P.Eng., Horizon Engineering Inc., dated April 6, 2022 attached as Schedule D

(e) Environmental Assessment, prepared by Jeremy Nilson, B.Sc., R.P.Bio, Keystone Environmental, dated March 11, 2022, attached as Schedule E.

(6) Provide a security in the amount of $10,000 in the form of an automatically renewing irrevocable letter of credit, bank draft, or in a form satisfactory to the Director of Finance. This security will be held to ensure that the works have been satisfactorily completed according to the plans and specifications in Schedule A - E.

(7) Partial releases of the security bond will be considered upon completion of the works at the following key stages, upon submission of the following reports, approved by the District:

(a) 50% of the security bond will be released after all two of the following reports have been submitted:

i. Field review report #1 prepared and signed by the qualified engineering professional confirming that appropriate erosion and sediment control measures are installed. This report is to be submitted; within four weeks of the date of issuance of this development permit.

ii. Field review report #2 prepared and signed by the qualified professional engineer upon completion of:
    1. Site clearing, preparation and grading.
    2. Review of structure siting in consideration of geotechnical hazards and other requirements.
    3. Trench, cut, and fill stability for temporary excavations.
    4. Compacted engineered fill and backfilling.
    5. Foundation bearing capacity and subgrade.
    6. Drainage installation and permanent site dewatering

(b) The remaining 50% of the security bond will be released upon submission of:

i. Closure review following completion of all geotechnical components of construction.

ii. Final report prepared and signed by the qualified engineering professional immediately following completion of all geotechnical components of construction, land alteration works (installation of stormwater drainage, septic and other services required, and associated retaining structures), application of erosion control cover (seeding, straw, etc., as appropriate), and removal of temporary erosion and sediment control measures.

(8) Notice of this permit shall be filed with the Land Title 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.

(9) If construction for the development permitted by this Permit does not substantially commence within <u>twenty-four months</u> of the date of issuance, this Permit shall lapse.

THIS DEVELOPMENT PERMIT IS NOT A BUILDING PERMIT.

Approved by Council on _____

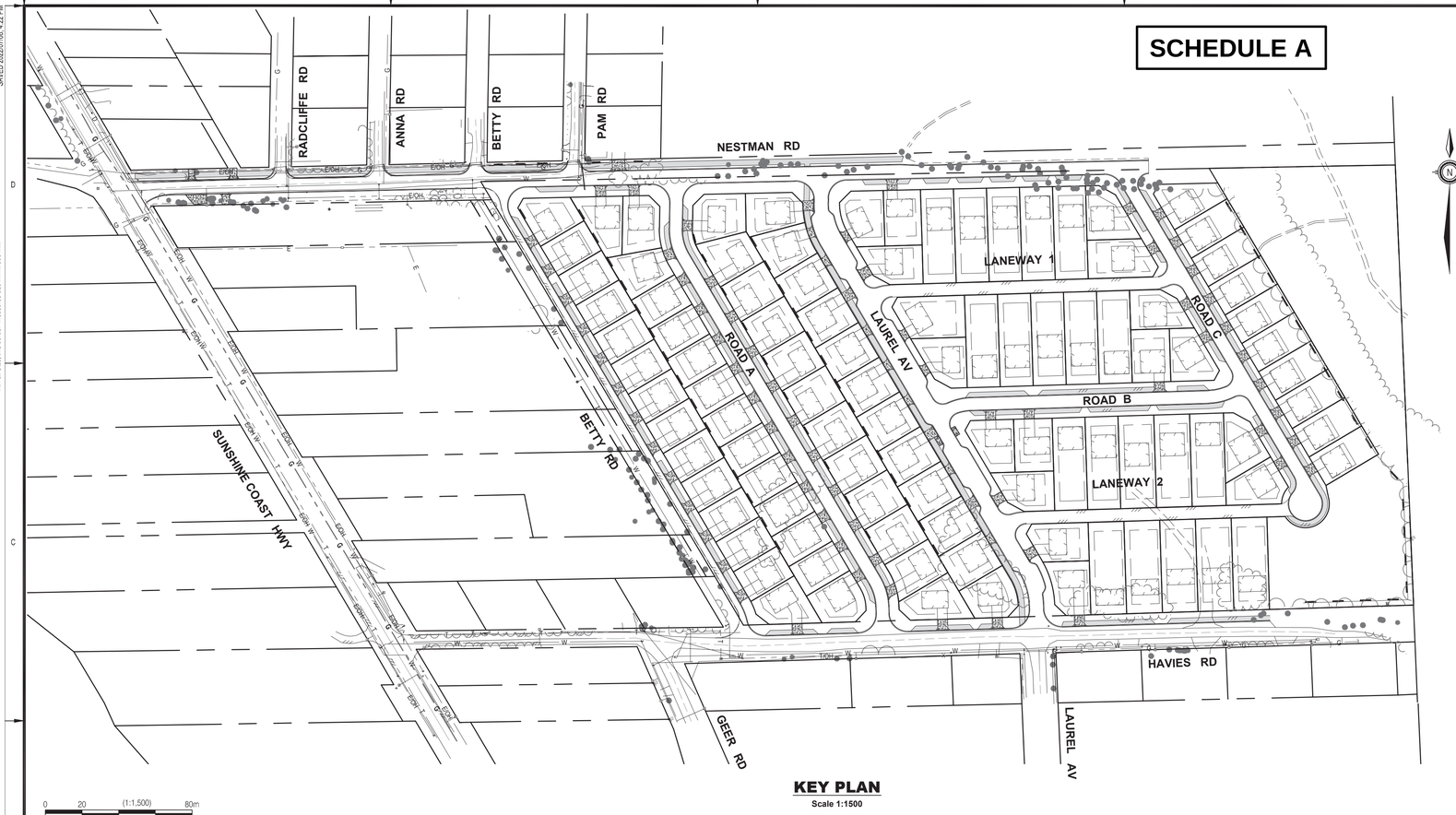
Authorizing Resolution _____

Issued on _____

_____
Andrew Allen
Director of Planning and Development

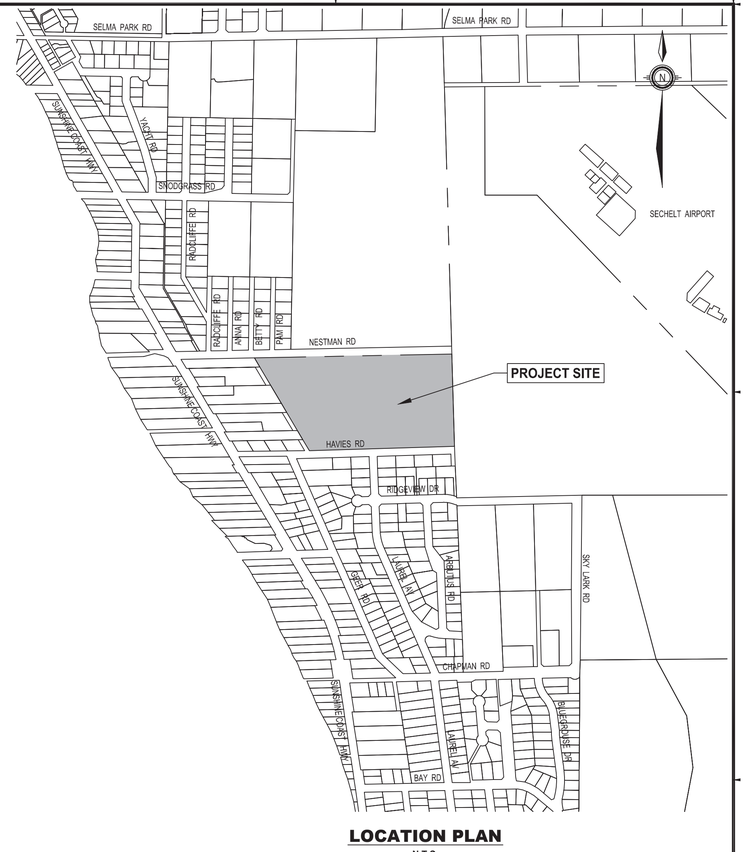
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SCHEDULE A



KEY PLAN
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LOCATION PLAN
N.T.S.

SUNSHINE COAST REGIONAL DISTRICT
BLOCK A, PLAN 1938, DL 1379
HAVIES RD & NESTMAN RD SUBDIVISION

DRAWING LIST

DWG. NO.	DRAWING DESCRIPTION	DWG. NO.	DRAWING DESCRIPTION	DWG. NO.	DRAWING DESCRIPTION	DWG. NO.	DRAWING DESCRIPTION
G1	LOCATION PLAN, KEY PLAN & DRAWING LIST	C-R10	HAVIES RD ROADS AND DRAINAGE - SHT 1	C-R35	HAVIES RD CROSS SECTIONS - SHT 2	C-W5	ROAD C WATERMAIN
G2	COMPREHENSIVE PLAN	C-R11	HAVIES RD ROADS AND DRAINAGE - SHT 2	C-R40	INTERSECTION DETAILS - SHT 1	C-W6	LANEWAY 1 WATERMAIN
G3	NOTES AND SURVEY CONTROL	C-R12	NESTMAN / CONNECTIONS RDS & DRAINAGE	C-R41	INTERSECTION DETAILS - SHT 2	C-W7	LANEWAY 2 WATERMAIN
C-GE1	LEGAL GEOMETRIC PLAN - SHT 1	C-R20	BETTY RD CROSS SECTIONS - SHT 1	C-R42	INTERSECTION DETAILS - SHT 3	C-W8	NESTMAN RD WATERMAIN - SHT 1
C-GE2	LEGAL GEOMETRIC PLAN - SHT 2	C-R21	BETTY RD CROSS SECTIONS - SHT 2	C-S1	BETTY RD SANITARY SEWER	C-W9	NESTMAN RD WATERMAIN - SHT 2
C-SW1	SITE GRADING PLAN - SHT 1	C-R22	LAUREL AV CROSS SECTIONS - SHT 1	C-S2	LAUREL AV SANITARY SEWER	C-W10	HAVIES RD WATERMAIN SC'S
C-SW2	SITE GRADING PLAN - SHT 2	C-R23	LAUREL AV CROSS SECTIONS - SHT 2	C-S3	ROAD A SANITARY SEWER	C-SD1	STANDARD DETAILS - SHT 1
C-SW3	SITE GRADING CROSS SECTIONS - SHT 1	C-R24	ROAD A CROSS SECTIONS - SHT 1	C-S4	ROAD B SANITARY SEWER	C-SD2	STANDARD DETAILS - SHT 2
C-SW4	SITE GRADING CROSS SECTIONS - SHT 2	C-R25	ROAD A CROSS SECTIONS - SHT 2	C-S5	ROAD C SANITARY SEWER	C-SD3	STANDARD DETAILS - SHT 3
C-R1	BETTY RD ROADS AND DRAINAGE	C-R26	ROAD B CROSS SECTIONS	C-S6	LANEWAY 1 SANITARY SEWER	C-SD4	STANDARD DETAILS - SHT 4
C-R2	LAUREL AV ROADS AND DRAINAGE	C-R27	ROAD C CROSS SECTIONS - SHT 1	C-S7	LANEWAY 2 SANITARY SEWER	C-SD5	STANDARD DETAILS - SHT 5
C-R3	ROAD A ROADS AND DRAINAGE	C-R28	ROAD C CROSS SECTIONS - SHT 2	C-S8	NESTMAN RD SANITARY SEWER	C-SD6	STANDARD DETAILS - SHT 6
C-R4	ROAD B ROADS AND DRAINAGE	C-R29	LANEWAY 1 CROSS SECTIONS	C-S9	HAVIES RD SANITARY SEWER	C-LP1	RD SIGNAGE & PAVEMENT MARKINGS - SHT 1
C-R5	ROAD C ROADS AND DRAINAGE	C-R30	LANEWAY 2 CROSS SECTIONS	C-S10	NESTMAN / CONNECTIONS SANITARY SEWER	C-LP2	RD SIGNAGE & PAVEMENT MARKINGS - SHT 2
C-R6	LANEWAY 1 ROADS AND DRAINAGE	C-R31	NESTMAN RD CROSS SECTIONS - SHT 1	C-W1	BETTY RD WATERMAIN SC'S	C-LP3	RD SIGNAGE & PAVEMENT MARKINGS - SHT 3
C-R7	LANEWAY 2 ROADS AND DRAINAGE	C-R32	NESTMAN RD CROSS SECTIONS - SHT 2	C-W2	LAUREL AV WATERMAIN		
C-R8	NESTMAN RD ROADS AND DRAINAGE - SHT 1	C-R33	NESTMAN RD CROSS SECTIONS - SHT 3	C-W3	ROAD A WATERMAIN		
C-R9	NESTMAN RD ROADS AND DRAINAGE - SHT 2	C-R34	HAVIES RD CROSS SECTIONS - SHT 1	C-W4	ROAD B WATERMAIN		

MUNICIPAL REF. NO. 3320-20 2016-17

KERR WOOD LEIDAL consulting engineers

JB Coast Consulting Inc. Engineers and Planners

FOR DEVELOPMENT PERMIT REVIEW
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Info:

Seal:

Rev	Date	Des	Dwn	Chk	Description
A	2022-07-08	JJB		KZ	FOR REVIEW

Rev	Date	Des	Dwn	Chk	Description

DISTRICT OF SECHELT••
••

BLOCK A, PLAN 1938, DL 1379••
HAVIES RD & NESTMAN RD SUBDIVISION••
LOCATION PLAN, KEY PLAN & DRAWING LIST••

Project No.	Drawing No.	Rev.
4155.011••	G1••	A••
Group: CIVIL		

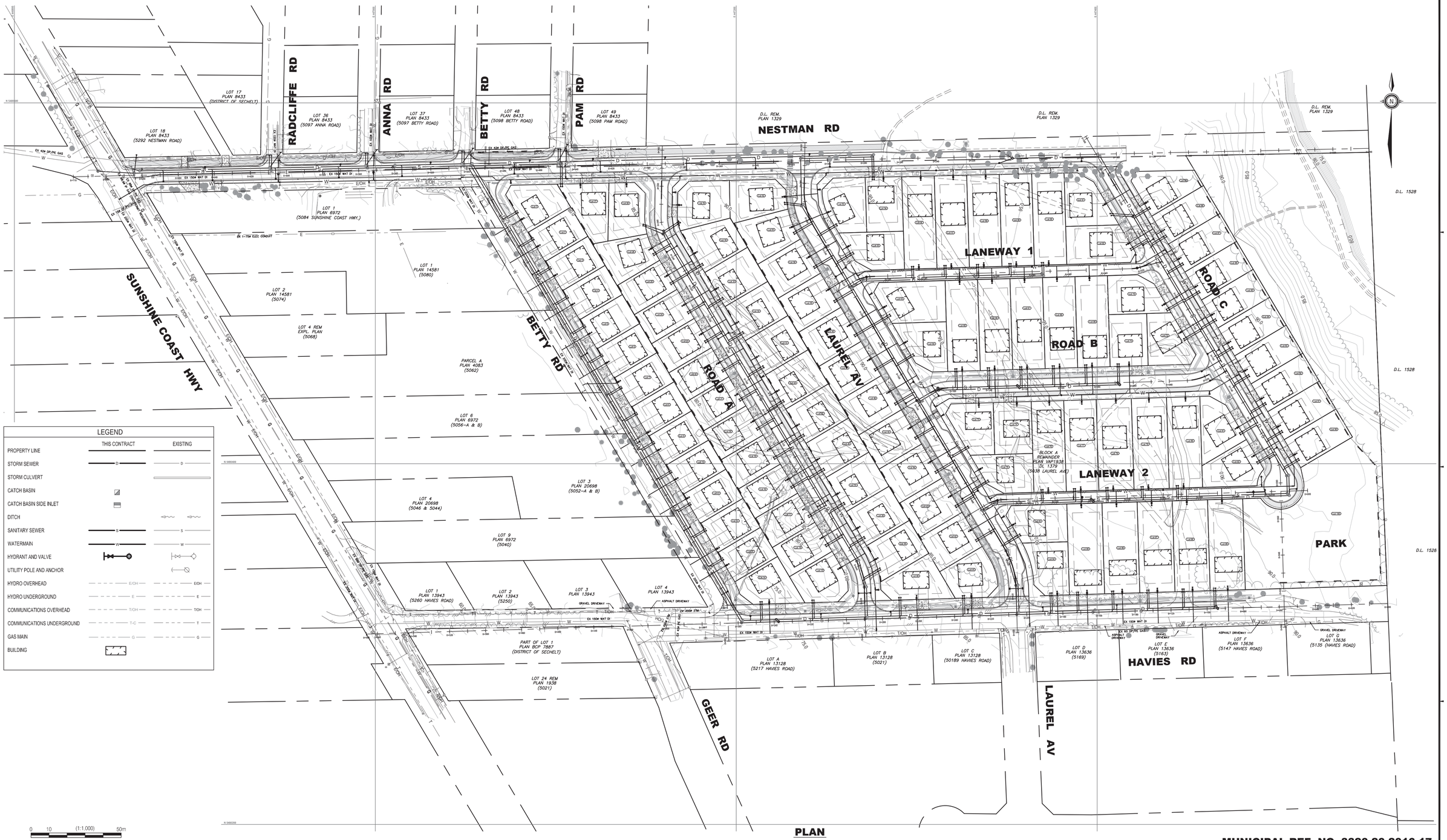
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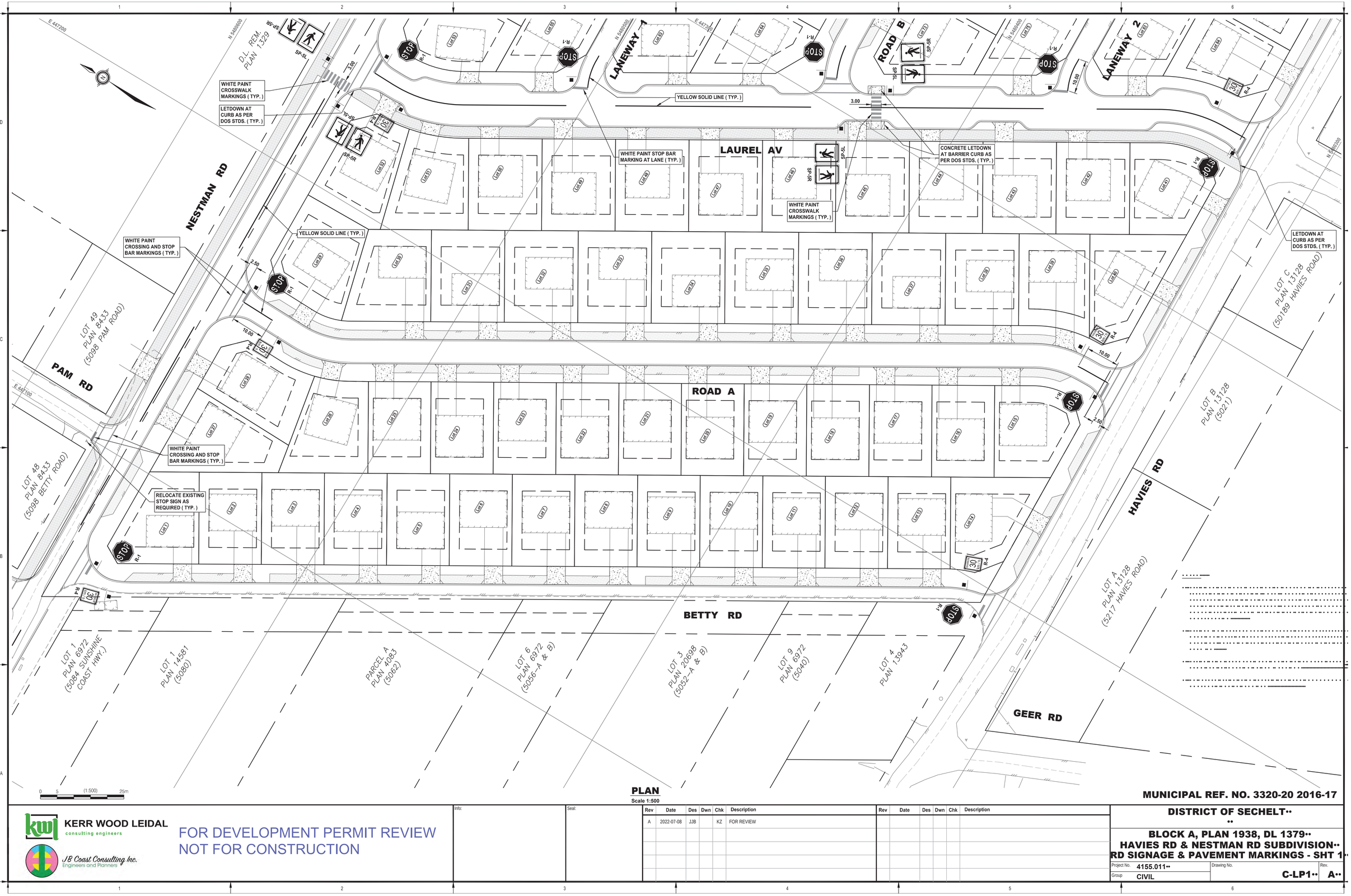
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NESTMAN RD
SUNSHINE COAST HWY
BETTY RD
RADCLIFFE RD
ANNA RD
BETTY RD
PAM RD
LANEWAY 1
LANEWAY 2
ROAD A
ROAD B
ROAD C
LAUREL AV
PARK
HAVIES RD
GEER RD
LAUREL AV
LOT 17 PLAN 8433 (DISTRICT OF SECHELT)
LOT 18 PLAN 8433 (5292 NESTMAN ROAD)
LOT 36 PLAN 8433 (5097 ANNA ROAD)
LOT 37 PLAN 8433 (5097 BETTY ROAD)
LOT 48 PLAN 8433 (5098 BETTY ROAD)
LOT 49 PLAN 8433 (5098 PAM ROAD)
LOT 1 PLAN 6972 (5084 SUNSHINE COAST HWY.)
LOT 1 PLAN 14581 (5080)
LOT 2 PLAN 14581 (5074)
LOT 4 REM EXPL. PLAN (5068)
PARCEL A PLAN 4083 (5062)
LOT 6 PLAN 6972 (5056-A & B)
LOT 3 PLAN 20698 (5052-A & B)
LOT 4 PLAN 20698 (5046 & 5044)
LOT 9 PLAN 6972 (5040)
LOT 1 PLAN 13943 (5260 HAVIES ROAD)
LOT 2 PLAN 13943 (5250)
LOT 3 PLAN 13943
LOT 4 PLAN 13943
PART OF LOT 1 PLAN BCP 7887 (DISTRICT OF SECHELT)
LOT 24 REM PLAN 1938 (5021)
LOT A PLAN 13128 (5217 HAVIES ROAD)
LOT B PLAN 13128 (5021)
LOT C PLAN 13128 (50189 HAVIES ROAD)
LOT D PLAN 13636 (5169)
LOT E PLAN 13636 (5163)
LOT F PLAN 13636 (5147 HAVIES ROAD)
LOT G PLAN 13636 (5135 HAVIES ROAD)
BLOCK A REMAINDER PLAN VAP1938 DL 1379 (5438 LAUREL AVE)
D.L. REM. PLAN 1329
D.L. 1528
D.L. 1526
EX 150M WAT DI
EX 100M STM
EX 100M SAN MH
EX 150M WAT D
EX 100M WAT D
EX 100M SAN D
EX 100M STM D
EX 425M DP/PE GAS
EX 1~75K ELEC CONDUIT
EX 100M WAT DI
EX 100M WAT D
EX 100M SAN D
EX 100M STM D
EX 425M DP/PE GAS
EX 1~75K ELEC CONDUIT
EX 150M WAT DI
EX 100M STM
EX 100M SAN MH
EX 150M WAT D

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KERR WOOD LEIDAL
consulting engineers

JE Coast Consulting Inc.
Engineers and Planners

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A	2022-07-08	JJB		KZ	FOR REVIEW

Rev	Date	Des	Dwn	Chk	Description

DISTRICT OF SECHELT••
••
BLOCK A, PLAN 1938, DL 1379••
HAVIES RD & NESTMAN RD SUBDIVISION••
RD SIGNAGE & PAVEMENT MARKINGS - SHT 1••

Project No.	Drawing No.	Rev.
4155.011••	C-LP1••	A••
Group: CIVIL		

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DISTRICT OF SECHELT••
••
BLOCK A, PLAN 1938, DL 1379••
HAVIES RD & NESTMAN RD SUBDIVISION••
RD SIGNAGE & PAVEMENT MARKINGS - SHT 2••

Project No.	Drawing No.	Rev.
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WHITE PAINT CROSSING AND STOP BAR MARKINGS (TYP.)

LETDOWN AT CURB AS PER DOS STDS. (TYP.)

RELOCATE EXISTING STOP SIGN AS REQUIRED (TYP.)

WHITE PAINT CROSSING AND STOP BAR MARKINGS (TYP.)

YELLOW SOLID LINE (TYP.)

WHITE PAINT STOP BAR MARKING

BETTY RD

ANNA RD

RADCLIFFE RD

NESTMAN RD

SUNSHINE COAST HWY

HAVIES RD

GEER RD

LOT 48 PLAN 8433 (5098 BETTY ROAD)

LOT 37 PLAN 8433 (5097 BETTY ROAD)

LOT 36 PLAN 8433 (5097 ANNA ROAD)

LOT 17 PLAN 8433 (DISTRICT OF SECHELT)

LOT 18 PLAN 8433 (5292 NESTMAN ROAD)

LOT 1 PLAN 6972 (5084 SUNSHINE COAST HWY.)

LOT 1 PLAN 14581 (5080)

PARCEL A PLAN 4083 (5062)

LOT 6 PLAN 6972 (5056-A & B)

LOT 3 PLAN 20698 (5052-A & B)

LOT 9 PLAN 6972 (5040)

LOT 4 PLAN 13943

LOT 3 PLAN 13943

LOT 2 PLAN 14581 (5074)

LOT 4 REM EXPL. PLAN (5068)

LOT 4 PLAN 20698 (5046 & 5044)

LOT 2 PLAN 13943 (5250)

LOT 1 PLAN 13943 (5260 HAVIES ROAD)

PART OF LOT 1 PLAN BCP 7887 (DISTRICT OF SECHELT)

LOT 24 REM PLAN 1938 (5021)

E 447000

E 447100

E 447200

N 5480600

N 5480400

0 5 (1:500) 25m

PLAN
Scale 1:500

MUNICIPAL REF. NO. 3320-20 2016-17

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JB Coast Consulting Inc. Engineers and Planners

FOR DEVELOPMENT PERMIT REVIEW
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Info:

Seal:

Rev	Date	Des	Dwn	Chk	Description
A	2022-07-08	JJB		KZ	FOR REVIEW

DISTRICT OF SECHELT••
••

BLOCK A, PLAN 1938, DL 1379••
HAVIES RD & NESTMAN RD SUBDIVISION••
RD SIGNAGE & PAVEMENT MARKINGS - SHT 3••

Project No.	Drawing No.	Rev.
4155.011••	C-LP3••	A••
Group: CIVIL		

SCHEDULE B



MINIMUM STREET TREE CLEARANCES

LAMP STANDARDS	6m
STEEL/WOODEN POLES	3m
DRIVEWAYS	2m
CATCH BASINS	2m
MANHOLES, VALVE BOXES, SERVICES	2m
SEWER SERVICES	1.5m
HYDRANTS	2m
CORNERS	IN LINE WITH 8m SIGHT TRIANGLE

PLANT SCHEDULE

PMG PROJECT NUMBER: 22-039

KEY	QTY	BOTANICAL NAME	COMMON NAME	PLANTED SIZE / REMARKS
TREE				
	40	ACER RUBRUM 'BOWHALL'	COLUMNAR BOWHALL MAPLE	6CM CAL; 2M STD; B&B
	22	AMELANCHIER x G. 'AUTUMN BRILLIANCE'	AUTUMN BRILLIANCE SERVICEBERRY	6CM CAL; 1.5M STD; B&B
	55	PYRUS CALLERYANA 'CHANTICLEER'	CHANTICLEER PEAR	6CM CAL; 1.5M STD; B&B
	16	FAGUS SYLVATICA 'RED OBELISK'	RED OBELISK BEECH	6CM CAL; 1.5M STD; B&B

NOTES: * PLANT SIZES IN THIS LIST ARE SPECIFIED ACCORDING TO THE BC LANDSCAPE STANDARD AND CANADIAN LANDSCAPE STANDARD, LATEST EDITION. CONTAINER SIZES SPECIFIED AS PER CNLA STANDARD. BOTH PLANT SIZE AND CONTAINER SIZE ARE THE MINIMUM ACCEPTABLE SIZES. * REFER TO SPECIFICATIONS FOR DEFINED CONTAINER MEASUREMENTS AND OTHER PLANT MATERIAL REQUIREMENTS. * SEARCH AND REVIEW: MAKE PLANT MATERIAL AVAILABLE FOR OPTIONAL REVIEW BY LANDSCAPE ARCHITECT AT SOURCE OF SUPPLY. AREA OF SEARCH TO INCLUDE LOWER MAINLAND AND FRASER VALLEY. * SUBSTITUTIONS: OBTAIN WRITTEN APPROVAL FROM THE LANDSCAPE ARCHITECT PRIOR TO MAKING ANY SUBSTITUTIONS TO THE SPECIFIED MATERIAL. UNAPPROVED SUBSTITUTIONS WILL BE REJECTED. ALLOW A MINIMUM OF FIVE DAYS PRIOR TO DELIVERY FOR REQUEST TO SUBSTITUTE. SUBSTITUTIONS ARE SUBJECT TO BC LANDSCAPE STANDARD AND CANADIAN LANDSCAPE STANDARD - DEFINITION OF CONDITIONS OF AVAILABILITY. * ALL LANDSCAPE MATERIAL AND WORKMANSHIP MUST MEET OR EXCEED BC LANDSCAPE STANDARD AND CANADIAN LANDSCAPE STANDARD LATEST EDITION. * ALL PLANT MATERIAL MUST BE PROVIDED FROM CERTIFIED DISEASE FREE NURSERY. * BIO-SOLIDS NOT PERMITTED IN GROWING MEDIUM UNLESS AUTHORIZED BY LANDSCAPE ARCHITECT.


ACER RUBRUM 'BOWHALL' | AMELANCHIER | PYRUS C. 'CHANTICLEER' | FAGUS S. 'RED OBELISK'

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pmg LANDSCAPE ARCHITECTS
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p: 604 294-0011 ; f: 604 294-0022

SEAL:

NO.	DATE	REVISION DESCRIPTION	DR.
3	22.JUN.21	NEW SITE PLAN	JR
2	22.MAY.17	NEW SITE PLAN	JR
1	22.MAY.13	REV. PER CLIENT COMMENTS	JR

CLIENT:

PROJECT:

HAVIES SUBDIVISION

5038 LAUREL AVENUE
SECHELT, BC

DRAWING TITLE:

LANDSCAPE KEY PLAN

DATE:	22.MAR.30
SCALE:	1:750
DRAWN:	JR
DESIGN:	JR
CHK'D:	BA

DRAWING NUMBER: **L1** OF 7

PMG PROJECT NUMBER: **22-039**

22039-3.ZIP



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NO.	DATE	REVISION DESCRIPTION	DR.
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2	22.MAY.17	NEW SITE PLAN	JR
1	22.MAY.13	REV. PER CLIENT COMMENTS	JR

CLIENT:

PROJECT:

HAVIES SUBDIVISION

5038 LAUREL AVENUE
SECHELT, BC

DRAWING TITLE:

SHRUB PLAN

DATE:	22.MAR.30	DRAWING NUMBER:
SCALE:	1:300	**L2**
DRAWN:	JR	
DESIGN:	JR	
CHK'D:	BA	**OF 7**

PMG PROJECT NUMBER: **22-039**

22222.ZIP
L2.dwg

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2	22.MAY.17	NEW SITE PLAN	JR
1	22.MAY.13	REV. PER CLIENT COMMENTS	JR

CLIENT:

PROJECT:

HAVIES SUBDIVISION

5038 LAUREL AVENUE
SECHELT, BC

DRAWING TITLE:

SHRUB PLAN

DATE:	22.MAR.30	DRAWING NUMBER:	
SCALE:	1:300		**L3**
DRAWN:	JR		
DESIGN:	JR		**OF 7**
CHK'D:	BA		

PMG PROJECT NUMBER: **22-039**

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1	22.MAY.13	REV. PER CLIENT COMMENTS	JR

CLIENT:

PROJECT:

HAVIES SUBDIVISION

5038 LAUREL AVENUE
SECHELT, BC

DRAWING TITLE:

SHRUB PLAN

DATE:	22.MAR.30	DRAWING NUMBER:
SCALE:	1:300	**L4**
DRAWN:	JR	
DESIGN:	JR	
CHK'D:	BA	**OF 7**

PMG PROJECT NUMBER: **22-039**

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PLANT SCHEDULE

PMG PROJECT NUMBER: 22-039

KEY	QTY	BOTANICAL NAME	COMMON NAME	PLANTED SIZE / REMARKS
GRASS				
PE	815	PENNISETUM ALOPECUROIDES 'HAMELIN'	DWARF FOUNTAIN GRASS	#1 POT
PERENNIAL				
LM	74	LAVANDULA ANGUSTIFOLIA 'MUNSTEAD'	ENGLISH LAVENDER; COMPACT; VIOLET-BLUE	#1 POT
S	441	SEDUM TELEPHIUM 'HERBSTFREUDE'	AUTUMN JOY STONECROP	9CM POT

NOTES: * PLANT SIZES IN THIS LIST ARE SPECIFIED ACCORDING TO THE BC LANDSCAPE STANDARD AND CANADIAN LANDSCAPE STANDARD, LATEST EDITION. CONTAINER SIZES SPECIFIED AS PER CNLA STANDARD. BOTH PLANT SIZE AND CONTAINER SIZE ARE THE MINIMUM ACCEPTABLE SIZES. * REFER TO SPECIFICATIONS FOR DEFINED CONTAINER MEASUREMENTS AND OTHER PLANT MATERIAL REQUIREMENTS. * SEARCH AND REVIEW: MAKE PLANT MATERIAL AVAILABLE FOR OPTIONAL REVIEW BY LANDSCAPE ARCHITECT AT SOURCE OF SUPPLY. AREA OF SEARCH TO INCLUDE LOWER MAINLAND AND FRASER VALLEY. * SUBSTITUTIONS: OBTAIN WRITTEN APPROVAL FROM THE LANDSCAPE ARCHITECT PRIOR TO MAKING ANY SUBSTITUTIONS TO THE SPECIFIED MATERIAL. UNAPPROVED SUBSTITUTIONS WILL BE REJECTED. ALLOW A MINIMUM OF FIVE DAYS PRIOR TO DELIVERY FOR REQUEST TO SUBSTITUTE. SUBSTITUTIONS ARE SUBJECT TO BC LANDSCAPE STANDARD AND CANADIAN LANDSCAPE STANDARD - DEFINITION OF CONDITIONS OF AVAILABILITY. * ALL LANDSCAPE MATERIAL AND WORKMANSHIP MUST MEET OR EXCEED BC LANDSCAPE STANDARD AND CANADIAN LANDSCAPE STANDARD LATEST EDITION. * ALL PLANT MATERIAL MUST BE PROVIDED FROM CERTIFIED DISEASE FREE NURSERY. * BIO-SOLIDS NOT PERMITTED IN GROWING MEDIUM UNLESS AUTHORIZED BY LANDSCAPE ARCHITECT.


PENNISETUM ALOPECUROIDES 'HAMELIN'


LAVANDULA ANGUSTIFOLIA 'MUNSTEAD'


SEDUM TELEPHIUM 'HERBSTFREUDE'

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CLIENT:

PROJECT:

HAVIES SUBDIVISION

5038 LAUREL AVENUE
SECHELT, BC

DRAWING TITLE:

SHRUB PLAN

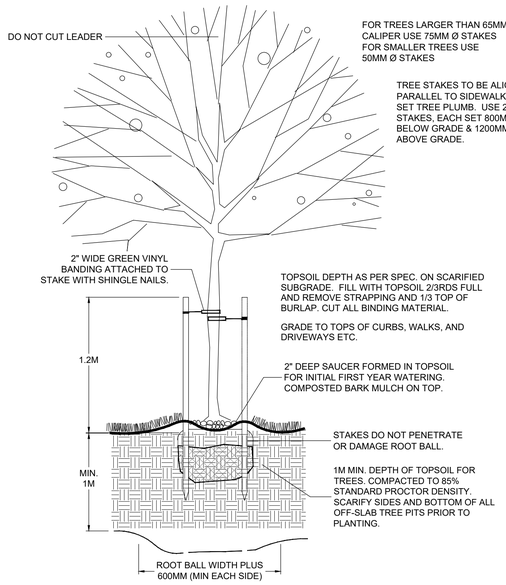
DATE: 22.MAR.30
SCALE: 1:300
DRAWN: JR
DESIGN: JR
CHK'D: BA

DRAWING NUMBER: **L5**

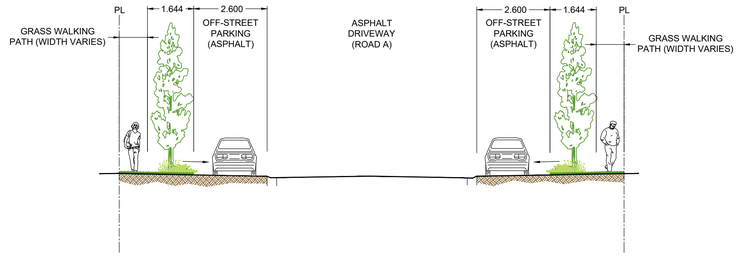
OF 7

22039-3.ZIP

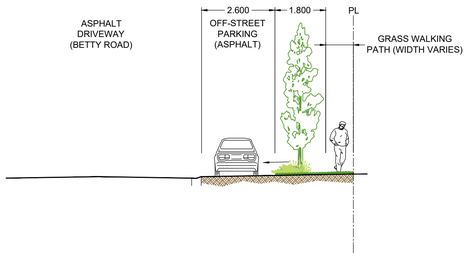
PMG PROJECT NUMBER: **22-039**



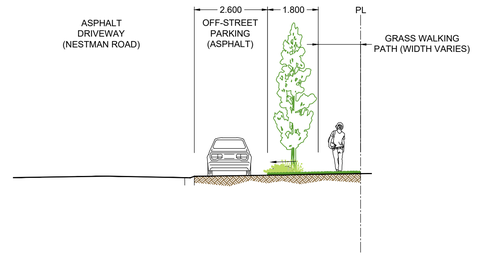
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NTS



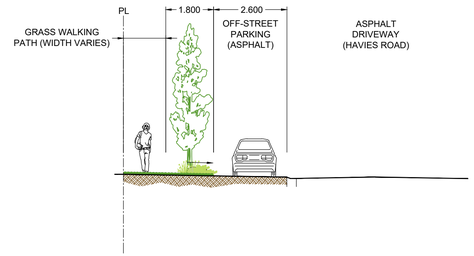
2 TYPICAL ROAD A,B,C CROSS SECTION
NTS



3 TYPICAL BETTY ROAD CROSS SECTION
NTS



4 TYPICAL NESTMAN ROAD CROSS SECTION
NTS



5 TYPICAL HAVIES ROAD CROSS SECTION
NTS

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1	22.MAY.13	REV. PER CLIENT COMMENTS	JR

CLIENT:

PROJECT:

HAVIES SUBDIVISION

5038 LAUREL AVENUE
SECHELT, BC

DRAWING TITLE:

LANDSCAPE DETAILS

DATE: 22.MAR.30
SCALE: 1:300
DRAWN: JR
DESIGN: JR
CHK'D: BA

DRAWING NUMBER: **L6**

OF 7

22039-3.ZIP

PMG PROJECT NUMBER: **22-039**

PART ONE GENERAL REQUIREMENTS

1.1 REFERENCES

.1 CCDC Doc 2 2008
Comply with all articles in the General Conditions of Contract in conjunction with this section unless superseded by other Contract Documents.

.2 Canadian Landscape Standard, latest edition, prepared by the Canadian Society of Landscape Architects and the Canadian Landscape & Nursery Association, jointly. All work and materials shall meet standards as set out in the Canadian Landscape Standard unless superseded by this specification or as directed by Landscape Architect with written instruction.

.3 MASTER MUNICIPAL SPECIFICATIONS & STANDARD DETAILS, 2000 edition, prepared by the Consulting Engineers of British Columbia, Roadbuilders and Heavy Construction Association, and the Municipal Engineers Division

.4 STANDARD FOR LANDSCAPE IRRIGATION SYSTEM, 2008. Prepared by the Irrigation Industry Association of British Columbia.

.5 MUNICIPAL BYLAWS AND ENGINEERING SPECIFICATIONS WHERE NOTED.

1.2 TESTING

.1 A current (not more than one month) test for all growing medium to be used on this site is required. Provide and pay for testing by an independent testing facility pre-approved by the Landscape Architect. Deliver growing medium test results to Landscape Architect for review and approval prior to placement. Refer to Section 3.4 Growing Medium Testing for procedure.

.2 Owner reserves the right to test or re-test materials. Contractor responsible to pay for testing if materials do not meet specification.

1.3 SUBMITTALS

.1 Any alternate products differing from that contained in the contract documents must be pre-approved by the Landscape Architect.

.2 Submittals to consist of product sample or manufacturer's product description.

1.4 SITE REVIEW

.1 Under the terms of the Landscape Architect's Contract with the Owner and where the Landscape Architect is the designated reviewer, the Landscape Architect will observe construction as is necessary in their opinion to confirm conformance to the plans and specifications. Contact Owners Representative to arrange for site observation at the appropriate times. Allow two days notice. Observation schedule may include but will not be limited to the following:
.1.1 Start Up Site Meeting, General Contract: Prior to any site disturbance, a meeting with the general contractor to review free preservation issues, general landscape issues and municipal requirements.
.1.2 Start Up Site Meeting, Landscape Contract (if separate): At the start of work with Owner's Representative, Site Superintendent and Landscape Contractor; a meeting is to be held to review expected work and to verify the acceptability of the subgrade and general site conditions to the Landscape Contractor. Provide growing medium test results for this meeting.
.1.3 Progress Site Visits: To observe materials and workmanship as necessary through the course of the work. Review of different aspects of the work may be dealt with on any single visit. Such elements may include: Site Layout; Rough Grading; Growing Medium – quality, depths, finish grading; Drainage and Drainage Materials; Lawns or Grass areas; Planting –plant material including negotiations with suppliers, nursery inspections, plant sizes, quality, quantity, planting practice and layout, tree support; Mulch; Irrigation Systems; Play Equipment; Site Furniture; and other elements of the site development where the Landscape Architect is the designated reviewer such as: Pedestrian Paving, Fencing, Non-structural walls and slabs, Unit Paving.
.1.4 Substantial Performance: Review of all work, accounting of all substitutions, deletions; plant counts, preparations of deficiency list, and recommendations for completion.
.1.5 Certificate of Completion: Upon the declaration of Substantial Performance, a recommendation for the issuance of the Certificate of Completion will be made to the Payment Certifier as defined in the contract.
.1.6 Deficiency Review: Prior to the completion of the holdback period, check for completion of deficiencies. Once completed, a Schedule 'C' will be issued where required.
.1.7 Warranty Review: Prior to the completion of the warranty period (+/- 11 months after issuance of the Certificate of Completion), review all warranty material and report recommendations for warranty replacement.

1.5 WORKMANSHIP

.1 Unless otherwise instructed in the Contract Documents, the preparation of the subgrade shall be the responsibility of the General Contractor. Placement of growing medium constitutes acceptance of the subgrade by the Landscape Contractor. Any subsequent corrections to the subgrade required are the responsibility of the Landscape Contractor.

.2 All work and superintendence shall be performed by personnel skilled in landscape contracting. In addition, all personnel applying herbicides and/or pesticides shall hold a current license issued by the appropriate authorities.

.3 A site visit is required to become familiar with site conditions before bidding and before start of work.

.4 Confirm location of all services before proceeding with any work.

.5 Notify Landscape Architect of any discrepancies. Obtain approval from Landscape Architect prior to deviating from the plans.

.6 Take appropriate measures to avoid environmental damage. Do not dump any waste materials into water bodies. Conform with all federal, provincial and local statutes and guidelines.

.7 Collect and dispose of all debris and/or excess material from landscape operations. Keep paved surfaces clean and repair damage resulting from landscape work. Repairs are to be completed prior to final acceptance.

.8 Where new work connects with existing, and where existing work is altered, make good to match existing undisturbed condition.

1.6 WARRANTIES

.1 Guarantee all materials and workmanship for a minimum period of one full year from the date of Certificate of Completion.

.2 Refer to individual sections for specific warranties.

PART TWO SCOPE OF WORK

2.1 SCOPE OF WORK

.1 Other conditions of Contract may apply. Confirm Scope of Work at time of tender.

.2 Work includes supply of all related items and performing all operations necessary to complete the work in accordance with the drawings and specifications and generally consists of the following:

.2.1 Retention of Existing Trees where shown on drawings.
.2.2 Finish Grading and Landscape Drainage.
.2.3 Supply and placement of growing medium.
.2.4 Testing of imported growing medium and/or site topsoil.
.2.5 Supply and incorporation of additives to meet requirements of soil test and Table One.
.2.6 Preparation of planting beds, supply of plant material and planting.
.2.7 Preparation of rough grass areas, supply of materials and seeding.
.2.8 Preparation of lawn areas, supply of materials and sodding.
.2.9 Supply and placement of bark mulch.
.2.10 Maintenance of planted and seeded/sodded areas until accepted by Owner.
.2.11 SEPARATE PRICE: Establishment Maintenance, Section 3.11.
.2.12 Other work: Work other than this list, not specified by Landscape Architect.

2.2 MATERIALS

.1 Growing Medium: Conform to Canadian Landscape Standard for definitions of imported and on-site topsoil. Refer to Table One below.

TABLE ONE: PROPERTIES OF GROWING MEDIUM FOR LEVEL 2 GROOMED AND LEVEL 3 MODERATE AREAS
Canadian System of Soil Classification Textural Class: "Loamy Sand" to "Sandy Loam"

Applications	Low Traffic Areas Trees and Large Shrubs	High Traffic Lawn Areas	Planting Areas and Planters
Growing Medium Types	2L	2H	2P

Texture	Percent Of Dry Weight of Total Growing Medium		
Coarse Gravel: larger than 25mm	0 – 1%	0 – 1%	0 – 1%
All Gravel: larger than 2mm	0 – 5%	0 – 5%	0 – 5%
	Percent Of Dry Weight of Growing Medium Excluding Gravel		
Sand: larger than 0.05mm smaller than 2.0mm	50 – 80%	70 – 90%	40 – 80%
Silt: larger than 0.002mm smaller than 0.05mm	10 – 25%	0 – 15%	10 – 25%
Clay: smaller than 0.002mm	0 – 25%	0 – 15%	0 – 25%
Clay and Silt Combined	maximum 35%	maximum 15%	maximum 35%
Organic Content (coast):	3 – 10%	3 – 5%	10 – 20%
Organic Content (interior):	3 – 5%	3 – 5%	15 – 20%
Acidity (pH):	6.0 – 7.0	6.0 – 7.0	4.5 – 6.5
Drainage:	Percolation shall be such that no standing water is visible 60 minutes after at least 10 minutes of moderate to heavy rain or irrigation.		

.2 Fertilizer: An organic and/or inorganic compound containing Nitrogen (N), Phosphate (2S), and Potash (soluble 2) in proportions required by soil test.

.3 Lime: Ground agricultural limestone. Meet requirements of the Canadian Landscape Standard.

.4 Organic Additive: Commercial compost product to the requirements of the Canadian Landscape Standard, latest edition and pre-approved by the Landscape Architect. Recommended suppliers: The Answer Garden Products, Fraser Richmond Soils & Fibre, Stream Organics Management.

.5 Sand: Clean, washed pump sand to meet requirements of the Canadian Landscape Standard.

.6 Composted Bark Mulch: 10mm (3/8") minus Fir/Hemlock bark chips and fines, free of chunks and sticks, dark brown in colour and free of all soil, stones, roots or other extraneous matter. Fresh orange in colour bark will be rejected.

.7 Herbicides and Pesticides: If used, must conform to all federal, provincial and local statutes. Appliers must hold current licenses issued by the appropriate authorities in the area.

.8 Filter Fabric: A non biodegradable blanket or other filtering membrane that will allow the passage of water but not fine soil particles. (Such as MIRAFI 140 NL, GEOLON N40 OR AMOCO 4545 or alternate product pre-approved by the Landscape Architect.)

.9 Drainage Piping if required: Schedule 40 PVC nominal sizes.

.10 Drain Rock: Clean, round, inert, durable, and have a maximum size of 19mm and containing no material smaller than 10mm.

.11 Plant Material: To the requirements of the Canadian Landscape Standard. Refer to 3.9, Plants and Planting. All plant material must be provided from a certified disease free nursery. Provide proof of certification.

.12 Sod: Refer to individual sections in this specification.

.13 Supplier and installers of segmental block walls to provide engineered drawings for all walls: signed and sealed drawings for all walls, individually, in excess of 1.2m, or combinations of walls collectively in excess of 1.2m. Installations must be reviewed and signed off by Certified Professional Engineer, inlcude cost of engineering services in Tender price.

.14 Miscellaneous: Any other material necessary to complete the project as shown on the drawings and described herein.

PART THREE SOFT LANDSCAPE DEVELOPMENT

3.1 RETENTION OF EXISTING TREES

.1 Prior to any work on site – protect individual trees or plant groupings indicated as retained on landscape plans as vegetation retention areas.
.1.1 In some instances the Landscape Architect will tag trees or areas to remain. Discuss tree retention areas at a start-up meeting with the Landscape Architect.

.2 A physical barrier must be installed to delineate clearing boundaries. Refer to physical barrier detail. If detail not provided, comply with local municipal requirements.

.3 No machine travel through or within vegetation retention areas or under crowns of trees to be retained is allowed.

.4 Do not stockpile soil, construction materials, or excavated materials within vegetation retention areas.

.5 Do not park, fuel or service vehicles within vegetation retention areas.

.6 No debris fires, clearing fires or trash burning shall be permitted within vegetation retention areas.

.7 No excavations, drain or service trenches nor any other disruption shall be permitted within vegetation retention areas without a review of the proposed encroachment by the Landscape Architect.

.8 Do not cut branches or roots of retained trees without the approval of the Landscape Architect.

.9 Any damage to existing vegetation intended for preservation will be subject to evaluation by an I.S.A. Certified Arborist using the "Guide for Plant Appraisal", Eighth Edition, 1992.
.9.1 Replacement planting of equivalent value to the disturbance will be required. The cost of the evaluation and of the replacement planting will be the responsibility of the General Contractor and or the person(s) responsible for the disturbance.

.10 In municipalities with specific tree retention/replacement bylaws ensure compliance to bylaws.

.11 In situations where required construction may disturb existing vegetation intended for preservation, contact Landscape Architect for review prior to commencing construction.

3.2 GRADES

.1 Ensure subgrade is prepared to conform to depths specified in Section 3.5, Growing Medium Supply, below. Where planting is indicated close to existing trees, prepare suitable planting pockets for material indicated on the planting plan. Shape subgrade to eliminate free standing water and conform to the site grading and drainage plan.

.2 On slopes in excess of 3:1 trench subgrade across slope to 150mm (6") minimum at 1.5m (5 ft.) intervals minimum.

.3 Scarify the entire subgrade immediately prior to placing growing medium. Re-cultivate where vehicular traffic results in compaction during the construction procedures. Ensure that all planting areas are smoothly contoured after light compaction to finished grades.

.4 Eliminate standing water from all finished grades. Provide a smooth, firm and even surface and conform to grades shown on the Landscape Drawings. Do not exceed maximum and minimum gradients defined by the Canadian Landscape Standard.

.5 Construct swales true to line and grade, smooth and free of sags or high points. Minimum slope 2%, maximum side slopes 10%. Assure positive drainage to collection points.

.6 Slope not to exceed the following maximums: Rough Grass 3:1, Lawn 4:1, Landscape plantings 2:1.

.7 Finished soil/mulch elevation at building to comply with municipal requirements.

.8 Inform Landscape Architect of completion of finish grade prior to placement of seed, sod, plants or mulch.

3.3 LANDSCAPE DRAINAGE

.1 Related Work: Growing medium and Finish Grading, Grass areas, Trees Shrubs and Groundcovers, Planters, Crib Walls.

.2 Work Included: Site finish grading and surface drainage. Installation of any drainage systems detailed on landscape plans. Note: Catch basins shown on landscape plans for coordination only, confirm scope of work prior to bid.
.2.1 Coordinate all landscape drainage work with rest of site drainage. Refer to engineering drawings and specifications for connections and other drainage work.
.2.2 Determine exact location of all existing utilities and structures and underground utilities prior to commencing work, which may not be located on drawings and conduct work so as to prevent interruption of service or damage to them. Protect existing structures and utility services and be responsible for damage caused.
.2.3 Planter drains on slab: Refer to Section 3.10, Installing Landscapes on Structures.

.3 Execution
.3.1 Do trenching and backfilling in accordance with engineering details and specifications.
.3.2 Lay drains on prepared bed, true to line and grade with inverts smooth and free of sags or high points. Ensure barrel of each pipe is in contact with bed throughout full length.
.3.3 Commence laying pipe at outlet and proceed in upstream direction.
.3.4 Lay perforated pipes with perforations at 8pm and 4pm positions.
.3.5 Make joints tight in accordance with manufacturer's directions.
.3.6 Do not allow water to flow through the pipes during construction except as approved by Engineer.
.3.7 Make watertight connections to existing drains, new or existing manholes or catchbasins where indicated or as directed by Landscape Architect.
.3.8 Plug upstream ends of pipe with watertight clean out caps.
.3.9 Surround and cover pipe with drain rock in uniform 150mm layers to various depths as shown in details, minimum 100mm.
.3.10 Cover drain rock with non-woven filter cloth lap all edges and seams minimum 150mm.
.3.11 Assure positive drainage.
.3.12 Back fill remainder of trench as indicated.
.3.13 Protect subdrains from floatation during installation.

3.4 GROWING MEDIUM TESTING

.1 Submit representative sample of growing medium proposed for use on this project to an independent laboratory. Provide test results to Landscape Architect prior to placing. Test results to include:
.1.1 Physical properties, % content of gravel, sand, silt, clay and organics.
.1.2 Acidity PH and quantities of lime or sulphur required to bring within specified range.
.1.3 Nutrient levels of principle and trace elements and recommendations for required soil amendments.
.1.4 Carbon/Nitrogen level.

3.5 GROWING MEDIUM SUPPLY AND PLACEMENT.

.1 Supply all growing medium required for the performance of the Contract. Do not load, transport or spread growing medium when it is so wet that its structure is likely to be damaged.

.2 Supply all growing medium admixtures as required by the soil test. Amended growing medium must meet the specification for growing medium as defined in Table One for the various areas.
.2.1 Thoroughly mix required amendments into the full depth of the growing medium.
.2.2 Special mixes may be required for various situations. Refer to drawing notes for instructions.

.3 Place the amended growing medium in all grass and planting areas. Spread growing medium in uniform layers not exceeding 6" (150mm), over unfrozen subgrade free of standing water.

.4 Minimum depths of growing medium placed and compacted to 80%:
.4.1 On-grade:
.4.1.1 Seeded and sodded lawn.....6" (150mm)
.4.1.2 Mass planted shrubs & groundcovers.....18" (450mm)
.4.1.3 Groundcover only areas, if defined on plan.....9" (225mm)
.4.1.4 Tree & large shrub pits.....depth to conform to depth of rootball – width shall be at least twice the width of the root ball with saucer shaped sides.
.4.2 On-Slab:
.4.2.1 Irrigated lawn.....9" (210mm)
.4.2.2 Groundcover areas.....12" (300mm)
.4.2.3 Lawn without automatic irrigation.....12" (300mm)
.4.2.4 Shrub & groundcover areas.....18" (450mm)
.4.2.5 Trees and specimen shrubs:.....30" (760mm) over columns and/or edge of slab (verify column locations on-site for tree locations.)
.4.2.6 Depth noted includes 1" to 2" (25-50mm) sand over filter fabric
.4.2.7 Maximum 18" depth growing medium except where mounded for trees over column points.

.5 Manually spread growing medium/planting soil around existing trees, shrubs and obstacles.

.6 In perimeter seeded grass areas, feather growing medium out to nothing at edges and blend into existing grades.

.7 Finished grades shall conform to the elevations shown on landscape and site plans.

3.6 ROUGH GRASS AREA – SEEDING

.1 General: Rough grass areas are noted on the drawings as "Rough Grass". Treat all areas defined as rough grass between all property lines of the project including all boulevards to edge of roads and lanes.

.2 Preparation of Surfaces: To Canadian Landscape Standard Class 3 Areas (Rough grass) Section 7.1.1.3
.2.1 Clean existing soil by mechanical means of debris over 50mm in any dimension.
.2.2 Roughly grade surfaces to allow for maintenance specified and for positive drainage.

.3 Time of Seeding: Seed from early spring (generally April 1st) to late fall (September 15th) of each year. Further extensions may be obtained on concurrence of the Landscape Architect.

.4 Seed Supply & Testing: All seed must be obtained from a recognized seed supplier and shall be No. 1 grass mixture delivered in containers bearing the following information:
.4.1 Analysis of the seed mixture
.4.2 Percentage of each seed type

.5 Seed Mixture: All varieties shall be rated as strong performers in the Pacific Northwest and are subject to client approval:
70% Creeping Red Fescue
20% Annual Rye
5% Saturn Perennial Rye
5% Kentucky Bluegrass
For Wildflower Areas use a mixture of Wildflowers with Hard Fescues (Terralink Coastal Wildflowers) with Hard Fescue or pre-approved alternate.

.6 Fertilizer: Mechanical seeding: Apply a complete synthetic slow-release fertilizer with maximum 35% water soluble nitrogen and a formulation ratio of 18-18-18 – 50% sulphur urea coated , 112 kg/hal(100lbs/acre) using a mechanical spreader.

.7 Seeding: Apply seed at a rate of 112k/H (100lbs /acre) with a mechanical spreader. Incorporate seed into the top 1/4" (6mm) of soil and lightly compact.

.8 Acceptance: Provide adequate protection of the seeded areas until conditions of acceptance have been met. Comply with Section 3.7 Hydroseeding.

3.7 HYDROSEEDING

.1 May be used as an alternate to mechanical seeding in rough grass areas.

.2 May not be used in areas of lawn unless pre-approved by the Landscape Architect prior to bidding.

.3 Preparation and Growing Medium
.3.1 In areas of Rough Grass: Comply with Section 3.6 Rough Grass.
.3.2 Where approved for use in areas of lawn, comply with Section 3.8 Lawn Areas: Sodding.

.4 Protection: Ensure that fertilizer in solution does not come in contact with the foliage of any trees, shrubs, or other susceptible vegetation. Do not spray seed or mulch on objects not expected to grow grass. Protect existing site equipment, roadways, landscaping, reference points, monuments, markers and structures from damage. Where contamination occurs, remove seeding slurry to satisfaction of and by means approved by the Landscape Architect

.5 Mulch shall consist of virgin wood fibre or recycled paper fibre designed for hydraulic seeding and dyed for ease of monitoring application. If using recycled paper material for wood fibre substitute use 135% (by weight). Conform to Canadian Landscape Standard for mulch requirements.

.6 Water: Shall be free of any impurities that may have an injurious effect on the success of seeding or may be harmful to the environment.

.7 Equipment: Use industry standard hydraulic seeder/mulcher equipment with the tank volume certified by an identification plate or sticker affixed in plain view on the equipment. The hydraulic seeder/mulcher shall be capable of sufficient agitation to mix the material into a homogenous slurry and to maintain the slurry in a homogenous state until it is applied. The discharge pumps and gun nozzles shall be capable of applying the materials uniformly over the designated area.

PART THREE SOFT LANDSCAPE DEVELOPMENT - CONT

.8 Application Rate:
.8.1 Seed Mixture: 136 kg/ha (125 lbs/acre)
.8.2 Fertilizer: 112 kg/ha (100 lbs/acre)
.8.3 Coastal Wildflower Mix: Where specified, apply (31 lbs/acre) (1/4 lb: 1 lb. of grass seed)
.8.4 Notes:
.8.4.1 At the time of Tender provide a complete chart of all components of the mix proposed including mulch, tackifier, water etc. Sloped sites require tackifier.
.8.4.2 Fertilizer:
.8.4.2.1 Rough Grass: If a soil analysis is available, comply with results.
.8.4.2.2 Lawn: Where hydroseeding is approved, comply with soil analysis recommendations.

.9 Accurately measure the quantities of each of the materials to be charged into the tank either by mass or by a commonly accepted system of mass-calibrated volume measurements. The materials shall be added to the tank while it is being filled with water, in the following sequence; seed, fertilizer. Thoroughly mix into a homogenous slurry. After charging, add no water or other material to the mixture. Do not leave slurry in the tank for more than four (4) hours.

.10 Distribute slurry uniformly over the surface of the area to be hydroseeded. Blend application into previous applications and existing grass areas to form uniform surfaces.

.11 Clean up: Remove all materials and other debris resulting from seeding operations from the job site.

.12 Maintenance: Begin maintenance immediately after seeding and continue for 60 days after Substantial Completion and until accepted by the Owner. Re-seed at three week intervals where germination has failed. Protect seeded areas from damage with temporary wire or twine fences complete with signage until grass area is taken over by the Owner. Water in sufficient quantities to ensure deep penetration and at frequent intervals to maintain vigorous growth until grass is taken over by the Owner. It is the Owner's responsibility to supply water at no extra cost to the Contract.

.13 Acceptance of the Rough Grass Areas: Proper germination of all specified grass species is the responsibility of the Landscape Contractor. The grass shall be reasonably well established, with no apparent dead or bare spots and shall be reasonably free of weeds (to Canadian Landscape Standard, Section 13 Maintenance Level 4 (Open space). Sixty days after substantial completion, areas meeting the conditions above will be taken over by the Owner. Areas seeded in Fall will be accepted in Spring one month after start of growing season, provided that the above conditions for acceptance are fulfilled.

3.8 LAWN AREAS – SODDING

.1 General: Treat all areas defined as lawn areas on the landscape plan between all property lines of the project including all boulevards to edge of roads and lanes.

.2 Growing Medium: Comply with Section 2.2.1, Growing Medium. Prior to sodding, request an inspection of the finished grade, and depth and condition of growing medium by the Landscape Architect.

.3 Time of Sodding: Sod from April 1st to October 1st. Further extensions may be obtained on concurrence of the Landscape Architect.

.4 Sod Supply: Conform to all conditions of Canadian Landscape Standard, Section 8, B.C. Standard for Turfgrass Sod.

.5 Specified Turfgrass by area: Refer to Table 2 below.

TABLE 2 SPECIFIED TURFGRASS BY AREA

Area	Description	Quality Grade	Major Species
CLASS 1	Lawn, all areas noted on drawings as lawn in urban development sites including boulevard grass	No. 1 Premium	Kentucky Blue for sun; Fescues for shade
CLASS 2	Grass – public parks, industrial and institutional sites	No. 2 Standard	same
CLASS 3	Rough Grass	see hydroseeding	
SPECIAL			

.6 Lime: The lime shall be as defined in Section 2.2.3, Materials. Apply at rates recommended in required soil test. Refer to Section 3.4 for method.

.7 Fertilizer: Refer to Section 2.2.2 Materials. Apply specified fertilizer at rates shown in the required soil test. Apply with a mechanical spreader. Cultivate into growing medium 4.8 hours prior to sodding. Apply separately from lime.

.8 Sodding: Prepare a smooth, firm, even surface for laying sod. Lay sod staggered with sections closely butted, without overlapping or gaps, smooth and even with adjoining areas and roll lightly. Water to obtain moisture penetration of 3" to 4" (1 – 10cm). Comply with requirements of Canadian Landscape Standard Section 8, BC Standard for Turfgrass Sod.

.9 Maintenance: Begin maintenance immediately after sodding and continue for 60 days after Substantial Completion and until accepted by the Owner. Protect sodded areas from damage with temporary wire or twine fences complete with signage until lawn is taken over by the Owner. Water to obtain moisture penetration of 3" to 4" (1-10cm) at all times and maintain sufficient growth. Keep grass cut at height of between 1-1/2" (4cm) and 2" (5cm). Provide adequate protection of sodded areas against damage until the turf has been taken over by Owner. Repair any damaged areas, re-grade as necessary. Aeration may be required if in the Landscape Architect's opinion, drainage through the sod base medium is impaired.

.10 Acceptance of Lawn Areas: The turf shall be reasonably well established, with no apparent dead spots or bare spots and shall be reasonably free of weeds (to Canadian Landscape Standard, Section 13 Maintenance Level 2 (Appearance). Use herbicides if necessary for weed removal unless other conditions of contract forbid their use. After the lawn has been cut at least twice, areas meeting the conditions above will be taken over by the Owner.

3.9 PLANTS AND PLANTING

.1 Conform to planting layout as shown on Landscape Plans.

.2 Obtain approval of Landscape Architect for layout and preparation of planting prior to commencement of planting operations.

.3 Make edge of beds with smooth clean defined lines.

.4 Time of Planting:
.4.1 Plant trees, shrubs and groundcovers only during periods that are normal for such work as determined by local weather conditions when seasonal conditions are likely to ensure successful adaptation of plants to their new location.

.5 Standards:
.5.1 All plant material shall conform to the requirements of the Canadian Landscape Standard, latest edition, unless exceeded by drawing Plant Schedule or this specification.
.5.1.1 Refer to Canadian Landscape Standard, Section 9, Plants and Planting and in Section 12, BCLNA Standard for Container Grown Plants for minimum standards.
.5.1.2 Refer to Plant Schedule for specific plant and container sizes and comply with requirements.
.5.2 Plant material obtained from areas with less severe climatic conditions shall be grown to withstand the site climate.

.6 Review:
.6.1 Review at the source of supply and/or collection point does not prevent subsequent rejection of any or all planting stock at the site.

.7 Availability:
.7.1 Area of search includes the Lower Mainland and Fraser Valley. Refer to Plant Schedule for any extension of area.
.7.2 Supply proof of the availability of the specified plant material within 30 days of the award of the Contract.

.8 Substitution:
.8.1 Obtain written approval of the Landscape Architect prior to making any substitutions to the specified material. Non-approved substitutions will be rejected.
.8.2 Allow a minimum of 5 days prior to delivery for request to substitute.
.8.3 Substitutions are subject to Canadian Landscape Standard – definition of Conditions of Availability.

.9 Plant Species & Location:
.9.1 Plants shall be true to name and of the height, caliper and size of root ball as shown on the landscape/site plan plant schedule. Caliper of trees is to be taken 6" (15cm) above grade.
.9.2 Plant all specified species in the location as shown on the landscape drawings. Notify Landscape Architect if conflicting rock or underground/overhead services are encountered.
.9.3 Deviation of given planting location will only be allowed after review of the proposed deviation by the Landscape Architect.

.10 Excavation:
.10.1 Trees and large shrubs: Excavate a saucer shaped tree pit to the depth of the rootball and to at least twice the width of the rootball. Assure that finished grade is at the original grade the tree was grown at.

.11 Drainage of Planting Holes:
.11.1 Provide drainage of planting pits where required: ie. on sloped conditions, break out the side of the planting pit to allow drainage down slope; and in flat conditions, mound to raise the rootball above impervious layer. Notify the Landscape Architect where the drainage of planting holes is limited.

.12 Planting and Fertilizing Procedures:
.12.1 Plant all trees and shrubs with the roots placed in their natural growing position. If burlapped, loosen around the top of the ball and cut away or fold under. Do not pull burlap from under the ball. Carefully remove containers without injuring the rootballs. After settled in place, cut twine. For wire baskets, clip and remove top three rows of wire.
.12.2 Fill the planting holes by gently firming the growing medium around the root system in 6" (15cm) layers. Settle the soil with water. Add soil as required to meet finish grade. Leave no air voids. When 2/3 of the topsoil has been placed, apply fertilizer as recommended by the required soil test at the specified rates.
.12.3 Where planting is indicated adjacent to existing trees, use special care to avoid disturbance of the root system or natural grades of such trees.
.12.4 Where trees are in lawn areas, provide a clean cut mulched 900mm (3 ft.) diameter circle centered on the tree.

.13 Staking of Trees:
.13.1 Use two 2"x2"x5' stakes, unless superseded by municipal requirements. Set stakes minimum 2 ft. in soil. Do not drive stake through rootball.
.13.2 Leave the tree carefully vertical.
.13.3 Tie with pre-approved commercial, flat woven polypropylene fabric belt, minimum width 19mm (3/4"). Approved product: ArborTie – available from DeepRoot.
.13.4 Coniferous Trees over 6 ft height: Guy with three 2-strand wires (11 gauge). Drive three stakes equidistant around the tree completely below grade.
.13.5 Trees 6 ft + on Wood or Concrete Decks: Guy as above using three deadmen (min. 2"x2"x4") buried to the maximum possible depth instead of stakes.
.13.6 Mark all guy wires with visible flagging material.

.14 Pruning:
.14.1 Limit pruning to the minimum necessary to remove dead or injured branches. Preserve the natural character of the plants, do not cut the leader. Use only clean, sharp tools. Make all cuts clean and cut to the branch collar leaving no stubs. Shape affected areas so as not to retain water. Remove damaged material.

.15 Mulching:
.15.1 Mulch all planting areas with an even layer of mulch to 2-1/2 – 3" (65 – 75mm) depth. Confirm placement of mulch in areas labeled "Groundcover Area" on drawings. Mulch a 3 ft. (900mm) diameter circle around trees in lawn areas, leave a clean edge.

.16 Acceptance:
.16.1 The establishment of all plant material is the responsibility of the Landscape Contractor.

.17 Plant Material Maintenance:
.17.1 Maintain all plant material for 60 days after landscape work has received a Certificate of Completion.
.17.2 Watering: Conform to Canadian Landscape Standard, Section 13.3.2 – Watering and generally as follows:
.17.2.1 Water to supplement natural rainfall such that the soil moisture content is kept to 50% to 100% of field capacity. Water to the full depth of the root zone each time. The Owner is responsible to supply water at no extra cost to the Contract. Confirm source of water prior to beginning work.
.17.3 Use appropriate measures to combat pests or diseases damaging plant material. Comply with all local governing statutes and guidelines for chemical control.
.17.4 Plant material which fails to survive shall be replaced in the next appropriate season as determined by the Landscape Architect.
.17.5 Repair tree guards, stakes, and guy wires, when necessary.
.17.6 Maintain areas relatively weed free. (Appearance level 2, Canadian Landscape Standard, Chapter 13).
.17.7 Maintain mulch to specified depths.

.18 Plant Warranty:
.18.1 Replace all unsatisfactory plant material except those designated "Specimen" for a period of one (1) year after the Certificate of Completion. Replace all unsatisfactory plant material designated "Specimen" for a period of two (2) years after the Certificate of Completion. Replace all unsatisfactory trees and shrubs and continue to replace these until the specified number is complete and satisfactory to the Landscape Architect. Such replacement shall be subject to the notification, inspection and approval as specified for the original planting, and shall not constitute an extra to the Contract.
.18.2 Those Plants, identified as hardy within one zone of the Canada Department of Agriculture tonal class for the area, specified by the Landscape Architect and installed by the Landscape Contractor which are killed through below normal temperatures (below the average of the extreme minimum temperatures officially recorded in the area concerned, in the last 10 years), will not be replaced without cost of replacement borne by the Owner.
.18.3 A review may be requested during the latter part of the warranty growing season. All plant material showing well developed foliage, healthy growth and bud forming, will then be taken over.

PART THREE SOFT LANDSCAPE DEVELOPMENT - CONT

.18.4 For all plant material, the Landscape Architect reserves the right to extend the Contractor's responsibility for another growing season if, in his opinion, leaf development and growth is not sufficient to ensure future satisfactory growth.
.18.5 Where the Owner is responsible for plant maintenance and has not provided adequate maintenance, the plant replacement section of the contract may be declared void. The Landscape Architect shall determine whether maintenance has been satisfactory using the Canadian Landscape Standard, Section 13, Maintenance as the guide. The required maintenance standard is a minimum of Level Three – Medium. Refer to Section 3.11, Establishment Maintenance.
.18.6 The Landscape Contractor is responsible to replace any plant material or repair any construction included in the Contract that is damaged or stolen until the issuance of the Certificate of Completion.
.18.7 Deviation from the specifications may require extension of the Warranty Period as determined by the Landscape Architect.

3.10 INSTALLING LANDSCAPE ON STRUCTURES

.1 Verify that drainage and protection material is completely installed and acceptable before beginning work. Contact Landscape Architect for instructions if not in place.

.2 Coordinate work with construction of planters and planter drainage.
.2.1 Verify that planter drains are in place and positive drainage to roof drains is present prior to placing any drain rock or soil.

.3 Provide clean out at all through-slab drain locations. Use 300mm min. dia. PVC Pipe filled with drain rock unless specific drawing detail shown.

.4 Install drain rock evenly to a minimum depth of 4" (100mmlor alternate sheet drain if specified. Install sheet drain as per manufacturer's recommendations.

.5 Cover drain rock (or alternate sheet drain if specified on drawing details) with filter fabric lapping 6" (150mm) at all edges. Obtain approval of drainage system prior to placing growing medium.

.6 Place an even layer of 25 – 50mm clean washed pump sand over filter fabric.

.7 Place growing medium to depths specified in Section 3.5 above for various surface treatments. Refer to Drawing details for any light weight filler required to alter grade. Use Styrofoam block over drain rock shaped to provide smooth surface transition at edges. Butt each piece tightly together and cover with filter fabric to prevent soil from migrating downward.

3.11 ESTABLISHMENT MAINTENANCE (Provide a separate price for this section)

.1 Intent: The intent of "establishment" maintenance is to provide sufficient care to newly installed plant material for a relatively short period of time to ensure or increase the long term success of the planting. The objective is the adaptation of plants to a new site in order to obtain the desired effect from the planting while reducing the rate of failure and unnecessary work associated with improper establishment. Establishment of maintenance procedures apply to all new and retained vegetation including cultivated turfgrass areas and new trees and shrubs.

.2 Maintenance Period: Provide maintenance of installed landscaping for 12 months following substantial completion.

.3 Related Standards and Legislation: Canadian Landscape Standard, latest edition, Fertilizer Code., B.C. Pesticide Control Act.

.4 Site Review: In addition to the inspections at substantial completion, at final progress draw application, and at the end of the guarantee period, there should be three other reviews during the 12 months attended by the Contractor and a designated representative of the Owner. Maintain a logbook and reporting procedures and submit to the designated representative.

.5 Scheduling: Prepare a schedule of anticipated visits and submit to designated representative at start-up. Maintenance operations shall be carried out predominately during the growing season between March 1st and November 30th, however visits at other times of the year may be required.

.6 Maintenance Level: Comply with B.C. Landscape Standard, Section 14, Table 14.2, Maintenance Level 2 "Groomed".

.7 Materials: Comply with Part Two of this specification.
.7.1 Fertilizers: To the requirements of the Canadian Landscape Standard. Formulations and rates as required by soil testing.

.8 Plant Material Establishment:
.8.1 Watering: During the first growing season, water new plants at least every ten (10) days between April 1st and July 31st, and every twenty (20) days between August 1st and September 15th. Minimum 25 gallons per tree per application. During the second growing season, water new plants at least every twenty days between April 1 and July 31 and once between August 1st and September 31st. Apply water at a rate and duration such that the water content reaches field capacity to the full depth of the growing medium. Apply water again when the water content reaches 25% of field capacity. Provide and irrigate with water in the event that any automatic irrigation system malfunctions or has not been completely installed. Scheduled applications of water shall be missed only when rainfall has penetrated the soil fully as required.
.8.2 Mulch: Maintain mulches in the original areas and to the original depths.
.8.3 Weed Control: Remove all weeds from all areas at least once per month during the growing season by hoeing or cultivation to a maximum depth of 80mm, hand-pulling, or, if necessary, by the use of herbicides.
.8.4 Pest and Disease Control: Inspect all planted areas for pests and diseases periodically and at least every two months during the growing season by an experienced person. Carry out treatment for pests or diseases promptly and consistently for maximum effectiveness. Comply with all B.C. Pesticide Control Act and municipal requirements.
.8.5 Tree Support: Maintain stakes, guy wires and ties one full growing season. Check ties at least every two months to ensure that they are not causing a depression in the bark. Loosen, repair or replace ties as necessary. Remove all stakes guy wires and ties after the first growing season except where large trees require continuing support in the opinion of the Landscape Architect. All flagging of guy wires shall be visible and in good repair.
.8.6 Pruning: Inspect all trees and shrubs at least every two months during the growing season; prune to remove all dead, weak or diseased wood. Maintain the natural shape of the plant. Carry out clipping or shaping only if required in the maintenance contract for specific varieties or conditions.
.8.7 Fertilizing: Once during the twelve month period of establishment maintenance fertilize shrubs, trees and groundcovers according to soil analysis requirements.

.9 Grass Areas Establishment:
.9.1 Watering: Use hoses and sprinklers, irrigation systems or other methods to apply water to Class 1 and Class 2 grassed areas (Canadian Landscape Standard, Section 7, Lawns and Grasses) such that the grass is maintained in a turgid condition. Supply and irrigate with water in the event of any irrigation system malfunction, or incomplete installation at no expense to the owner. Apply water to prevent packing or erosion of the soil. Apply water at a rate and duration so that the water content in the growing medium reaches field capacity to the full depth of the growing medium. Apply water again when the water content reaches 25% of field capacity.
.9.2 Weed, Insect and Disease Control: Inspect grass areas each time they are mowed for weeds, insect pests, and diseases and treat promptly when necessary by appropriate manual methods, or by the use of chemicals in compliance with the B.C.S.L.A./B.C.L.N.A. Landscape Standards latest edition. Kill broadleafed weeds in grassed areas by a general application of a suitable herbicide if the weed population exceeds 10 Broadleaf weeds or

SITE PLAN

SCHEDULE C

HAVIES SECHELT

PLAN A
3 BED, 3 BATH
1,500 SQ FT

PLAN B
3 BED, 3 BATH
1,500 SQ FT

PLAN C
6 BED, 6 BATH
2,580 SQ FT

PLAN D
5 BED, 6 BATH
2,465 SQ FT

PLAN E
6 BED, 6 BATH
2,479 SQ FT

PLAN F
5 BED, 6 BATH
2,465 SQ FT



The developer reserves the right to make changes and modifications to the information contained herein without prior notice. Dimensions, sizes, specifications, layouts and materials are approximate only and subject to change without notice. Artist's renderings are representations only and may not be accurate. Please see sales team for more details. E.&O.E.

HOUSE TYPE A

THE HAVIES 1500SF(A) TYPICAL

UNITS ON LOT 2-14

5038 LAUREL ROAD, SECHELT, BC



MATTHEW CHENG
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Consultants

Project Title

1500 sf (A) typical units on lot 2-14

THE HAVIES
5038 Laurel Ave.
Sechelt, BC

Sheet Title

COVER SHEET

Drawn: S.L.

Checked: M.C.

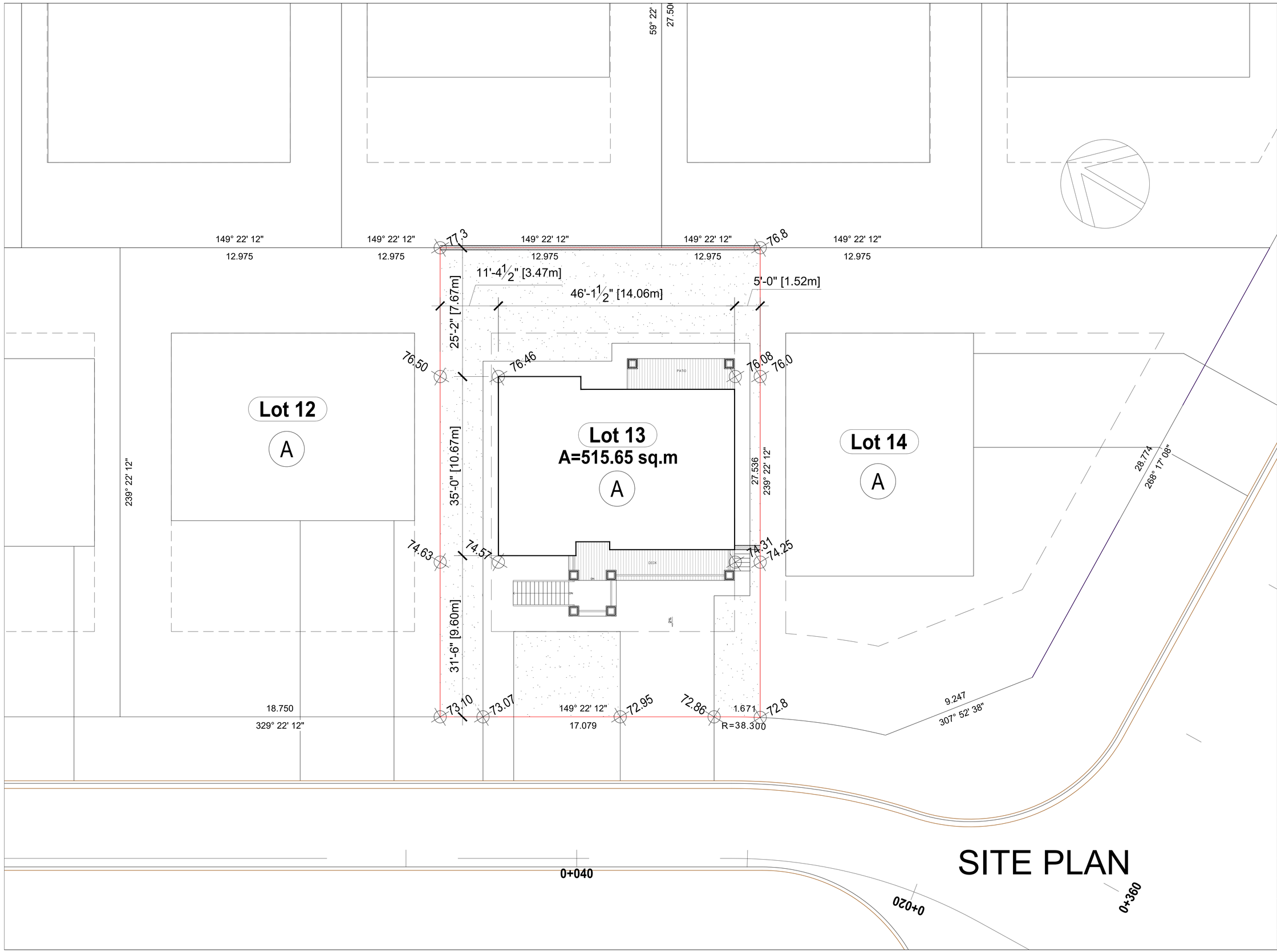
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Project Number: 15 V TH 01

Revision Date:

Dwg. No.: A000

Print Date: 04/11/22



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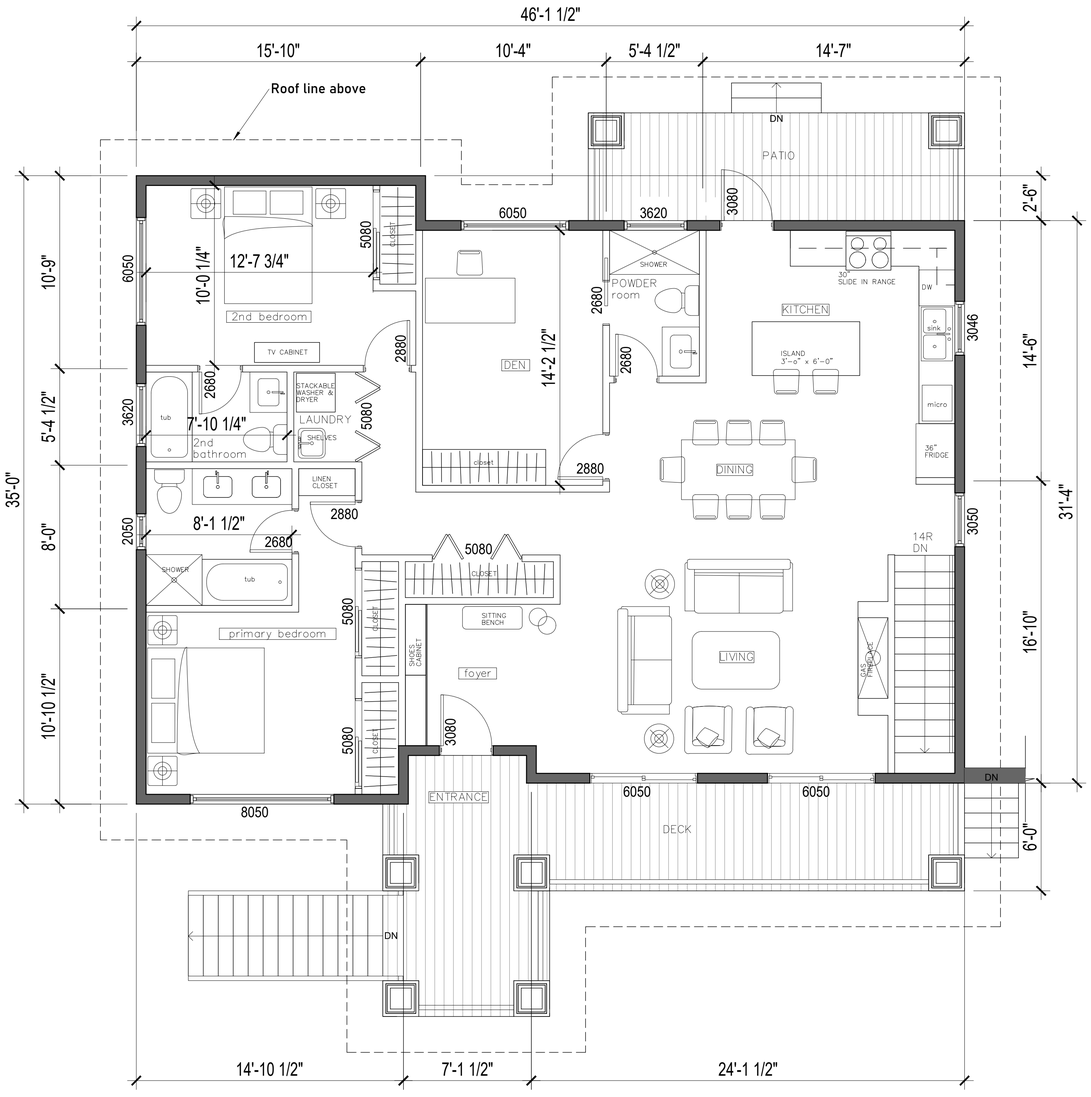
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Project Title
1500 sf (A) typical units on lot 2-14

THE HAVIES
5038 Laurel Ave.
Sechelt, BC

Sheet Title
SITE PLAN

Drawn: S.L.
Checked: M.C.
Scale: 1/8" = 1'-0"
Project Number: 15 V TH 01
Revision Date:
Dwg. No.: A001
Print Date: 04/11/22



MAIN FLOOR PLAN

LOT 2 -14 MAIN LIVING AREA 1500 SF

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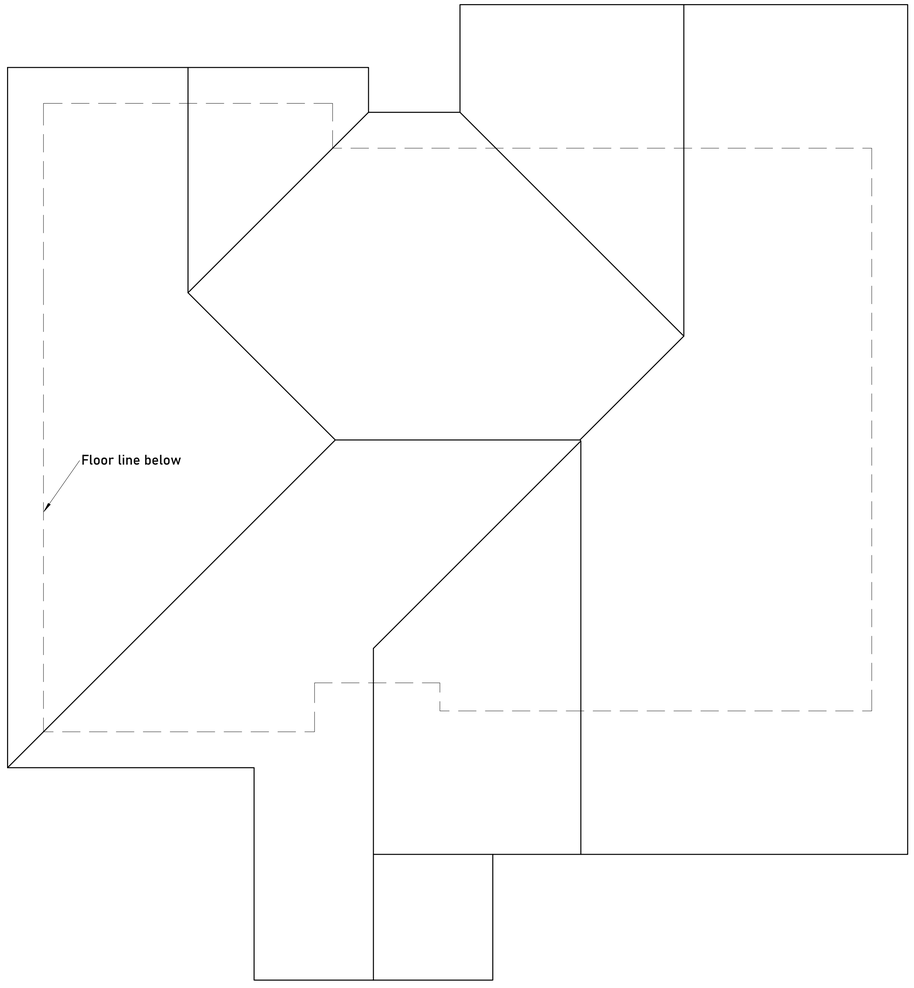
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Project Title
1500 sf (A) typical units on lot 2-14

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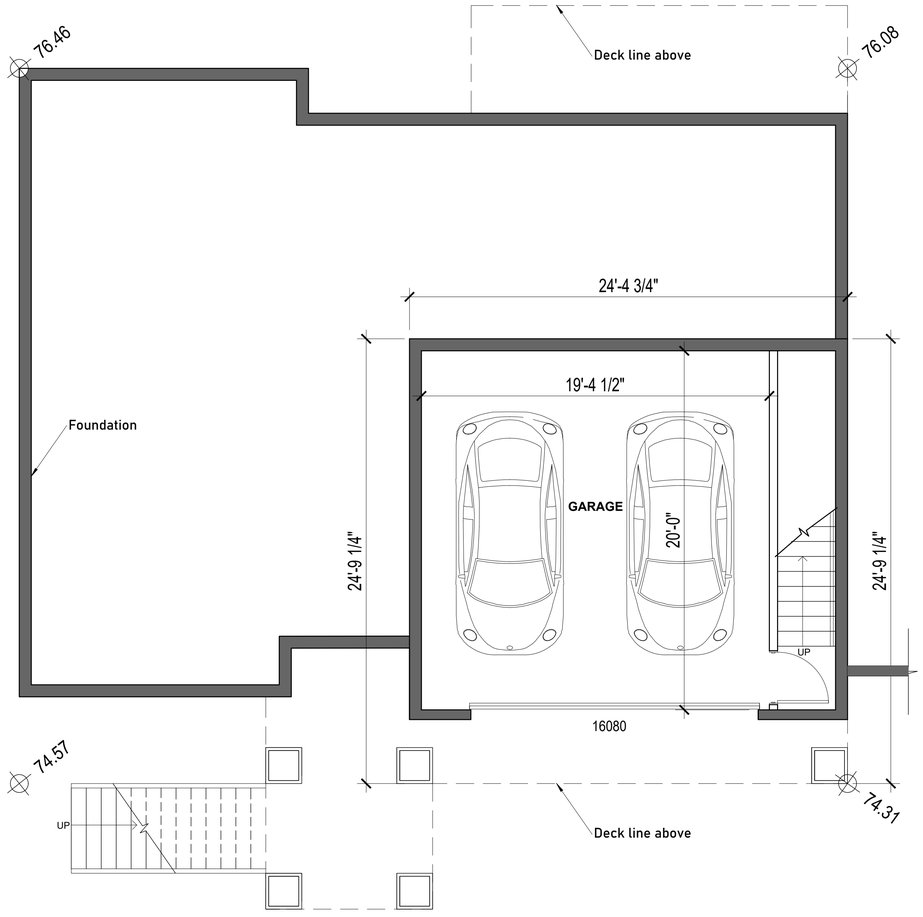
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MAIN FLOOR PLAN

Drawn: S.L.
Checked: M.C.
Scale: 1/4" = 1'-0"
Project Number: 15 V TH 01
Revision Date:
Dwg. No.: A101
Print Date: 04/11/22



ROOF PLAN

LOT 2 -14



LOWER FLOOR PLAN

LOT 2 -14 2 CAR GARAGE 684 SF

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THE HAVIES
5038 Laurel Ave.
Sechelt, BC

Sheet Title

ROOF PLAN

LOWER FLOOR PLAN

Drawn: S.L.

Checked: M.C.

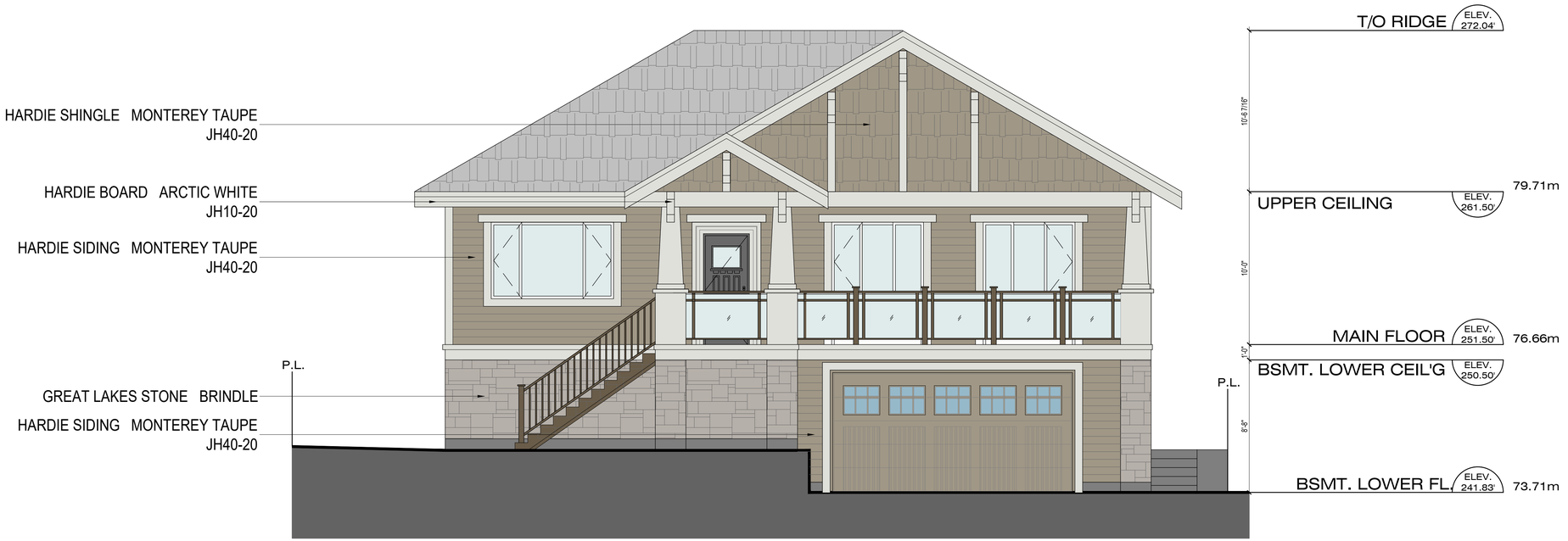
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Project Number: 15 V TH 01

Revision Date:

Dwg. No.: A102

Print Date: 04/11/22



SOUTHWEST ELEVATION



NORTHWEST ELEVATION

MATERIAL LEGEND

SAMPLE	SUPPLIER	SPECIFICATION
	HARDIE BOARD	ARCTIC WHITE JH10-20
	HARDIE SHINGLE	BOOTHBAY BLUE JH70-20
	HARDIE SIDING	BOOTHBAY BLUE JH70-20
	GREAT LAKES STONE	BRINDLE

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s

Project Title

1500 sf (A) typical units on lot 2-14

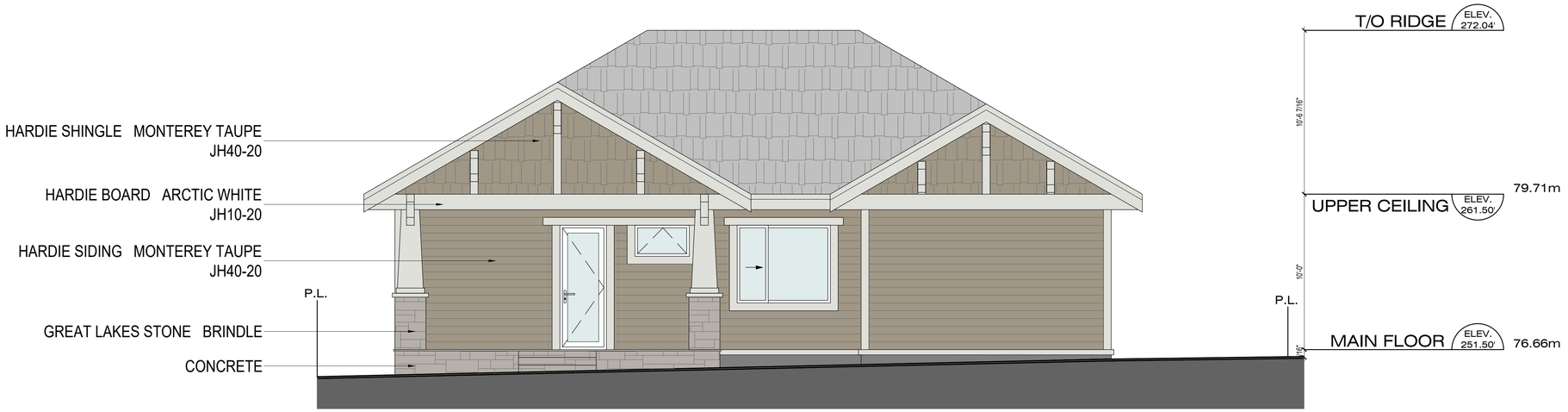
THE HAVIES
5038 Laurel Ave.
Sechelt, BC

Sheet Title

SOUTHWEST ELEVATION

NORTHWEST ELEVATION

Drawn: S.L.
Checked: M.C.
Scale: 1/4" = 1'-0"
Project Number: 15 V TH 01
Revision Date:
Dwg. No.: A201
Print Date: 04/11/22



NORTHEAST ELEVATION

MATERIAL LEGEND

SAMPLE	SUPPLIER	SPECIFICATION
	HARDIE BOARD	ARCTIC WHITE JH10-20
	HARDIE SHINGLE	BOOTHBAY BLUE JH70-20
	HARDIE SIDING	BOOTHBAY BLUE JH70-20
	GREAT LAKES STONE	BRINDLE



SOUTHEAST ELEVATION

MATTHEW CHENG ARCHITECT INC.
Unit 202 - 670 EVANS AVENUE
VANCOUVER, BC V6A 2K9
Tel: (604) 731-3012 / Fax: (604) 731-3908
Cel: (604) 649-0669 / Email:
matthew@mcai.ca

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Revision:

RE	YY-MM-	DESCRIPTION	DRWN	CHK

Consultant
s

Project Title

1500 sf (A) typical units on lot 2-14

THE HAVIES
5038 Laurel Ave.
Sechelt, BC

Sheet Title

NORTHEAST ELEVATION

SOUTHEAST ELEVATION

Drawn: S.L.
Checked: M.C.
Scale: N.T.S.
Project Number: 15 V TH 01
Revision Date:
Dwg. No.: A202
Print Date: 04/11/22

HOUSE TYPE B

THE HAVIES 1500SF(B) TYPICAL

UNITS ON LOT 15-25

5038 LAUREL ROAD, SECHELT, BC



MATTHEW CHENG
ARCHITECT INC.
Unit 202 - 670 EVANS AVENUE
VANCOUVER, BC V6A 2K9
Tel: (604) 731-3012 / Fax: (604) 731-3908
Cel: (604) 649-0669 / Email:
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Revision:

RE	YY-MM-DD	DESCRIPTION	DRWN	CHK

Consultant
s

Project Title

1500 sf (B) typical units on lot 15-25

THE HAVIES
5038 Laurel Ave.
Sechelt, BC

Sheet Title

COVER SHEET

Drawn: S.L.

Checked: M.C.

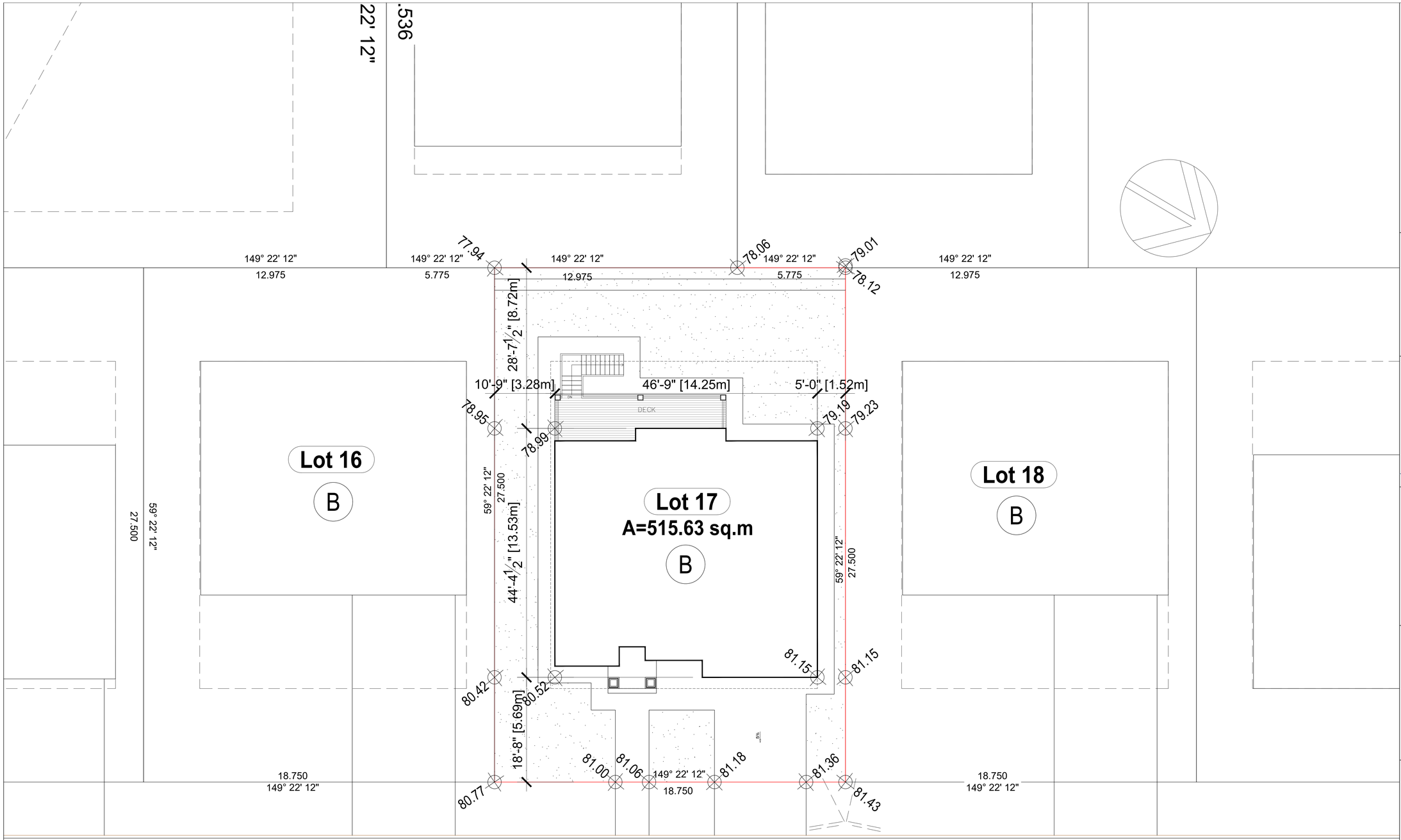
Scale: N.T.S.

Project Number: 15 V TH 01

Revision Date:

Dwg. No.: A000

Print Date: 05/11/22



SITE PLAN

MATTHEW CHENG
ARCHITECT INC.
Unit 202 - 670 EVANS AVENUE
VANCOUVER, BC V6A 2K9
Tel: (604) 731-3012 / Fax: (604) 731-3908
Cel: (604) 649-0669 / Email:
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Revision:

RE	YY-MM-DD	DESCRIPTION	DRWN	CHK

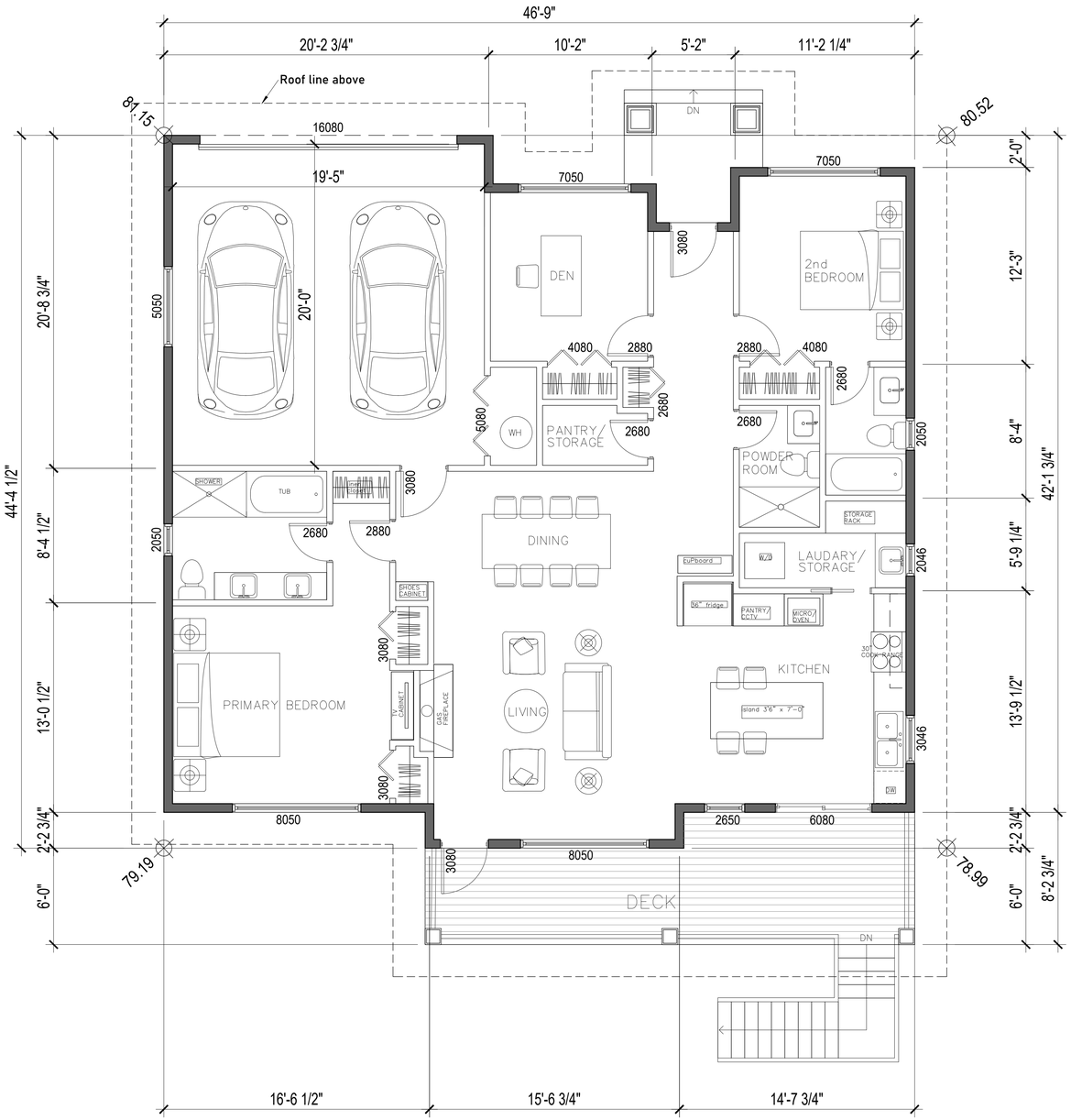
Consultants

Project Title
1500 sf (B) typical units on lot 15-25

THE HAVIES
5038 Laurel Ave.
Sechelt, BC

Sheet Title
SITE PLAN

Drawn: S.L.
Checked: M.C.
Scale: 1/8" = 1'-0"
Project Number: 15 V TH 01
Revision Date:
Dwg. No.: A001
Print Date: 05/11/22



MAIN FLOOR PLAN

LOT 15 -27 MAIN LIVING AREA 1500 SF
2 CAR GARAGE 390 SF

MATTHEW CHENG ARCHITECT INC.
Unit 202 - 670 EVANS AVENUE
VANCOUVER, BC V6A 2K9
Tel: (604) 731-3012 / Fax: (604) 731-3908
Cel: (604) 649-0669 / Email:
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Revision:

RE	YY-MM-DD	DESCRIPTION	DRWN	CHK

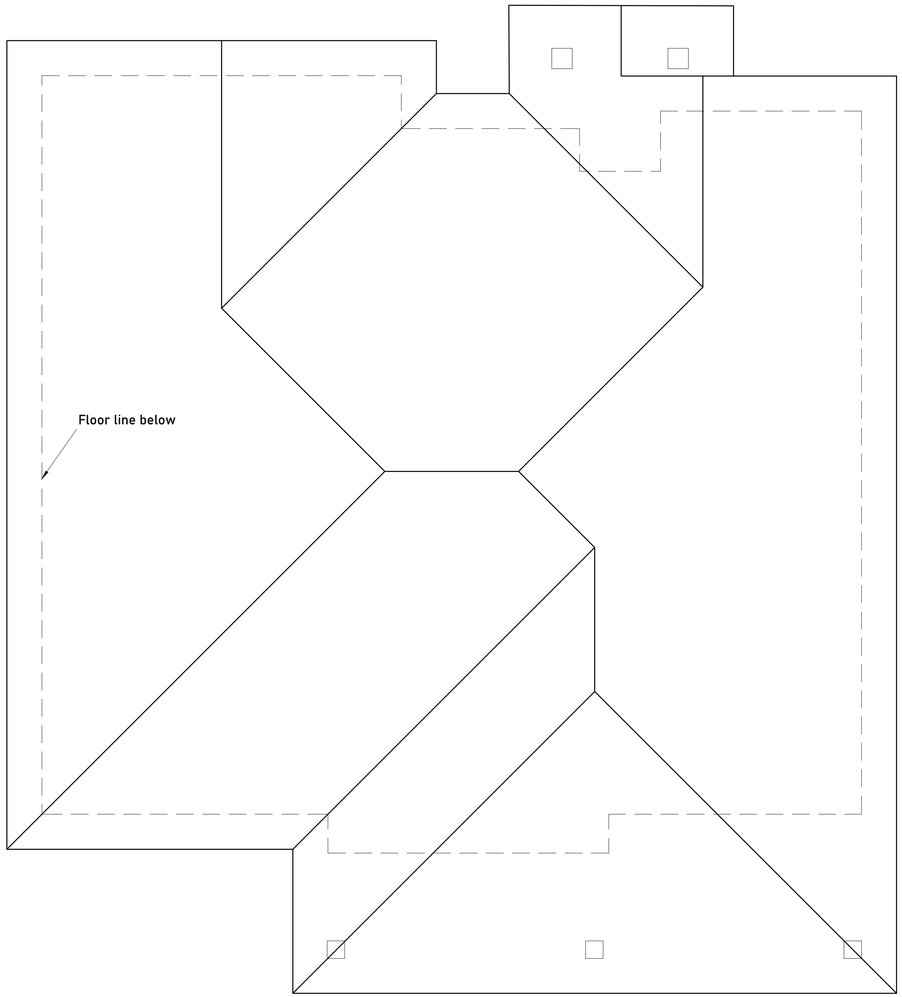
Consultants

Project Title
1500 sf (B) typical units on lot 15-25

THE HAVIES
5038 Laurel Ave.
Sechelt, BC

Sheet Title
MAIN FLOOR PLAN

Drawn: S.L.
Checked: M.C.
Scale: 1/4" = 1'-0"
Project Number: 15 V TH 01
Revision Date:
Dwg. No.: A101
Print Date: 05/11/22



ROOF PLAN

LOT 15 -27

MATTHEW CHENG
ARCHITECT INC.
Unit 202 - 670 EVANS AVENUE
VANCOUVER, BC V6A 2K9
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Revision:

RE	YY–MM–	DESCRIPTION	DRWN	CHK

Consultant
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Project Title

1500 sf (B) typical units on lot 15-25

THE HAVIES
5038 Laurel Ave.
Sechelt, BC

Sheet Title

ROOF PLAN

Drawn: S.L.

Checked: M.C.

Scale: 1/4" = 1'-0"

Project Number: 15 V TH 01

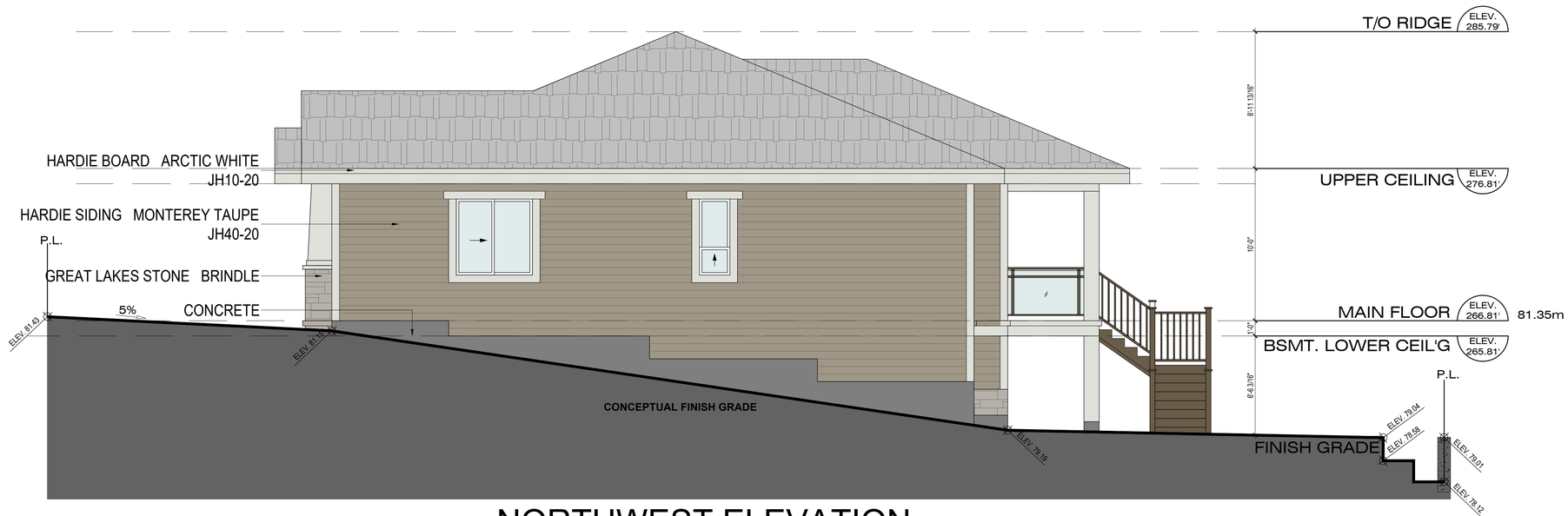
Revision Date:

Dwg. No.: A102

Print Date: 05/11/22



NORTHEAST ELEVATION



NORTHWEST ELEVATION

MATERIAL LEGEND

SAMPLE	SUPPLIER	SPECIFICATION
	HARDIE BOARD	ARCTIC WHITE JH10-20
	HARDIE SHINGLE	MONTEREY TAUPE JH40-20
	HARDIE SIDING	MONTEREY TAUPE JH40-20
	GREAT LAKES STONE	BRINDLE

MATTHEW CHENG ARCHITECT INC.
Unit 202 - 670 EVANS AVENUE
VANCOUVER, BC V6A 2K9
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Revision:

RE	YY-MM--	DESCRIPTION	DRWN	CHK

Consultant
s

Project Title

1500 sf (B) typical units on lot 15-25

THE HAVIES
5038 Laurel Ave.
Sechelt, BC

Sheet Title

NORTHEAST ELEVATION

NORTHWEST ELEVATION

Drawn: S.L.

Checked: M.C.

Scale: 1/4" = 1'-0"

Project Number: 15 V TH 01

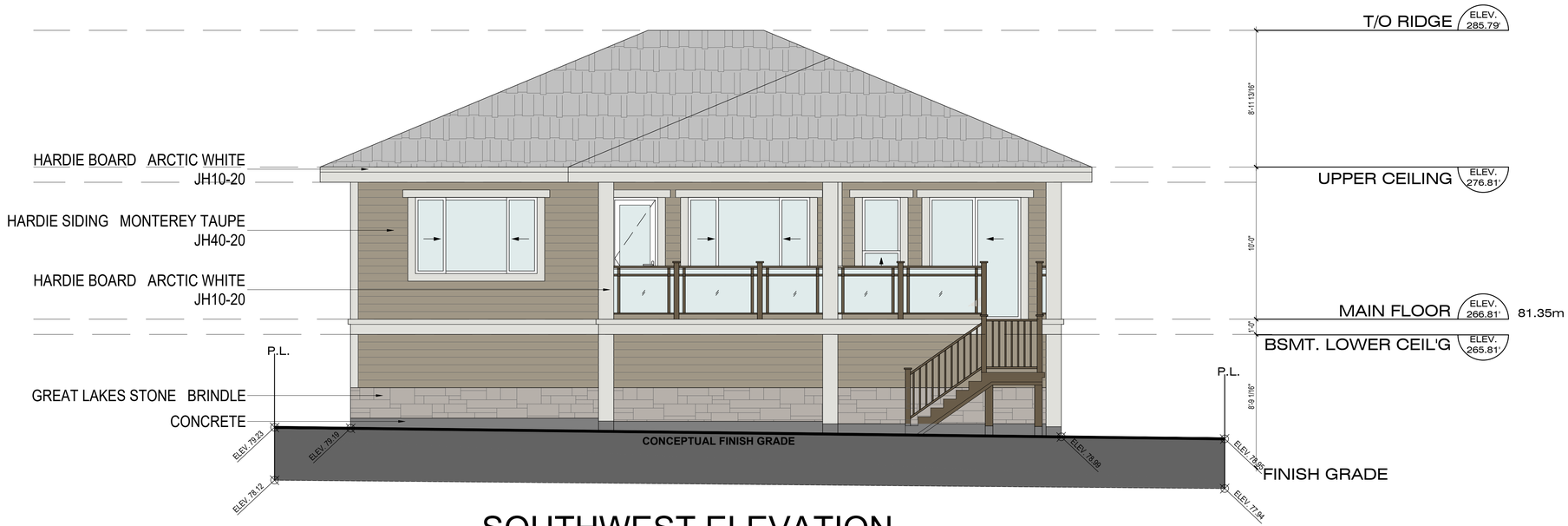
Revision Date:

Dwg. No.: A201

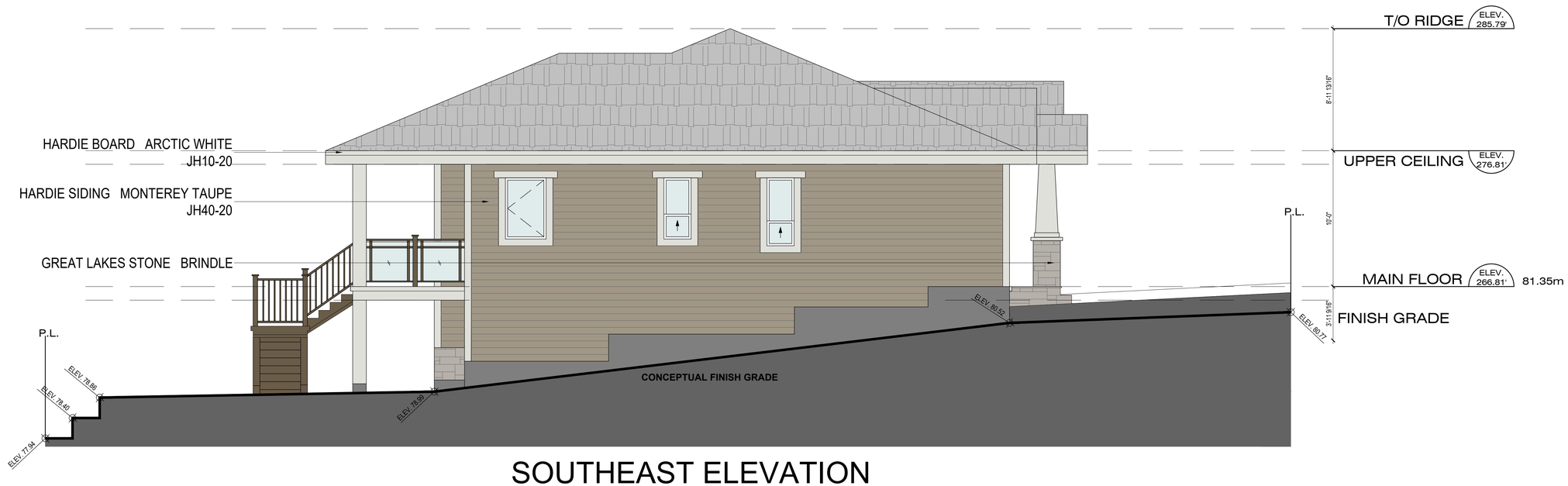
Print Date: 05/11/22

MATERIAL LEGEND

SAMPLE	SUPPLIER	SPECIFICATION
	HARDIE BOARD	ARCTIC WHITE JH10-20
	HARDIE SHINGLE	MONTEREY TAUPE JH40-20
	HARDIE SIDING	MONTEREY TAUPE JH40-20
	GREAT LAKES STONE	BRINDLE



SOUTHWEST ELEVATION



SOUTHEAST ELEVATION

MATTHEW CHENG ARCHITECT INC.
Unit 202 - 670 EVANS AVENUE
VANCOUVER, BC V6A 2K9
Tel: (604) 731-3012 / Fax: (604) 731-3908
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Revision:

RE	YY–MM–	DESCRIPTION	DRWN	CHK

Consultant
s

Project Title

1500 sf (B) typical units on lot 15-25

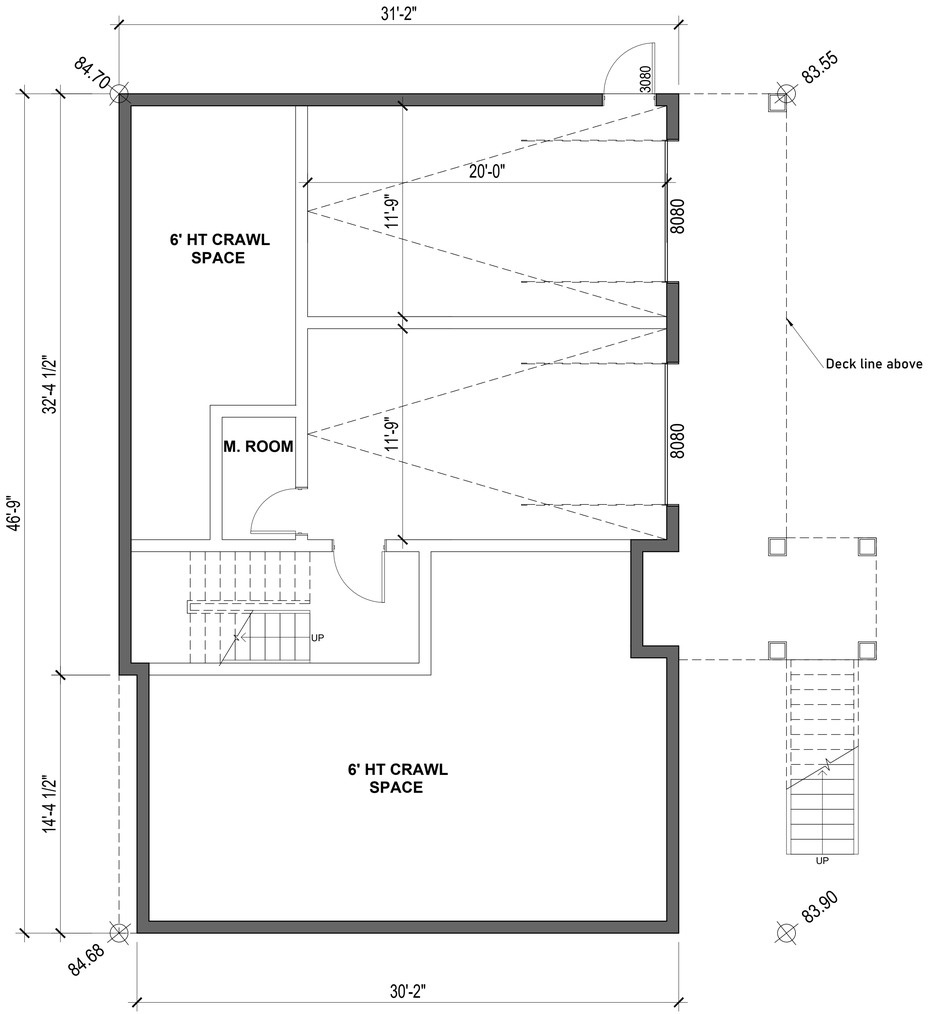
THE HAVIES
5038 Laurel Ave.
Sechelt, BC

Sheet Title

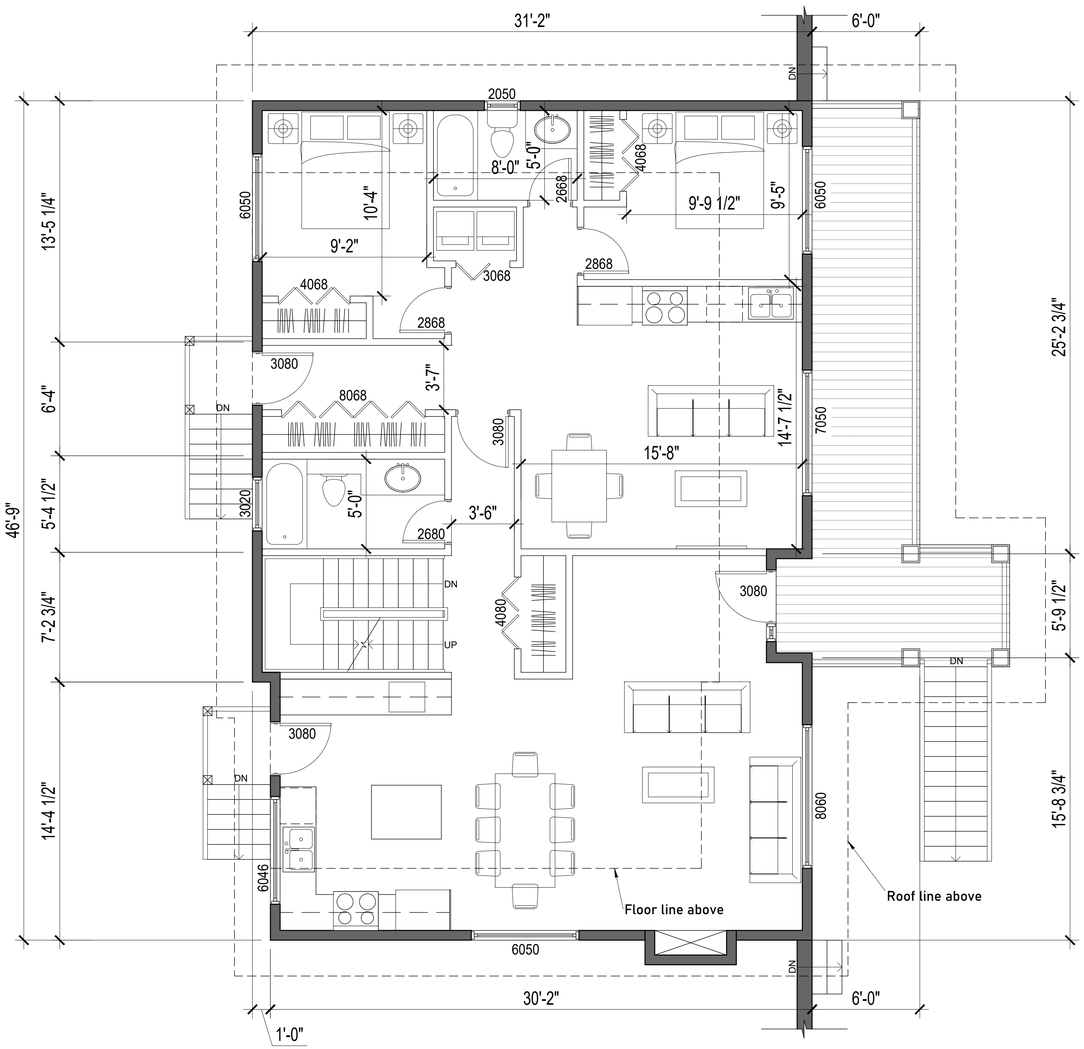
SOUTHWEST ELEVATION

SOUTHEAST ELEVATION

Drawn: S.L.
Checked: M.C.
Scale: 1/4" = 1'-0"
Project Number: 15 V TH 01
Revision Date:
Dwg. No.: A202
Print Date: 05/11/22



2450 SF WITH A 2 CAR GARAGE
BASEMENT LEVEL



2450 SF WITH A 2 CAR GARAGE
MAIN 1445 SF TYPICAL UNITS AT LOT 30-40

MATTHEW CHENG
ARCHITECT INC.
Unit 202 - 670 EVANS AVENUE
VANCOUVER, BC V6A 2K9
Tel: (604) 731-3012 / Fax: (604) 731-3908
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Revision:

RE. V	YY-MM-DD	DESCRIPTION	DRWN	CHK

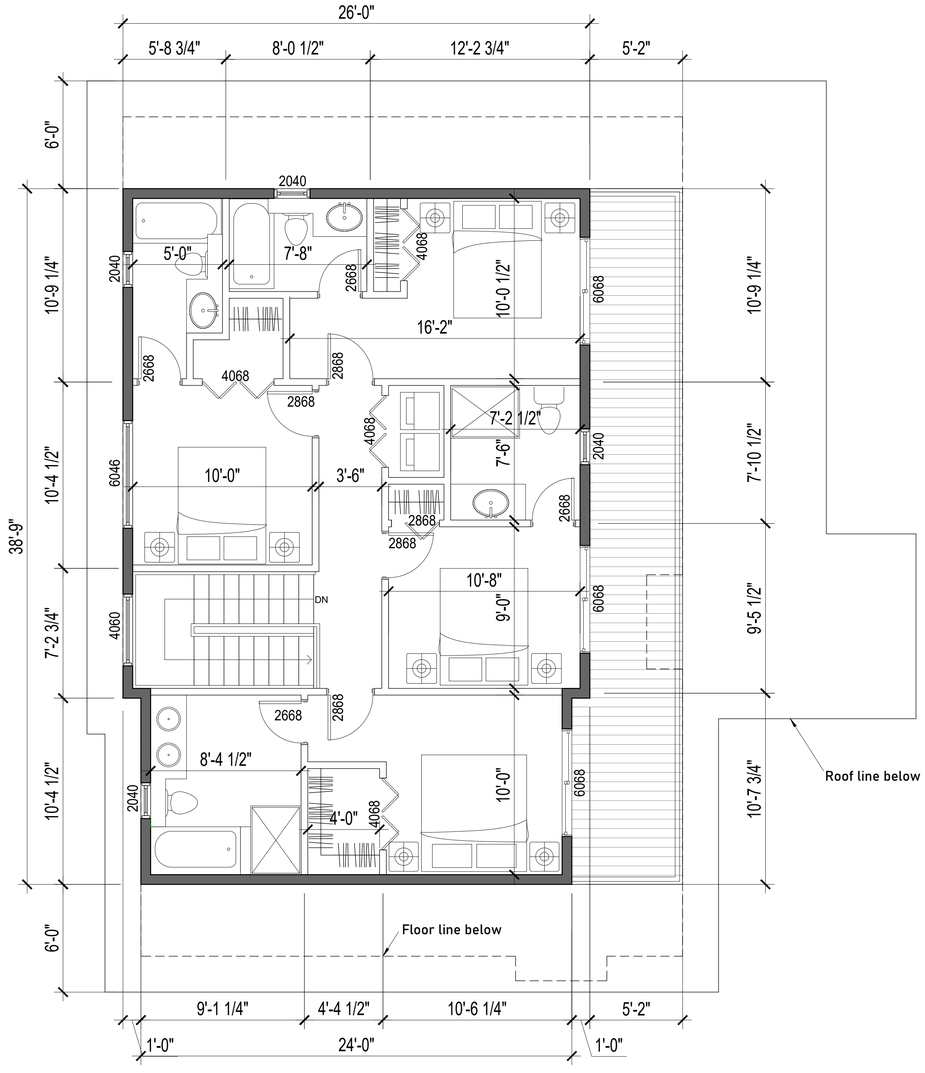
Consultant s

Project Title
2450 sf (C)Typical unit at lot 30-40

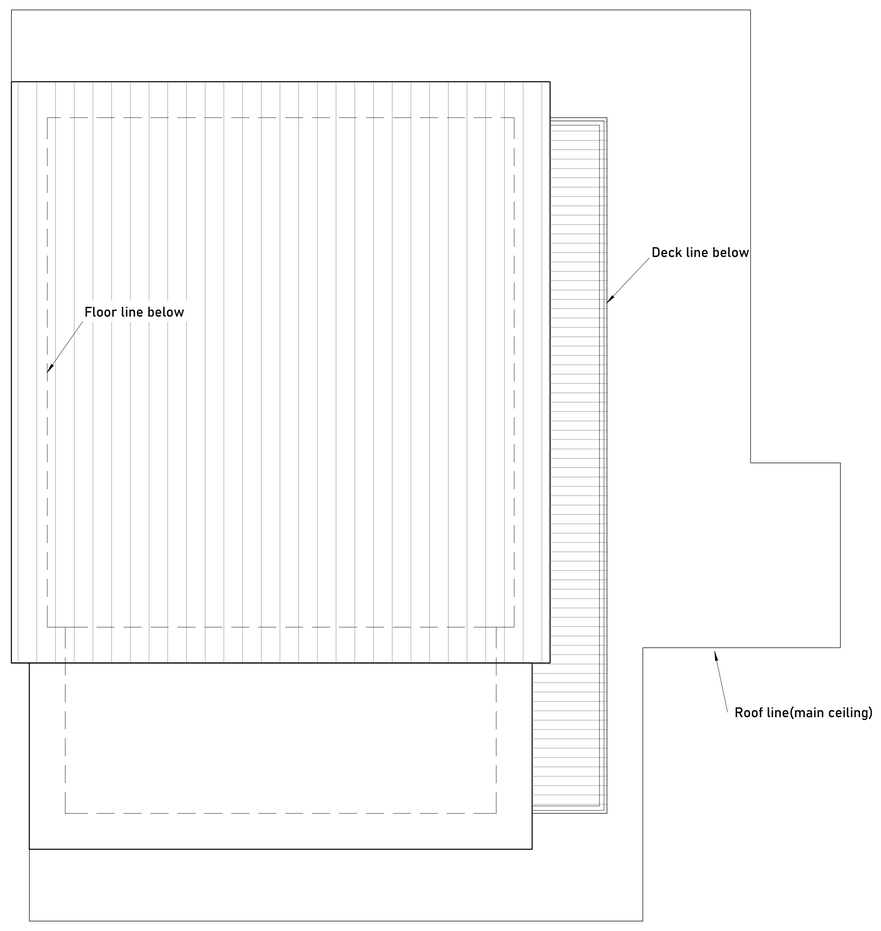
5038 Laurel Road, Sechelt, Sunshine Coast

Sheet Title
FLOOR PLANS

Drawn: Author
Checked: Checker
Scale: 1/4" = 1'-0"
Project Number: 15 V TH 01
Revision Date:
Dwg. No.: A101
Print 02/23/22



2450 SF WITH A 2 CAR GARAGE
UPPER 1005 SF TYPICAL UNITS AT LOT 30-40



2450 SF WITH A 2 CAR GARAGE
ROOF TYPICAL UNITS AT LOT 30-40

MATTHEW CHENG
ARCHITECT INC.
Unit 202 - 670 EVANS AVENUE
VANCOUVER, BC V6A 2K9
Tel: (604) 731-3012 / Fax: (604) 731-3908
Cel: (604) 649-0669 / Email:
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Revision:

RE	YY-MM-DD	DESCRIPTION	DRWN	CHK

Consultant
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Project Title
2450 sf (C)Typical unit at lot 30-40

5038 Laurel Road, Sechelt, Sunshine Coast

Sheet Title
FLOOR PLANS

Drawn: Author
Checked: Checker
Scale: 1/4" = 1'-0"
Project Number: 15 V TH 01
Revision Date:
Dwg. No.: A102
Print 02/23/22



SOUTHWEST ELEVATION

MATERIAL LEGEND

SAMPLE	SUPPLIER	SPECIFICATION
	HARDIE BOARD	PEARL GRAY
	FASCIA BOARD	MEDIUM GREY TYPICAL
	DRY-STACK STONE	CHARCOAL
	FISHER COATING	TRUEGRAIN SERIES CEDARTONE
	CONCRETE	MEDIUM GREY TYPICAL



SOUTHEAST ELEVATION

MATTHEW CHENG ARCHITECT INC.
Unit 202 - 670 EVANS AVENUE
VANCOUVER, BC V6A 2K9
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Revision:

RE V	YY-MM-DD	DESCRIPTION	DRWN	CHK

Consultants

Project Title
2450 sf (C)Typical unit at lot 30-40

5038 Laurel Road, Sechelt, Sunshine Coast

Sheet Title
ELEVATIONS

Drawn: Author
Checked: Checker
Scale: 1/4" = 1'-0"
Project Number: 15 V TH 01
Revision Date:
Dwg. No.: A201
Print 02/23/22



NORTHEAST ELEVATION



NORTHWEST ELEVATION

MATERIAL LEGEND

SAMPLE	SUPPLIER	SPECIFICATION
	HARDIE BOARD	PEARL GRAY
	FASCIA BOARD	MEDIUM GREY TYPICAL
	DRY-STACK STONE	CHARCOAL
	FISHER COATING	TRUEGRAIN SERIES CEDARTONE
	CONCRETE	MEDIUM GREY TYPICAL

MATTHEW CHENG ARCHITECT INC.
Unit 202 - 670 EVANS AVENUE
VANCOUVER, BC V6A 2K9
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Revision:

RE V	YY-MM-DD	DESCRIPTION	DRWN	CHK

Consultants

Project Title
2450 sf (C)Typical unit at lot 30-40

5038 Laurel Road, Sechelt, Sunshine Coast

Sheet Title
ELEVATIONS

Drawn: Author
Checked: Checker
Scale: 1/4" = 1'-0"
Project Number: 15 V TH 01
Revision Date:
Dwg. No.: A202
Print 02/23/22

HOUSE TYPE D

THE HAVIES 2450SF(D) TYPICAL

UNITS ON LOT 44

5038 LAUREL ROAD, SECHELT, BC



MATTHEW CHENG ARCHITECT INC.
Unit 202 - 670 EVANS AVENUE
VANCOUVER, BC V6A 2K9
Tel: (604) 731-3012 / Fax: (604) 731-3908
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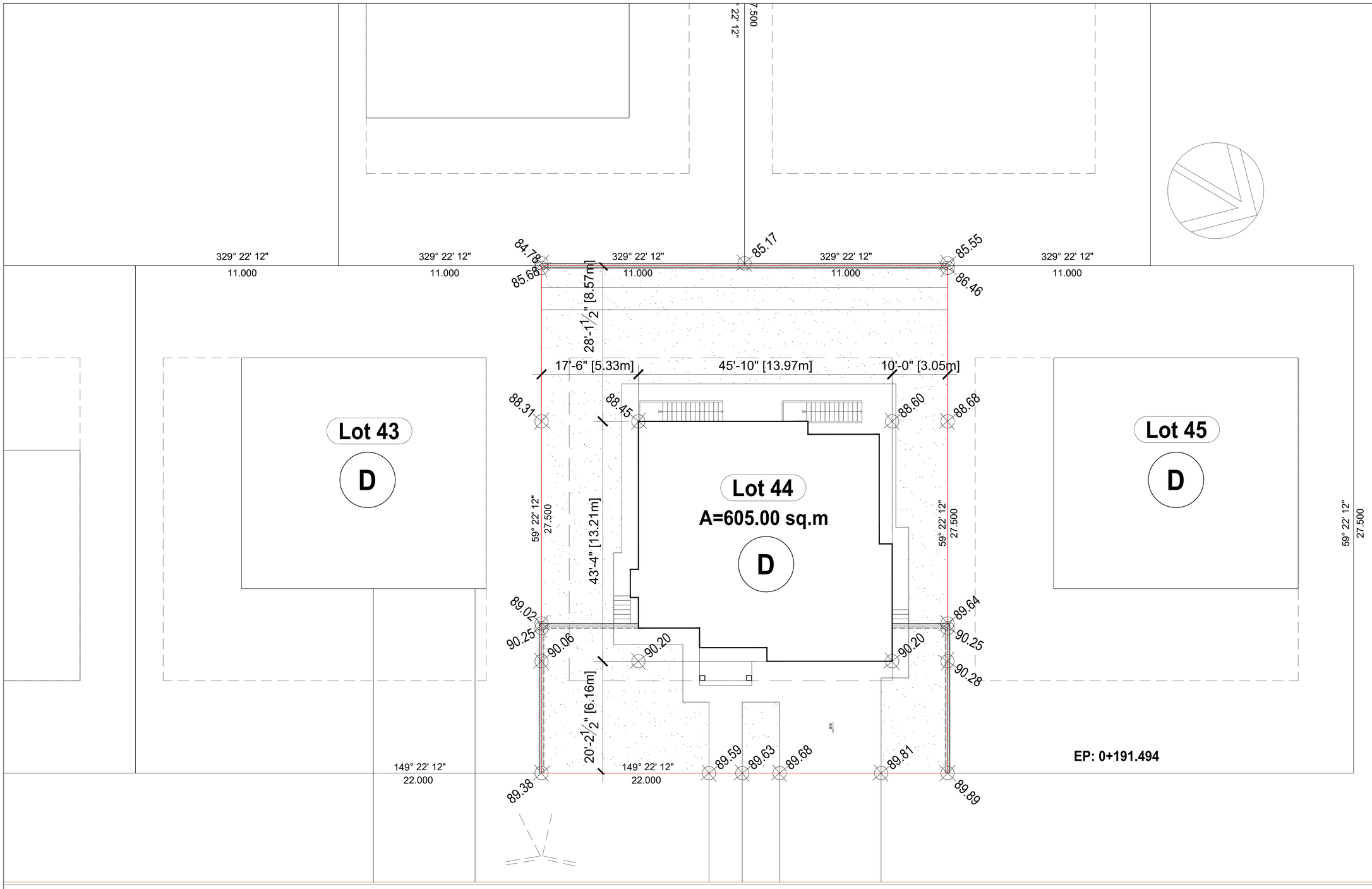
Consultants

Project Title
2450 sf (D) typical units on lot 44

THE HAVIES
5038 Laurel Ave.
Sechelt, BC

Sheet Title
COVER SHEET

Drawn: S.L.
Checked: M.C.
Scale: N.T.S.
Project Number: 15 V TH 01
Revision Date:
Dwg. No.: A000
Print Date: 05/25/22



SITE PLAN

MATTHEW CHENG
ARCHITECT INC.
Unit 202 - 670 EVANS AVENUE
VANCOUVER, BC V6A 2K9
Tel: (604) 731-3012 / Fax: (604) 731-3908
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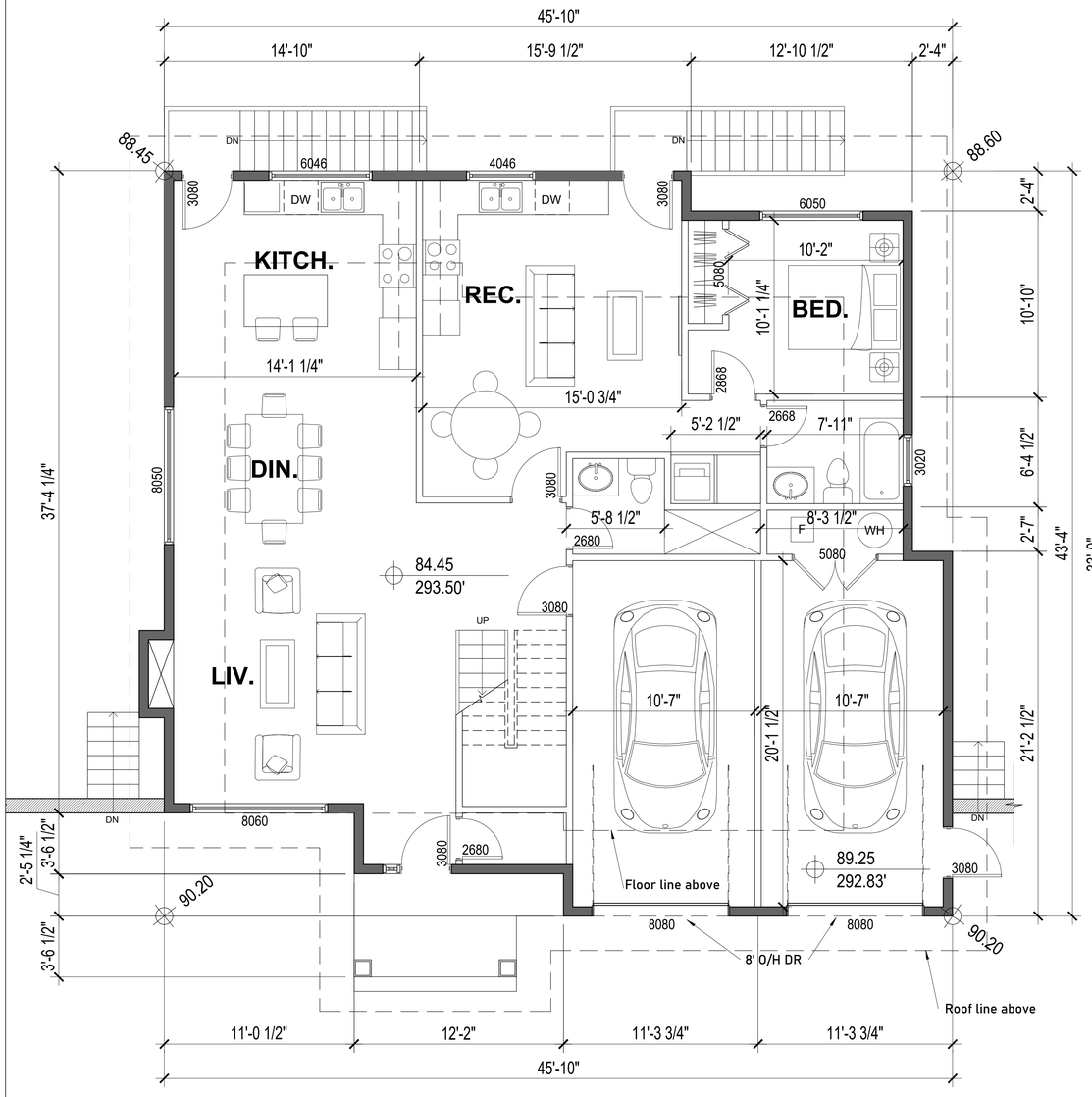
Consultants

Project Title
2450 sf (D) typical units on lot 44

THE HAVIES
5038 Laurel Ave.
Sechelt, BC

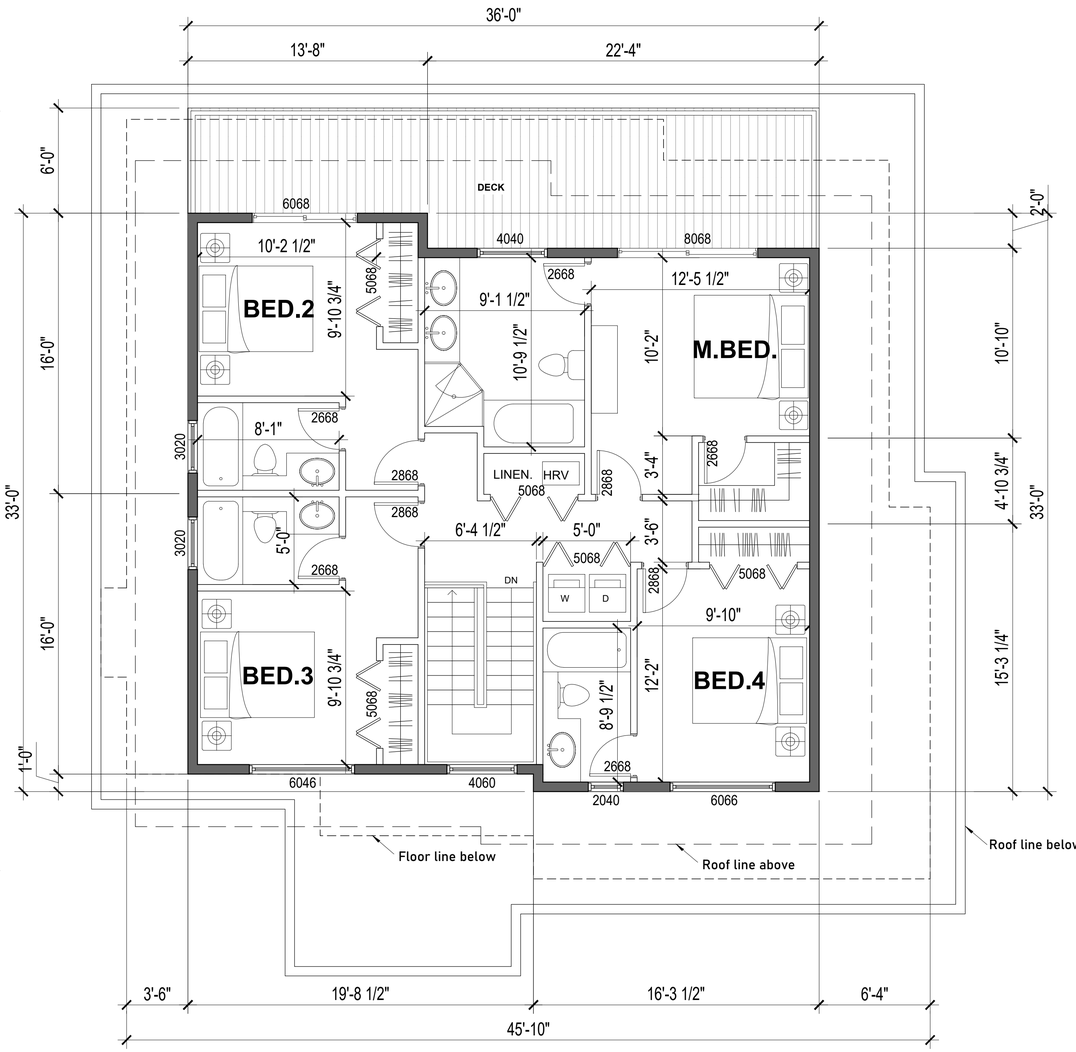
Sheet Title
SITE PLAN

Drawn: S.L.
Checked: M.C.
Scale: 1/8" = 1'-0"
Project Number: 15 V TH 01
Revision Date:
Dwg. No.: A001
Print Date: 05/25/22



MAIN FLOOR PLAN

LOT 41-52, 61-62, 70-72, 81-82
MAIN LIVING AREA 1350 SF
2 CAR GARAGE AREA 460 SF



UPPER FLOOR PLAN

LOT 41-52, 61-62, 70-72, 81-82
UPPER LIVING AREA 1124 SF

MATTHEW CHENG ARCHITECT INC.
Unit 202 - 670 EVANS AVENUE
VANCOUVER, BC V6A 2K9
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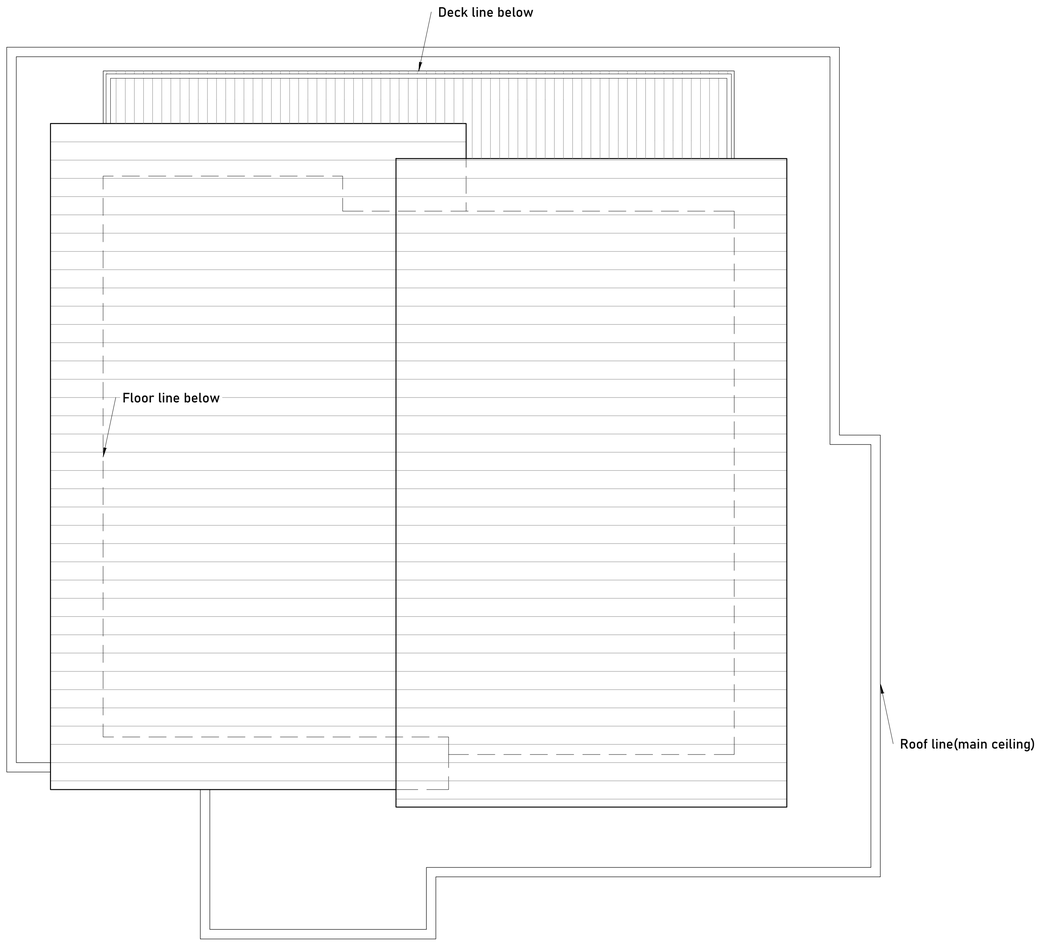
Consultants

Project Title
2450 sf (D) typical units on lot 44 Option 1

THE HAVIES
5038 Laurel Ave.
Sechelt, BC

Sheet Title
MAIN FLOOR PLAN
UPPER FLOOR PLAN

Drawn: S.L.
Checked: M.C.
Scale: 1/4" = 1'-0"
Project Number: 15 V TH 01
Revision Date:
Dwg. No.: A101
Print Date: 05/25/22



ROOF PLAN

LOT 41-52, 61-62, 70-72, 81-82

MATTHEW CHENG
ARCHITECT INC.
Unit 202 - 670 EVANS AVENUE
VANCOUVER, BC V6A 2K9
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Revision:

RE V	YY-MM-DD	DESCRIPTION	DRWN	CHK

Consultants

Project Title

2450 sf (D) typical units on lot 44 Option 1

THE HAVIES
5038 Laurel Ave.
Sechelt, BC

Sheet Title

ROOF PLAN

Drawn: S.L.

Checked: M.C.

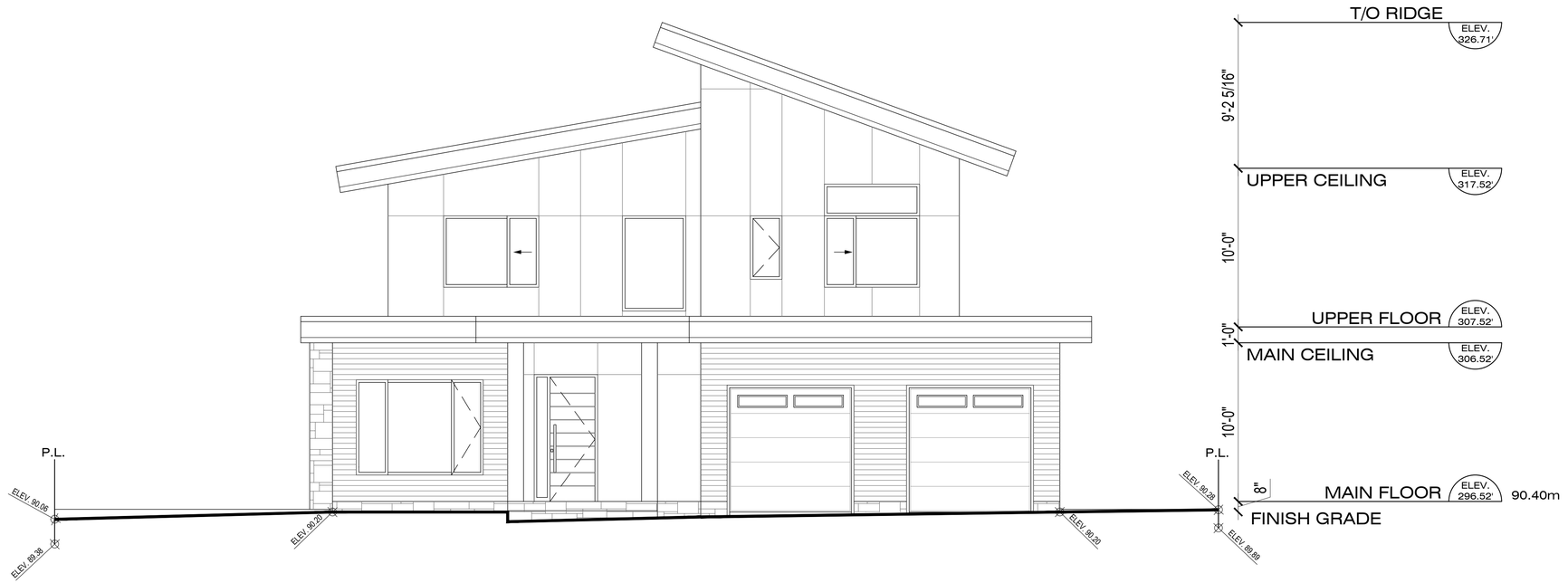
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Project Number: 15 V TH 01

Revision Date:

Dwg. No.: A102

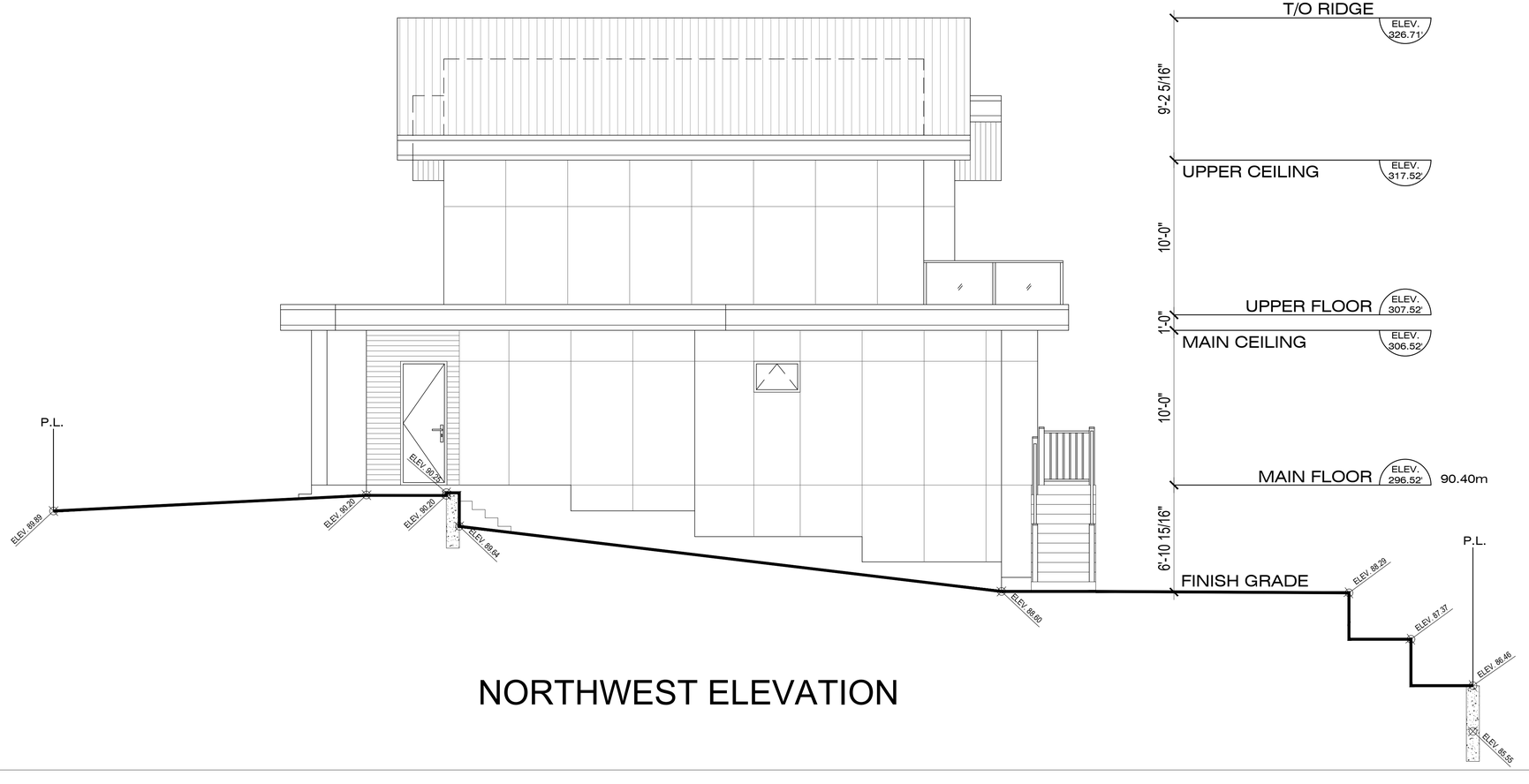
Print Date: 05/25/22



NORTHEAST ELEVATION

MATERIAL LEGEND

SAMPLE	SUPPLIER	SPECIFICATION
	HARDIE BOARD	PEARL GRAY
	FASCIA BOARD	MEDIUM GREY TYPICAL
	DRY-STACK STONE	CHARCOAL
	FISHER COATING	TRUEGRAIN SERIES CEDARTONE
	CONCRETE	MEDIUM GREY TYPICAL



NORTHWEST ELEVATION

MATTHEW CHENG ARCHITECT INC.
Unit 202 - 670 EVANS AVENUE
VANCOUVER, BC V6A 2K9
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Revision:

RE V	YY-MM-DD	DESCRIPTION	DRWN	CHK

Consultant
s

Project Title

2450 sf (D) typical units on lot 44 Option 1

THE HAVIES
5038 Laurel Ave.
Sechelt, BC

Sheet Title

NORTHEAST ELEVATION

NORTHWEST ELEVATION

Drawn: S.L.

Checked: M.C.

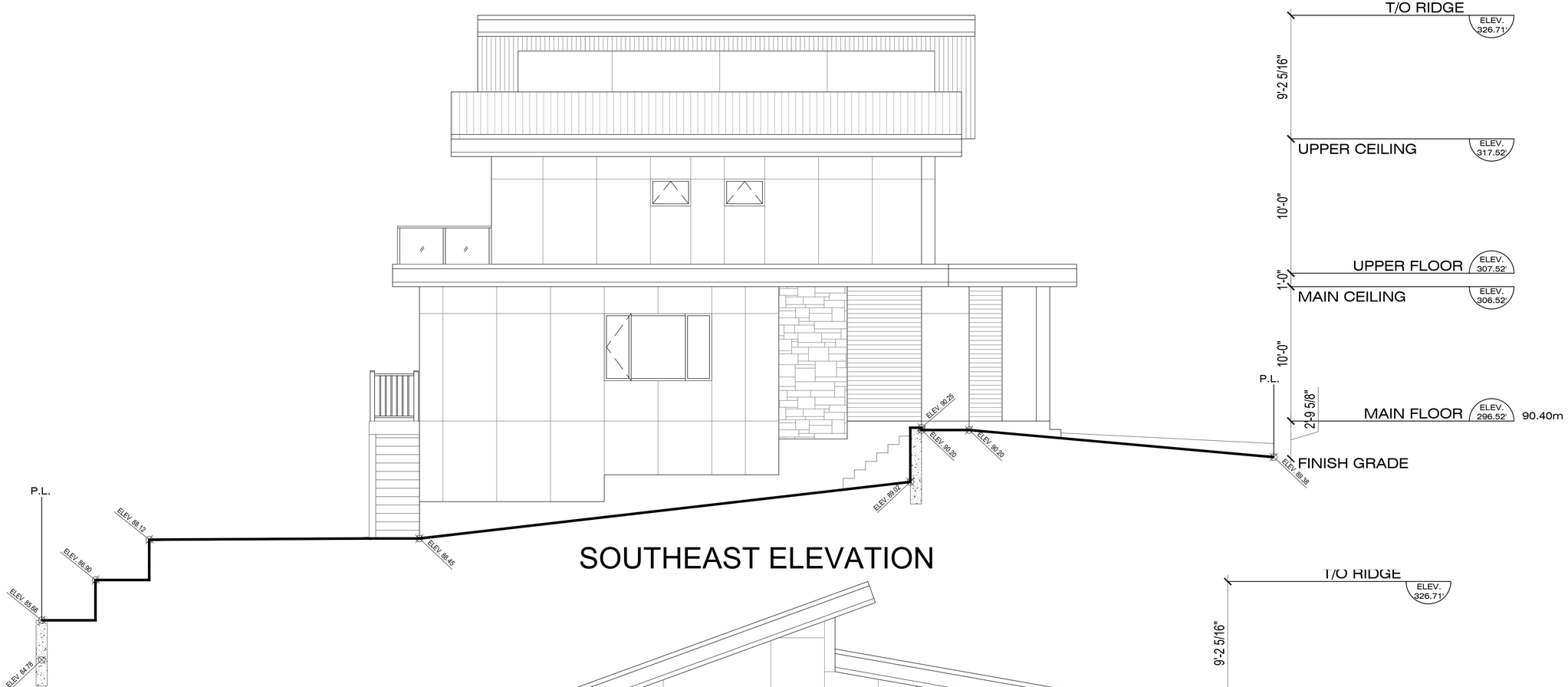
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Project Number: 15 V TH 01

Revision Date:

Dwg. No.: A201

Print Date: 05/25/22



SOUTHEAST ELEVATION



SOUTHWEST ELEVATION

MATERIAL LEGEND

SAMPLE	SUPPLIER	SPECIFICATION
	HARDIE BOARD	PEARL GRAY
	FASCIA BOARD	MEDIUM GREY TYPICAL
	DRY-STACK STONE	CHARCOAL
	FISHER COATING	TRUEGRAIN SERIES CEDARTONE
	CONCRETE	MEDIUM GREY TYPICAL

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Revision:

RE V	YY-MM-DD	DESCRIPTION	DRWN	CHK

Consultants

Project Title

2450 sf (D) typical units on lot 44 Option 1

5038 Laurel Road, Sechelt, Sunshine Coast

Sheet Title

SOUTHEAST ELEVATION

SOUTHWEST ELEVATION

Drawn: S.L.

Checked: M.C.

Scale: 1/4" = 1'-0"

Project Number: 15 V TH 01

Revision Date:

Dwg. No.: A202

Print Date: 05/25/22

HOUSE TYPE E

THE HAVIES 2450SF(E) TYPICAL

UNITS ON LOT 85

5038 LAUREL ROAD, SECHELT, BC



Rendering represents typical units only. Individual units may differ.

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Revision:

RE V	YY-MM-DD	DESCRIPTION	DRWN	CHK

Consultants

Project Title
2450 sf (E) typical units on lot 85

THE HAVIES
5038 Laurel Ave.
Sechelt, BC

Sheet Title
COVER SHEET

Drawn: S.L.
Checked: M.C.
Scale: N.T.S.
Project Number: 15 V TH 01
Revision Date:
Dwg. No.: A000
Print Date: 05/25/22

18.000
268° 17' 08"

18.000
268° 17' 08"

LANEWAY 2

0+140

0+120

88° 17' 08"
30.847

91.17

3'-4" [1.02m]

88° 17' 08"
19.500

92.28

Garage

21'-0" [6.40m]

3070

20'-0" [6.10m]

3'-4" [1.02m]

Gara

Lot 83

F

110'-3" [33.60m]

20.868

178° 17' 08"

25.312
268° 17' 08"

168'-0" [51.21m]

29.502

178° 17' 08"

50.400

178° 17' 08"

Lot 84

F

11'-0" [3.35m]

44'-0" [13.41m]

10'-0" [3.05m]

Lot 86

E

90.25

90.41

91.20

91.38

Lot 85

A=982.80 sq.m

E

31'-8" [9.65m]

90.01

90.12

90.97

91.15

26'-1" [7.95m]

8.560
313° 46' 50"

13.500
268° 17' 08"

19.500
268° 17' 08"

89.80

90.10

90.21

90.94

65'-0" [19.81m]

0+180

HAVIES RD

0+160

SITE PLAN

MATTHEW CHENG
ARCHITECT INC.
Unit 202 - 670 EVANS AVENUE
VANCOUVER, BC V6A 2K9
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Revision:

RE V	YY-MM-DD	DESCRIPTION	DRWN	CHK

Consultants

Project Title

2450 sf (E) typical units on lot 56-60, 65-69,76-80,85-89

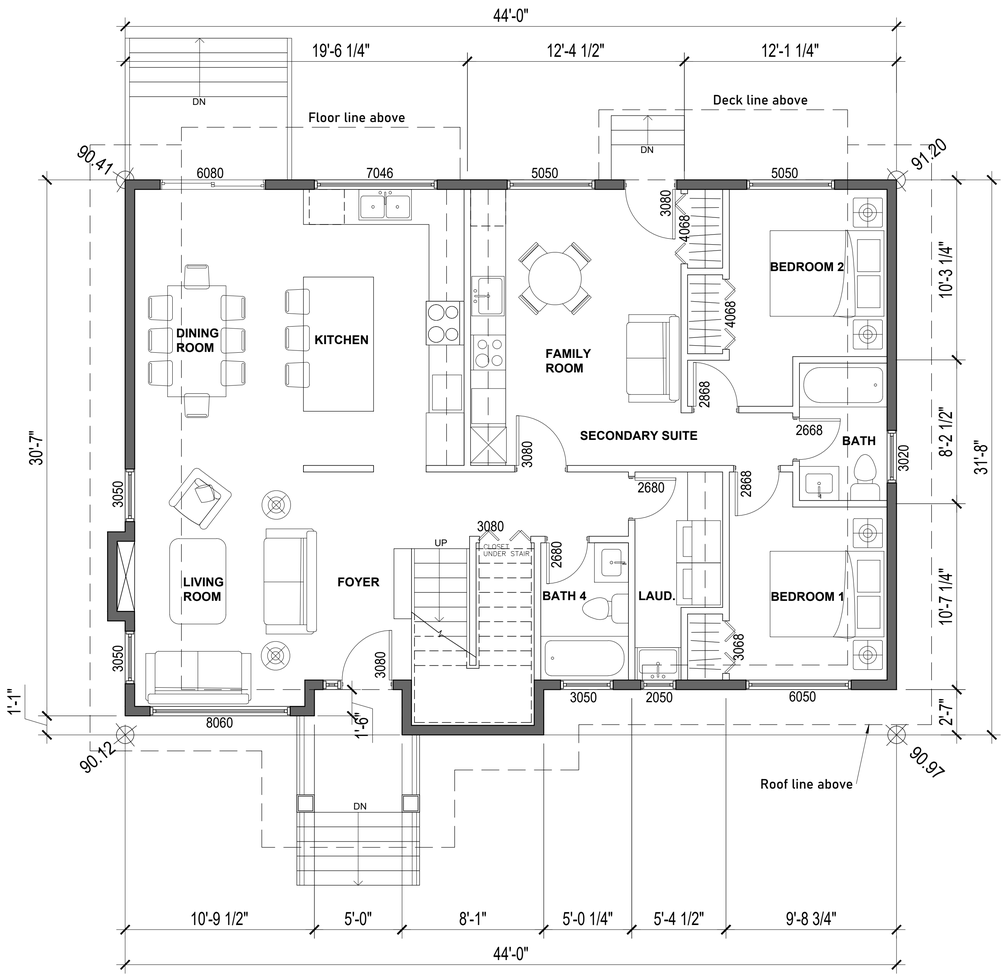
THE HAVIES
5038 Laurel Ave.
Sechelt, BC

Sheet Title

SITE PLAN

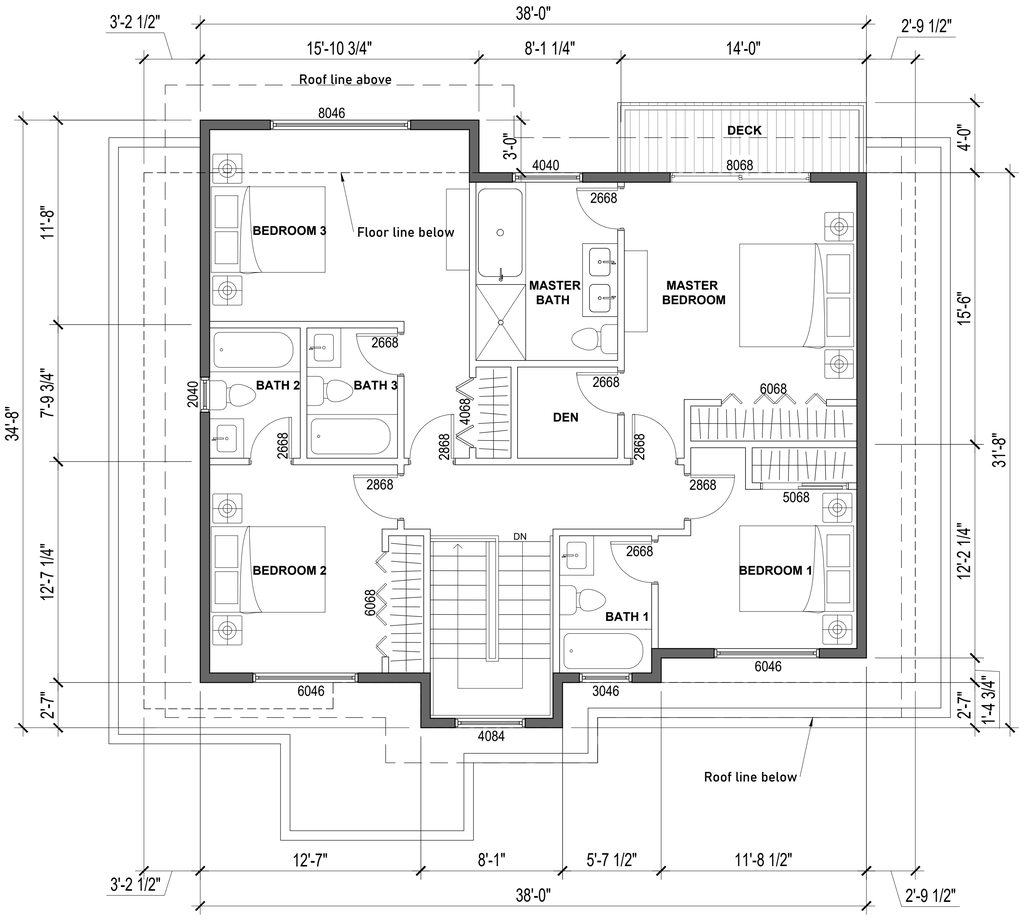
Drawn: S.L.
Checked: M.C.
Scale: 1/8" = 1'-0"
Project Number: 15 V TH 01
Revision Date:
Dwg. No.:
Print Date: 05/25/22

A001



MAIN FLOOR PLAN

MAIN LIVING AREA 1317 SF



UPPER FLOOR PLAN

UPPER LIVING AREA 1157 SF

MATTHEW CHENG ARCHITECT INC.
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Revision:

RE V	YY-MM-DD	DESCRIPTION	DRWN	CHK

Consultants

Project Title

2450 sf (E) typical units on lot 85 Option 1

THE HAVIES
5038 Laurel Ave.
Sechelt, BC

Sheet Title

MAIN FLOOR PLAN

UPPER FLOOR PLAN

Drawn: S.L.

Checked: M.C.

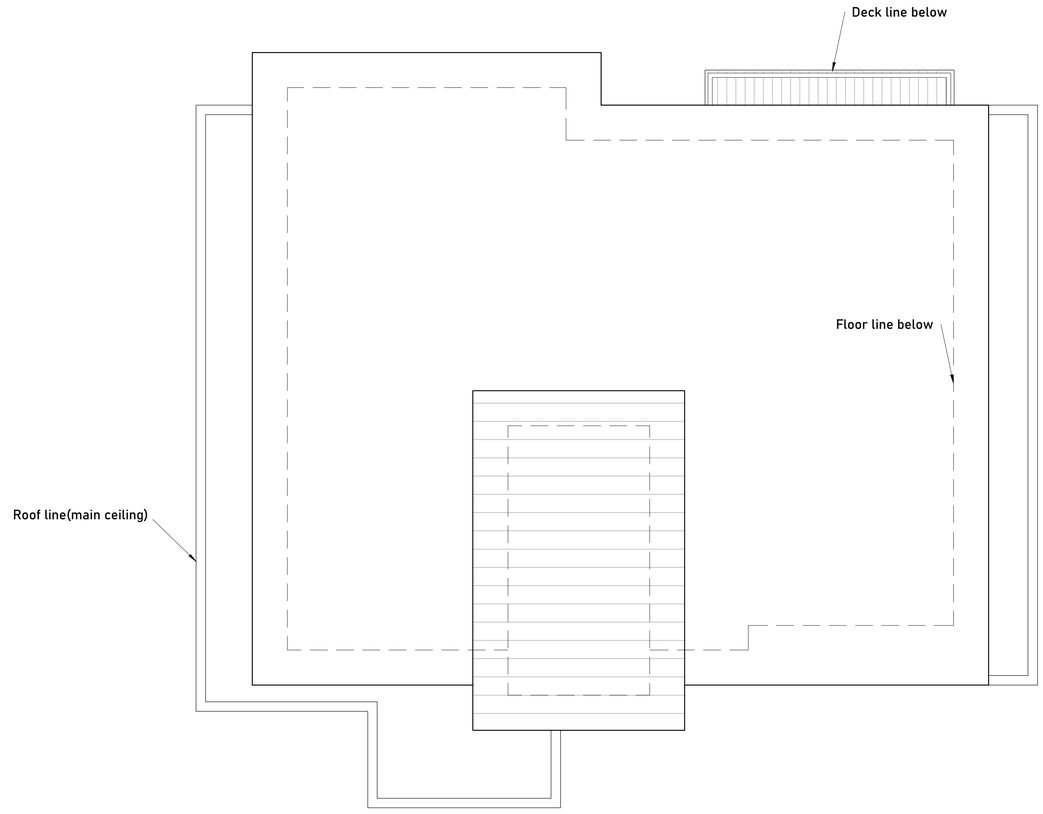
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Project Number: 15 V TH 01

Revision Date:

Dwg. No.: A101

Print Date: 05/25/22



ROOF PLAN

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Revision:

REV	YY-MM-DD	DESCRIPTION	DRWN	CHK

Consultants

Project Title

2450 sf (E) typical units on lot 85 Option 1

THE HAVIES
5038 Laurel Ave.
Sechelt, BC

Sheet Title

ROOF PLAN

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Scale: 1/4" = 1'-0"

Project Number: 15 V TH 01

Revision Date:

Dwg. No.: A102

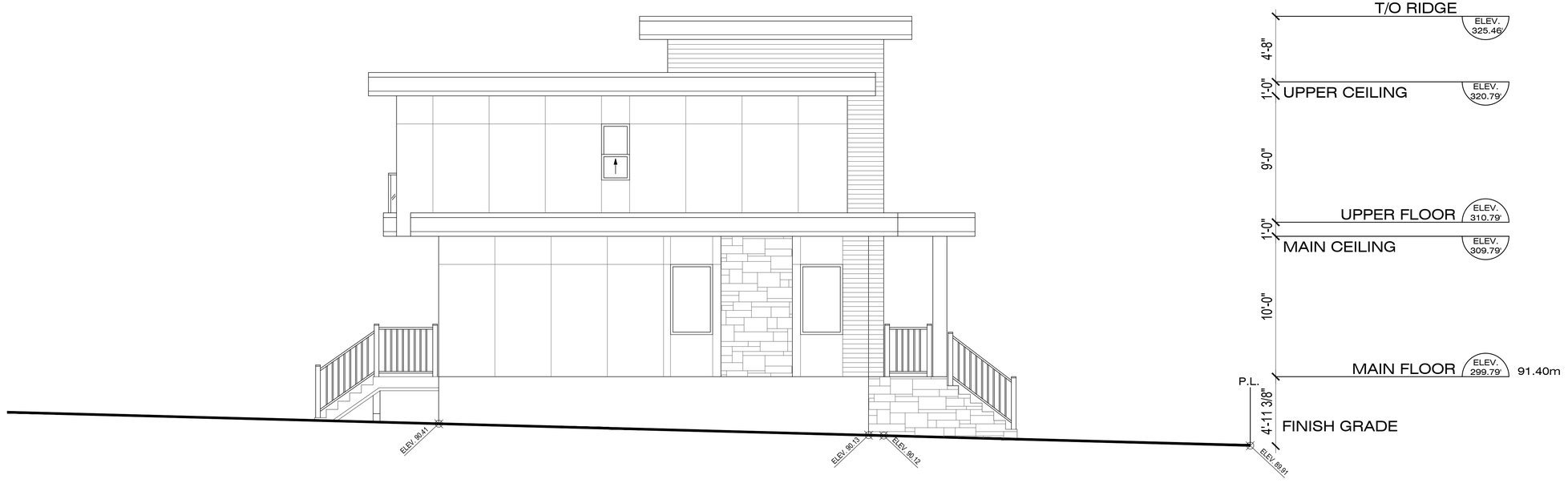
Print Date: 05/25/22

MATERIAL LEGEND

SAMPLE	SUPPLIER	SPECIFICATION
	HARDIE BOARD	NAVAJO BEIGE JH30-10
	FASCIA BOARD	MEDIUM GREY TYPICAL
	DRY-STACK STONE	CHARCOAL
	FISHER COATING	TRUEGRAIN SERIES SEPIA
	CONCRETE	MEDIUM GREY TYPICAL



SOUTH ELEVATION



WEST ELEVATION

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Revision:

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Project Title

2450 sf (E) typical units on lot 85 Option 1

THE HAVIES
5038 Laurel Ave.
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Sheet Title

SOUTH ELEVATION

WEST ELEVATION

Drawn: S.L.

Checked: M.C.

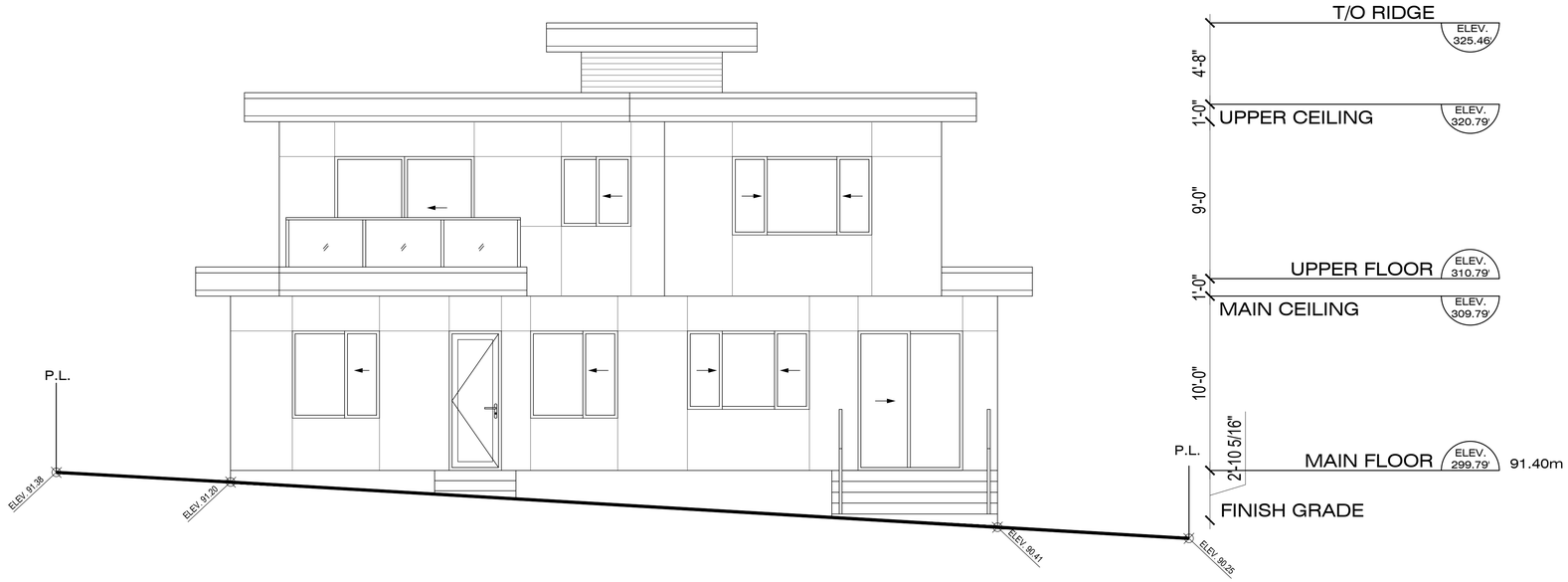
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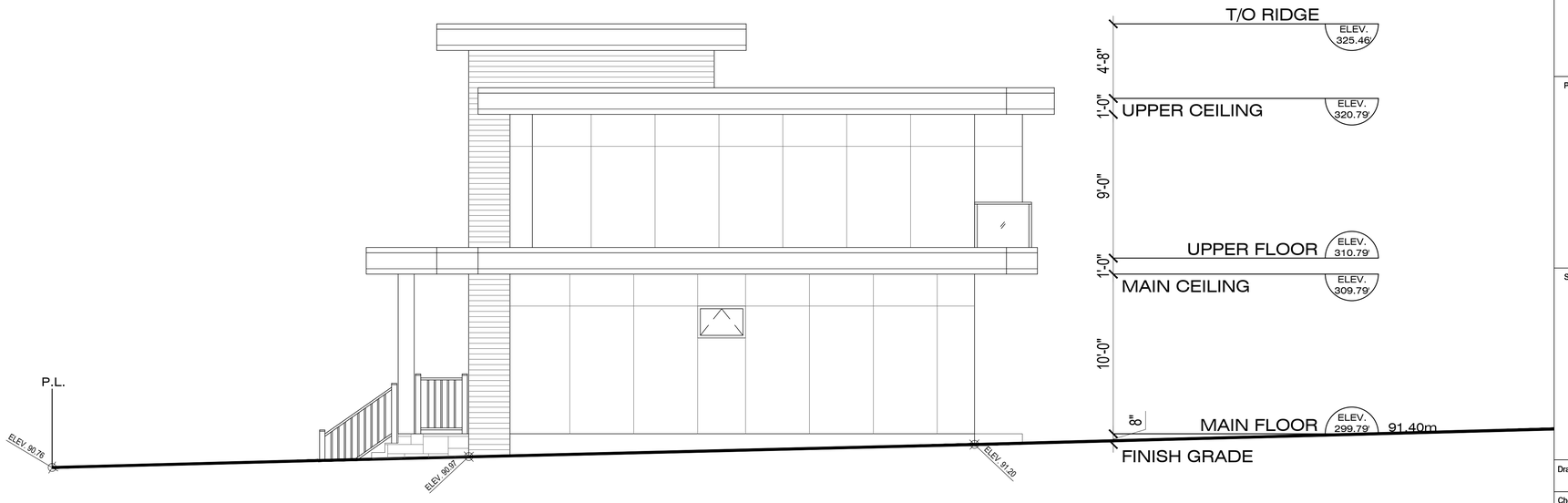
Print Date: 05/25/22



NORTH ELEVATION

MATERIAL LEGEND

SAMPLE	SUPPLIER	SPECIFICATION
	HARDIE BOARD	NAVAJO BEIGE JH30-10
	FASCIA BOARD	MEDIUM GREY TYPICAL
	DRY-STACK STONE	CHARCOAL
	FISHER COATING	TRUEGRAIN SERIES SEPIA
	CONCRETE	MEDIUM GREY TYPICAL



EAST ELEVATION

MATTHEW CHENG ARCHITECT INC.
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Revision:

REV	YY-MM-DD	DESCRIPTION	DRWN	CHK

Consultants

Project Title

2450 sf (E) typical units on lot 85 Option 1

THE HAVIES
5038 Laurel Ave.
Sechelt, BC

Sheet Title

NORTH ELEVATION

EAST ELEVATION

Drawn: S.L.
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Scale: 1/4" = 1'-0"
Project Number: 15 V TH 01
Revision Date:
Dwg. No.: A202
Print Date: 05/25/22

HOUSE TYPE F

THE HAVIES 2450SF(F) TYPICAL

UNITS ON LOT 53-55,63-64,73-75,83-84,90-99

5038 LAUREL ROAD, SECHELT, BC



MATTHEW CHENG ARCHITECT INC.
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Revision:

RE V	YY-MM-DD	DESCRIPTION	DRWN	CHK

Consultants

Project Title

2450 sf (F) typical units on lot 53-55, 63-64,73-75,83-84, 90-99

THE HAVIES
5038 Laurel Ave.
Sechelt, BC

Sheet Title

COVER SHEET

Drawn: S.L.

Checked: M.C.

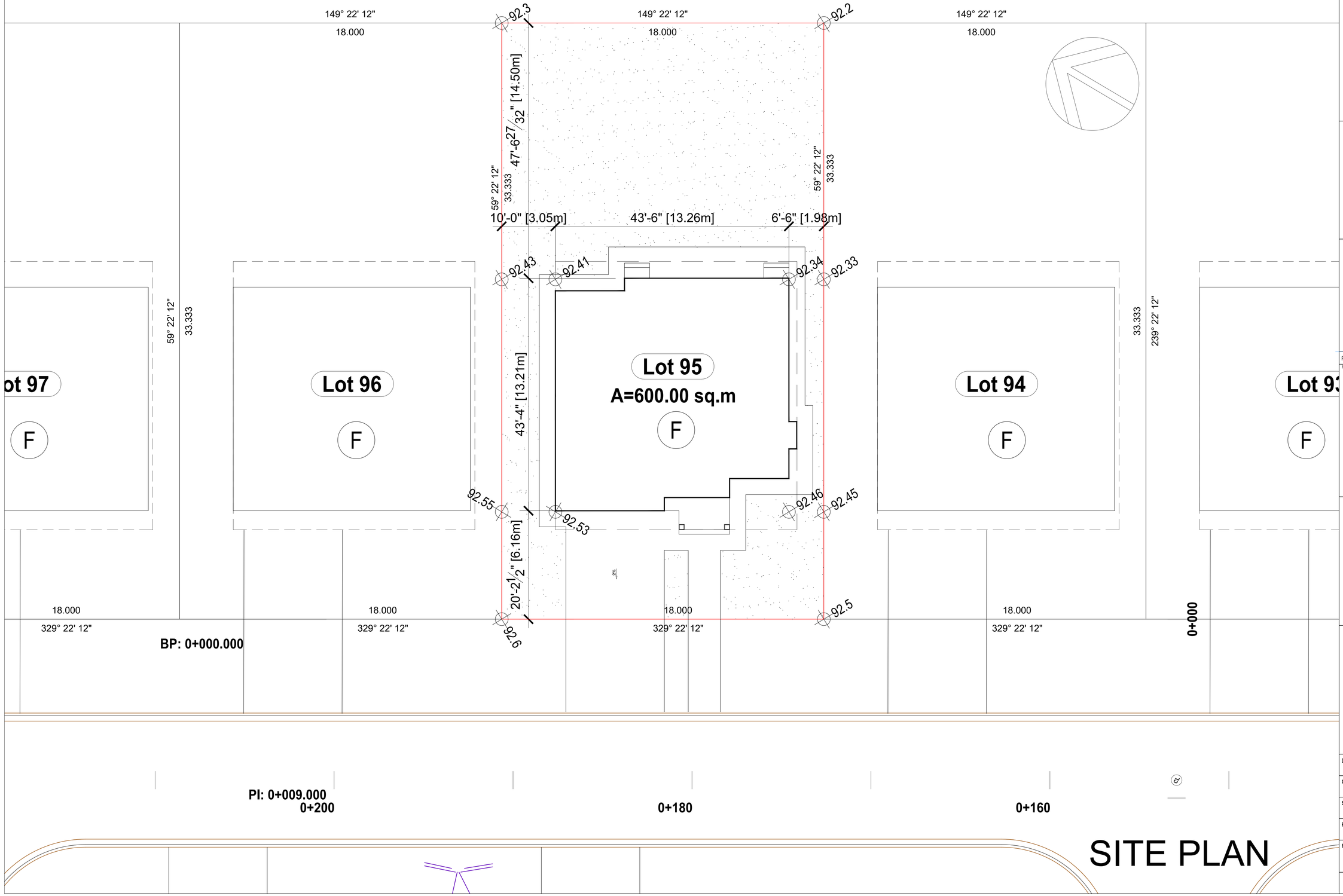
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Project Number: 15 V TH 01

Revision Date:

Dwg. No.: A000

Print Date: 04/11/22



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Revision:

RE V	YY-MM-DD	DESCRIPTION	DRWN	CHK

Consultant s

Project Title

2450 sf (F) typical units on lot 53-55, 63-64,73-75,83-84, 90-99

THE HAVIES
5038 Laurel Ave.
Sechelt, BC

Sheet Title

SITE PLAN

Drawn: S.L.

Checked: M.C.

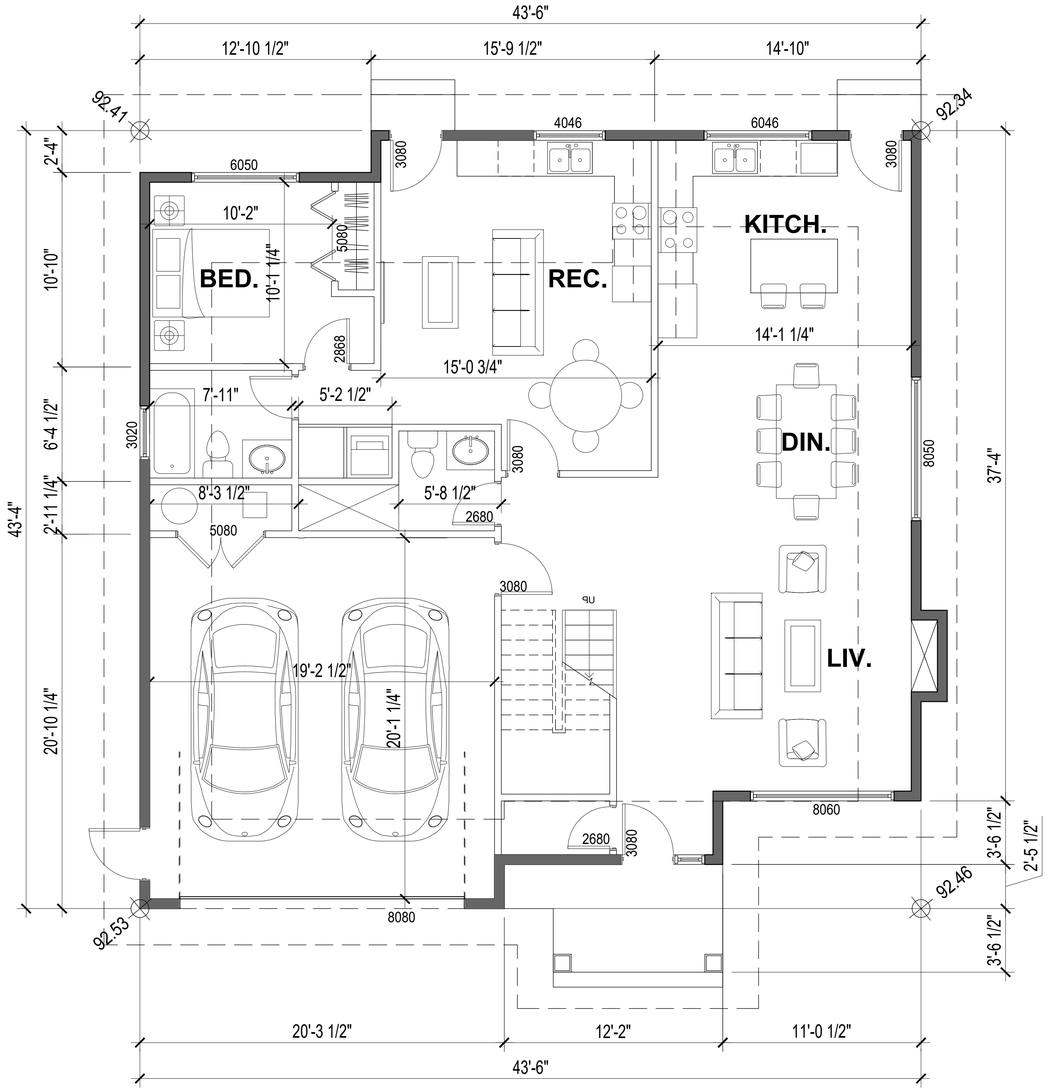
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Revision Date:

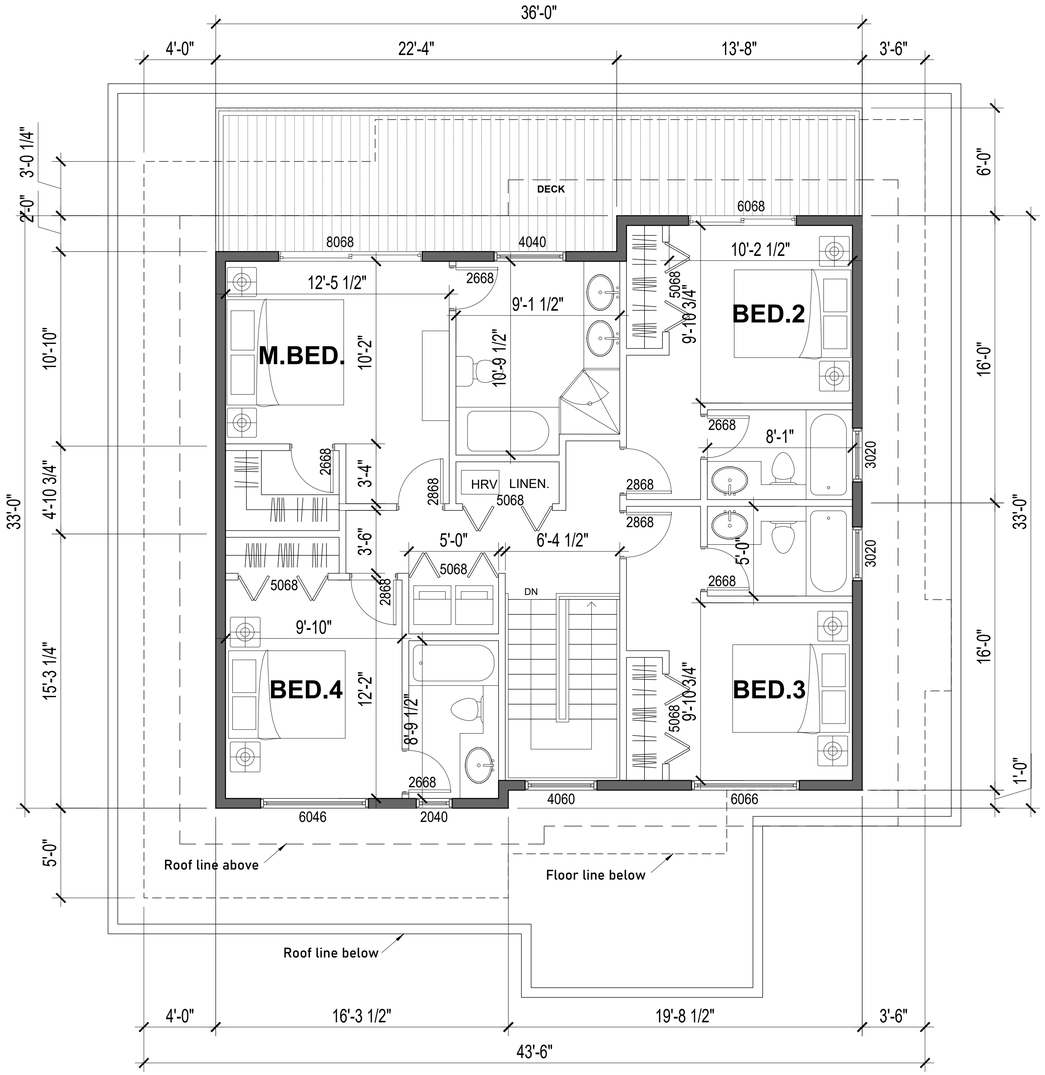
Dwg. No.: A001

Print Date: 04/11/22



MAIN FLOOR PLAN

LOT 53-55, 63-64, 73-75, 83-84, 90-99
MAIN LIVING AREA 1350 SF
2 CAR GARAGE AREA 410 SF



UPPER FLOOR PLAN

LOT 53-55, 63-64, 73-75, 83-84, 90-99
UPPER LIVING AREA 1124 SF

MATTHEW CHENG
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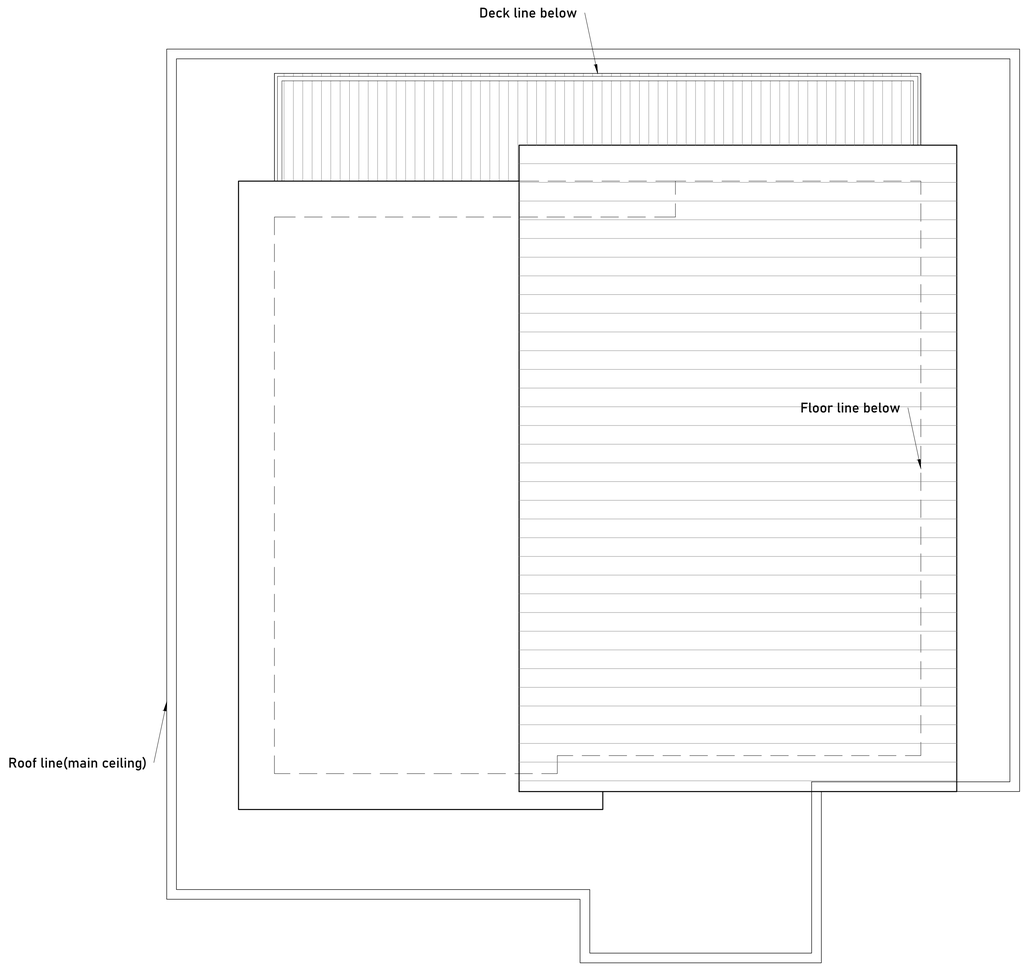
Consultants

Project Title
2450 sf (F) typical units on lot 53-55, 63-64,73-75,83-84, 90-99
THE HAVIES
5038 Laurel Ave.
Sechelt, BC

Sheet Title
MAIN FLOOR PLAN

UPPER FLOOR PLAN

Drawn: S.L.
Checked: M.C.
Scale: 1/4" = 1'-0"
Project Number: 15 V TH 01
Revision Date:
Dwg. No.: A101
Print Date: 04/11/22



ROOF PLAN

MATTHEW CHENG
ARCHITECT INC.
Unit 202 - 670 EVANS AVENUE
VANCOUVER, BC V6A 2K9
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Revision:

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Consultants

Project Title

2450 sf (F) typical units on lot 53-55, 63-64,73-75,83-84, 90-99

THE HAVIES
5038 Laurel Ave.
Sechelt, BC

Sheet Title

ROOF PLAN

Drawn: S.L.

Checked: M.C.

Scale: 1/4" = 1'-0"

Project Number: 15 V TH 01

Revision Date:

Dwg. No.: A102

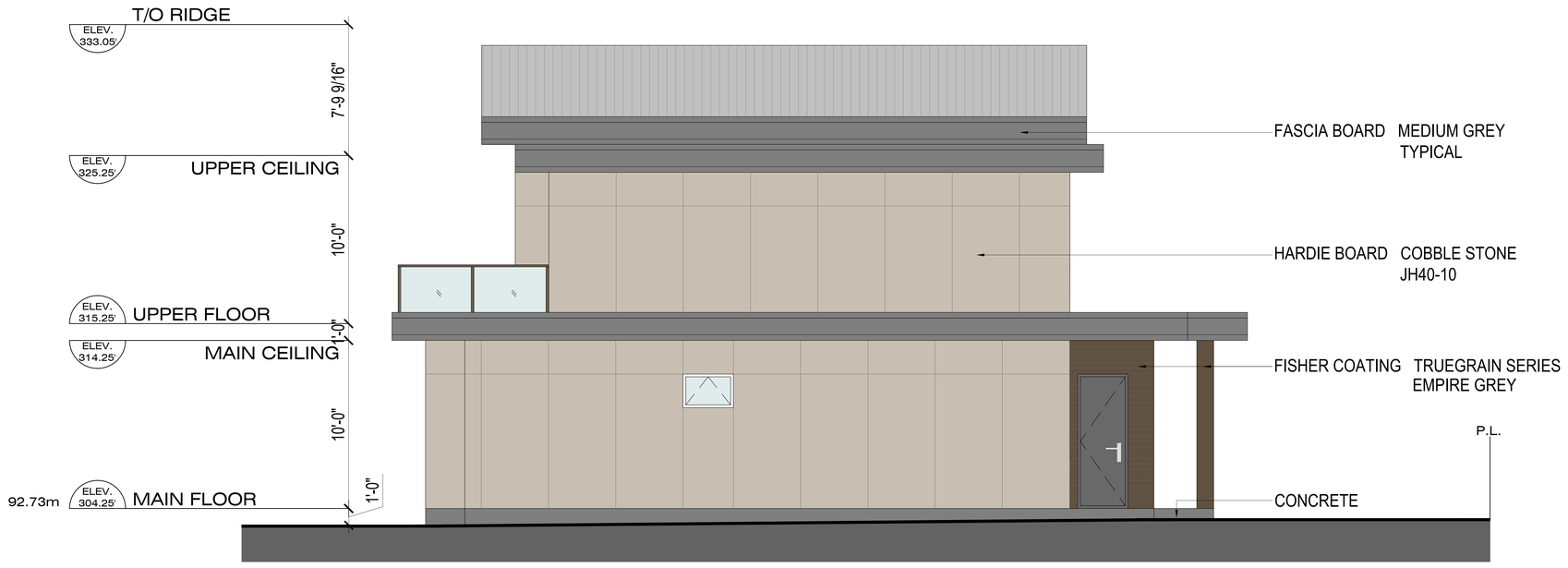
Print Date: 04/11/22



SOUTHWEST ELEVATION

MATERIAL LEGEND

SAMPLE	SUPPLIER	SPECIFICATION
	HARDIE BOARD	COBBLE STONE JH40-10
	FASCIA BOARD	MEDIUM GREY TYPICAL
	DRY-STACK STONE	CHARCOAL
	FISHER COATING	TRUEGRAIN SERIES EMPIRE GREY
	CONCRETE	MEDIUM GREY TYPICAL



NORTHWEST ELEVATION

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Revision:

RE V	YY-MM-DD	DESCRIPTION	DRWN	CHK

Consultants

Project Title

2450 sf (F) typical units on lot 53-55, 63-64,73-75,83-84, 90-99

THE HAVIES
5038 Laurel Ave.
Sechelt, BC

Sheet Title

SOUTHWEST ELEVATION

NORTHWEST ELEVATION

Drawn: S.L.

Checked: M.C.

Scale: 1/4" = 1'-0"

Project Number: 15 V TH 01

Revision Date:

Dwg. No.: A201

Print Date: 04/11/22



SOUTHEAST ELEVATION

MATERIAL LEGEND

SAMPLE	SUPPLIER	SPECIFICATION
	HARDIE BOARD	COBBLE STONE JH40-10
	FASCIA BOARD	MEDIUM GREY TYPICAL
	DRY-STACK STONE	CHARCOAL
	FISHER COATING	TRUEGRAIN SERIES EMPIRE GREY
	CONCRETE	MEDIUM GREY TYPICAL



NORTHEAST ELEVATION

MATTHEW CHENG ARCHITECT INC.
Unit 202 - 670 EVANS AVENUE
VANCOUVER, BC V6A 2K9
Tel: (604) 731-3012 / Fax: (604) 731-3908
Cel: (604) 649-0669 / Email:
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Revision:

RE V	YY-MM-DD	DESCRIPTION	DRWN	CHK

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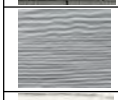
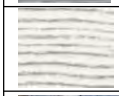
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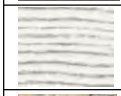
HOUSE TYPE COLOUR SCHEMES

Type A-B

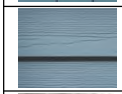
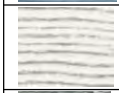
Colour Scheme 1

SAMPLE	LOCATION	SPECIFICATION
	FACIAL BOARD, TRIM & GARAGE DOOR	CALM OC-22
	HARDIE SHINGLES SIDING	LIGHT MIST
	HARDIE BOARD SIDING	LIGHT MIST
	HARDIE BOARD SOFFIT	SUMMER WHITE
	STONE CLADDING	KETTLE VALLEY GRANITE URBAN LEDGE
	BASE/SKIRTING/PAVEMENT	CONCRETE CEMENT
	ROOF	ASPHALT SHINGLES

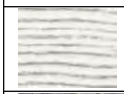
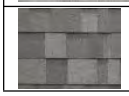
Colour Scheme 2

SAMPLE	LOCATION	SPECIFICATION
	FACIAL BOARD, TRIM & GARAGE DOOR	CALM OC-22
	HARDIE SHINGLES SIDING	AGED PEWTER
	HARDIE BOARD SIDING	AGED PEWTER
	HARDIE BOARD SOFFIT	SUMMER WHITE
	STONE CLADDING	ARBUTUS SQUARES & RECS
	BASE/SKIRTING/PAVEMENT	CONCRETE CEMENT
	ROOF	ASPHALT SHINGLES

Colour Scheme 3

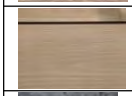
SAMPLE	LOCATION	SPECIFICATION
	FACIAL BOARD, TRIM & GARAGE DOOR	CALM OC-22
	HARDIE SHINGLES SIDING	denim blue
	HARDIE BOARD SIDING	denim blue
	HARDIE BOARD SOFFIT	SUMMER WHITE
	STONE CLADDING	BLACK PEARL LEDGE STONE VENEER
	BASE/SKIRTING/PAVEMENT	CONCRETE CEMENT
	ROOF	ASPHALT SHINGLES

Colour Scheme 4

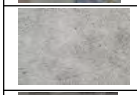
SAMPLE	LOCATION	SPECIFICATION
	FACIAL BOARD, TRIM & GARAGE DOOR	CALM OC-22
	HARDIE SHINGLES SIDING	BAKED CLAY
	HARDIE BOARD SIDING	BAKED CLAY
	HARDIE BOARD SOFFIT	SUMMER WHITE
	STONE CLADDING	Thin Cobble Veneer
	BASE/SKIRTING/PAVEMENT	CONCRETE CEMENT
	ROOF	ASPHALT SHINGLES

Type C-F

Colour Scheme 1

SAMPLE	LOCATION	SPECIFICATION
	HARDIE PANEL PAINTED	SILENT NIGHT
	FACIAL BOARD	STORMY SKY
	GARAGE DOOR	STORMY SKY
	HARDIE BOARD SIDING	TRUE GRAIN SERIES BEECH
	HARDIE BOARD SOFFIT	TRUE GRAIN SERIES BEECH
	STONE CLADDING	OCEAN MIST ASHLAR
	BASE/SKIRTING/PAVEMENT	CONCRETE CEMENT
	ROOF	ASPHALT SHINGLES

Colour Scheme 2

SAMPLE	LOCATION	SPECIFICATION
	HARDIE PANEL PAINTED	RODEO
	FACIAL BOARD	KENDALL CHARCOAL
	GARAGE DOOR	KENDALL CHARCOAL
	HARDIE BOARD SIDING	TRUE GRAIN SERIES SEPIA
	HARDIE BOARD SOFFIT	PONY BROWN
	STONE CLADDING	ARBUTUS SQUARES & RECS
	BASE/SKIRTING/PAVEMENT	CONCRETE CEMENT
	ROOF	ASPHALT SHINGLES

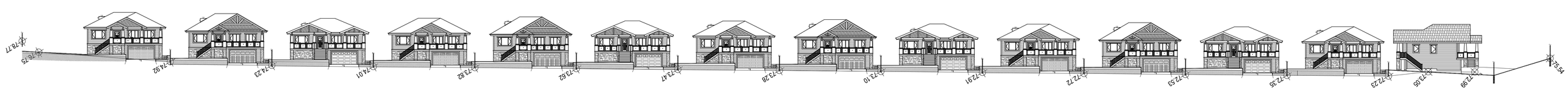
Colour Scheme 3

SAMPLE	LOCATION	SPECIFICATION
	HARDIE PANEL PAINTED	SILENT NIGHT
	FACIAL BOARD	CASCABEL CHILE
	GARAGE DOOR	WROUGHT IRON
	HARDIE BOARD SIDING	ELEGANT RED
	HARDIE BOARD SOFFIT	ELEGANT RED
	STONE CLADDING	LIMESTONE-GRAND BANKS
	BASE/SKIRTING/PAVEMENT	CONCRETE CEMENT
	ROOF	ASPHALT SHINGLES

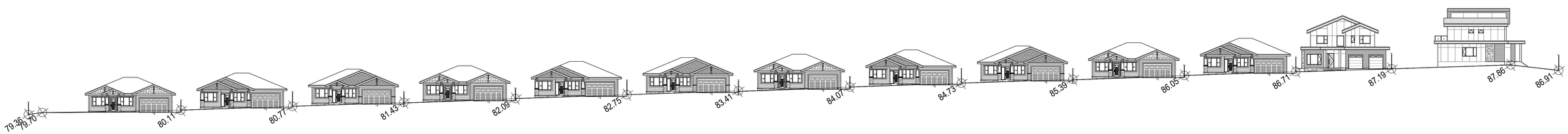
Colour Scheme 4

SAMPLE	LOCATION	SPECIFICATION
	HARDIE PANEL PAINTED	RODEO
	FACIAL BOARD	WROUGHT IRON
	GARAGE DOOR	WROUGHT IRON
	HARDIE BOARD SIDING	NAVY BLUE(RGB 74, 82, 92)
	HARDIE BOARD SOFFIT	NAVY BLUE
	STONE CLADDING	OCEAN MIST ASHLAR
	BASE/SKIRTING/PAVEMENT	CONCRETE CEMENT
	ROOF	ASPHALT SHINGLES

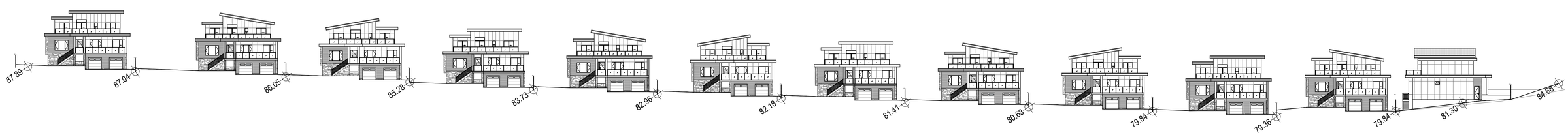
HOUSE TYPE ELEVATIONS



TYPE A BETTY RD ELEVATION



TYPE B ROAD A ELEVATION



TYPE C ROAD A ELEVATION



TYPE D LAUREL AVE ELEVATION



TYPE E HAVIES RD ELEVATION



TYPE F ROAD C ELEVATION


HOUSE TYPE A














HOUSE TYPE B














HOUSE TYPE C














HOUSE TYPE D














HOUSE TYPE E














HOUSE TYPE F













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April 6, 2022
Our File: 121-5024

HOMEI SECHELT (LAUREL) LIMITED PARTNERSHIP
2253-13353 Commerce Parkway
Richmond, BC. V6V 3A1

c/o: **JB Coast Consulting Inc.**
Attn: **Jurek Janota Bzowski, B.Sc, P.Eng**
Kia Zahrabi, B.Eng, P.Eng

Re: **Proposed Havies Rd. 100 Lot Subdivision at 5038 Laurel Avenue, Sechelt, BC**
Geotechnical Investigation Report – R2

1.0 INTRODUCTION

This report summarizes the results of the subsurface investigations carried out during the period of January 10 to 14, 2022 and provides geotechnical design and construction recommendations for the proposed subdivision. The recommendations provided in this report are based on the results of the subsurface investigation, slope hazard reconnaissance, engineering analyses, our interpretation of local geology, our experience with similar projects, and the requirements set forth by the District of Sechelt's Development Permit Areas which are relevant to the subject site.

This report has been prepared in general conformance with our scope of services dated December 7, 2021 (ref. File No: P21-3617) to support the District of Sechelt's subdivision Development Permit process. Authorization to Proceed was received on January 17, 2021.

2.0 SITE DESCRIPTION

The subject site is situated to the north of the intersection of Havies Road and Laurel Street, in Sechelt, BC. The subject site has a civic address of 5038 Laurel Avenue and is approximately trapezoidal in shape. The site is bounded by Nestman Road and in turn, an undeveloped, forested lot to the north, residential lots to the west, Havies Road to the south and densely forested, steeply sloping terrain and in turn Chapman Creek to the east. It should be noted that the subject property encompasses a portion of the west bank of the Chapman Creek ravine. A site location plan is attached in Figure 1.

Based on information provided from the Sunshine Coast Regional District (SCRD) online mapping database (Property Viewer), it is understood that the subject site has approximately 500 and 368 metres of frontage along Nestman and Havies Road, respectively, and extends approximately 233 metres in the north-south direction. It is further understood that the site encompasses an area of approximately 25 acres in plan. Aerial imagery and a discussion with the project team indicates that the site is generally undeveloped with the exception of a series of gravel roads which grant access to the site from Havies Road to the south and Nestman Road to the northwest.

For description purposes, the terrain within the subject property can generally be divided into four sections. Based on topographic information provided by the SCRD online mapping system, the western portion of the site slopes moderately down from a geodetic elevation of approximately El. 97 metres, along the central portion of the site, to El. 74 metres along the west property line of the site. The central portion of the site comprises comparatively milder sloping terrain of approximately 1V:20H which slopes down towards the east over a horizontal distance of approximately 138 metres, effectively forming a "ridge" along the central portion of the site. A 7

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metres high, moderately steep slope, having a geometry of approximately 1V:3H to 1V:2H, sloping down to the east over a horizontal distance of approximately 23 metres is present along the northeast portion of the site and extends approximately in the north-south direction. The topography flattens over a horizontal distance of approximately 30 metres to the east of the toe of this slope and towards the crest of the west bank of Chapman Creek ravine located to the northeast, forming a bench between these slopes. A pedestrian trail, orientated approximately parallel to the toe of the upper slope currently traverses this bench. The topography along the west ravine embankment of Chapman Creek slopes steeply down towards the northeast corner of the site at gradients estimated to range from approximately 1V:1.5H to 1V:1H. The west bank flattens near the toe of the slope, towards the floodplain of Chapman Creek. The elevation difference between the portion of the crest of the ravine bank which encroaches within the property and its toe is estimated to be approximately 40 metres. The previously described upper 7 metres high and lower 40 metres high slopes will be referred to as the upper and lower escarpment slopes (which were inferred to be historically cut by Chapman Creek) herein this report. The SCRD online maps designate the northeast portion of the property, which encompasses a portion of the creek bank, as mostly having steep slopes which exceed gradients of 30%.

At the time of this subsurface investigation, the site was covered by mainly low-lying vegetation (i.e. small trees and shrubs). Ponding of surface water was observed along the western region of the site as well as along the southeast corner of the site which was observed to exhibit "boggy" ground surface conditions. This was inferred to be attributed to the low permeability of the till-like sand to sand and silt encountered at relatively shallow depths within the site (as further explained in Section 4.2 of this report. The portions of the site situated adjacent to the west embankment of the Chapman Creek ravine were densely vegetated with large trees and shrubs. Stockpiles of Hog fuel were also noted to be present at the northeast, central and southern portions of the site. Furthermore, the alignments of the proposed interior roads which will service the proposed subdivision had been surveyed at the time of this subsurface investigation and were delineated with survey stakes. The alignments of the proposed roads had also been cleared of surficial vegetation at the time of this investigation to better facilitate site access with the investigation equipment.

3.0 BACKGROUND INFORMATION

3.1 Sunshine Coast Regional District Development Permit Areas

For purpose of preparing this proposal, we have read and interpreted the following maps and documents which pertain to the Development Permit Areas (DPA) relevant to the subject site:

- The Sunshine Coast Regional District's (SCRD) online mapping system(Property Viewer) for the District of Sechelt which indicates that the northeastern portion of the subject site located near the west bank of Chapman Creek, is subject to DPA2 and DPA5 guidelines. For reference, we have attached a copy of the DPA map obtained from the online SCRD Maps.
- The District of Sechelt Official Community Plan Bylaw No. 492, 2010, specifically with regards to:
    - Pages 154 to 162 titled "DPA2 - Watercourses (Habitat protection and creek hazards)", and
    - Pages 172 to 179 titled "DPA5 – Steep Slopes".

Both the aforementioned documents indicate that reports for proposed developments located within these DPAs must satisfy the Guidelines for Legislated Landslide Assessments for

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Proposed Residential Developments in British Columbia, published by APEGBC (now EGBC) and dated May 2010.

It should be noted that the steep slopes of the Chapman Creek watershed have historically been documented to produce landslides (a total of 274 have been recorded as summarized in the Champman Creek Flood Analysis published by KWL in August 2010) and debris floods induced by overtopping and failures of landslide-generated dams. Thus, the District of Sechelt has identified Chapman Creek has having a high potential for creek hazards.

3.2 Surficial Geology

Based on published information from the Ministry of Mines and Petroleum Resources, the subject site is expected to be mainly underlain by Capilano Sediments consisting of Marine and Glacio-Marine deposits, comprising varied gravelly, sandy, stoney, clay and clay veneer (normally over till). However, it should be noted that the eastern edge of the site is indicated to be situated near the interface in surface expression of the aforementioned Capilano Sediments and the younger (and potentially overlying) Salish Sediments which comprise shore, deltaic, fluvial, and swamp deposits consisting of gravel, sand, clay, and peat.

3.3 Proposed Development

3.3.1 General

We have been provided with a site plan and preliminary Civil drawings dated November 4, 2021, both of which have been prepared by Kerr Wood Leidal and JB Coast Consulting. Based on the available information provided to us, we understand that the proposed development comprises 100 subdivided residential parcels with associated internal roads and utilities. It is further understood that the parcels will generally be developed with single-family homes to be founded at-grade. The aforementioned layout provided in the Civil Drawings indicates that the residential lots will generally be distributed throughout the site. However, it is understood that the easternmost 12,626 square metres of the site, which encompasses the upper escarpment and a portion of the lower escarpment, will be maintained as park space. The setback distance between the east edge of the proposed subdivision and the crest of the lower escarpment slope forming the west bank of the Chapman Creek ravine is understood to be approximately 60 to 70 metres at the north, increasing to distances greater than 80 metres towards the south end of the site.

The layout of the proposed subdivision, profile drawings of the proposed interior roads and cross-sectional profiles for each of the proposed roads, showing the cut/fill depths required to achieve the design grades of the proposed roadways are presented in the Civil drawings. Based on the subdivision layout drawings, it is understood that the residential parcels will be bordered by the proposed roadway of Nestman Road to the north, Havies Road to the south and the proposed roadway of Betty Road to the west. As the existing roadway of Nestman Road currently terminates approximately 90 metres to the east of the West Property line of the site, the subject roadway will also be extended towards the proposed easternmost residential lots to service the subdivision. The existing roadway of Laurel Avenue, currently situated to the south of the subject site will also be extended north of its intersection with Havies Road. The extended segment of this roadway will bisect the subdivision in the north-south direction and connect with Nestman Road to the north. It is understood that the alignments of two proposed interior roads (labelled "Road A and C" in the civil drawings) orientated in the north-south direction will traverse the western and eastern portions of the site, respectively, and extend from Havies Road to the south and connect with Nestman Road to the north. Furthermore, three additional interior roads (labelled "Laneway 1", "Road B" and "Laneway 2") which will be orientated in the east-west direction will connect the proposed roadways of Laurel Avenue and Road C at the eastern portion of the site.

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3.3.2 Site Grading

Based on the cross-sectional profiles provided in the civil drawings, it is understood that existing site grades at the eastern portion of the site will have to be raised by up to approximately 2 metres in order to achieve the design grades of the proposed roadways of "Road C", the eastern sections of "Laneway 1", "Road B" and "Laneway 2". It is envisaged that site grades at the proposed residential lots located adjacent to these roadways will also have to be raised accordingly. The Civil drawings indicate that existing grades along the balance of the site will be subject to cut depths of up approximately 2 metres, with fill placement of up to 2.5 metres required at the northernmost 20 to 60 metres of the proposed roadways of "Betty Road" and "Road A" to be constructed at the western half of the site.

3.4 Previous Geotechnical Assessment (Western Geotechnical, 2017)

We have been provided with a copy of the previous geotechnical assessment report completed for the subject site, which was prepared by Western Geotechnical and dated October 4, 2017. This report summarized the soil conditions encountered during the previous subsurface investigation completed at the subject site which was indicated to comprise nine test pits advanced to maximum depths of approximately 2.7 metres below previous site grades at the time of the investigation. The results of the slope stability analysis and geotechnical recommendations pertaining to the design and construction of the previously proposed subdivision (comprising 55 lots) were also presented in this report. The findings from this geotechnical assessment, briefly summarized below, have been taken into consideration herein. However, we have been informed that the site has been subject to land alteration (i.e. site clearing) since the preparation of this report, thus site conditions have been modified. It should also be noted that the layout of the previously proposed subdivision differs from the layout of the subdivision currently proposed.

The soil conditions encountered during the 2017 subsurface investigation were understood to generally comprise a surficial layer of well graded sand and gravel which was inferred to be Fluvial deposits underlain by till-like materials at average depths of 0.9 metres below the then existing site grades. The till-like deposits were indicated to comprise well graded sand with some gravel and silt and trace clay and cobble contents. All test pits were terminated within this till-like stratum. It should be noted that in-situ penetration tests (i.e. Standard Penetration Tests) were not advanced during this site investigation to assess material strengths. Perched groundwater was encountered between the interface of the surficial sand and gravel and underlying till-like layer. The test pit location plan attached to the previous report indicates that test pits were not advanced at the easternmost, steeply sloping portions of the site possibly due to limited access attributed to the presence of steep slopes and dense vegetation.

Due to the proximity of the site to Chapman Creek, several geotechnical hazards associated with the watercourse including Debris Flows, Debris Floods, Debris Torrents and Mountain Stream Erosion and Avulsion were identified in the Western Geotechnical report and assessed with respect to the safety of the proposed subdivision. Local slope stability with respect to the steeper slopes located at the eastern portion of the site and global stability of the West Bank of Chapman Creek was also analyzed within this report. The analysis generally indicated that the creek bank is susceptible to slope instabilities under static and seismic loading conditions, however, the proposed subdivision would not be impacted due to its setback from the failure surfaces estimated to be associated with these conditions. Furthermore, the report states that the aforementioned creek hazards do not pose a risk to the proposed development due to its vertical and horizontal setbacks from the creek.

Horizon Engineering previously carried out a subsurface investigation (in March and May, 2018) for the proposed sanitary sewer alignment to be constructed along the portion of Highway 101,

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which extends from the intersection of Highway 101 and Nestman Road to the intersection of Dolphin Street and Trail Avenue in Downtown Sechelt. It should be noted that one test hole was advanced near the intersection of the highway and Nestman Road, situated downslope from the subject property as part of this subsurface investigation.

3.5 Seismic Hazard Calculation

Based on published information from the BC Building Code 2018 Division B - Appendix C Table C-3, the seismic event with a 2% probability of exceedance in 50 years (i.e. 1 in 2475 year event) at the project site would have peak ground acceleration (PGA) of **0.363 g**, where g is the gravitational acceleration. An event with a 2% probability of exceedance in 50 years corresponds to a return period of 2,475 years. The peak ground acceleration is for the firm ground conditions and is assumed to have no vertical acceleration component. The 2% probability of exceedance in 50 years published spectral acceleration values for different natural periods are presented in Table 1.

Table 1: BC Building Code (2018)
Spectral Accelerations (g) for 2% Probability of Exceedance in 50 Years

Sa(0.2) (g)	Sa(0.5) (g)	Sa(1.0) (g)	Sa(2.0) (g)	Sa(5.0) (g)	Sa(10.0) (g)
0.828	0.745	0.434	0.265	0.086	0.030

Based on the 2018 Edition of the BCBC, the subject site may be categorized as Site Class **C**. Please refer to Tables 4.1.8.4-B through 4.1.8.4-I on Division B - Part 4 of the NBCC to obtain the acceleration based site coefficients.

4.0 SUBSURFACE INVESTIGATION

4.1 General

In order assess the subsurface conditions underlying the site, a total of seven test pits, labelled TP22-01 to TP22-07, seven solid-stem auger test holes, labelled AH22-01 to AH22-07 and one deep sonic test hole, labelled SH22-01, were advanced at locations distributed throughout the site as indicated in the aforementioned figure in Figure 2. The test hole locations were surveyed on site prior to the subsurface investigation. The subsurface investigation was carried out during the period of January 10 to 14, 2022 and was supervised and directed by an engineer from our office. The soil stratigraphy was logged in the field and select samples were collected for further soil characterization and laboratory testing. It should be noted that a utility locate was not carried out in advance of the subsurface investigation as the client was confident that the site was clear of any underground services.

The test pits were advanced on January 10, 2022 with an excavator, supplied and operated by Maycon Construction Management Ltd. of Gibsons, BC. The test pits were advanced to depths ranging from 2.1 to 4.1 metres (7.0 to 12.5 feet) below existing site grades. It should be noted that the test pits were also advanced to identify potential borrow areas for materials which could be re-used as fill to raise site grades, as required along the eastern portions of the site during the site grading stages of the project. All test pits were backfilled with excavation spoils, tamped with the excavator bucket upon completion of soil logging and sampling.

The auger test holes were advanced on January 11 and 12, 2022, with a truck-mounted drill-rig supplied and operated by Southland Drilling of Delta, BC. The auger test holes were advanced to depths ranging from 6.1 to 10.7 metres (20.7 to 35.0 feet) below existing site grades. In order to

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evaluate the in-situ densities/consistencies of the subsurface materials encountered at the auger test holes, Dynamic Cone Penetrometer Test (DCPT) soundings were conducted adjacent to each of the auger test holes. The DCPT entails the continuous penetration, from ground surface, of a 60 degrees conical steel point having a diameter of 50 millimeters which is attached to steel drill rods and driven by a 63.5 kilograms drop hammer falling through a height of 750 millimetres. The number of hammer blows is recorded for every 0.3 metre (1 foot) of penetration of the conical point below the ground surface and these blow counts are used to characterize the in-situ relative densities/consistencies of the subsurface materials. During the subject subsurface investigation, the DCPT soundings generally encountered effective refusal within the natural, very dense till-like stratum which underlies the site at depths ranging from 150 millimetres to 1.2 metres (0.5 to 4 feet) below existing site grades, as further described in Section 4.2 below.

Subsequent to the completion of the auger test holes, a track-mounted sonic drill rig, supplied and operated by Blue Max Drilling of Surrey, BC, was mobilized to site to advance the deep sonic test hole at the northeast portion of the site. A sonic drill is a rotary vibratory drill casing capable of extracting continuous cores. The sonic drill head works by sending high frequency resonant vibrations down the drill casing string to the drill bit. The frequency ranges between 50 and 150 Hertz (cycles per second) and is varied to optimally suit the subsurface conditions. These vibrations cause the surrounding soil at the drill string and bit to 'fluidize' which allows for relatively easy penetration into the soil layers and samples to be removed from the borehole. This test hole was advanced at a horizontal setback distance of approximately 60.0 metres to the southwest of the portion of the crest of the west Chapman Creek ravine bank which encroaches within the site. This test hole was advanced to a depth of approximately 39.6 metres (130.0 feet) in order to suitably assess the potential for circular/global slip surfaces which may extend from near the crest of the creek bank to its toe which could impact the proposed development. In order to evaluate the in-situ relative density of the subsurface materials encountered at the sonic test hole, Standard Penetration Test (SPT) soundings were advanced within the cased borehole. The SPT involves driving a split spoon sampler, having a diameter of 50 millimetres (2 inches), into the soil with a 63.5 kilograms (140.0 lb) drop hammer falling through a height of 750 millimetres (30 inches). The number of blows required to drive the split spoon sampler 450 millimetres (18 inches) is recorded and the number of blows required to advance the rod from 150 to 450 millimetres (6 to 18 inches) is reported as the "N" value, which can then be correlated to the relative denseness of the soil. SPT soundings were advanced within the borehole at depth intervals of 3.0 metres (10 feet) to a depth of 30.5 metres (100.0 feet) and an additional SPT sounding was advanced at the termination depth of the borehole, at 39.6 metres (130 feet) below existing site grades.

In order to monitor groundwater levels across the site, 50 millimetres (2 inches) diameter, PVC standpipe piezometers were installed near each corner of the site as well as at the central-northern portion of the site, approximately at which the highest elevations within the site are situated. Specifically, the piezometers were installed at the test holes advanced at AH22-01, AH22-02, AH22-05, AH22-07 and SH22-01. The piezometer locations are also indicated in Figure 2 and labelled as PZ22-01 to PZ22-05. The piezometers installed at the auger test hole locations generally extended to depths of approximately 4.5 to 9.1 metres (15 to 30 feet) below existing site grades whereas the piezometer installed at the northeast corner of the site extended to depths of approximately 30.5 metres (100.0 feet). Furthermore, two shallow piezometers (approximately 1.2 metres ([4 feet] deep) were installed near TP22-02 and AH22-04 with the screen embedded within the upper, well graded sand encountered at the test holes, as further explained in Section 4.2 below, in order to facilitate the slug tests required to estimate the permeability of the upper sand layer. The annuli between the PVC standpipe piezometers and boreholes were backfilled with filter sand along the screened portions of the PVC. Bentonite chips were placed above the filter sand and along the solid portions of the PVC in order develop a suitable seal. Drill cuttings were placed as backfill above the bentonite seal at the piezometers installed within the auger test holes. With the exception of the piezometers installed at auger test hole AH22-02, the portions of

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the standpipe piezometers which extended above the existing site grades were encased in monument casings. The piezometer installed within SH22-01 was capped and covered with a 'J-plug' and a flush-mount well cover. We recommend that the piezometers remain capped and secured during the period of service and be decommissioned as per the British Columbia Groundwater Protection regulations under Water Sustainability Act (February 29, 2016) at the end of their service life.

The test holes which were not equipped with piezometers were generally backfilled with drill cuttings, filter sand and bentonite seals in general accordance with the British Columbia Groundwater Protection regulations.

4.2 Soil Conditions

The test holes advanced during the subsurface investigation indicated that the site is generally surfaced with a 150 to 600 millimetres (6 to 24 inches) thick layer of hog fuel/topsoil or fill which was organic-rich. The surficial topsoil/hogfuel was found to be underlain by a 150 to 450 milimetres (6 to 18 inches) thick layer of brown to rusty/light brown sand with varying gravel, silt and organic contents. At AH22-06, a 150 millimetres (6 inches) thick layer of this sand was encountered at the surface instead of the hog fuel/topsoil. These surficial materials were found to be underlain by inferred till-like deposits comprising dense to very dense sand with varying silt contents. At the deep sonic test hole advanced at the northeast corner of the site, inferred proglacial deposits (i.e. deposited in front of the glacier in a fluvial environment) comprising stratified sandy gravel with silty sand to sand and silt interbeds were found to underlie the aforementioned till-like materials.

Detailed descriptions of the soil stratigraphy encountered at the test holes are presented in the test hole logs attached in Appendix A. The stratigraphy encountered at each of the test holes is also summarized below.

4.2.1 Hogfuel/Topsoil

With the exception of AH22-06, all test hole locations were found to be surfaced with a 150 to 600 millimetres (6 to 24 inches) thick layer of topsoil/hogfuel. The Hog Fuel generally comprised wood chips mixed with dark brown sandy silt whereas the topsoil comprised dark brown silty, fine to medium grained sand with trace to some organics (rootlets) which was found to be moist and inferred to be loose.

4.2.2 Sand

The aforementioned surficial Hog Fuel/Topsoil was found to be underlain by 150 to 450 millimetres (6 to 18 inches) thick layer of brown to rusty/light brown, well graded sand with varying gravel, silt and organic contents. At AH22-06, a 150 millimetres (6 inches) thick layer of this sand was encountered at the surface instead of the hog fuel/topsoil. The sand encountered below the surficial topsoil/fill at the test holes advanced at the northwest corner of the site (which encompassed TP22-01, TP22-03 and AH22-01) was noted to have higher silt and organic contents. At the test holes advanced at the southeast portion of the site, encompassing AH22-04, TP22-05 and TP22-07, the sand was observed to include trace amounts of organics. This sand was found to be moist to wet and inferred to be loose to compact based on the DCPT blow counts recorded within this layer.

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4.2.3 Sand to Sand and Silt (Till-like Deposits)

At depths ranging from 150 millimetres (6 inches) to 1.2 metres (4.0 feet) below existing site grades at all test hole locations, the previously described sand was in turn underlain by grey to dark grey, fine to medium grained sand with varying silt contents ranging from some silt to sand and silt, with trace gravel and occasional cobbles. Occasional boulders were also encountered within this stratum at TP22-05, advanced at the northeast potion of the site. The moisture content of this stratum was inferred to range from moist to wet at the test hole locations. This sand to sand and silt was inferred to comprise natural, till-like materials and dense to very dense as the DCPT and SPT soundings encountered effective refusal within these materials. This stratum was found to extend to the termination depths of the test pits and auger test holes.

4.2.4 Sandy Gravel (Pro-glacial Deposits)

At the sonic test hole (SH22-01), the above sand to sand and silt was found to grade into a coarse, granular deposit comprising brownish grey sandy gravel with some cobbles at a depth of approximately 24.3 metres (80.0 feet) below existing site grades at the subject test hole location. These materials were found to be wet and inferred to be dense to very dense based on the SPT soundings advanced within this stratum. Sample core recovery was generally noted to be poor within this stratum due to interference from cobbles. Thus, the depth of the interface between the previously described sand to sand and silt layer and this granular layer has been inferred based on drilling efforts. It should be noted no sample recovery was observed between depths of approximately 30.4 to 32.9 metres (100.0 to 108.0 feet). At depths below approximately 32.9 metres (108.0 feet), grey silty sand to sand and silt was encountered with interbeds of brownish grey, well graded sand and sandy gravel. These materials were inferred to be proglacial deposits and dense to very dense. The sonic test hole was terminated within this stratum.

4.3 Slug Tests

In an effort to estimate the hydraulic conductivities of the upper sand layer and the underlying grey sand to sand and silt, falling-head slug tests were attempted at piezometers PZ22-04 and PZ22-05 which were installed at test holes AH22-04 and AH22-07, respectively. The slug tests entailed increasing the hydraulic head within the standpipe piezometers installed within these test holes and subsequently measuring the rate at which the water levels equilibrate using a data logger. The screened portion of the aforementioned standpipe piezometers were developed within the targeted strata of the light brown well graded sand and grey silty sand at PZ22-04 and PZ22-05, respectively.

The water level within PZ22-04 could not be discernably increased with the equipment available on site during the slug test attempted at this location with a screen developed in the upper sand layer. This observation generally indicates permeable soil conditions within this layer. The slug test conducted on the grey silty sand encountered at PZ22-05 indicated relatively impermeable soil conditions with its hydraulic conductivity estimated to be in the order of 4.7×10^{-7} metres/sec based on the Hsorlev (1951) method of slug test analysis. In order estimate the hydraulic conductivity of the upper sand stratum, gradation tests were completed on three samples of the sand in order to empirically correlate the hydraulic conductivity of the material with its D10 value. Based on these correlations, the sand was estimated to have hydraulic conductivities in the order of 4.9×10^{-5} metres/second to 2.9×10^{-4} metres/second. However, it should be noted that this sand layer is relatively thin (i.e. 150 to 450 millimetres thick), as previously summarized.

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4.4 Groundwater Conditions

Horizon Engineering attended the subject site on February 3, 2022 to measure the groundwater levels within the piezometers installed during this subsurface investigation. The depth of the groundwater table was measured to vary from 0.7 to 6.2 metres (2.5 to 20.3 feet) below the existing site grades at the piezometer locations. However, the piezometer installed at SH22-01 at the northeast portion of the site was found to be dry. A summary of the measured groundwater levels and estimated groundwater elevations are summarized in Table 2 below.

Table 2: Depth of Groundwater Level Below Existing Site Grades

Test Hole	Date of Measurement	Depth of Groundwater Level (metres)*	Estimated Groundwater Elevations (metres)
AH22-01	February 3, 2022	6.2	71.8
AH22-02	February 3, 2022	5.0	89.4
AH22-05	February 3, 2022	4.0	70.0
AH22-07	February 3, 2022	0.7	88.2
SH22-01	February 3, 2022	-	-

Notes: " – " indicates that piezometer was dry at the time measurement was recorded
Groundwater depths referenced relative to existing site grades at piezometer locations

It is envisaged that the groundwater level measured at AH22-07 is indicative of perched groundwater conditions as the depth of the groundwater level corresponds with the approximate depth of the interface of the sand and underlying till-like sand to sand and silt. Groundwater levels within the site are expected to susceptible to seasonal fluctuations.

5.0 SLOPE RECONNAISSANCE

On January 12, 2022, Mr. Pierre Friele, P.Geo. of Cordilleran Geoscience and Mr. Jason Tam, E.I.T. of Horizon Engineering carried out a geotechnical field assessment of the portions of the upper and lower escarpment slopes of the Chapman Creek ravine fronting the subject site. The field assessment consisted of a slope reconnaissance to visually assess the sloping terrain and identify geotechnical natural hazards and indicator signs of existing or potential slope instability which may impact the proposed development.

The approximate traverse path is shown in the site reconnaissance site plan shown in the Site Reconnaissance plan (Figure 3) attached to this report. Photographs of notable features observed along the escarpment banks are presented in Figure 3A.

5.1 Observations

5.1.1 Upper Escarpment Slope

The reconnaissance carried out along the upper 7 metres high escarpment generally indicated moderate slope gradients of approximately 30% to 50%. This escarpment was inferred to be a relict feature produced by downcutting of Chapman Creek during the deglaciation period. At the time of this reconnaissance, the slope was densely vegetated with large trees (coniferous and deciduous) and shrubs. The trees situated on this slope were generally observed to be vertical and neither pistol butted nor jackstrawed. The sloping terrain located along this escarpment did not exhibit any obvious indicator signs of recent or past global slope instability. Wet site indicator plants (which grow in environments with generally high year-round groundwater levels) were not observed to be present on the slope and groundwater seepage was not observed along this escarpment.

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5.1.2 *Lower Escarpment Slope*

The lower escarpment slope was estimated to be approximately 40 metres in height and observed to be steeply sloped with gradients ranging from approximately 70% to 80%. This lower escarpment was also densely vegetated with large coniferous and deciduous trees and shrubs. Isolated, pistol-butted trees were observed to be present along the slope which may be an indicator of slope movement/instability. A photograph showing the typical vegetation and slope gradients observed along the lower escarpment slope is presented in Photo 1 of Figure 3A. Based on the presence of these trees and the steepened geometry of the escarpment, it is inferred that the slope may be susceptible to ongoing creep movement including shallow, surficial instability and small slides. This is generally corroborated by the results of the slope stability analyses carried out to assess the stability of the lower escarpment slope, as further described in Appendix B attached to this report, as slip surfaces which correlated to Factors of Safety below 1.2 were generally confined to the upper/surficial, weaker stratum and shallow in depth. Wet site indicator plants were not observed to be present along the slope, however, these plant types, including salmon berry and devils club were observed to be present within the floodplain of Chapman Creek.

At the portion of the lower escarpment fronting the central portion of the site (refer to Photo 2 of Figure 3A), a small ephemeral stream was observed to be flowing over the slope towards the creek from the crest of the lower escarpment. As previously described in Section 2.0 of this report, the southeast portion of the site comprises "boggy" site conditions and standing water was noted to be present at this portion of the site. As the site was found to be underlain by dense to very dense till-like deposits having relatively low permeabilities, this steam was inferred to be perched surface runoff flowing over the till-like deposits from the southeast portion of the site and onto the slope.

An oversteepened stream cut exposure, having slope gradients of approximately 2V:1H to near vertical was observed to be situated in line with the central portion of the site and located adjacent to the south cutbank of Chapman Creek. Based on LiDAR data, the exposure was estimated to be approximately 45 metres in height and the crest of this exposure was estimated to be offset from the east property line of the subject site by a horizontal distance of approximately 110 to 130 metres (east of and away from the subject site). The materials exposed along this feature was observed to comprise, from top down, stratified sand, gravel and silt, inferred to be Capilano deposits overlying a thick diamicton unit, inferred to be a Vashon Formation till. This till deposit was underlain by stratified silt, sand and gravel which was inferred to be Vashon Drift. This deposit was in turn inferred to be underlain by a second till unit which extended down to Chapman Creek. A photograph of the steam cut exposure is presented in Photo 3 of Figure 3A.

5.2 Discussion and Interpretation

Based on the geometry of the upper escarpment and the aforementioned observations from the slope reconnaissance, it is envisaged that the subject slope is stable under static conditions.

As previously stated (i.e. in Section 5.1.2 above), it is inferred that the lower escarpment slope which forms the west bank of the Chapman Creek Ravine is susceptible to shallow, surficial instability and small slides. However, based on the setback distance of approximately 70 metres from the east edge of the proposed development to the crest of this escarpment, it is envisaged that these surficial slope failures would have negligible impacts on the proposed development.

It is expected that slope failures associated with the over-steepened stream cut exposure would not impact the proposed development as it is estimated to be situated at a horizontal setback distance of 46 metres beyond the crest of a plane extending from the toe of this steepened slope

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at a gradient of 1V:2H. This 1V:2H plane is a conservative estimate of the horizontal extent of a failure plane for the slope which would be associated with a Factor of Safety of 1.5 based on the inferred soil strengths of the materials exposed/inferred at the subject site.

There is an elevation difference of approximately 55 metres between the proposed development site grades and the Chapman Creek channel; thus, potential creek flooding or channel avulsion events are not expected to be a design consideration or natural hazard that would directly impact the proposed development.

Based on the aforementioned setback distance of the proposed development to the crest of the lower escarpment of the Chapman Creek Ravine, this slope is not expected to be a hazard that could impact the proposed development provided the recommendations provided in this report are incorporated into the design of the development.

6.0 DISCUSSION AND RECOMMENDATIONS (DPA GUIDELINES)

The subsurface conditions encountered during this investigation were consistent with the subsurface conditions encountered during the previous investigation carried out by others in 2017. It should be noted that the Capilano Sediments which were indicated by surficial geology maps to underlie the site were not encountered during this or the previous subsurface investigation.

Based on our observations from the slope reconnaissance and subsequent slope stability analysis, the proposed subdivision is considered suitable from a geotechnical perspective and with respect to the guidelines set forth with the respective, pertinent District of Sechelt Development Permit Areas relevant to the subject site (i.e. DPA 2 and 5) provided the recommendations summarized in this report are incorporated into the design of the subdivision.

The following sections of the report provides comments and recommendations to address the geotechnical components of the District of Sechelt Development Permit Area Guidelines for DPA 2 and 5.

6.1 Site Slope Inventory

As per the requirements of DPA5, a slope analysis has been carried out to identify and delineate the steeply sloping portions of the site (exceeding 20% in gradient); this is presented in Figure 4 attached. The steep slopes are generally situated near the northeast corner of the site along the west bank of the Chapman Creek ravine. Localized interior slopes which exceed 20% in gradient have also been identified in the analysis.

The steeply sloping portions of the site are described below.

i. *Upper and Lower Escarpment Slopes*

The northeast corner of the site has been designated as 'Steep Slopes > 30%' on the SCRD Online Maps. Figure 4A presents a cross sectional profile, Section A-A, through the upper and lower escarpment slopes. The cross section extends from the East Property Line of the proposed Lot 98 down to the toe of the lower escarpment slope, in the southwest to northeast direction and has been developed based on the LIDAR data obtained from the SCRD Online Mapping database. This indicates that slopes of approximately 7 metres high are present with gradients ranging from approximately 33% to 50% along the upper escarpment slope. Slopes approximately 40 metres in height with steeply sloping gradients of 67% to 100% are present along the lower escarpment slope which forms the main ravine of Chapman Creek.

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ii. *Interior Slopes*

Topographic data from the SCRD online mapping database indicates areas within the interior of the site having locally steep slopes. These localized steep slopes are inferred to be a result of previous site grading and it is envisaged that these portions of the site would be re-graded during the construction of the proposed development in order to reduce the gradients. Alternatively, suitable retaining walls could be designed and constructed to manage these interior steep slopes.

6.2 Slope Stability Analysis

A set of slope stability analyses has been carried out for the subject site and is discussed in greater detail in Appendix B, attached to this report. The following summarizes our conclusions and recommendations:

iii. *Upper Escarpment Slope*

The upper escarpment slope was found to be stable under both static and seismic loading conditions. Shallow/surficial slip surfaces are expected under seismic loading conditions, however, these failures will not impact the proposed development based on the design setback distance.

iv. *Lower Escarpment Slope (West Bank of Ravine)*

Our slope stability analyses for the west bank of the Chapman Creek ravine (see Appendix B of this report) indicate that slip surfaces associated with Factors of Safety of 1.5 or less do not extend to the footprint of the proposed subdivision and are generally situated with a minimum horizontal offset distance of approximately 18 metres from the east property lines of the easternmost proposed lots. These slip surfaces encompass both global and shallow failures. As the proposed development is understood to be offset from the crest of the lower escarpment slope by a minimum horizontal distance of approximately 60 to 70 metres, it is envisaged that these slope failures will also not impact the development.

The analysis indicates that slip surfaces, under seismic loading conditions, are expected to extend to near the footprint of the proposed subdivision. However, the slope displacements estimated to be induced under the design seismic event are found to be within tolerable thresholds established by the Engineers and Geoscientists of British Columbia (EGBC) Guidelines for Legislated Landslide Assessments for Proposed Residential Developments.

6.3 DPA2-Watercourses

DPA2 applies to all watercourses and their tributaries including seasonal or ephemeral flows. DPA2 also includes specific creeks with potentially hazardous conditions, as identified on Map Schedules D1 to D3.

Our review of Maps D1 to D3 indicates that the northeast portion of the subject site (adjacent to Chapman Creek) is designated as being with a Watercourse Habitat and Watercourse Hazard Development Permit Area.

b. Riparian Area

The interpretation of riparian area and recommendations pertaining to habitat protection should be provided by a suitable Qualified Professional (QP) and is outside the scope of this geotechnical report.

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c. Creek Hazard

For Chapman Creek, DPA2 hazard guidelines apply to all lands within:

- 30 metres from top of creek bank
- 15 metres from top of ravine slope
- All areas within an identified creek fan

Accordingly, it is understood that the northeast portion of the site are subject to the DPA2 guidelines.

d. Guideline Requirements

We have reviewed DPA2 guidelines for creek hazards (i.e. pages 143 to 146 of the OCP). The following sections of the report address the pertinent geotechnical-related items in these guidelines:

Item 10:
Stability of Natural Slopes: please refer to Section 6.2 and Appendix B of this report.
Impact of Proposed Development on the Creek Bank: Due to the setback distance between the proposed development area and the creek bank we do not expect the proposed construction to have any impact on the stability of the creek bank. However, we note that any disturbance within the riparian zone should be avoided; this includes but is not limited to discharging concentrated or sediment laden stormwater to the creek banks.

Potential Erosion: Erosion at the toe of the creek banks is a natural process. Typically, the mechanism of failure associated with toe erosion comprises progressive sloughing at the lower portion of the creek bank. Chapman Creek has historically been documented to be susceptible to debris flow and erosion of the ravine banks, however, based on the vertical and horizontal setback distances between the proposed development site and the creek, it is envisaged that these hazards would not directly impact the subdivision.

Furthermore, it is expected that slope failures associated with the over steepened stream cut exposure observed at the south cutback of Chapman Creek would not impact the proposed development as it is situated at a horizontal setback distance beyond a plane extending from the toe of this steepened slope at a gradient of 1V:2H. This 1V:2H plane is a conservative estimate of the horizontal extents of a failure plane of the slope which would correspond to a Factor of Safety of 1.5.

Potential Flooding: To be addressed by a suitable QP as it is outside of the scope of this geotechnical report.

Items 11 and 12:
Surface Erosion: It is recommended that vegetation be maintained to minimize erosion along the creek banks. This is also applicable to the area within 15 metres from the crest of the Chapman Creek ravine bank. Maintaining vegetation within the setback area will minimize surface erosion and sediment discharge to the creek. As it is understood that the easternmost portion of the property will be allocated to park space, the proposed subdivision configuration should fulfill this requirement.

Item 13:
Floodplain: To be addressed by a suitable QP as it is outside of the scope of this geotechnical report.

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Item 14:
Stormwater Management: stormwater drainage infrastructure and septic fields should not be situated in the setback area. Septic effluent or stormwater should not be discharged into the creek, as it could cause surface erosion and lead to instability of the creek bank.

Items 15 to 18 (river hydraulic study and flood hazard assessment):
To be addressed by a suitable QP as it is outside of the scope of this geotechnical report.

Item 19 and 20:
The requirements of these items are not geotechnical-related and should be met by the developer during permit application

6.4 DPA 5 – Steep Slopes

DPA5 applies to all lands having a slope of 20% or greater for a minimum horizontal distance of 10 metres. In addition, DPA5 applies to all subdivisions and developments, except where specifically exempted. The objective of DPA5 is:

- To minimize the impact of development on hillsides and steeply sloped lands,
- To retain the features of steeply sloped lands, and
- To support low impact and innovative development approaches to minimize long-term infrastructure maintenance costs on steep areas

Figure 4 shows the manifestation of steep slopes across the site.

We have reviewed DPA5 guidelines for steep slopes (i.e. pages 156 to 163 of the OCP). A number of guidelines listed in DPA5 should be addressed by architectural design, landscape design, environmental study and civil engineering design. The following sections of the report address geotechnical-related items:

Item 4:
Report: This report has been prepared to address the requirements of land subdivision.

Item 5:
a) For a complete description of the site conditions, please refer to Sections 2.0 and 4.0 of this report. We have not encountered any rock outcrop at the subject site based on our investigation; bedrock is expected to be below the depth of interest for this development.
b) It is understood that the site is undeveloped and is not underlain by any underground infrastructure
c) The design assumptions and outcomes of our slope stability analyses are detailed in Appendix C of this report. In addition:

- A detailed site reconnaissance of the creek bank was carried out by our personnel, and our observations and conclusions are detailed in Section 5.2 of this report.
- Figure 6 attached, shows the distribution of slope across the site for areas with 0-10%, 10-20%, 20-30% and >30% slopes. The majority of the subject site has gentle slopes, with steeper slopes mainly concentrated along the creek bank and along the northeast portion of the property.
- The subject development will be located outside the 10 metres riparian setback (shown on Figure 2) from the crest of the Ravine Bank. We consider this setback to be sufficient to limit the possible impacts on the stability of the creek bank and of the natural creek process on the proposed subdivision.
- Please see the recommendations provided in Section 8.3 of this report.

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- As discussed in Section 5.2, it is envisaged that erosion or scouring of the toe of the creek bank would not impact the proposed development based on the proposed setback distance

d), ***e)*** and ***f)***: Road profiles and cross sections showing the required cut and fill depths are presented in the preliminary Civil drawings, dated November 4, 2021 prepared by JB Coast Consulting. We understand that the site grading plan and sections through each lot showing proposed building envelopes as well as corridor analysis will be carried out by others once the final design grading information becomes available.

g) The following address the requirements of this item:

- It is understood that a 15 metres minimum setback from the crest of the ravine bank has been established by others (in DPA 2) and that any construction activity shall be limited to outside of this setback. Furthermore, it is understood that the easternmost portions of the site, which encompasses the upper escarpment and a portion of the lower escarpment of Chapman Creek ravine, will be allocated to park space.
- The slope stability analysis generally indicates that the proposed setback distances for the subdivision from the crest of the Chapman Creek ravine embankments as indicated in the preliminary Civil drawings, generally satisfy the requirements set forth by the EGBC Guidelines for Legislated Landslide Assessments for Proposed Residential Developments in BC with respect to acceptable factors of safety
- For further recommendations and best practices for slope management please refer to Section 6.5 of this report.

h) The topography within the vicinity of the subject site is generally gently sloping down towards the west. The potential impacts of the proposed construction on the adjacent properties are discussed below:

- Existing single family developments are situated downslope and to the south of the subject site (south of Havies Road). It is understood that the existing site grades along the west and south property lines of the site will be subject to cut depths of up to 2 metres. Suitable retaining walls (designed with suitable drainage with suitable filters) should be incorporated into the design of the subdivision to manage grade differences, if required. Based on this, it is expected that the construction of the proposed development will not impact the adjacent properties.
- Suitable drainage and erosion and sediment control measures should be in place during construction to manage site runoff and prevent discharge into neighbouring properties and municipal infrastructure
- Bedrock was not encountered during the surface investigation, and we do not expect blasting to be required for site preparation.

i) In order to reduce the potential impact on the stability of any slopes (i.e. the creek bank), it is recommended that any septic field or stormwater management system be offset from the crest of the slopes by a horizontal distance equivalent to twice the maximum height of the slope. This is equivalent to a minimum 80 metres setback from the crest of the creek bank. It is understood that existing site grades along the easternmost portion of the site are proposed to be raised by approximately 2.0 to 2.5 metres. If a retaining wall is to be constructed along the east property lines of the easternmost lots (Lots 91 to 100) to retain the fill materials and manage grade differences, the suitably filtered drainage system which would be installed for this retaining wall should serve to divert water, flowing from these lots, away from the escarpment slopes.

j) The slope stability analyses carried out for the subject site (see Appendix C, attached) has been carried out in general conformance with the methods prescribed in the EGBC Legislated Landslide Guidelines for Residential Developments. A Schedule D (Landslide Assessment Assurance Statement) can be issued for the subject property to support Development and Building Permit Applications.

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6.5 Slope Management - Best Practices

The following recommendations are provided with respect to maintaining the stability of the slopes on the subject property:

No additional surcharge loads, such as fill, retaining walls, or other structures, should be placed on the slopes without suitable engineering recommendations regarding slope stability.

- Fill should not be placed on the slope or adjacent crest areas (i.e. within horizontal setback distances of 5 and 25 metres from the crests of the upper and lower escarpment slopes, respectively). It is understood that fill will not be placed to the east of the easternmost lots.
- Landscaping waste material (e.g. garden debris) should not be disposed of on or adjacent to the sloping terrain (or within the riparian setback).
- Intercepted water from the development (including any hard landscaped surfaces) should not be directed onto the slopes without suitable erosion control measures.
- Rainwater leaders and perimeter drainage pipes should be connected to the District of Sechelt's stormwater disposal system or approved and permitted alternative.
- Vegetation on slopes should be retained where possible in an effort to reduce surface erosion and soil ravelling.
- The existing slope geometries should not be steepened,
- Excavation work on or at the toes of any slopes should not be carried out without prior review and recommendations from a geotechnical engineer.

7.0 DISCUSSION AND RECOMMENDATIONS (GENERAL)

The following sections of the report provide site-specific recommendations with regards to the design and construction of the proposed subdivision. The recommendations provided below which pertain to the development of the individual lots should be taken into consideration by the Geotechnical Engineer-of-Record (GER) of each lot as it is understood that subgrade preparation and construction of the proposed homes is beyond the scope of this phase of the project.

The dense to very dense, till-like sand to sand and silt or suitably compacted Engineered Fill placed atop these materials are considered suitable subgrade materials for supporting the proposed homes of the subdivision and its associated infrastructure (e.g. roads and utilities). The surficial Hog Fuel/topsoil and underlying sand, comprising varying gravel and organic contents should be sub-excavated from below the footprints of the proposed homes if encountered at the founding elevations of the homes in order to expose the aforementioned till-like materials. Due to the significant fines and organic contents of the upper sand layer underlying the northwest portion of the site, these materials should also be sub-excavated from below the footprints of any settlement-sensitive infrastructure (e.g. roads and sidewalks). As the sand encountered at the test holes advanced along the balance of the site had lesser organic contents, it is expected that these materials can remain below the alignments of proposed roadways if encountered at the subgrade elevations. As the sand was inferred to be in a loose to compact condition, these materials should be compacted with a ride-on-vibratory drum roller compactor prior to placement of additional fill or installation of the pavement structure layers. It should be noted that the organic contents of the sand were observed at discrete test hole locations during this subsurface investigation, thus the GER should assess the in-situ organic contents of the sand exposed during the proposed site grading operations and modify these recommendations, if required. Grades within sub-excavations should be restored with suitably compacted Engineered Fill as specified in Section 7.4 of this report. Potential borrow areas within the site, at which Engineered and general fill could be sourced, are also identified in this section of the report.

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7.1 Foundation Recommendations

The following recommendations pertaining to the design and construction of the proposed homes are preliminary and are to be confirmed by the Geotechnical Engineers-of-Record of the respective lots.

7.1.1 Recommended Static Design Bearing Pressures

The proposed homes can be supported on conventional pad and strip footings founded on top of the natural, till-like, dense to very dense, grey sand to sand and silt or on Engineered Fill placed on top of this layer if necessary due to sub-excavation or site grading requirements. The Engineered Fill should be compacted in accordance with our specifications provided in Section 5.4 of this report.

A Serviceability Limits States (SLS) design bearing pressure of 200 KPa may be used for structural design of the pad/strip footings founded on the dense to very dense, grey, till-like sand to sand and silt. If the foundations are to be supported on suitably compacted Engineered Fill placed on top of the till-like materials, then the foundations should be designed for SLS bearing pressures of 100 KPa.

Due to the transient nature of the seismic loads during earthquakes, the bearing pressures provided above may be increased by 50% for seismic loading conditions.

The total settlement of footings, under static loading, designed in accordance with the above recommendations should be less than 25 millimetres. The differential settlement would be expected to be less than 19 millimetres over a span of 10 metres or 0.002 radians angular distortion.

Minimum pad footing dimensions of 600 millimetres and minimum strip footing widths of 450 millimetres are recommended. It is recommended that foundations be placed at least 450 millimetres below any slab-on-grade and exterior grades for frost protection. Foundations should be constructed on soil which is level, steps at no more than 1V:2H and, where located near sloping ground, should be placed behind a line rising up at 1V:2H from the toe of the adjacent slope. Adjacent foundations which will be founded at different elevations should be located such that the upper footing is founded below a 1V:2H line rising up from the adjacent, bottom edge of the lower adjacent footing.

We note that long-term settlement of Engineered Fill under 'self-weight' is expected to be about 0.7% of its total thickness (e.g. up to approximately 8.4 millimetres of settlement for a 1.2 metres thick layer of Engineered Fill). The bulk of this settlement should be expected to occur within one year after completion of the Engineered Fill placement and compaction.

In general, it is best practice for the preparation of subgrade for foundation construction or placement of Engineered Fill that any existing fill, loosened, softened, organic, disturbed, or otherwise deleterious material should be removed to expose the aforementioned subgrade, comprising dense to very dense, grey sand to sand and silt. As the upper sand layer is expected to have varying organic contents, these materials should also be sub-excavated from below proposed building footprints if encountered at the founding elevations. The sub-excavation of unsuitable materials should extend horizontally past the edges of the proposed building (and footings) by a minimum distance equivalent to the fill thickness required to restore grades up to the founding elevations of the proposed footings. For example, if the fill thickness is estimated to be 1 metre, then the area of sub-excavation and subgrade improvement should extend 1 metre beyond the footprint of the proposed structure.

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7.2 Slabs-on-Grade

It is recommended that 6 inches thick drainage layers of compacted 19 millimeters clear crushed gravel be placed beneath any slabs-on-grade for the proposed homes. These drainage layers may be separated from the slabs-on-grade by layers of 6 mil polyethylene sheeting. The underslab drainage layers and weep holes should be reviewed by the GER for the Building Permit prior to pouring concrete for the slab-on-grade.

7.3 Site Preparation and Temporary Excavation

7.3.1 General

We recommend that all topsoil/hogfuel, fill, disturbed, organic-rich, softened, or otherwise deleterious materials be stripped from beneath the footprints of the proposed foundations, alignments of the proposed roadways and other settlement-sensitive features in order to expose the suitable subgrade materials, as previously described in Section 5.1. If encountered below the footprint of settlement-sensitive structures, the excavation spoils which had been placed as backfill within the test pits advanced during this subsurface investigation should be removed to the bottoms of the test pits and replaced with Engineered Fill, compacted in suitable lift thicknesses.

It is judged that the materials encountered during the geotechnical investigation would be readily excavated using conventional hydraulic excavation equipment in good repair. It is possible that large boulders may be encountered which may require splitting for removal. Boulders or bedrock which cannot be ripped and have a volume in excess of 1 m^3, should be defined as "rock" for contractual purposes. Volumes should be quantified in-situ (ie before being split) by the owner or Horizon Engineering Inc.

7.3.2 Temporary Excavations

Based on the preliminary site grading plan, it is envisaged that excavations extending to maximum depths of approximately 4 metres below existing site grades will be required during the site grading phase of construction to establish subgrade elevations for the proposed roadways and possibly the proposed homes. In general, it is recommended that excavation slopes be prepared no steeper than 1.0 vertical to 1.0 horizontal in any fill, loose to compact sand and 4.0 vertical to 3.0 horizontal in dense to very dense till-like materials provided that the excavations do not extend below the ground water table. Unshored excavation slopes should be protected with a layer of 6-mil polyethylene sheeting, fastened to resist wind action and maintained regularly.

Grade adjacent to the excavations should be sloped to direct surface runoff away from the excavation slopes, and the excavation areas should be kept free from standing water by installing temporary sump pumps if required. At this time, we expect that perched groundwater flowing along the interface of the surficial materials and underlying till-like materials would be encountered during construction. It is envisaged that the volume of water that would be intercepted by the proposed excavations could be suitably managed with conventional drainage measures (i.e. sumps and submersible pumps) during construction. However, due to the topographic nature of the site, it is envisaged that excavations advanced within the site may encounter significant seepage inflow associated with overland flow and perched groundwater table conditions following periods of significant rainfall. Thus, temporary interceptor trenches equipped with suitable subdrains should be incorporated into the site groundwater and surface runoff management measures to divert ground and surface water away from excavations.

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The stability and safety of excavation slopes exceeding 1.2 metres in height should be reviewed by the GER for Building Permit. It is recommended that excavated spoil and construction materials be stockpiled no closer than 1.8 metres to the crest of any excavation slopes and that the spoils be covered with 6-mil polyethylene sheeting. Any signs of instability such as tension cracks, excessive sloughing (in excess of 0.02 m^3 volume or 0.2 m^2 face area), or ground movements should be reported to the GER immediately.

7.4 Engineered Fill

7.4.1 General

Within the context of this report, Engineered Fill should consist of select, clean, well-graded granular material with less than 5% fines content and 100% passing a 75 millimetres sieve. Soil having high fine contents, such as the natural, till-like, sand to sand and silt underlying the subject site should not be re-used as Engineered Fill as these materials are inherently sensitive to moisture, thus they have a narrow range of moisture contents that would be successful for achieving the specified compaction levels. Soil having significant organic contents are also not recommended for re-use as Engineered Fill due to the possibility of settlement induced by the decomposition of the organic materials.

Engineered Fill should extend beyond the footprints of foundations, where applicable, a distance equal to its thickness. The moisture content of Engineered Fill should be within 2% of its optimum moisture content for compaction at the time of placement. Furthermore, Engineered Fill should placed in suitable lift thicknesses (generally 300 millimetres loose thickness, or less) and compacted to the equivalent of at least 100% of its Maximum Dry Density, determined in accordance with ASTM D698 (Standard Proctor). Field density testing should be carried out to ensure the compaction criteria are achieved and these test results should be forwarded to the GER for review. In addition, the GER should be given the opportunity to review the Engineered Fill material type and placement and compaction procedures.

Any footings, paved areas, or hard landscaping which will be supported on Engineered Fill (especially variable thicknesses) should be designed in consideration of the magnitude of settlement previously summarized in Section 7.1.

Any fill proposed for use at the site should have associated documentation verifying that it is free of contaminants. This documentation should be provided to the environmental consultant for approval before any material is brought to the site. In addition, samples of the proposed material should be provided to the GER for assessment (including for gradation and Proctor testing) prior to placement.

7.4.2 Potential Borrow Areas

It is envisaged that the relatively thin stratum of rusty brown, well graded sand encountered at TP 22-02, TP 22-04 and TP22-06 would be suitable for re-use as borrow materials to raise site grades, as understood to be required along the eastern half of the property. It should be noted that the sand encountered at test pits TP22-05 and TP22-07 was observed to contain trace amounts of organics (rootlets and wood chips). It is envisaged that these materials would be suitable for raising grades along the alignments of proposed roadways and the lawns/landscaping areas of the proposed lots, however, they should not be placed below proposed building foundations. As previously stated, the upper sand layer encountered at TP22-01 and TP22-03 had higher silt and organic contents. Thus, it is recommended that these materials only be re-used to raise site grades within proposed landscaping areas. As the sizes of the samples retrieved from the auger flights are generally small, it is noted that the organic contents of the sand samples

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retrieved from the auger test hole locations may not be representative. It is recommended that the excavation spoils, which will be generated from any proposed grading operations, be reviewed by the GER with respect to their suitability for re-use as Engineered Fill as a more accurate assessment of the sand's organic content can be carried out once it has been exposed and stockpiled. It is envisaged that additional areas presenting potentially suitable borrow materials could also be identified at that time.

7.5 Drainage (for At-Grade Homes)

It is recommended that 100 millimetres (4 inch) diameter, rigid, perforated, PVC pipes be placed around the perimeters of the buildings, with inverts at least 300 millimetres (12 inches) below the tops of the proposed slab-on-grade elevations. The pipes should be bedded on and surrounded by a minimum thickness of 150 millimetres (6 inches) of 19 millimetres clear crushed gravel. The pipes should include long sweep 90° or double 45° corners, and cleanouts at all corners and as required. The gravel backfill may be wrapped with a suitable (i.e. compatible) filter cloth to minimize soil migration of fine grained soils into the drainage system. Through-wall weep holes, 75 millimetres (3 inches) in diameter at 1.8 to 2.4 metres (6.0 to 8.0 feet) on centre, should be provided to hydraulically connect the underslab fill with exterior drain pipes or the exterior backfill with interior drain pipes. In addition, the excavation for the installation of foundation drains and bedding should not encroach beyond a 1V:2H line extending from the bottom edges of any adjacent foundations as this would compromise the subgrade for the foundation.

As the natural soils expected to be encountered on site comprise relatively impermeable, dense to very dense/hard deposits having high fines contents, it is envisaged that on-site disposal of stormwater via infiltration would not be practicable for this site. It is therefore recommended that stormwater be managed with a detention system and discharged into municipal systems at a controlled rate. The above recommendations should be confirmed by the professional taking responsibility for Item 4.2 of the Schedule B per BCBC 2018.

7.6 Buried Utilities

Trenching for buried utilities should be carried out in conformance with WorkSafeBC requirements. Pipe bedding/cover and trench backfill should conform to the Master Municipal Construction Documents (MMCD) specifications. Pipe bedding/cover should consist of select, clean, well-graded granular sand. Trench backfill should consist of select, clean, well-graded granular material with less than 5% fines content and 100% passing a 25 mm sieve. Pipe bedding / cover and trench backfill, within 2% of their respective optimum moisture contents for compaction, should be placed in suitable lifts and compacted to the equivalent of at least 98% of their respective maximum dry densities when determined in accordance with ASTM D698 (Standard Proctor). Field density testing of pipe bedding / cover and trench backfill should be carried out and the results forwarded to Horizon Engineering Inc in a timely fashion for our review. In addition, Horizon Engineering should be given an opportunity to approve material proposed for use as pipe bedding / cover and trench backfill before it is brought to site and to assure ourselves that placement procedures are suitable and field density test results are representative.

8.0 INTERIOR ROADS

Upon removing any fill, loosened, disturbed, organic, or otherwise deleterious materials from beneath the new pavement footprint areas, we recommend placing the minimum pavement structure provided below.

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Table 3: Recommended Minimum Asphalt Pavement Structure

Material/Layer	Thickness (mm)
Asphaltic Concrete	75
19 mm minus crushed sand and gravel (base course)	150
75 mm minus crushed sand and gravel (subbase course)	300

The above base and subbase course materials should be compacted to 95% of the respective materials Maximum Dry Densities determined in accordance with ASTM D1557 (Modified Proctor).

It is envisaged that subgrade materials comprising either the loose to compact, light/rusty brown sand or the dense to very dense till-like sand to sand and silt would be exposed at the subgrade elevations of the proposed roadways during site grading. The till-like sand is considered to be a suitable subgrade for the supporting the proposed pavement structure of the roadways. As the sand encountered at test holes AH22-01, TP22-01 and TP22-03, which were advanced at the northwest portion of the site, were found to have significant organic contents, these materials should be sub-excavated from below proposed roadways which will be constructed at the subject portion of the site. Based on the remaining test holes, it is expected that the sand underlying the balance of the site has lower organic contents; thus, these materials may be suitable for supporting the proposed roadways, however, this should be assessed at the time of construction. If encountered at the proposed roadway subgrade elevations, the sand should be suitably compacted and proofrolled in the presence of Horizon Engineering with a ride-on vibratory drum roller compactor prior to placement of the pavement structure materials or Engineered Fill. Engineered Fill placed to raise grades or restore grades at sub-excavations along proposed roadway alignments should be compacted to 95% of its Maximum Dry Density, when determined in accordance with ASTM D1557 (Modified Proctor).

The actual densities achieved should be measured by in-situ density tests. Laboratory gradation tests should be carried out on the source materials and the results should be provided to Horizon Engineering for review and approval.

Furthermore, as perched groundwater inflows are expected to be encountered during the proposed earthworks and site grading, it is envisaged that it would be beneficial that the subgrade of the proposed roadways be prepared with a cambered surface, or otherwise graded to facilitate drainage of perched groundwater from the subgrade. This would reduce the likelihood of water ponding along the surface of the subgrade which could result in the water softening of the subgrade materials.

9.0 REVIEW

The current report has been prepared to address the geotechnical aspects of DPA2 and DPA5. **Based on the results of our field investigation, site reconnaissance and engineering analyses, the subject site may be considered suitable for the proposed development from a geotechnical perspective provided the recommendations provided herein are incorporated into the design and construction. Therefore, as required by the British Columbia Land Title Act (Section 86) regarding subdivision approvals and British Columbia Community Charter (Section 56) regarding building permit applications, from a geotechnical point of view, the land may be "used safely for the use intended".**

In accordance with the 2018 edition of the British Columbia Building Code and the associated Letters of Assurance program, the Geotechnical Engineer of Record will be required to perform Field Reviews and consulting services regarding the following items:

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Geotechnical - Temporary
7.1 Excavation
7.2 Shoring, if required
Geotechnical - Permanent
8.1 Bearing capacity of the soil
8.2 Compaction of engineered fill
8.4 Structural considerations of soil, including slope stability and seismic loading
8.5 Backfill

Thus, Horizon Engineering should be given the opportunity to confirm the stability of temporary excavations, the suitability of foundation and slab-on-grade subgrades, the suitability of Engineered Fill and backfill, the placement and compaction level of the Engineered Fill. In addition, density test results for the aforementioned fill types should be forwarded to us in a timely fashion for our review.

It is the responsibility of the Client to ensure that Horizon Engineering is contacted to carry out the aforementioned field reviews during construction. The British Columbia Building Code 2012 Schedule C-B Letters of Assurance cannot be completed without having carried out the required field reviews.

10.0 CLOSURE

This report has been prepared for the sole use of JB Coast Consulting and other consultants for this project, as described. Any use or reproduction of this report for other than the stated intended purpose is prohibited without the written permission of Horizon Engineering Inc.

We are pleased to be of assistance to you on this project and we trust that our comments and recommendations are both helpful and sufficient for your current purposes. If you would like further details or require clarification of the above, please do not hesitate to call.

For
HORIZON ENGINEERING INC.

Jason Tam, P.Eng.
Geotechnical Engineer

For
HORIZON ENGINEERING INC.

Karen Savage, P.Eng., FEC
President

Attachements:

Figure 1:	Site Location Plan
Figure 2:	Test Hole Location Plan
Figure 3:	Site Reconnaissance Plan
Figure 3A:	Site Reconnaissance Photos
Figure 4 :	Site Slope Inventory Analysis
Figure 4A:	Section A-A Cross Sectional Slope Profile
Figure 5:	DPA2 Areas
Figure 6:	DPA5 Areas
Appendix A	Test Hole Logs
Appendix B	Slope Stability Analysis

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HOMEI SECHELT (LAUREL) LIMITED PARTNERSHIP 2253-13353 Commerce Parkway, Richmond, BC	SITE LOCATION PLAN	HORIZON ENGINEERING INC
PROPOSED SUBDIVISION Havies Rd, Sechelt, BC		Scale: NTS · File No: 121-5024 · Date: MAR/2022 · FIGURE: 1 Des: JT · Dwn: CT · Chk: KS · Rev:

3-Mar-22, 1:01:31 PM, Cole, N:\2021 Projects\121-5024 SCH Havies Road\Drawings\121-5024 F1 Site Location Plan.dwg



LEGEND

- Approximate location of Test Pit
- Approximate location of Auger Hole
- Approximate location of Sonic Hole

SCALE: 1:2000 0 20m 40m 80m 120m 160m

REFERENCE DRAWINGS

- SCRD Maps, aerial photography dated 2021.
- SCRD Maps, GIS data accessed 3 Mar 2022.
- Kerr Wood Leidal Consulting Engineers, Slope Analysis plan dated 2022-04-06.

NO	DATE	REVISION
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PROPOSED SUBDIVISION
Havies Rd, Sechelt, BC

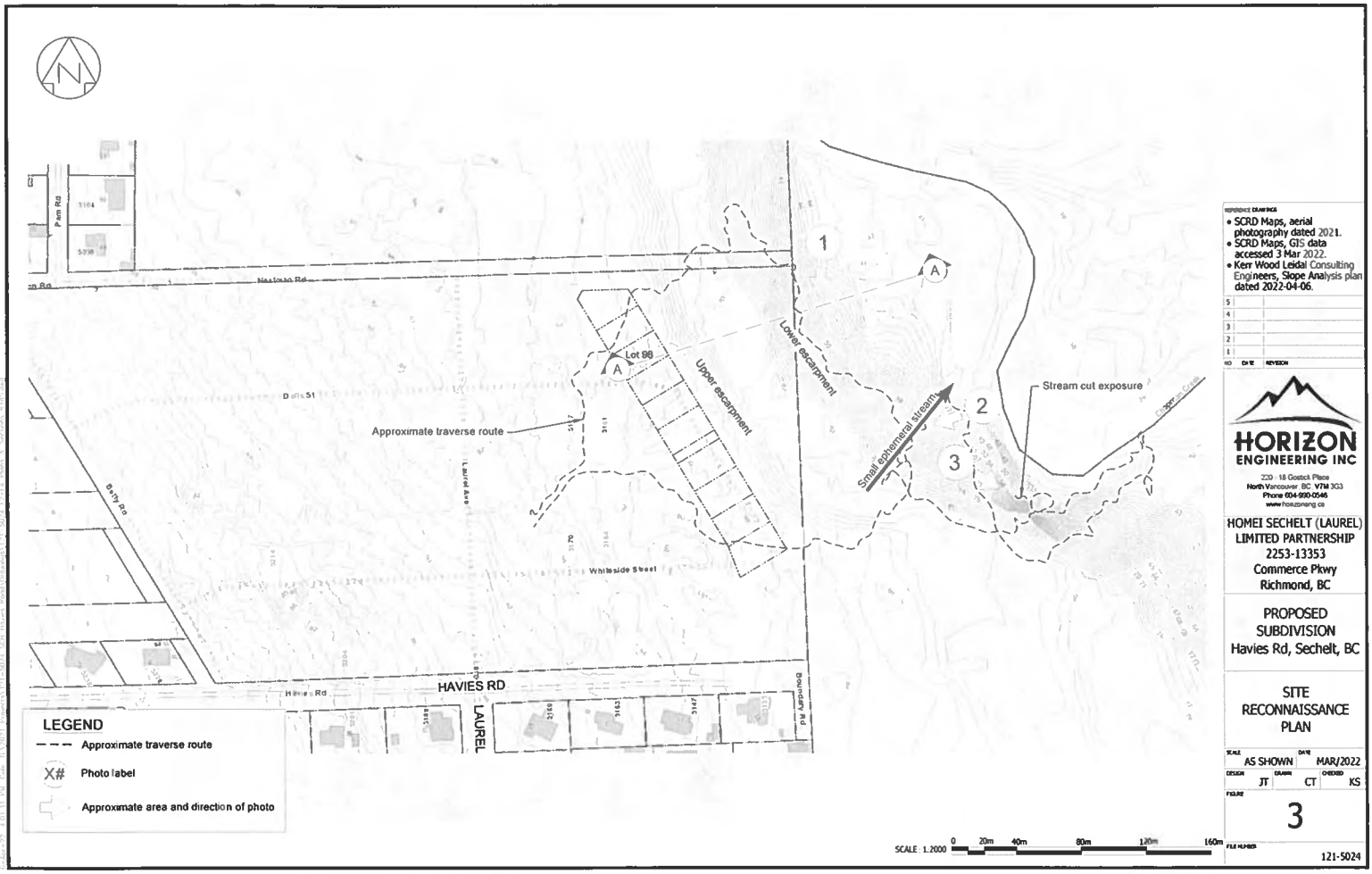
TEST HOLE LOCATION PLAN

SCALE	DATE
AS SHOWN	MAR/2022

DESIGN	DRAWN	CHECKED
JT	CT	KS

FIGURE 2

FILE NUMBER 121-5024



REFERENCE DRAWINGS

- SCRD Maps, aerial photography dated 2021.
- SCRD Maps, GIS data accessed 3 Mar 2022.
- Kerr Wood Leidal Consulting Engineers, Slope Analysis plan dated 2022-04-06.

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SITE RECONNAISSANCE PLAN

SCALE	DATE
AS SHOWN	MAR/2022

DESIGN	DRAWN	CHECKED
JT	CT	KS

FIGURE
3

FILE NUMBER
121-5024



1 Lower escarpment



2 Small ephemeral stream



3 Stream cut exposure

REFERENCE DRAWINGS

- SCRD Maps, aerial photography dated 2021.
- SCRD Maps, GIS data accessed 3 Mar 2022.
- Kerr Wood Leidal Consulting Engineers, Slope Analysis plan dated 2022-04-06.

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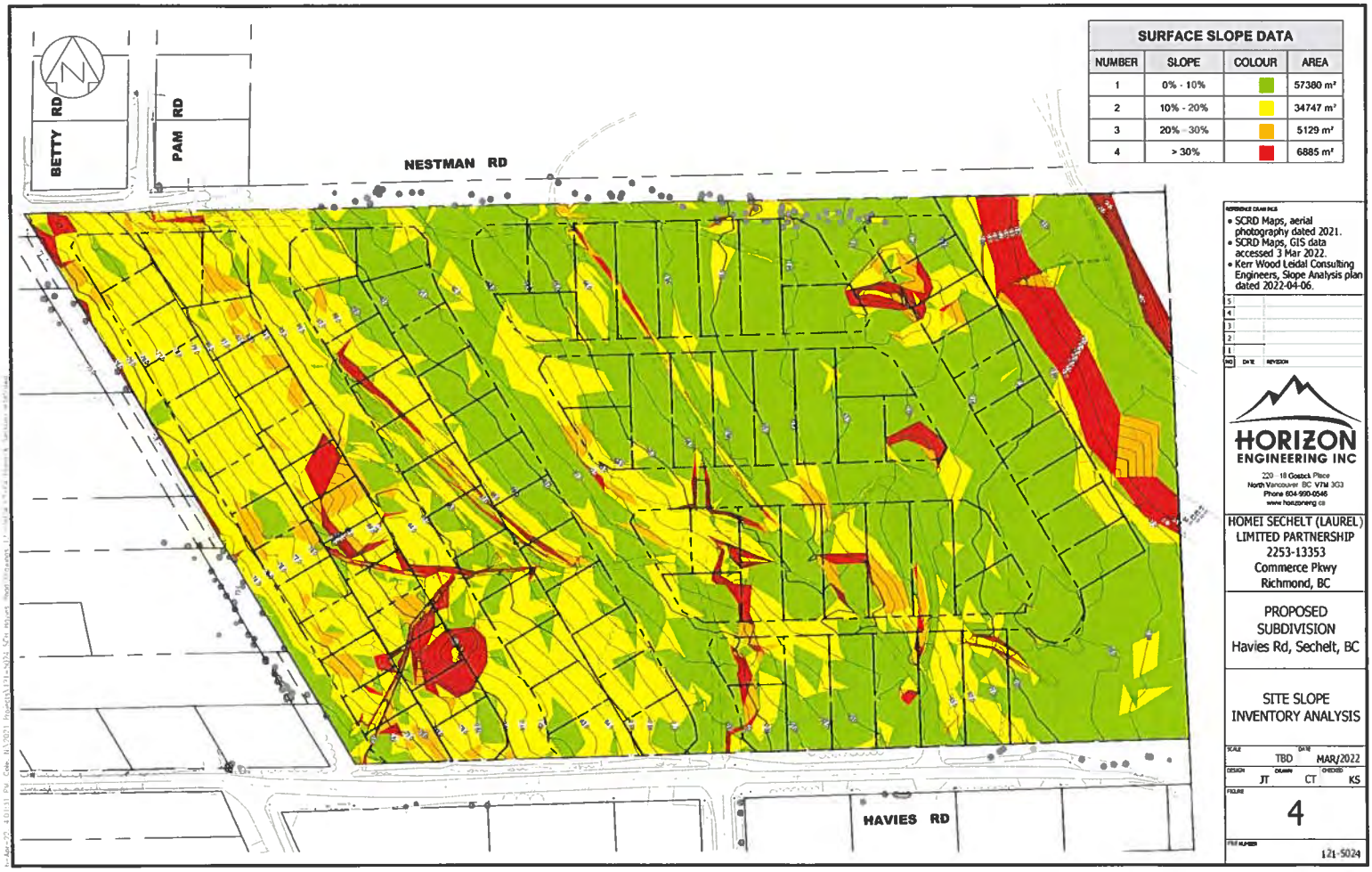
SITE PHOTOS

SCALE	DATE
1:500	MAR/2022

DESIGN	DRAWN	CHECKED
JT	CT	KS

FIGURE
3A

FILE NUMBER
121-5024



SURFACE SLOPE DATA			
NUMBER	SLOPE	COLOUR	AREA
1	0% - 10%		57380 m²
2	10% - 20%		34747 m²
3	20% - 30%		5129 m²
4	> 30%		6885 m²

REFERENCE DRAWINGS
- SCRD Maps, aerial photography dated 2021.
- SCRD Maps, GIS data accessed 3 Mar 2022.
- Kerr Wood Leidal Consulting Engineers, Slope Analysis plan dated 2022-04-06.

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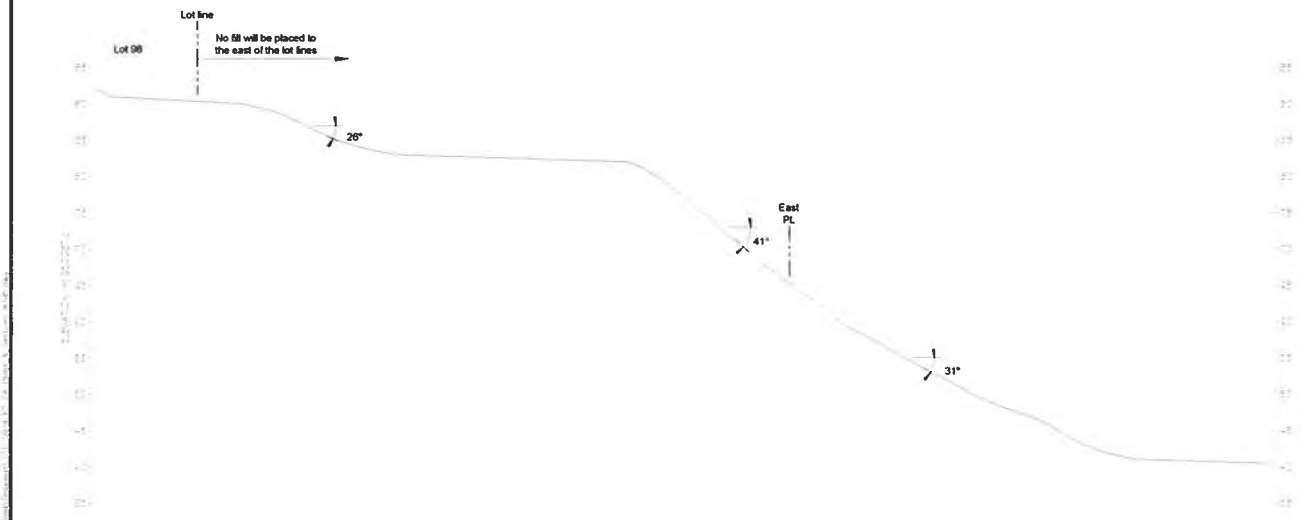
PROPOSED SUBDIVISION
Havies Rd, Sechelt, BC

SITE SLOPE INVENTORY ANALYSIS

SCALE	DATE
TBD	MAR/2022
DESIGN: JT	DRAWN: CT
	CHECKED: KS

FIGURE
4

FILE NUMBER
121-5024



Section A-A
Scale 1 500

SCALE 1 500 0 5m 10m 20m 30m 40m

REFERENCE DRAWINGS
- SCRD Maps, aerial photography dated 2021.
- SCRD Maps, GIS data accessed 3 Mar 2022.
- Kerr Wood Leidal Consulting Engineers, Slope Analysis plan dated 2022-04-06.

NO	DATE	REVISION
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SECTION A-A

SCALE	DATE
1:500	MAR/2022

DESIGN	DRAWN	CHECKED
JT	CT	KS

FIGURE
4A

FILE NUMBER
121-5024



Prepared by: JT Checked by: JT Approved by: KS Date: 22-Feb-22	**Proposed Havies Subdivision at 5038 Laurel Avenue**	
	Figure 5: DPA5 Areas	Job Number: 121-5024

HORIZON ENGINEERING INC



Prepared by: JT Checked by: JT Approved by: KS Date: 22-Feb-22	**Proposed Havies Subdivision at 5038 Laurel Avenue** Figure 6: DPA5 Areas	Job Number: 121-5024

HORIZON ENGINEERING INC

Auger Hole Log No. AH22-01

LOGGED BY: JT REVIEWER: KS DATE: 2022 - 01 - 12 ADDRESS: 5038 Laurel Avenue, Sechelt, BC

METHOD: Track mounted auger drill rig NORTHING: _____ EASTING: _____ ELEVATION: _____

Type of Test:
- O Dynamic Cone Penetrometer Test (DCPT)
- ● Becker Denseness Test (BDT)
- ▲ Standard Penetration (SPT)
- ■ Moisture Content (% of dry weight)
- › Plastic limit
- ‹ Liquid limit

TYPE -- Type of sample
- SPT -- Split spoon
- S -- Shelby tube
- G -- Grab
- O -- Other (specify)

Notes: Test hole advanced at northwest corner of the site

▽ Ground water level

Depth m	Depth ft	DESCRIPTION	Symbol	Depth	SAMPLE DCPT	SAMPLE TYPE	Piezometer / Comments / Additional Testing
0	0	**TOPSOIL** (dark brown) fine to medium grained sand, silty, trace organics (rootlets), moist, very loose		0.5	5		
		SAND (brown) well graded, some silt to silty, trace gravel, moist, loose to compact		2	17	G 1	
1					44	G 2	
	5	- inferred to be possible fill		5	110		DCPT Effective Refusal: 110 blows/3"
2		**SILTY SAND** (light grey) fine to medium grained, trace gravel, moist, dense to very dense				G 3	
		SAND (grey) fine to medium grained, some silt to silty, trace gravel, moist					
3	10	- inferred to be dense to very dense		11			
		SILTY SAND TO SAND AND SILT (dark grey to grey) fine to medium grained, trace gravel, moist					
4		- inferred to be dense to very dense				G 4	Groundwater level measured at depth of 13 feet with Datalogger
	15	- grey, sand and silt, wet below 20 feet					
5		- limited sample recovery between 25 to 30 feet due to wash out of samples				G 5	
6	20						
7						G 6	
	25						
8							
9	30						
		SAND (light grey) fine to medium grained, trace to some silt, trace to some gravel, moist		32		G 7	
10		- inferred occasional cobbles based on drilling efforts					
	35			35	105		DCPT re-advanced at 35 feet: 105 blows/3"
11		- inferred to be dense to very dense					
		Auger Hole Terminated at 35.0 feet					
12							

HORIZON ENGINEERING INC

PROJECT: Proposed Subdivision

FILE NO.: 121-5024

CLIENT: HOMEI Sechelt (Laurel) Limited Partnership

SHEET 1 of 1

TESTHOLE LOG 121-5024 - 2022 01 11 - JT 20220125 GPJ HORIZON GDT 22-1-31

Auger Hole Log No. AH22-02

LOGGED BY: JT REVIEWER: KS DATE: 2022 - 01 - 12 ADDRESS: 5038 Laurel Avenue, Sechelt, BC

METHOD: Track mounted auger drill rig NORTHING: _____ EASTING: _____ ELEVATION: _____

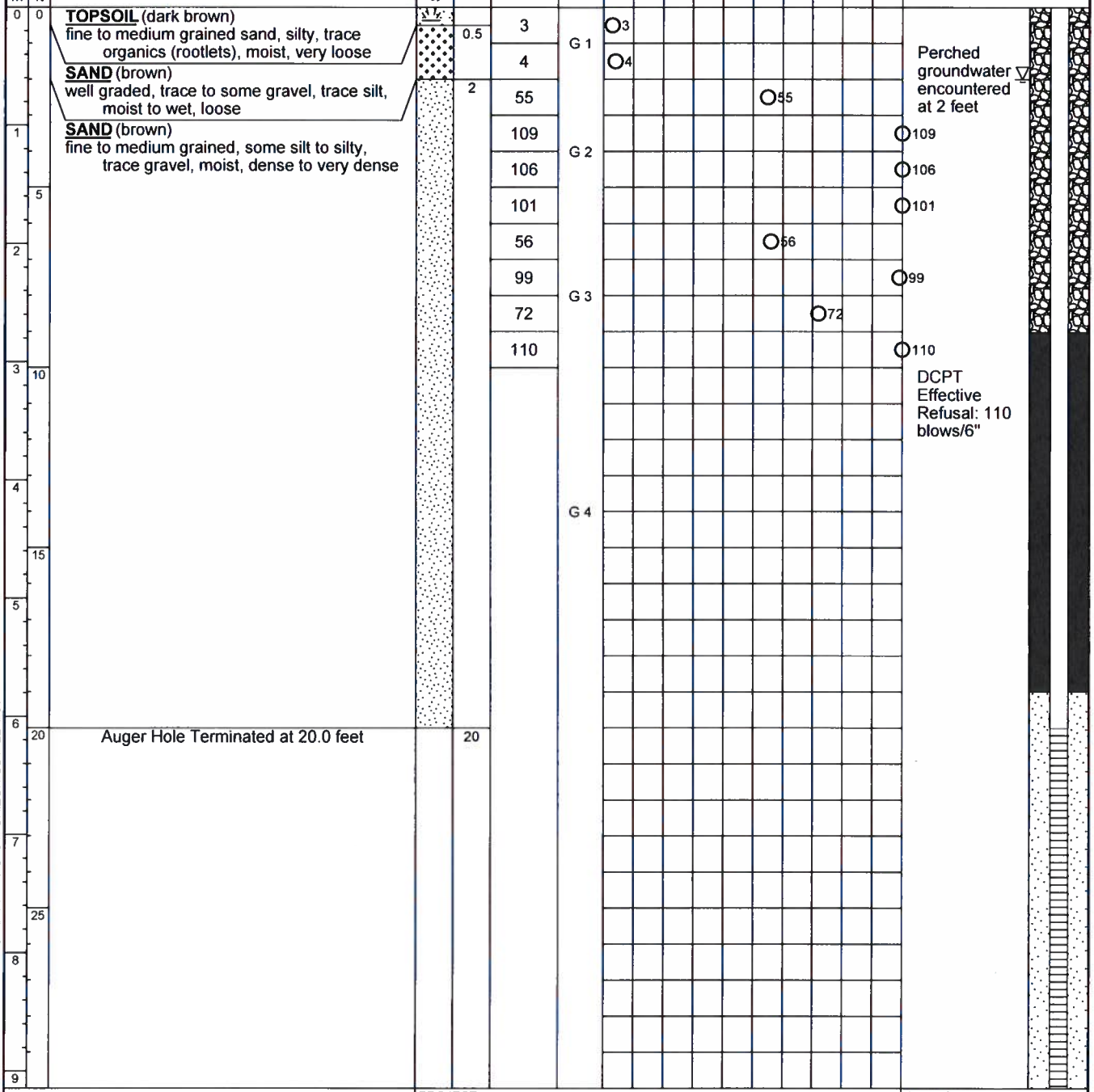
Type of Test:
- O Dynamic Cone Penetrometer Test (DCPT)
- ● Becker Denseness Test (BDT)
- ▲ Standard Penetration (SPT)
- ■ Moisture Content (% of dry weight)
- > Plastic limit
- < Liquid limit

TYPE -- Type of sample
- SPT -- Split spoon
- S -- Shelby tube
- G -- Grab
- O -- Other (specify)

▽ Ground water level

Notes: Test hole advanced at the north end of central portion of the site

Depth m	Depth ft	DESCRIPTION	Symbol	Depth	SAMPLE DCPT	SAMPLE TYPE	20	40	60	80	Piezometer / Comments / Additional Testing
0	0	**TOPSOIL** (dark brown) fine to medium grained sand, silty, trace organics (rootlets), moist, very loose		0.5	3	G 1	O3				
					4		O4				
		SAND (brown) well graded, trace to some gravel, trace silt, moist to wet, loose		2	55				O55		Perched groundwater ▽ encountered at 2 feet
1	5	**SAND** (brown) fine to medium grained, some silt to silty, trace gravel, moist, dense to very dense			109	G 2				O109	
					106					O106	
					101					O101	
2					56				O56		
					99	G 3				O99	
3	10				72					O72	
					110					O110	DCPT Effective Refusal: 110 blows/6"
4						G 4					
5	15										
6	20	Auger Hole Terminated at 20.0 feet		20							
7	25										
8											
9											



HORIZON ENGINEERING INC

PROJECT: Proposed Subdivision

FILE NO.: 121-5024

CLIENT: HOMEI Sechelt (Laurel) Limited Partnership

SHEET 1 of 1

TESTHOLE LOG 121-5024 - 2022.01.11 - JT 20220125.GPJ HORIZON.GDT 22-1-31

Auger Hole Log No. AH22-03

LOGGED BY: JT REVIEWER: KS DATE: 2022 - 01 - 12 ADDRESS: 5038 Laurel Avenue, Sechelt, BC

METHOD: Track mounted auger drill rig NORTHING: _____ EASTING: _____ ELEVATION: _____

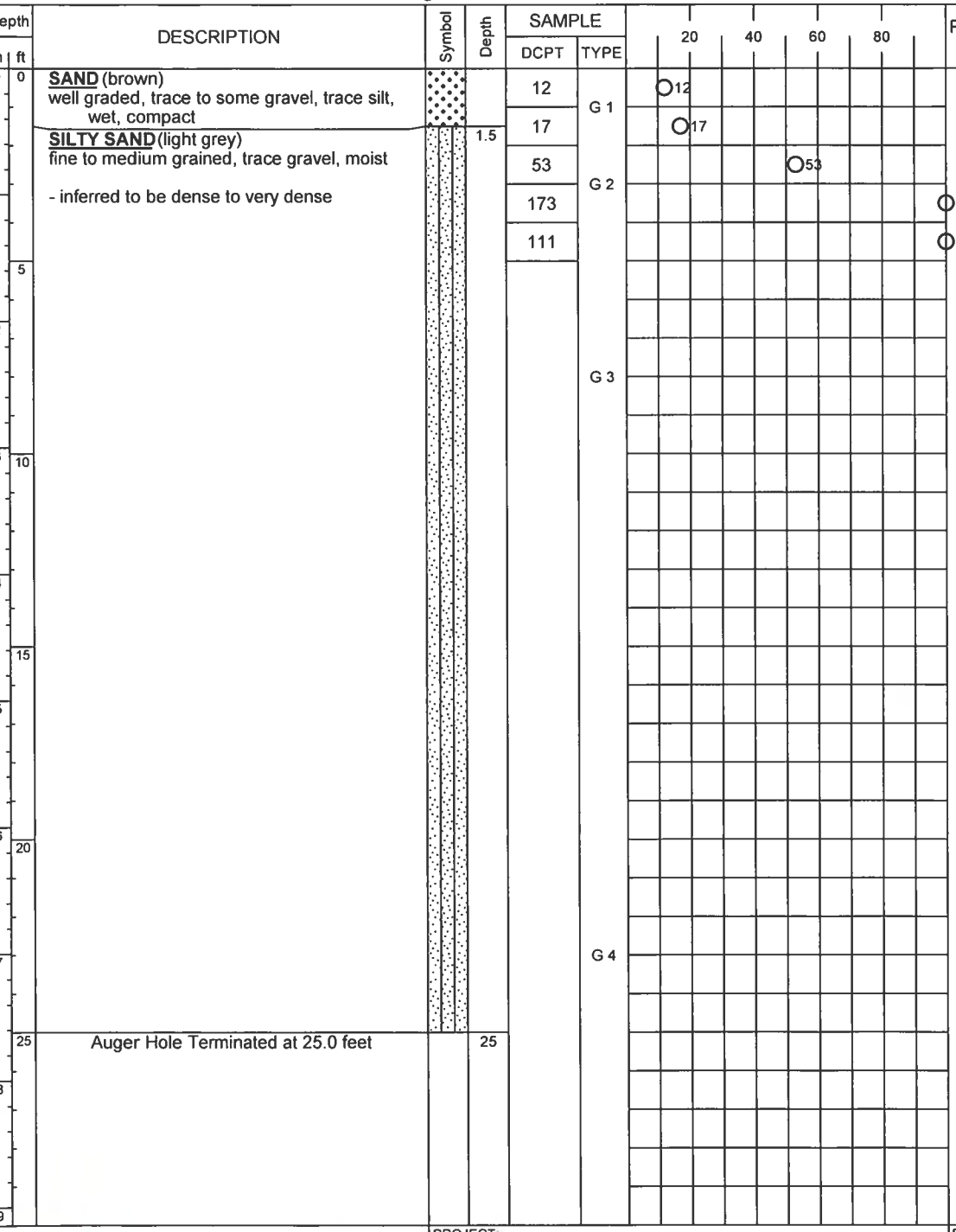
Type of Test:
- O Dynamic Cone Penetrometer Test (DCPT)
- ● Becker Denseness Test (BDT)
- ▲ Standard Penetration (SPT)
- ■ Moisture Content (% of dry weight)
- > Plastic limit
- < Liquid limit

TYPE -- Type of sample
- SPT -- Split spoon
- S -- Shelby tube
- G -- Grab
- O -- Other (specify)

▽ Ground water level

Notes: Test hole advanced at the central-eastern portion of the site

Depth m	Depth ft	DESCRIPTION	Symbol	Depth	SAMPLE DCPT	SAMPLE TYPE	Piezometer / Comments / Additional Testing
0	0	**SAND** (brown) well graded, trace to some gravel, trace silt, wet, compact			12	G 1	
					17		
		SILTY SAND (light grey) fine to medium grained, trace gravel, moist		1.5	53	G 2	
1		- inferred to be dense to very dense			173		
	5				111		DCPT Effective Refusal: 111 blows/6"
2						G 3	
3	10						
4							
	15						
5							
6	20					G 4	
7							
	25	Auger Hole Terminated at 25.0 feet		25			
8							
9							



HORIZON ENGINEERING INC

PROJECT: Proposed Subdivision

FILE NO.: 121-5024

CLIENT: HOMEI Sechelt (Laurel) Limited Partnership

SHEET 1 of 1

TESTHOLE LOG 121-5024 - 2022 01 11 - JT 20220125.GPJ HORIZON.GDT 22-1-31

Auger Hole Log No. AH22-04

LOGGED BY: JT REVIEWER: KS DATE: 2022 - 01 - 12 ADDRESS: 5038 Laurel Avenue, Sechelt, BC

METHOD: Track mounted auger drill rig NORTHING: _____ EASTING: _____ ELEVATION: _____

Type of Test:
- O Dynamic Cone Penetrometer Test (DCPT)
- ● Becker Denseness Test (BDT)
- ▲ Standard Penetration (SPT)
- ■ Moisture Content (% of dry weight)
- › Plastic limit
- ‹ Liquid limit

TYPE -- Type of sample
- SPT -- Split spoon
- S -- Shelby tube
- G -- Grab
- O -- Other (specify)

▽ Ground water level

Notes: Test hole advanced at the southeast portion of the site

Depth m	Depth ft	DESCRIPTION	Symbol	Depth	SAMPLE DCPT	SAMPLE TYPE
0	0	**TOPSOIL** (dark brown) fine to medium grained sand, silty, trace organics (rootlets), moist, very loose		0.5	1	O1
					1	O1
		SAND (rusty brown) fine to medium grained sand, trace to no silt, moist, loose			1	O1 G 1
1					40	O40
	5	**SAND** (light grey) fine to medium grained, some silt to silty, moist, very dense		4	150	O150 G 2
2		- some silt between 5 to 10 feet				G 3
3	10					
4						G 4
	15	- well graded sand, some gravel to gravelly, some silt, between 15 to 20 feet				
5						
6	20					G 5
		- inferred higher gravel/cobble content between 20 to 23 feet based on drilling efforts, decreases below				
7		- wet below 20 feet				G 6
	25					
8						
9	30					
10						
	35	Auger Hole Terminated at 35.0 feet		35		
11						
12						

20 40 60 80

Piezometer / Comments / Additional Testing

O150 DCPT Effective Refusal: 150 blows/6"

HORIZON ENGINEERING INC

PROJECT: Proposed Subdivision

FILE NO.: 121-5024

CLIENT: HOMEI Sechelt (Laurel) Limited Partnership

SHEET 1 of 1

TESTHOLE LOG 121-5024 - 2022.01.11 - JT 20220125.GPJ HORIZON.GDT 22-1-31

Auger Hole Log No. AH22-05

LOGGED BY: AS REVIEWER: KS DATE: 2022 - 01 - 11 ADDRESS: 5038 Laurel Avenue, Sechelt, BC

METHOD: Track mounted auger drill rig NORTHING: _____ EASTING: _____ ELEVATION: _____

Type of Test:
- O Dynamic Cone Penetrometer Test (DCPT)
- ● Becker Denseness Test (BDT)
- ▲ Standard Penetration (SPT)
- ■ Moisture Content (% of dry weight)
- › Plastic limit
- ‹ Liquid limit

TYPE -- Type of sample
- SPT -- Split spoon
- S -- Shelby tube
- G -- Grab
- O -- Other (specify)

▽ Ground water level

Notes: Test hole advanced at the southwest corner of the site

Depth m	Depth ft	DESCRIPTION	Symbol	Depth	SAMPLE DCPT	SAMPLE TYPE	Piezometer / Comments / Additional Testing
0	0	**TOPSOIL** fine to medium grained sand, silty, trace organics (rootlets), loose, wet			7		
				1	16	G 1	
		SAND (brown) Well-graded sand, trace silt, wet, compact		2	221		DCPT Refusal
1	5	**SILTY SAND** (grey) fine to medium grained, trace gravel, moist, very dense				G 2	
						G 3	
2		- dark grey, sand and silt below 28.5 feet				G 4	
3	10						Groundwater level measured at depth of 11 feet with data logger
4						G 5	
	15						
5						G 6	
6	20						
7						G 7	
	25						
8						G 8	
9	30	Auger Hole Terminated at 30.0 feet		30			
10							





HORIZON ENGINEERING INC

PROJECT: Proposed Subdivision

FILE NO.: 121-5024

CLIENT: HOMEI Sechelt (Laurel) Limited Partnership

SHEET 1 of 1

TESTHOLE LOG 121-5024 - 2022 01 11 - JT 20220125 GPJ HORIZON GDT 22-1-31

Auger Hole Log No. AH22-06

LOGGED BY: AS REVIEWER: KS DATE: 2022 - 01 - 11 ADDRESS: 5038 Laurel Avenue, Sechelt, BC

METHOD: Track mounted auger drill rig NORTHING: _____ EASTING: _____ ELEVATION: _____

Type of Test:
- O Dynamic Cone Penetrometer Test (DCPT)
- ● Becker Denseness Test (BDT)
- ▲ Standard Penetration (SPT)
- ■ Moisture Content (% of dry weight)
- › Plastic limit
- ‹ Liquid limit

TYPE -- Type of sample
- SPT -- Split spoon
- S -- Shelby tube
- G -- Grab
- O -- Other (specify)

▽ Ground water level

Notes: Test hole advanced near the central-southern portion of the site

Depth m	Depth ft	DESCRIPTION	Symbol	Depth	SAMPLE DCPT	SAMPLE TYPE	Piezometer / Comments / Additional Testing
0	0	**SAND** (brown) Well-graded, trace silt, moist to wet, compact		0.5	33		
		SILTY SAND (grey) fine to medium grained, trace gravel, moist, very dense - dark grey, sand and silt below 7.5 feet			76		
1					89	G 1	
	5				98		
2					125		
					116	G 2	
3	10				97		
					100		DCPT effective refusal at 7.5 feet
4						G 3	
	15						
5						G 4	
6	20	Auger Hole Terminated at 30.0 feet		20		G 5	
7							

20 40 60 80

33 76 89 98 125 116 97 100

HORIZON ENGINEERING INC

PROJECT: Proposed Subdivision

CLIENT: HOMEI Sechelt (Laurel) Limited Partnership

FILE NO.: 121-5024

SHEET 1 of 1

TESTHOLE LOG 121-5024 - 2022 01 11 - JT 20220125.GPJ HORIZON.GDT 22-1-31

Auger Hole Log No. AH22-07

LOGGED BY: AS REVIEWER: KS DATE: 2022 - 01 - 11 ADDRESS: 5038 Laurel Avenue, Sechelt, BC

METHOD: Track mounted auger drill rig NORTHING: _____ EASTING: _____ ELEVATION: _____

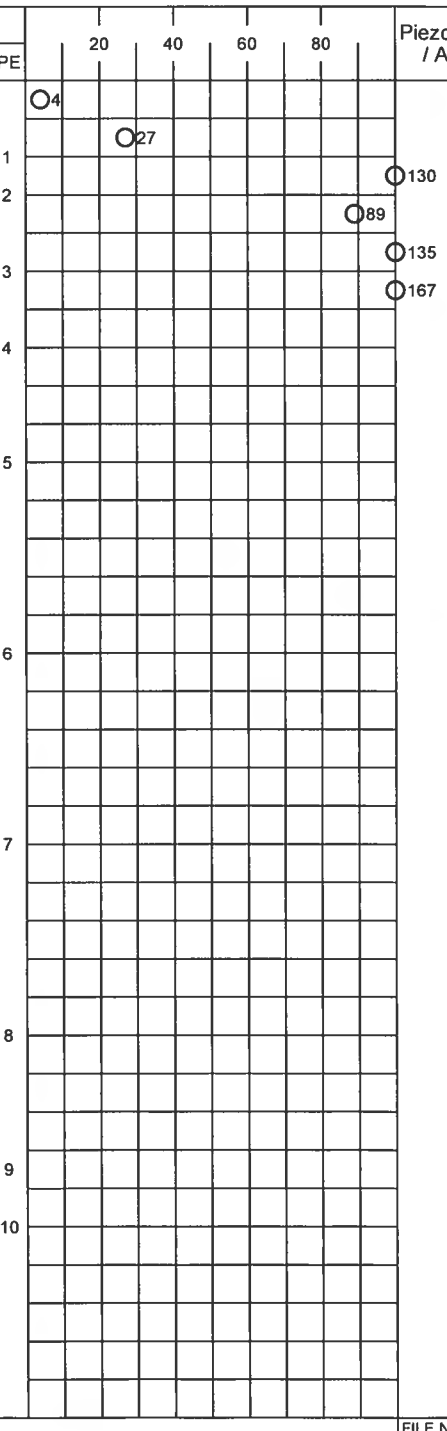
Type of Test:
- O Dynamic Cone Penetrometer Test (DCPT)
- ● Becker Denseness Test (BDT)
- ▲ Standard Penetration (SPT)
- ■ Moisture Content (% of dry weight)
- > Plastic limit
- < Liquid limit

TYPE -- Type of sample
- SPT -- Split spoon
- S -- Shelby tube
- G -- Grab
- O -- Other (specify)

▽ Ground water level

Notes: Test hole advanced at the southeast corner of the site

Depth m	Depth ft	DESCRIPTION	Symbol	Depth	SAMPLE DCPT	SAMPLE TYPE
0	0	**TOPSOIL** (dark brown) fine to medium grained sand, silty, trace organics (rootlets), moist, very loose			4	
					27	G 1
		SAND (brown) Well-graded, trace silt, moist to wet, compact		2	130	G 2
1		**SILTY SAND** (grey) fine to medium grained, trace gravel, moist, very dense		3	89	
					135	G 3
	5	- dark grey, sand and silt below 28.5 feet			167	
2						G 4
3	10					G 5
4						
	15					G 6
5						
6	20					G 7
7						
	25					G 8
8						
9	30	Auger Hole Terminated at 30.0 feet		30		G 9
						G 10
10						



Piezometer / Comments / Additional Testing



HORIZON ENGINEERING INC

PROJECT: Proposed Subdivision

FILE NO.: 121-5024

CLIENT: HOMEI Sechelt (Laurel) Limited Partnership

SHEET 1 of 1

TESTHOLE LOG 121-5024 - 2022 01 11 - JT 20220125.GPJ HORIZON.GDT 22-1-31

Borehole Log No. SH22-01

LOGGED BY: JT REVIEWER: KS DATE: 2022 - 01 - 14 ADDRESS: 5038 Laurel Avenue, Sechelt, BC

METHOD: Track mounted sonic drill rig NORTHING: _____ EASTING: _____ ELEVATION: _____

Type of Test:
- O Dynamic Cone Penetrometer Test (DCPT)
- ● Becker Denseness Test (BDT)
- ▲ Standard Penetration (SPT)
- ■ Moisture Content (% of dry weight)
- › Plastic limit
- ‹ Liquid limit

TYPE -- Type of sample
- SPT -- Split spoon
- S -- Shelby tube
- G -- Grab
- O -- Other (specify)

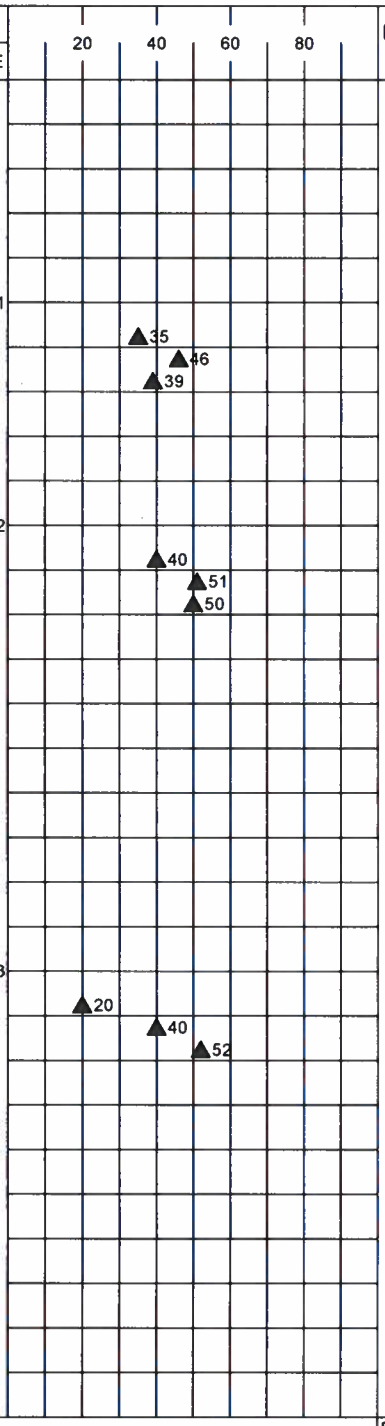
▽ Ground water level

Notes: Borehole advanced at the northeast corner of the site

Piezometer covered with flush-mount well cover

Water levels within piezometer not measured yet

Depth m	Depth ft	DESCRIPTION	Symbol	Depth	SAMPLE SPT	SAMPLE TYPE	Piezometer / Comments / Additional Testing
0	0	**TOPSOIL** (dark brown) fine to medium grained sand, silty, trace organics (rootlets), moist				G 1	(blow counts for top 6 inches not presented due to presence of disturbed materials)
		- inferred to be very loose		1.5		G 2	
		SANDY SILT (brown) fine grained sand, silty, trace gravel		3		G 3	
1		- inferred to be firm		3.5		G 4	
	5	**SAND** (light brown) fine to medium grained, some silt to silty, trace gravel, dry to moist			35	SPT 1	SPT Blow Counts at 5 feet:
					46		
2		- inferred to be firm			39	G 5	35-46-39
		SAND (light grey) fine to medium grained, some silt to silty, trace to no gravel, dry to moist				G 6	
		- inferred to be dense to very dense					
3	10	**SILTY SAND TO SAND AND SILT** (dark grey) fine to medium grained, trace angular to subangular gravel, moist		10	40	SPT 2	SPT Blow Counts at 10 feet:
					51	G 7	
		- inferred to be dense to very dense			50		35-46-39
4		- denseness increases below approximately 25 feet based on drilling efforts				G 8	
	15						
5						G 9	
6	20				20	SPT 3	SPT Blow Counts at 20 feet:
					40		
					52	G 10	20-40-52
7							
	25						
8						G 11	
9		*(Continued)*					



HORIZON ENGINEERING INC

PROJECT: Proposed Subdivision

CLIENT: HOMEI Sechelt (Laurel) Limited Partnership

FILE NO.: 121-5024

SHEET 1 of 5

TESTHOLE LOG 121-5024 - 2022 01 11 - JT 20220125.GPJ HORIZON.GDT 22-1-31

Borehole Log No. SH22-01

LOGGED BY: JT REVIEWER: KS DATE: 2022 - 01 - 14 ADDRESS: 5038 Laurel Avenue, Sechelt, BC

METHOD: Track mounted sonic drill rig NORTHING: _____ EASTING: _____ ELEVATION: _____

Type of Test:
- O Dynamic Cone Penetrometer Test (DCPT)
- ● Becker Denseness Test (BDT)
- ▲ Standard Penetration (SPT)
- ■ Moisture Content (% of dry weight)
- > Plastic limit
- < Liquid limit

TYPE -- Type of sample
- SPT -- Split spoon
- S -- Shelby tube
- G -- Grab
- O -- Other (specify)

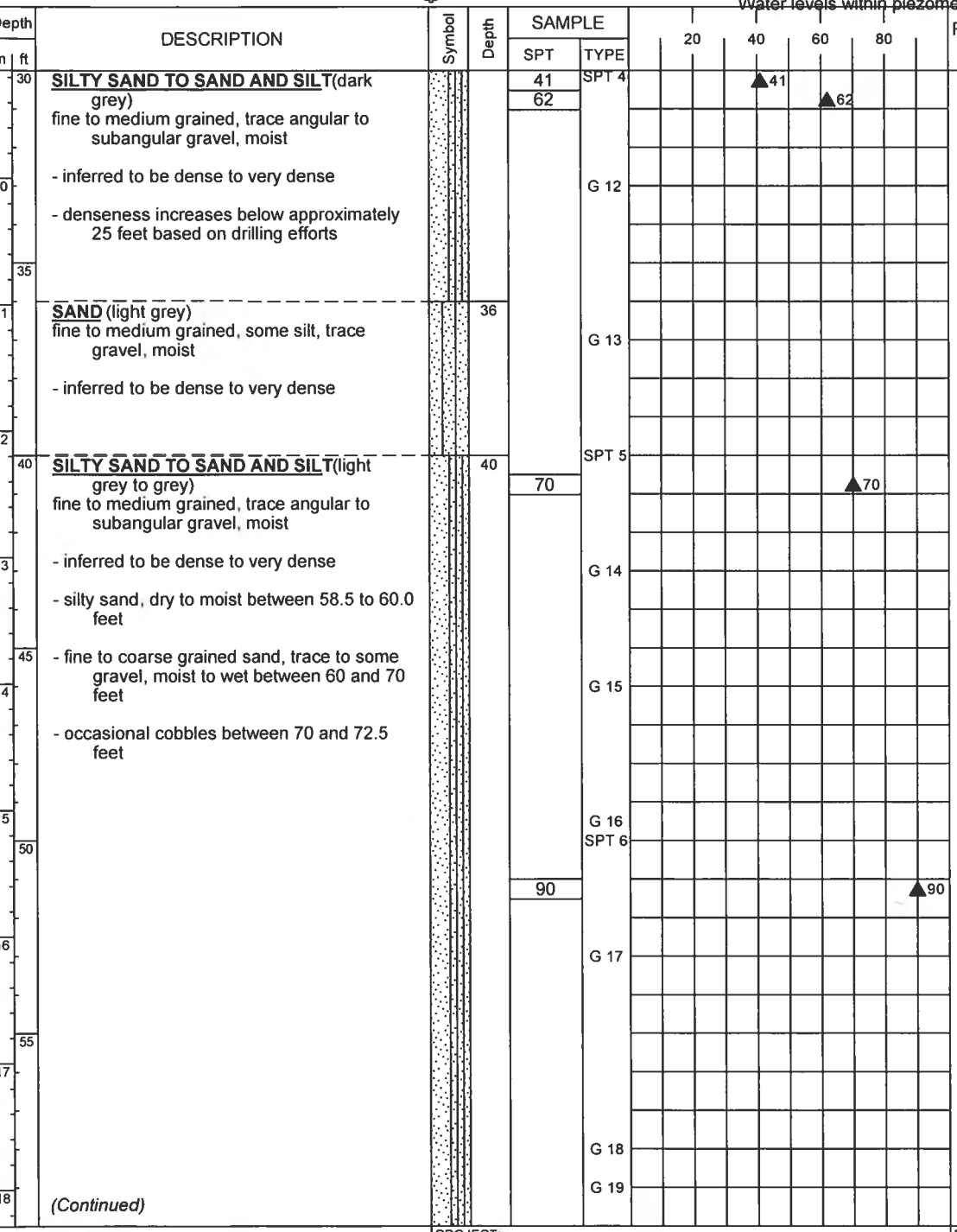
▽ Ground water level

Notes: Borehole advanced at the northeast corner of the site

Piezometer covered with flush-mount well cover

Water levels within piezometer not measured yet

Depth m	Depth ft	DESCRIPTION	Symbol	Depth	SAMPLE SPT	SAMPLE TYPE	Piezometer / Comments / Additional Testing
	30	**SILTY SAND TO SAND AND SILT**(dark grey) fine to medium grained, trace angular to subangular gravel, moist - inferred to be dense to very dense - denseness increases below approximately 25 feet based on drilling efforts			41 62	SPT 4 G 12	SPT Blow Counts at 30 feet: 62 blows/3" - Effective Refusal
10	35						
11		**SAND** (light grey) fine to medium grained, some silt, trace gravel, moist - inferred to be dense to very dense		36		G 13	
12	40	**SILTY SAND TO SAND AND SILT**(light grey to grey) fine to medium grained, trace angular to subangular gravel, moist - inferred to be dense to very dense - silty sand, dry to moist between 58.5 to 60.0 feet - fine to coarse grained sand, trace to some gravel, moist to wet between 60 and 70 feet - occasional cobbles between 70 and 72.5 feet - occasional cobbles between 70 and 72.5 feet		40	70	SPT 5 G 14 G 15 G 16	SPT Blow Counts at 40 feet: 70/4" - Effective Refusal
13	45						
14							
15	50				90	SPT 6	SPT Blow Counts at 50 feet: 9-90/2" (note: low blow count at 50.5' inferred to be attributed to disturbed materials)
16						G 17	
17	55						
18		*(Continued)*				G 18 G 19	



TESTHOLE LOG 121-5024 - 2022 01 11 - JT 20220125 GPJ HORIZON GDT 22-1-31

HORIZON ENGINEERING INC

PROJECT: Proposed Subdivision

FILE NO.: 121-5024

CLIENT: HOMEI Sechelt (Laurel) Limited Partnership

SHEET 2 of 5

Borehole Log No. SH22-01

LOGGED BY: JT REVIEWER: KS DATE: 2022 - 01 - 14 ADDRESS: 5038 Laurel Avenue, Sechelt, BC

METHOD: Track mounted sonic drill rig NORTHING: _____ EASTING: _____ ELEVATION: _____

Type of Test:
- O Dynamic Cone Penetrometer Test (DCPT)
- ● Becker Denseness Test (BDT)
- ▲ Standard Penetration (SPT)
- ■ Moisture Content (% of dry weight)
- › Plastic limit
- ‹ Liquid limit

TYPE -- Type of sample
- SPT -- Split spoon
- S -- Shelby tube
- G -- Grab
- O -- Other (specify)

▽ Ground water level

Notes: Borehole advanced at the northeast corner of the site

Piezometer covered with flush-mount well cover

Water levels within piezometer not measured yet

Depth m	Depth ft	DESCRIPTION	Symbol	Depth	SAMPLE SPT	SAMPLE TYPE	Piezometer / Comments / Additional Testing
19	60	**SILTY SAND TO SAND AND SILT**(light grey to grey) fine to medium grained, trace angular to subangular gravel, moist - inferred to be dense to very dense - silty sand, dry to moist between 58.5 to 60.0 feet			100	SPT 7 G 20 G 21	▲100 SPT Blow Counts at 60 feet: 100/6"
20	65	- fine to coarse grained sand, trace to some gravel, moist to wet between 60 and 70 feet - occasional cobbles between 70 and 72.5 feet *(Continued)*				G 22	
21	70				102	SPT 8 G 23	▲102 SPT Blow Counts at 70 feet: 102/6"
22		**SAND** (light grey) fine to medium grained, some silt to silty, trace to some subangular to angular gravel, occasional cobbles, dry to moist		72.5		G 24	
23	75	- inferred to be dense to very dense				G 25	
24	80	NO SAMPLE RECOVERY DUE TO OBSTRUCTION ON COBBLE - inferred to comprise sandy gravel, as described between 85 to 90 feet		80	90	SPT 9	▲90 SPT Blow Counts at 80 feet: 90/3" - Effective Refusal
25							
26	85	**SANDY GRAVEL**(grey) well graded sand, angular to subangular and sub-rounded to rounded gravel, some cobble, wet - 50% sample recovery between 80 to 90 feet, encountered obstruction on a cobble - inferred to be dense to very dense		85		G 26	
27							

20 40 60 80

HORIZON ENGINEERING INC

PROJECT: Proposed Subdivision

FILE NO.: 121-5024

CLIENT: HOMEI Sechelt (Laurel) Limited Partnership

SHEET 3 of 5

TESTHOLE LOG 121-5024 - 2022 01 11 - JT 20220125.GPJ HORIZON.GDT 22-1-31

Borehole Log No. SH22-01

LOGGED BY: JT REVIEWER: KS DATE: 2022 - 01 - 14 ADDRESS: 5038 Laurel Avenue, Sechelt, BC

METHOD: Track mounted sonic drill rig NORTHING: _____ EASTING: _____ ELEVATION: _____

Type of Test:
- O Dynamic Cone Penetrometer Test (DCPT)
- ● Becker Denseness Test (BDT)
- ▲ Standard Penetration (SPT)
- ■ Moisture Content (% of dry weight)
- > Plastic limit
- < Liquid limit

TYPE -- Type of sample
- SPT -- Split spoon
- S -- Shelby tube
- G -- Grab
- O -- Other (specify)

▽ Ground water level

Notes: Borehole advanced at the northeast corner of the site

Piezometer covered with flush-mount well cover

Water levels within piezometer not measured yet

Depth m	Depth ft	DESCRIPTION	Symbol	Depth	SAMPLE SPT	SAMPLE TYPE	Piezometer / Comments / Additional Testing
	90	**NO SAMPLE RECOVERY** - inferred to comprise sandy gravel, as described between 85 to 90 feet and 97 to 100 feet		90	80	SPT 10	SPT Blow Counts at 90 feet: 80/2" - Effective Refusal
28							
29	95					G 27	
		SANDY GRAVEL(grey) well graded sand, angular to subangular and sub-rounded to rounded gravel, some cobble, wet - 30% sample recovery between 90 to 100 feet, encountered obstruction on a cobble - inferred to be dense to very dense		97		G 28	
30						G 29	
	100			100	6 90	SPT 11	SPT Blow Counts at 100 feet: 6-90/2" - Effective Refusal (note: low blow count at 100' inferred to be attributed to disturbed materials)
31		**NO SAMPLE RECOVERY**					
32	105						
33		**SAND** (light grey) well graded, trace to no silt, wet - inferred to be dense to very dense		108		G 30	
	110	**SILTY SAND TO SAND AND SILT**(grey) well graded sand, trace gravel, moist to wet - inferred to be dense to very dense		109 110			
34		**NO SAMPLE RECOVERY**		111.5		G 31	
		SAND (light grey) well graded, trace to no silt, wet - inferred to be dense to very dense		112.5 113.5		G 32 G 33	
35	115	**SANDY GRAVEL**(grey) well graded sand, angular to subangular and rounded to sub-rounded gravel, some cobble, wet - inferred to be dense to very dense					
36		**SILTY SAND**(grey) well graded, trace angular to subangular and rounded to sub-rounded gravel, wet *(Continued)*				G 34 G 35	

HORIZON ENGINEERING INC

PROJECT: Proposed Subdivision

FILE NO.: 121-5024

CLIENT: HOMEI Sechelt (Laurel) Limited Partnership

SHEET 4 of 5

TESTHOLE LOG 121-5024 - 2022.01.11 - JT 20220125.GPJ HORIZON.GDT 22-1-31

Borehole Log No. SH22-01

LOGGED BY: JT REVIEWER: KS DATE: 2022 - 01 - 14 ADDRESS: 5038 Laurel Avenue, Sechelt, BC

METHOD: Track mounted sonic drill rig NORTHING: _____ EASTING: _____ ELEVATION: _____

Type of Test:
- O Dynamic Cone Penetrometer Test (DCPT)
- ● Becker Denseness Test (BDT)
- ▲ Standard Penetration (SPT)
- ■ Moisture Content (% of dry weight)
- › Plastic limit
- ‹ Liquid limit

TYPE -- Type of sample
- SPT -- Split spoon
- S -- Shelby tube
- G -- Grab
- O -- Other (specify)

▽ Ground water level

Notes: Borehole advanced at the northeast corner of the site

Piezometer covered with flush-mount well cover

Water levels within piezometer not measured yet

Depth m	Depth ft	DESCRIPTION	Symbol	Depth	SAMPLE SPT	SAMPLE TYPE	20 40 60 80	Piezometer / Comments / Additional Testing
	120	- moist between 115.0 to 117.5 feet - some silt to silty, moist between 117.5 to 119 feet - trace to some silt between 119.0 to 120.0 feet - inferred to be dense to very dense		120				
37				123		G 36		
38	125	**NO SAMPLE RECOVERY** **SAND** (light grey) well graded, some gravel, wet - inferred to be dense to very dense		125		G 37		
		SILTY SAND (grey) well graded, some silt to silty, some gravel to gravelly, moist to wet - inferred to be dense to very dense		127		G 38		
39	130	**SAND** (light brownish grey) well graded, trace to some gravel, dry to moist - inferred to be dense to very dense Sonic Hole Terminated at 130.0 feet		130	90 100	SPT 12	▲90 ▲100	SPT Blow Counts at 130 feet: 90-100/3"- Effective Refusal
40								
41	135							
42								
43	140							
44								
45	145							

HORIZON ENGINEERING INC

PROJECT: Proposed Subdivision

FILE NO.: 121-5024

CLIENT: HOMEI Sechelt (Laurel) Limited Partnership

SHEET 5 of 5

TESTHOLE LOG 121-5024 - 2022.01.11 - JT 20220125.GPJ HORIZON.GDT 22-1-31

Test Pit Log No. TP22-01

LOGGED BY: JT REVIEWER: KS DATE: 2022 - 01 - 10 ADDRESS: 5038 Laurel Avenue, Sechelt, BC

METHOD: Excavator NORTHING: _____ EASTING: _____ ELEVATION: _____

Type of Test:
- O Dynamic Cone Penetrometer Test (DCPT)
- ● Becker Denseness Test (BDT)
- ▲ Standard Penetration (SPT)
- ■ Moisture Content (% of dry weight)
- > Plastic limit
- < Liquid limit

TYPE -- Type of sample
- SPT -- Split spoon
- S -- Shelby tube
- G -- Grab
- O -- Other (specify)

▽ Ground water level

Notes: Test pit advanced at the north-western portion of the site

Depth m	Depth ft	DESCRIPTION	Symbol	Depth	SAMPLE TYPE	20	40	60	80	Piezometer / Comments / Additional Testing
0	0	**TOPSOIL** (dark brown) fine to medium grained sand, silty, trace organics (rootlets), moist - inferred to be very loose								
		SAND (brown) fine to medium grained, trace to some silt, trace gravel, trace organics (rootlets), moist - wood stump encountered at depth of 1 foot - inferred to be loose to compact		1	G 1					▽ Perched groundwater encountered at depth of 2 feet
1		**SILTY SAND** (light grey) fine to medium grained, trace gravels, occasional cobbles, moist - inferred to be dense to very dense - denseness of material inferred to increase below 6 feet		2.5						
	5				G 2					
2										
		Test Pit Terminated at 9.0 feet		9						
3										

HORIZON ENGINEERING INC

PROJECT: Proposed Subdivision

FILE NO.: 121-5024

CLIENT: HOMEI Sechelt (Laurel) Limited Partnership

SHEET 1 of 1

TESTHOLE LOG 121-5024 - 2022 01 11 - JT 20220125.GPJ HORIZON.GDT 22-1-31

Test Pit Log No. TP22-02

LOGGED BY: JT REVIEWER: KS DATE: 2022 - 01 - 10 ADDRESS: 5038 Laurel Avenue, Sechelt, BC

METHOD: Excavator NORTHING: _____ EASTING: _____ ELEVATION: _____

Type of Test:
- O Dynamic Cone Penetrometer Test (DCPT)
- ● Becker Denseness Test (BDT)
- ▲ Standard Penetration (SPT)
- ■ Moisture Content (% of dry weight)
- › Plastic limit
- ‹ Liquid limit

TYPE -- Type of sample
- SPT -- Split spoon
- S -- Shelby tube
- G -- Grab
- O -- Other (specify)

▽ Ground water level

Notes: Test pit advanced at the north-eastern portion of the site

Test pit encompassed footprint of approximately 6.5'x9' in plan

Depth m	Depth ft	DESCRIPTION	Symbol	Depth	SAMPLE TYPE	Piezometer / Comments / Additional Testing
0	0	**TOPSOIL** (dark brown) fine to medium grained sand, silty, trace organics (rootlets), moist				
		- inferred to be very loose		0.5	G 1	Spalling of north test pit wall upon completion of test pit
		SAND (brown) fine to medium grained, trace silt, trace gravel, moist				
		- inferred to be loose to compact		1.5	G 2	
		SAND AND GRAVEL (rusty brown) well graded, some gravel to gravelly, trace to no organics (rootlets), moist to wet				
		- inferred to be loose to compact				
		SILTY SAND (light grey) fine to medium grained, occasional boulders, moist		3		▽ Perched groundwater encountered at 3 feet
1		- inferred to be dense to very dense				
	5	- density inferred to increase with depth based on difficulty in advancing test pit			G 3	
2					G 4	
		Test Pit Terminated at 9.5 feet		9.5		
3	10					

20 40 60 80

HORIZON ENGINEERING INC

PROJECT: Proposed Subdivision

FILE NO.: 121-5024

CLIENT: HOMEI Sechelt (Laurel) Limited Partnership

SHEET 1 of 1

TESTHOLE LOG 121-5024 - 2022 01 11 - JT 20220125.GPJ HORIZON.GDT 22-1-31

Test Pit Log No. TP22-03

LOGGED BY: JT REVIEWER: KS DATE: 2022 - 01 - 10 ADDRESS: 5038 Laurel Avenue, Sechelt, BC

METHOD: Excavator NORTHING: _____ EASTING: _____ ELEVATION: _____

Type of Test:
- O Dynamic Cone Penetrometer Test (DCPT)
- ● Becker Denseness Test (BDT)
- ▲ Standard Penetration (SPT)
- ■ Moisture Content (% of dry weight)
- > Plastic limit
- < Liquid limit

TYPE -- Type of sample
- SPT -- Split spoon
- S -- Shelby tube
- G -- Grab
- O -- Other (specify)

▽ Ground water level

Notes: Test pit advanced at the central-westernmost portion of the site

Test pit encompassed footprint of approximately 6'x12' in plan

Depth m	Depth ft	DESCRIPTION	Symbol	Depth	SAMPLE TYPE	20	40	60	80	Piezometer / Comments / Additional Testing
0	0	**SILTY SAND - FILL**(dark brown) fine to medium grained, trace organics (rootlets), moist - inferred to be loose								
		SAND - POSSIBLE FILL(brown) fine to medium grained, some silt, trace organics (rootlets), moist - inferred to be loose to compact		3	G 1					
1		**SILTY SAND**(light grey) fine to medium grained, trace to some gravel, occasional cobbles, moist - inferred to be dense to very dense		4						▽ Perched groundwater encountered at 4 feet depth
	5				G 2					
2		Test Pit Terminated at 7.0 feet		7						
3										

HORIZON ENGINEERING INC

PROJECT: Proposed Subdivision

FILE NO.: 121-5024

CLIENT: HOMEI Sechelt (Laurel) Limited Partnership

SHEET 1 of 1

TESTHOLE LOG 121-5024 - 2022 01 11 - JT 20220125.GPJ HORIZON.GDT 22-1-31

Test Pit Log No. TP22-04

LOGGED BY: JT REVIEWER: KS DATE: 2022 - 01 - 10 ADDRESS: 5038 Laurel Avenue, Sechelt, BC

METHOD: Excavator NORTHING: _____ EASTING: _____ ELEVATION: _____

Type of Test:
- O Dynamic Cone Penetrometer Test (DCPT)
- ● Becker Denseness Test (BDT)
- ▲ Standard Penetration (SPT)
- ■ Moisture Content (% of dry weight)
- › Plastic limit
- ‹ Liquid limit

TYPE -- Type of sample
- SPT -- Split spoon
- S -- Shelby tube
- G -- Grab
- O -- Other (specify)

▽ Ground water level

Notes: Test pit advanced at the central portion of the site

Depth m	Depth ft	DESCRIPTION	Symbol	Depth	SAMPLE TYPE	20	40	60	80	Piezometer / Comments / Additional Testing
0	0	**HOG FUEL** wood chips								
		SAND (brown) well graded, trace to some silt, moist - inferred to be loose to compact		1.5	G 1					
1		**SILTY SAND TO SAND AND SILT** (grey) fine to medium grained, moist - inferred to be dense to very dense		3						
	5									
2					G 2					
		Test Pit Terminated at 9.0 feet		9						
3										

TESTHOLE LOG 121-5024 - 2022 01 11 - JT 20220125.GPJ HORIZON.GDT 22-1-31

HORIZON ENGINEERING INC

PROJECT: Proposed Subdivision

FILE NO.: 121-5024

CLIENT: HOMEI Sechelt (Laurel) Limited Partnership

SHEET 1 of 1

Test Pit Log No. TP22-05

LOGGED BY: JT REVIEWER: KS DATE: 2022 - 01 - 10 ADDRESS: 5038 Laurel Avenue, Sechelt, BC

METHOD: Excavator NORTHING: _____ EASTING: _____ ELEVATION: _____

Type of Test:
- O Dynamic Cone Penetrometer Test (DCPT)
- ● Becker Denseness Test (BDT)
- ▲ Standard Penetration (SPT)
- ■ Moisture Content (% of dry weight)
- › Plastic limit
- ‹ Liquid limit

TYPE -- Type of sample
- SPT -- Split spoon
- S -- Shelby tube
- G -- Grab
- O -- Other (specify)

▽ Ground water level

Notes: Test pit advanced at the central-eastern portion of the site

Test pit encompassed footprint of approximately 8x'14' in plan

Depth m	Depth ft	DESCRIPTION	Symbol	Depth	SAMPLE TYPE	20 40 60 80	Piezometer / Comments / Additional Testing
0	0	**HOG FUEL** wood chips			G 1		
		SAND AND GRAVEL (brown) Well-graded sand, angular to subangular gravel, trace silt, trace organics (rootlets), moist to wet, compact - inferred to be loose		2	G 2		
1		**SILTY SAND TO SANDY SILT** (light brownish grey) fine to medium grained sand, trace to some gravel, occasional cobbles, moist - inferred to be dense to very dense/hard		4	G 3		▽ Perched groundwater encountered at 4 feet depth
	5	**SILTY SAND TO SAND AND SILT** (light grey) fine to medium grained sand, some gravel, occasional cobbles and boulders, moist - inferred to be dense to very dense		6	G 4		
2		Test Hole Terminated at 9.0 feet		9			
3							

HORIZON ENGINEERING INC

PROJECT: Proposed Subdivision

CLIENT: HOMEI Sechelt (Laurel) Limited Partnership

FILE NO: 121-5024

SHEET 1 of 1

TESTHOLE LOG 121-5024 - 2022 01 11 - JT 20220125.GPJ HORIZON.GDT 22-1-31

Test Pit Log No. TP22-06

LOGGED BY: JT REVIEWER: KS DATE: 2022 - 01 - 10 ADDRESS: 5038 Laurel Avenue, Sechelt, BC

METHOD: Excavator NORTHING: _____ EASTING: _____ ELEVATION: _____

Type of Test:
- O Dynamic Cone Penetrometer Test (DCPT)
- ● Becker Denseness Test (BDT)
- ▲ Standard Penetration (SPT)
- ■ Moisture Content (% of dry weight)
- › Plastic limit
- ‹ Liquid limit

TYPE -- Type of sample
- SPT -- Split spoon
- S -- Shelby tube
- G -- Grab
- O -- Other (specify)

▽ Ground water level

Notes: Test pit advanced at the south-western portion of the site

Test pit encompassed footprint of approximately 6x'16' in plan

Depth m	Depth ft	DESCRIPTION	Symbol	Depth	SAMPLE TYPE	Piezometer / Comments / Additional Testing
0	0	**HOG FUEL** wood chips				
		SAND (rusty brown) well graded, trace gravel, moist to wet - inferred to be loose to compact		1.5	G 1	
1		**SILTY SAND** (light grey) fine to medium grained, trace gravel, moist - inferred to be dense to very dense		3		▽ Perched groundwater encountered 3 feet depth
	5				G 2	
2						
3	10	Test Hole Terminated at 10.0 feet		10	G 3	
4						

20 40 60 80

TESTHOLE LOG 121-5024 - 2022 01 11 - JT 20220125.GPJ HORIZON.GDT 22-1-31

HORIZON ENGINEERING INC

PROJECT: Proposed Subdivision

FILE NO.: 121-5024

CLIENT: HOMEI Sechelt (Laurel) Limited Partnership

SHEET 1 of 1

Test Pit Log No. TP22-07

LOGGED BY: JT REVIEWER: KS DATE: 2022 - 01 - 10 ADDRESS: 5038 Laurel Avenue, Sechelt, BC

METHOD: Excavator NORTHING: _____ EASTING: _____ ELEVATION: _____

Type of Test:
- O Dynamic Cone Penetrometer Test (DCPT)
- ● Becker Denseness Test (BDT)
- ▲ Standard Penetration (SPT)
- ■ Moisture Content (% of dry weight)
- › Plastic limit
- ‹ Liquid limit

TYPE -- Type of sample
- SPT -- Split spoon
- S -- Shelby tube
- G -- Grab
- O -- Other (specify)

▽ Ground water level

Notes: Test pit advanced at the south-eastern portion of the site

Depth m	Depth ft	DESCRIPTION	Symbol	Depth	SAMPLE TYPE	20 40 60 80	Piezometer / Comments / Additional Testing
0	0	**HOG FUEL** wood chips			G 1		
		SAND (rusty brown) well graded, trace to some gravel, trace organics (rootlets) - inferred to be loose to compact		1.5			
		SILTY SAND (rusty brown) well graded, trace organic (rootlets), moist		3	G 2		
1		- inferred to be compact		3.5			
		SAND AND SILT (light grey) fine to medium grained sand, trace gravel, occasional cobbles, moist - inferred to be dense to very dense					
	5				G 3		
2							
3	10				G 4		
		Test Hole Terminated at 12.5 feet		12.5			
4							

HORIZON ENGINEERING INC

PROJECT: Proposed Subdivision

FILE NO.: 121-5024

CLIENT: HOMEI Sechelt (Laurel) Limited Partnership

SHEET 1 of 1

TESTHOLE LOG 121-5024 - 2022 01 11 - JT 20220125.GPJ HORIZON.GDT 22-1-31

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APPENDIX B
Slope Stability Analyses

1.0 INTRODUCTION

The purpose of the slope stability analyses discussed in this report is to evaluate the conditions of steep slopes (i.e. steeper than 20% per DPA5) across the subject site. The slope stability analyses have been carried out in general conformance with the guidelines methods prescribed in the Legislated Landslide Guidelines (refer to Section 3.0 of the report for full reference).

A commercially available limit equilibrium slope stability analysis program (GeoSlope, version 9.0.0.15234) was used to carry out the analyses for this project under both static and design seismic conditions. The Morganstern-Price method of analysis was used to search for the most critical potential circular failure surface for each subject slope.

For the purpose of communicating the comparative stability of a slope, a Factor of Safety (FoS) may be determined for a given slope condition. A FoS is based on the ratio of resisting forces to driving forces, where the resisting forces help to stabilize a slope and the driving forces contribute to instability. A FoS greater than 1.0 would indicate that the slope is more likely to be stable, while a FoS less than 1.0 would indicate that the slope is likely to be unstable. The Engineers and Geoscientists of British Columbia (EGBC) Guidelines for Legislated Landslide Assessments for Proposed Residential Development in BC consider that a minimum slope stability FoS of 1.5 is required under static conditions and either a minimum FoS of 1.0 is required under seismic conditions or the predicted ground displacement should be less than 150 mm (6 inches).

The design seismic condition would be based on a seismic event with a 1:2475 annual chance of exceedance, which corresponds to a 2% probability of exceedance in 50 years.

2.0 MODEL SETUP

In order to assess the global stability of the west bank of the Chapman Creek Ravine, a cross sectional profile approximately orientated in the southwest to northeast direction and extending from the projected location of test hole AH22-02 to the toe of the ravine bank was modelled in Geoslope. Furthermore, as Lots 90 to 100 are proposed to be situated within close proximity to the crest of the 7 metres high, upper escarpment slope situated at the northeast portion of the site, the stability of this slope, under the proposed site conditions was also assessed.

The general geometry used in the slope stability analyses was interpreted from existing topographic LIDAR data provided by the SCRD online mapping system. The subsurface conditions encountered during the subsurface investigation and the observations from the slope reconnaissance were used to inform the slope stability analysis. Based on our measurements of groundwater carried out in the standpipe piezometers installed in select test holes, the groundwater levels within the proposed subdivision footprint were modelled at depths of approximately 5.0 metres (16.5 feet) below existing grades . It should be noted that the piezometer installed at SH22-01, located within closest proximity to the creek bank was dry at the time of measurement on February 3, 2022. Thus, the groundwater level at this piezometer location has been conservatively inferred to be situated at the

aforementioned depth based on the groundwater levels measured at the AH22-02, which was installed approximately 200 metres to the east of SH22-01 and the site topography. Furthermore, the colour of the natural till-like stratum at SH22-01 was found to grade from light grey to dark grey at a depth of approximately 10 feet below existing site grades at this test hole location, which may indicate that ambient groundwater levels are situated below this depth.

The observed stratigraphic profile encountered along the near-vertical stream cut exposure located at the outside river bend of Chapman Creek (as previously described in Section 5.0 of the report) was taken into consideration in the development of the inferred stratigraphy of the slope profile used in the slope stability analysis.

Furthermore, it is understood that existing site grades near the easternmost limits of the proposed subdivision will be raised by up to approximately 2.0 to 2.5 metres (6.5 to 8.2 feet) based on the civil site grading plans. The proposed, permanent site conditions, which would include the construction of the proposed single family home (on Lot 98) and inferred final site grades have been modelled in the analysis. It is also assumed that a retaining wall will be constructed at the easternmost limits of the subdivision to locally manage the proposed grade differences between Lots 91 to 100 and the portions of the site which will be allocated to park space to the east.

The soil parameters used in the slope stability model were selected based on correlation with the DCPT/SPT blow counts and our previous experience with similar subsurface conditions. The parameters are tabulated in Table 4 below and also indicated in the Figures attached.

Table 4: Soil Parameters used in Slope Stability Analysis

Layer	Unit Weight (kN/m^3)	Friction Angle (°)
Proposed Engineered Fill	18.5	35
Proposed Retaining Wall	24	50
Sand	18	33
Sand to Sand and Silt (Till-like)	21	37
Sand and Gravel (Proglacial)	20	38

3.0 ANALYSES RESULTS

The results of slope stability analyses at a slope profile extending across Lot 98, in an approximately southwest to northeast direction are presented in Figures 7 to 11. Slope stability analysis, under both static and seismic loading, has been carried out to assess the stability of the upper 7 metres high and the lower 40 metres high escarpment slopes. A cross sectional slope profile extending through Lot 98 was selected as it was understood that the subject lot would be located with closest proximity to the crest of the upper escarpment slope and would yield more conservative analysis results.

3.1 Global Static Analysis (Lower Escarpment Slope)

The global slope stability analysis was carried out to assess the potential for slip surfaces which extend from the footprint of the proposed development down to the Chapman Creek bed. Both shallow and deep-seated failure surfaces were investigated as part of this slope stability analysis. Small, localized, shallow surficial failures generated in the computer model were excluded from this analysis since the model represented a simplified slope geometry and subsurface geology of the overall slope. An envelope diagram of slip surfaces correlating to Factors of Safety between 0.83 (critical slip surface) and 1.5 is presented in Figure 7. The slip surface corresponding to a FoS of 1.5, was found to initiate from the toe of the upper escarpment slope and daylight at a horizontal offset distance of approximately 40 metres from the toe of the ravine bank. Thus, the slip surfaces associated with FoS values of 1.5 and less are not expected to impact the proposed development. As the east property line of Lot 98 will be situated at a minimum horizontal setback distance of approximately 18 metres from the tops of these slip surfaces, it is envisaged that the current setback distance of the proposed subdivision from the crest of the ravine would be considered suitable with respect to global slope stability of the ravine bank under static conditions.

3.2 Global Seismic Analysis (Lower Escarpment Slope)

In order to conduct seismic slope stability analyses, a ground acceleration of 3/4 of the Peak Ground Acceleration (PGA=0.363 g) for a 2% probability of exceedance in 50 years was used. This equates to a design seismic ground acceleration of **0.272 g**. It should be noted that for the purpose of identifying all potential global slip surfaces which may be triggered by the seismic loading conditions, the cross sectional profile of the model was extended towards the west property line of the site and the approximate crest of the east bank of Chapman Creek. The results indicated that global failure of the creek bank should be expected during the design seismic event.

A review of the seismic analysis results indicate that potential slip surfaces with FoS$\leq$1.0 are expected to encroach within the footprint of the proposed subdivision, initiating at a location approximately 140 metres to the west of the proposed development setback and daylighting near the toe of the east bank of the Chapman Creek ravine. The envelope diagram of slip surfaces correlating to Factors of Safety between 0.4 (critical slip surface) and 1.0 is presented in Figure 8 attached to this report. Thus, the eastern portion of the proposed subdivision is expected to be impacted by the global failure of the creek bank under the design seismic event.

If the stability analysis indicates FoS values of less than 1.0 under seismic loading conditions, the Legislated Landslide Guidelines recommend that the magnitudes of the seismic slope displacement be estimated and used for the design of the structures potentially affected. The aforementioned guidelines proposes that displacement magnitudes of 15 centimetres or less are tolerable with respect to life safety. For the purpose of this analysis, Method 2 of the Legislated Landslide Guidelines was utilized. This method entails the use of a seismic coefficient k_{15} which correlates to 15 centimetres of slope displacement along the resulting slip surface. The k_{15} coefficient was estimated to be 0.18 based on the seismic properties of the site. Subsequently, pseudo-static limit equilibrium analysis using the k_{15} coefficient indicated that the slip surface correlating to a FoS of 1.0 would initiate from a location along the upper escarpment slope situated approximately 12 metres to the northeast from the east property line of Lot 98 and daylight approximately 40 metres from the toe of the lower escarpment slope as shown in Figure 9. Thus, the portions of the slope which are located within this slip surface would be expected to experience slopes displacements of 15 centimetres or greater. As the proposed subdivision is proposed to be located approximately

12 metres from the top of this slip surface, it is envisaged that slope displacements of less than 15 centimetres would be induced within the subdivision under the design seismic event; this is satisfactory.

It should be noted that the above-referenced criteria, with respect to seismic slope displacement has been developed for light-weight residential buildings such as single-family houses and the aforementioned methodology and threshold is not applicable to multi-storey residential buildings and commercial/industrial heavy structures.

3.1 Upper Escarpment Slope

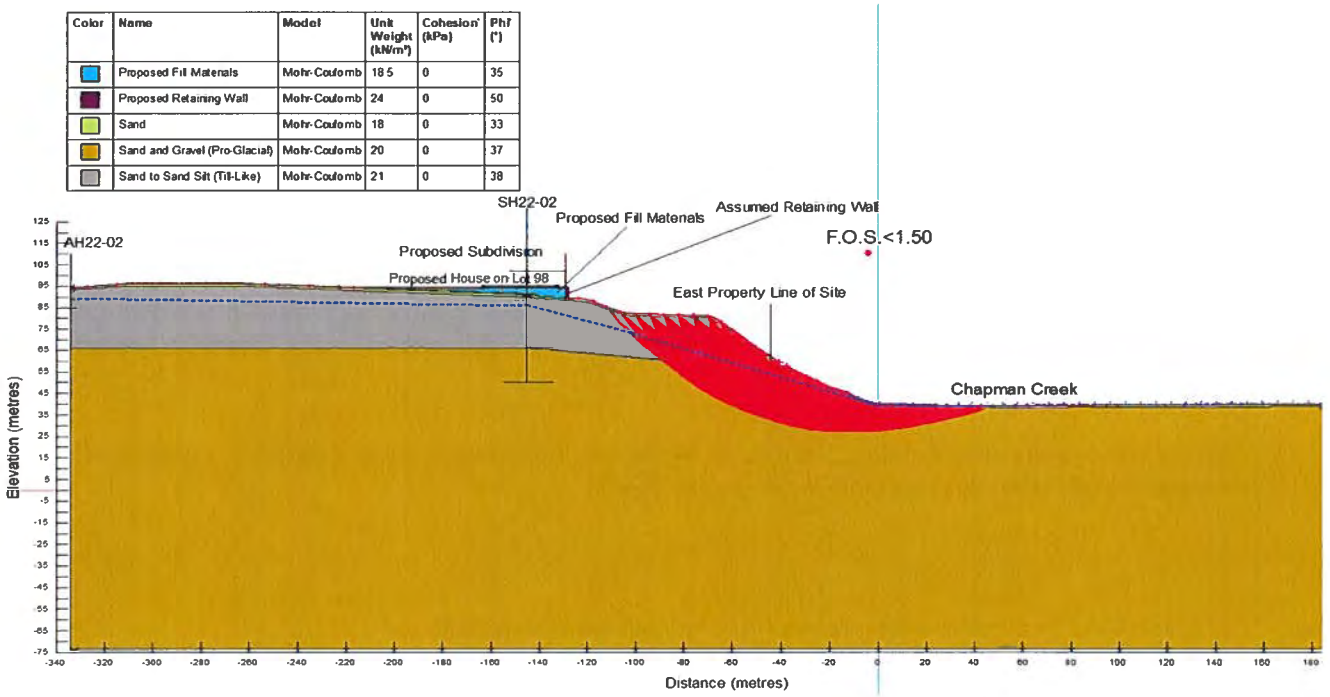
The slope stability analysis generally indicated that the upper escarpment slope is stable under both static and seismic loading conditions. The slip surfaces that correspond to factors of safety of 1.5 or less under static loading conditions were found to be shallow, confined within the comparatively weaker upper sand layer and situated at minimum horizontal offset distances of 11 metres outside of Lot 98. A close-up view of the slope stability model is presented in Figure 10 to show the extents of the slip surfaces. This is generally representative of surficial sloughing within the upper sand layer and it is envisaged that this would have negligible effects on the proposed development.

The slip surfaces generated under seismic loading conditions which correspond to a FoS of 1.0 or less were also found to be representative of shallow/surficial failures and were situated downslope from the proposed subdivision. Thus, this would have negligible impacts on the development based on the proposed setback distance.

Based on the results of the slope stability analysis, the upper escarpment slope is considered stable under both static and seismic loading conditions.

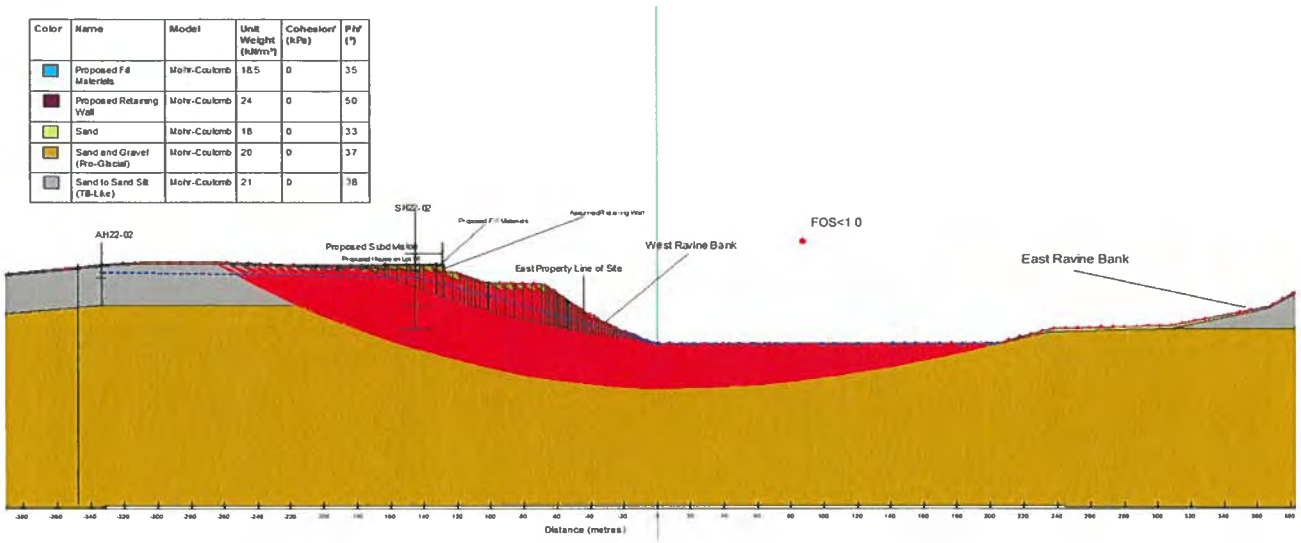
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Color	Name	Model	Unit Weight (kN/m³)	Cohesion (kPa)	Phi (°)
	Proposed Fill Materials	Mohr-Coulomb	18.5	0	35
	Proposed Retaining Wall	Mohr-Coulomb	24	0	50
	Sand	Mohr-Coulomb	18	0	33
	Sand and Gravel (Pro-Glacial)	Mohr-Coulomb	20	0	37
	Sand to Sand Silt (Till-Like)	Mohr-Coulomb	21	0	38



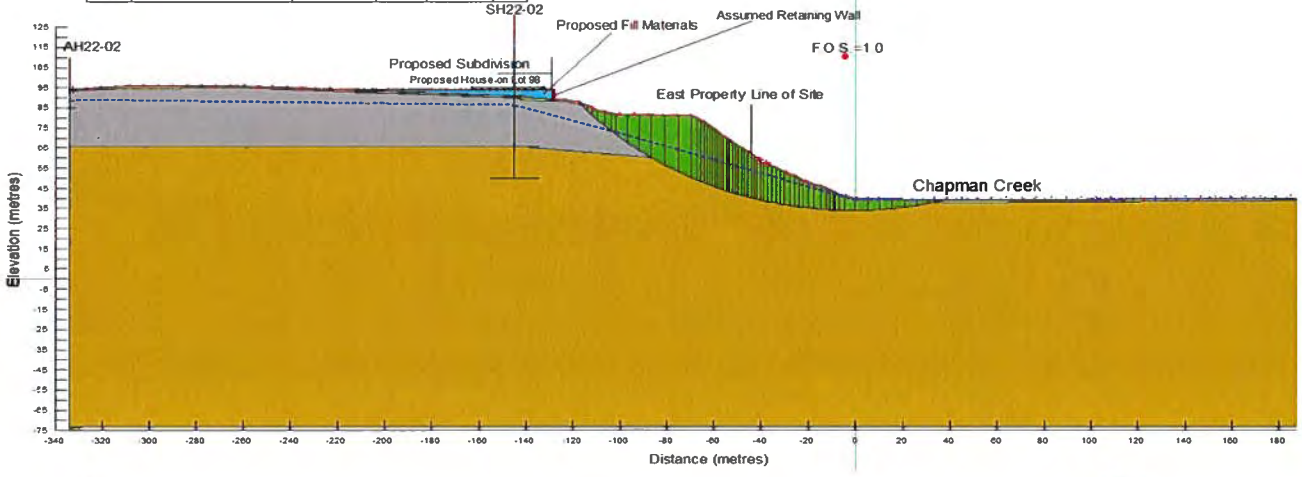
Prepared by: JT Checked by: JT Approved by: KS Date: 22-Feb-22	**Proposed Havies Subdivision at 5038 Laurel Avenue**	
	Figure 7: Slope Stability Analysis Results - Lower Escarpment All Slip Surfaces F.O.S <1.5 (Static Conditions)	Job Number: 121-5024
		HORIZON ENGINEERING INC

Color	Name	Model	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)
	Proposed Fill Materials	Mohr-Coulomb	18.5	0	35
	Proposed Retaining Wall	Mohr-Coulomb	24	0	50
	Sand	Mohr-Coulomb	18	0	33
	Sand and Gravel (Pro-Glacial)	Mohr-Coulomb	20	0	37
	Sand to Sand Silt (Till-Like)	Mohr-Coulomb	21	0	38



Prepared by: JT Checked by: JT Approved by: KS Date: 22-Feb-22	**Proposed Havies Subdivision at 5038 Laurel Avenue** Figure 8: Slope Stability Analysis Results - Lower Escarpment (Seismic Conditions) All Slip Surfaces (FOS<1.0 for PGA=0.272)	HORIZON ENGINEERING INC

Color	Name	Model	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)
	Proposed Fill Materials	Mohr-Coulomb	18.5	0	35
	Proposed Retaining Wall	Mohr-Coulomb	24	0	50
	Sand	Mohr-Coulomb	18	0	33
	Sand and Gravel (Pro-Glacial)	Mohr-Coulomb	20	0	37
	Sand to Sand Silt (Till-Like)	Mohr-Coulomb	21	0	38

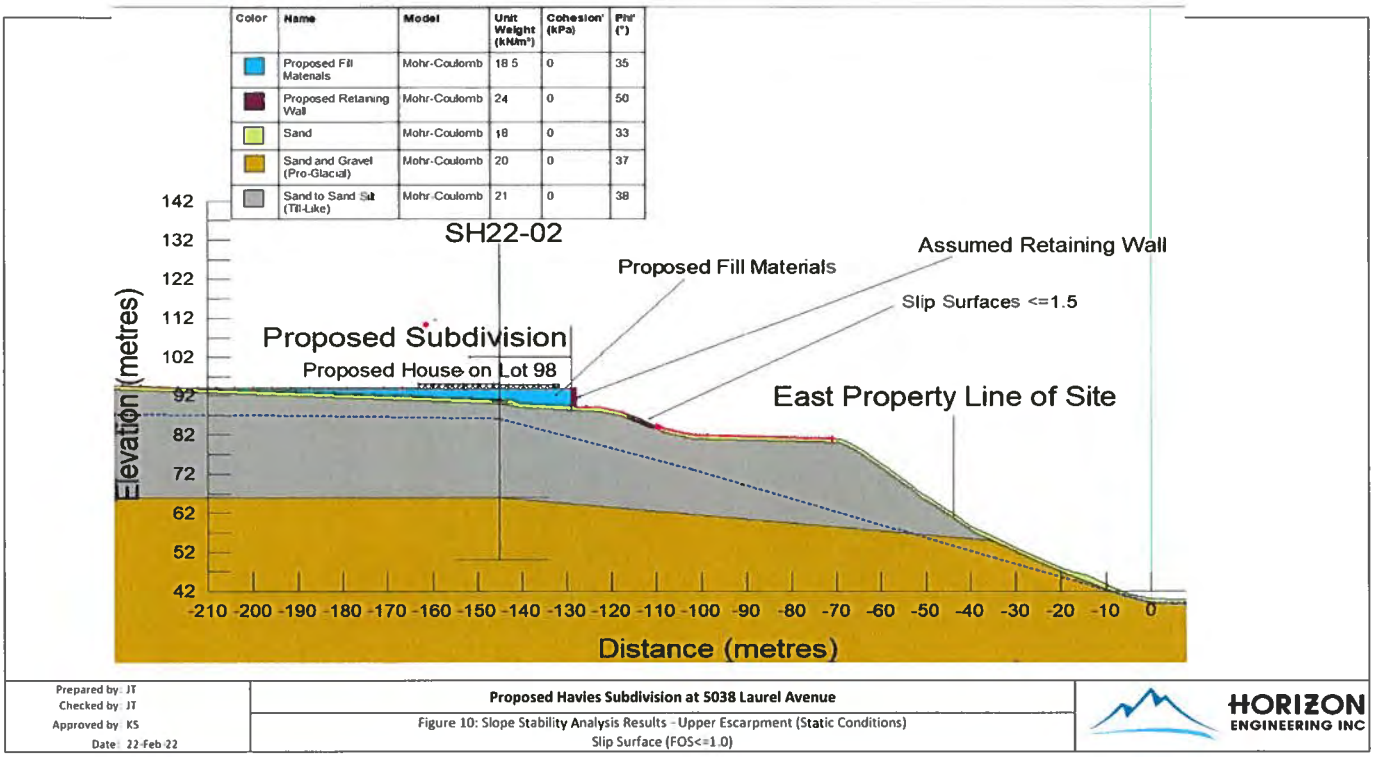


Prepared by: JT
Checked by: JT
Approved by: KS
Date: 22-Feb-22

Proposed Havies Subdivision at 5038 Laurel Avenue

Figure 9: Slope Stability Analysis Results - Lower Escarpment (Seismic Conditions k15=0.18)
Slip Surface (FOS=1.0)

HORIZON ENGINEERING INC

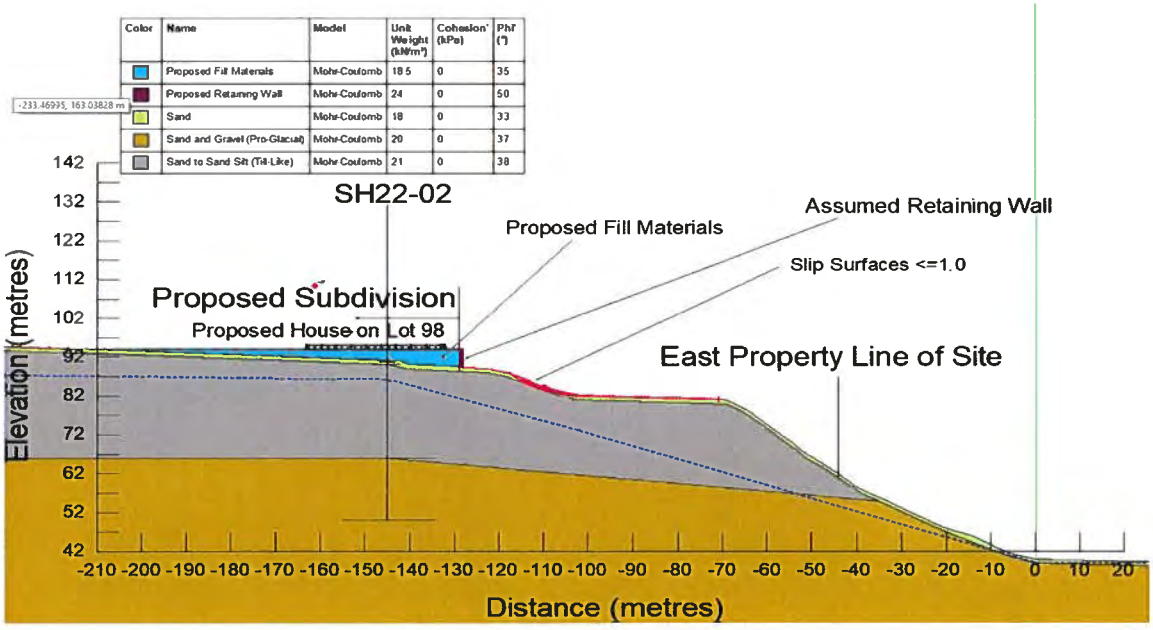


Prepared by: JT
Checked by: JT
Approved by: KS
Date: 22-Feb-22

Proposed Havies Subdivision at 5038 Laurel Avenue

Figure 10: Slope Stability Analysis Results - Upper Escarpment (Static Conditions)
Slip Surface (FOS<=1.0)

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Prepared by: JT Checked by: JT Approved by: KS Date: 22-Feb-22	**Proposed Havies Subdivision at 5038 Laurel Avenue** Figure 10: Slope Stability Analysis Results - Upper Escarpment (Seismic Conditions) Slip Surfaces (FOS<=1.0)	HORIZON ENGINEERING INC

SCHEDULE E

Keystone Environmental
Knowledge-Driven Results

March 11, 2022

Ms. Mei Shen
HOMEI Sechelt (Laurel) Limited Partnership
2253 – 13353 Commerce Parkway
Richmond, BC V6V 3A1

Dear Ms. Shei:

Re: Environmental Assessment
5038 Laurel Avenue, Sechelt, BC
File No. 17216

1. INTRODUCTION

Keystone Environmental Ltd. (Keystone Environmental) was retained by HOMEI Sechelt (Laurel) Limited Partnership (herein referred to as 'HOMEI') to conduct a preliminary Environmental Assessment of 5038 Laurel Avenue in Sechelt, BC ('the Site'; Figure 1). The purpose of the assessment was to identify existing biophysical conditions in the context of proposed development of the Site and provide a description of the anticipated environmental constraints on development associated with occurrences of species of management concern and/or other conspicuous environmental features within and/or near the Site, if any.

1.1 Environmental Assessment Scope

This scope of work for this biophysical assessment included the following tasks:

- A background review of environmental databases and available literature to compile information existing habitat values, potential ecological sensitivities and species at risk within the project area;
- A Qualified Environmental Professional (QEP) led field survey to ground-truth background information, inventory all watercourses on or within 30 metres of the Site (as per Provincial methodology per the Riparian Areas Protection Regulation; RAPR), and collect information on any observations which could constrain proposed development. This includes the determination of the classification of streams and associated appropriate setbacks in the context of development.

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Environmental Consulting
Engineering Solutions
Assessment & Protection

- A summary report of applicable environmental requirements and recommendations for environmental protection and enhancement as part of a redevelopment scenario.

1.2 Location and Environmental Setting

The Site is comprised of one legal lot referenced as 5038 Laurel Avenue, in the District of Sechelt, BC (PID 004-615-841). The Site is absent of infrastructure (Photograph 1). Historic aerial imagery shows minor clearing within the Site as early as 1980, with the entire Site first fully cleared between 1998 and 2005 (UBC 2022). The Site was most recently cleared and grubbed in 2019 including minor topographical changes (SCRD 2017). Roads and trails within the Site have facilitated illegal dumping (e.g., yard waste, garbage; Photograph 2).

The Site is located at the northern extent of Laurel Avenue and is bound to the north and east by mature forest[1] surrounding Chapman Creek. The Site is surrounded to the northwest, west, and south by existing low-density residential neighbourhoods.

The Site is within the eastern variant of the very dry maritime Coastal Western Hemlock Biogeoclimatic subzone (CWHxm1; BEC; Green and Klinka 1994). The Site's western portion slopes with a western aspect, and the eastern portion is generally flat. The Site's elevation is mapped between approximately 80 and 100 m asl.

2. REGULATORY FRAMEWORK

Regulatory considerations for potential redevelopment of the Site are multi-jurisdictional, as the Site is subject to the requirements of federal, provincial, and municipal environmental regulations and policies. Based on a preliminary understanding of Site conditions, the following section summarizes federal and provincial Acts and regulations that may be applicable to redevelopment.

- **Federal *Species at Risk Act*, Schedule 1:** The *Species at Risk Act* (*SARA*) Schedule 1 identifies wildlife species considered 'at risk' in Canada, categorizing them as Threatened, Endangered, Extirpated, or of Special Concern, and prohibits a number of specific activities related to listed species including killing, or harming the species, as well as the destruction of critical habitat identified in management plans required under *SARA* for the species.
- **Federal *Migratory Bird Conventions Act (MBCA):*** Ensures the conservation of migratory bird populations by regulating all activities that are harmful to migratory birds, their eggs or their nests, such as vegetation clearing.
- **BC *Heritage Conservation Act*:** Protects heritage and cultural resources in BC, including archaeological sites.

[1] Zoned as PA-1 (public assembly; parks and open space land use designation in the DOS OCP (DOS 2011)).

- **BC *Wildlife Act*:** Prohibits possessing, taking or destroying (i) a bird or its egg, (ii) the nest of an eagle, peregrine falcon, gyrfalcon, osprey, heron or burrowing owl, or (iii) the nest of a bird not in (ii), when the nest is occupied by a bird or its egg unless authorized under permit.
- **BC *Weed Control Act*:** Requires landowners to control 'noxious weeds' growing or located on their property.

The following are typical municipal requirements and bylaws applicable for proposed development projects in the District of Sechelt (DOS).

- **DOS Official Community Plan (2011; OCP):** A bylaw which guides the long-term planning of Sechelt, including stipulating Development Permit Areas which require additional investigation and reporting in advance of development.
- **DOS Zoning Bylaw (No. 25, 2021)**: A bylaw to establish zones, and to regulate the use of land, buildings and structures within the zones, pursuant to the Local Government Act.
- **DOS Environmental Management and Protection Bylaw (No. 484, 2009):** Regulates the cutting and removal of trees and requires their replacement in association with development. Specifies classifications of trees to be protected.

3. BACKGROUND INFORMATION REVIEW

Existing baseline conditions at the Site and immediate surrounding areas were assessed by conducting online database searches and by reviewing historical imagery. The objective of the background review was to identify any significant natural features or species protected by the regulations identified in Section 2, identify potential concerns and issues that may require further investigation, and to collect necessary biophysical information to identify environmental Site values that may be affected by future project works.

3.1 Database Background Review

Prior to the field assessment, databases were queried to identify information related to environmental values at the Site. These databases included the following:

- BC Alien Plant Program Map (IAPP);
- BC Ministry of the Environment (MoE), BC Species and Ecosystem Explorer and Conservation Data Centre (CDC);
- BC HabitatWizard;
- BC ENV EcoCat: Ecological Reports Catalogue;
- Community Mapping Network of BC Atlas Gallery;
- DOS Zoning Map;

- Environmental and Climate Change Canada (ECCC) *Species at Risk Act* (SARA) public species registry;
- Sunshine Coast Regional District Open Data and Mapping Services (SCRD);
- UBC Geographic Information Centre historical aerial imagery;
- Wildlife Tree Stewardship Database (WiTS).

3.1.1 DOS Online Review

DOS online databases and the OCP designates the Site as R-1, low-density residential land use. The Site is mapped as containing a long-established informal recreational trail network connecting to managed trails along Chapman Creek. The Site overlaps with areas regulated under the DOS DPA 2 (watercourse habitat and watercourse hazard; DOS 2011).

3.1.2 Species at Risk and Sensitive Ecosystems

For the purposes of this assessment, species at risk were defined as those federally designated as "Special Concern," "Threatened" or "Endangered" under Schedule 1 of the *Species at Risk Act (SARA)*, or species/ ecosystems recognized provincially as Red or Blue listed under the *Wildlife Act*.

The CDC website and HabitatWizard were queried for confirmed occurrences of species and ecosystems at risk and rare ecological communities on or within a five-kilometer radius of the Site (BC CDC 2022; Province of BC 2022a). The potential for species and ecosystems at risk occurrences on or within five kilometers of the Site was qualitatively assessed through a desktop review of available online mapping and compared against local habitat characteristics and species life requisites.

Searches did not yield occurrences of rare or endangered plants or wildlife within the Site; however, a few species or ecological communities are mapped, or have protected areas within five-kilometres of the Site (Table 3-1). See Appendix B for a more comprehensive list of species at risk with potential to occur on Site. Due to habitat requisites of these species, very few are likely to inhabit the Site or its surroundings.

Forests surrounding Chapman Creek, a large stream located in proximity to the Site have been classified using Sensitive Ecosystems Inventory mapping (SEI; EC and MSRM 2005; Province of BC 2022a). Forests outside of the Site's eastern boundary area classified as mature forest, riparian fringe forest, and riparian low bench forest within three red-listed plant communities (Table 3-1).

Table 3-1 Documented Observations of Species at Risk within a 5 Kilometre Radius of the Site (BC CDC 2022; EC and MSRM 2005)

Common Name/ Supplemental Information	Scientific Name	Provincial List Status	SARA Status	Location Relative to Site	Most Recent Observation (Year)	Probability of Presence on-Site
Birds						
Great blue heron	*Ardea herodias fannini*			3.8 km NW	2013	Low
Marbled murrelet	*Brachyramphus marmoratus*	Blue	1-T	N/A	-	Low
Mammals						
Roosevelt elk	*Cervus canadensis roosevelti*	Blue	N/A	On Site	2022	High
Ecological Communities						
Sitka spruce/ Salmonberry very dry maritime	*Picea sitchensis/ Rubus spectabilis*	Red	N/A	700 m SE	2016	Low
western hemlock – Douglas-fir/ Oregon beaked moss	*Tsuga heterophylla - Pseudotsuga menziesii / Eurhynchium oreganum*	Red	N/A	100 m E	-	Low
Sitka spruce – salmonberry very dry maritime	*Picea sitchensis / Rubus spectabilis*	Red	N/A	200 m E	-	Low

3.1.3 Aquatic Habitat

A review of the available mapping did not identify any previously mapped watercourses within the Site. Aerial imagery shows an area of stained soils and inundated soils (2019 and 2021, respectively) in the Site's southeastern extent (SCRD 2017). Chapman Creek is mapped as being located within 100 m east of Site. Chapman Creek supplies water to the SCRD water supply. The DOS OCP prioritizes protection of the existing Chapman Creek trail system and surrounding forested land and riparian area (DOS 2011).

3.1.4 Wildlife Habitat

A desktop search of the WITS database did not yield results for trees containing nests protected year-round under the *Wildlife Act* within the Site, or in a proximity which could influence Site activities (CMN 2018). Similarly, review of the BC HabitatWizard did not return any previously defined wildlife habitat features within the Site.

3.1.5 Invasive Plants

The provincial Invasive Alien Plant Program (IAPP) documents reported occurrences of noxious plants regulated under the provincial *Weed Control Act (*Province of BC 2022b). Infestations of Japanese knotweed (*Reynoutria japonica*) and bohemian knotweed (*R. bohemica*) and giant knotweed (*Reynoutria sachalinensis)* were mapped within one kilometer of the Site.

4. BIOPHYSICAL FIELD SURVEY

4.1 Field Survey Methodologies

A field survey of the Site was conducted by Keystone Environmental on February 09, 2022. The objective of the field survey was to collect additional biophysical information from the Site to supplement existing background information gathered during the desktop review. Appendix A provides a photographic record summarizing the field investigation.

The Site and surrounding areas were traversed by foot and information on plant species occurrences, mapped and unmapped aquatic features, wildlife habitat and incidental observations were recorded. The following sections briefly describe the extent of the field surveys conducted and the methodologies used to identify wildlife and their habitats, as well as the methodology used to identify the vegetation and habitat types.

4.1.1 Vegetation

Surveys of Site vegetation included a visual assessment. Due to the denuded nature of the Site (i.e., recently cleared and grubbed), systematic surveys were not performed, and the assessment focused on describing habitat types by identifying vegetation present on Site. The vegetation was characterized by species composition, structure, and habitat value to wildlife species that may be present. Vegetation surveys also included identifying and noting locations of species designated as provincially noxious and regulated under the provincial *Weed Control Act* or considered a 'Priority Species' as designated by the SCRD (SCRD 2015).

4.1.2 Wildlife and Wildlife Habitat

Wildlife and wildlife habitat were assessed qualitatively through documentation of habitat characteristics with the ability to meet one or more life requisites for wildlife known or with potential to occur within the Site. Field data were collected following modified methods from the provincial *Field Manual for Describing Terrestrial Ecosystems 2nd Edition* (BC MOE and BC MOF 2010) and included evaluation of the following information if it was present within the Site:

- Documentation of wildlife habitat features, such as wildlife trees, wildlife trails, hibernacula, and coarse woody debris (CWD);
- Assessment of bird nesting habitat, including a visual scan for protected nests (e.g., eagle, heron, osprey, or peregrine falcon);
- Confirmation of suitable breeding areas for herptiles; and

- Documentation of incidental wildlife observations or sign, such as scat or tracks.

4.1.3 Aquatic Features and Riparian Setbacks

Aquatic and riparian habitat assessments focused on confirming the location and extent of watercourses, ditches, and other aquatic features identified in the background review, and reviewing the property for unidentified aquatic features that may be regulated. The approximate top of bank of regulated aquatic features were mapped using a georeferenced figure in AvenzaMaps. Streamside Protection and Enhancement Area (SPEA) setbacks were determined for each aquatic feature, in accordance with municipal setback requirements (DOS 2011).

Top of bank and high water mark flagging was conducted by a Qualified Environmental Professional (QEP), where applicable, as per definitions and procedures listed in the BC Riparian Areas Protection Regulation Technical Manual. Flagging was completed on all ditches and watercourses within the Site, and within 30 metres of the Site boundaries.

Transects were completed within the Site and within 30 metres of the Site boundaries to locate unmapped watercourses, wetlands, and ditches. New features were flagged as per above and were assessed as follows based on whether they were ditches, wetlands, or streams.

4.2 Field Survey Results

The findings of the field surveys conducted by Keystone Environmental are presented in the following sections. Appendix C provides a holistic account of plant and wildlife observations during Site activities.

4.2.1 Vegetation

Vegetation cover on-Site was broadly divided into two categories, previously cleared areas most (i.e., recently disturbed in 2019) and a narrow margin of forest on the Site's north and east boundaries. Previously cleared areas were primarily characterized by remnant native understory vegetation (e.g., dull Oregon grape (*Mahonia nervosa),* salal (*Gaultheria shallon*)), regenerating shrub and tree species (e.g., willow (*Salix* sp.*),* Douglas fir (*Pseudotusga menziesii),* and red alder (*Alnus rubra*); Photograph 3), and several weedy or invasive species (Photograph 4). Noxious weeds were not observed during field investigations; however, three invasive plant species found within the Site are considered priority species by the SCRD (Appendix C; SCRD 2015).

An area previously identified as inundated in aerial imagery (2019, 2021) was observed as containing clay-rich subsoils and numerous facultative and obligate hydrophytes (i.e., hardhack (*Spirea douglasii)*; sedge and rush species; Photographs 5 and 6), indicating a prolonged presence of standing water throughout the growing season. These conditions are expected to have been established during clearing and grading.

The Site's eastern forested portion appeared similar to the mature forests described in the SEI mapping (Photograph 7). The portion within the Site was characterized by mature coniferous trees (Douglas fir, western red cedar (*Thuja plicata)*, and western hemlock (*Tsuga heterophylla*)), with

a lesser component of deciduous red alder. The understory was well-developed, including sapling western red cedar and a shrub layer primarily comprised of salmonberry (*Rubus spectabilis)*. The forest margins also included English holly and English ivy, mostly along trail and clearing edges. The Site's forested margin along the northeast was sloped to the top of bank of Chapman Creek.

Forested areas surrounding Chapman Creek were observed to align with the SEI mapping. included areas of forested swamp with mature Sitka spruce (*Picea sitchensis)* and Douglas fir measured as between 113-119 cm DBH. These areas were directly down slope of the inundated area within the Site, indicating a potential presence of a locally high, or seasonally perched water table.

Forests north of the Site are also conifer dominant; however, they are forested at a considerably higher density compared to the surrounding forests, with a sparse, heavily shaded understory.

Rare or endangered plants, or their habitat requisites, were not observed during surveys within the Site.

4.2.2 Wildlife and Wildlife Habitat

High-value wildlife habitat was not observed on-Site during the field survey; however, observations were made of features available for a variety of species' partial or complete life requisites.

The dense nature of the low-growing regenerating shrub and tree communities within the Site provides foraging and nesting habitat, and security cover for ground and shrub nesting birds, including species at risk detailed in Appendix B. Mallard ducks (*Anas platyrhynchos*) were observed in the Site's inundated area, and emergent hydrophytes likely provide forage for waterfowl during the winter months.

No nests protected year-round under the *Wildlife Act* were observed; however, large snags and wildlife trees surrounding the Site provide opportunity for tree and cavity nesting species (Photograph 7).

Areas of ponded water within the Site are likely to provide suitable habitat for lentic breeding amphibians (Photographs 5 and 6). This includes the Northern red-legged frog (*Rana aurora*) and Western toad (*Anaxyrus boreas*), which are both listed under Schedule 1 of SARA as Special Concern.

Areas of piled rock potentially derived from previous earth works (i.e., grubbing; Photograph 4) provide suitable hibernacula for local snake populations. This may include the Northern rubber boa (*Charina bottae;* SARA Schedule 1 Special Concern). This species has only recently been observed in several areas of the Sunshine Coast. The Site could support the sharp-tailed snake (*Contia tenuis;* SARA Schedule 1 Endangered), which utilize sunny openings near Douglas-fir arbutus forests and basks beneath objects (e.g., rocks, logs). This species has not been confirmed on the Sunshine Coast beyond anecdotal information from community naturalists (SCWP nd).

Foraging opportunities for small mammals at the Site are abundant; however, denning opportunities are limited. The Chapman Creek riparian area likely supports several denning animals and amphibians due to abundant understory vegetative cover and woody debris in varying stages of decay.

The Site's early seral vegetation provides forage for local ungulate populations, including Roosevelt elk (*Cervus canadensis roosevelti* provincial species of Special Concern) and Columbian black-tailed deer (*Odocoileus hermionus columbianus)*. Roosevelt elk sign (i.e., scat) was located in the Site's northeast corner.

On-Site habitat value is generally considered low to moderate. Due to the Site's current shrub cover, and proximity to contiguous, mature forest, and presence of a periodically inundated areas, the Site may provide dispersal, foraging, and breeding habitat for select wildlife. Evidence of species and ecosystems at risk identified as potentially present during the background review were not observed, and the presence of these species is limited to as described above and in Appendix B.

4.2.3 Aquatic Features and Riparian Setbacks

Watercourses were not observed within the Site but multiple drainage ditches occurred along the Site perimeter, specifically the south and west boundaries. In addition, Chapman Creek, a significant watercourse that provides fish habitat and the majority of local water supply occurs to the east of the Site (Photographs 8 and 9). A localized area of inundation occurs within the Site as well.

Ditch 1 occurs along the west boundary of the Site and was dry at the time of the field survey. Ditch 1 appeared to collect drainage from portions of the Site as well as the neighbouring property to the west and convey flows south towards the approximate mid-point of the west Site margin where its alignment changes to convey flows west away from the Site. Ditch 1 was characterized by a width that ranged from 1.1 to 1.7 m. Conspicuous vegetation adjacent to Ditch 1 included red alder, Himalayan blackberry, and grasses. Ditch 1 was assessed as a ditch (i.e., per the Provincial *Riparian Areas Protection Regulation* and *Water Sustainability Act*) based on its clear anthropogenic origin, linear character, lack of natural headwaters, function as a source of drainage conveyance and occurrence along property boundaries. Ditch 1 was assessed as providing a minor to negligible contribution of flows and associated nutrients to downstream habitats. Ditch 1 was not capable of sustaining fish.

Ditch 2 occurs along the south boundary of the Site, north of and parallel to Havies Road. Ditch 2 was dry at the time of the field survey. Ditch 2 appears to primarily collect drainage from Havies Road and conveys flows to the west where flows enter a 450 mm diameter corrugated metal pipe. Ditch 2 was characterized by a higher north bank due to the local elevation within the Site compared to the elevation of Havies Road. Ditch 2 was characterized by a channel width that varied from 1.1 m to 2.0 m. Conspicuous vegetation adjacent to Ditch 2 included Himalayan blackberry, broom, willow, common rush, sword fern and grasses. Ditch 2 was assessed as a ditch (i.e., per the Provincial *Riparian Areas Protection Regulation* and *Water Sustainability Act*) based on its clear anthropogenic origin, linear character, lack of natural headwaters, function as a source of drainage conveyance and occurrence along property boundaries. Ditch 2 was

assessed as providing a minor to negligible contribution of flows and associated nutrients to downstream habitats. Ditch 2 was not capable of sustaining fish.

An inundated area occurs within the approximate centre-eastern portion of the Site. This feature is likely the result of soil disturbance and grading subsequent to previous tree clearing and grubbing. This area was characterized by shallow standing water at the time of assessment and conspicuous vegetation associated with it consisted of facultative and obligate hydrophytes. There was no connection from the inundated area to other watercourses, stormwater infrastructure or other features. As such, the inundated feature was not considered to represent a stream under the Provincial *Riparian Areas Protection Regulation* nor does it provide fish habitat per the Federal *Fisheries Act*. As an artificial feature resulting from human disturbance it is not considered a natural stream or source of water supply per the Provincial *Water Sustainability Act*.

Chapman Creek occurs to the east of the Site. Chapman Creek is considered a major local watershed and provides the majority of water to the local water supply. It is considered to provide high habitat values and its protection and conservation is a priority for the local government. Chapman Creek is a known fish-bearing watercourse that is inhabited by a variety of salmonids and is stocked as well. Chapman Creek is considered a stream per the Provincial *Riparian Areas Protection Regulation* and *Water Sustainability Act* and provides fish habitat per the Federal *Fisheries Act*.

Table 4-1 On-Site Aquatic Features

Aquatic Feature	Classification	Preliminary Setback (m)	Description
Ditch 1	Ditch	2 m from top of bank	Linear feature following the western boundary of the Site. Flows in response to precipitation events. No water was present during field assessment.
Ditch 2	Ditch	2 m from top of bank	Linear feature following the southern boundary of the site along Havies Rd. Conveys surface flows along Havies Rd and discharges to local stormwater infrastructure. Flows in response to precipitation events. No water was present during field assessment.
Inundated Area	N/A	N/A	Most likely created due to soils disturbance and re-contouring consequent of forest clearing and grubbing. Shallow (maximum depth estimated 1 m at time of assessment) depressional features vegetated with facultative and obligate hydrophytes. No evidence of surface water connectivity to surrounding watercourses.
Chapman Creek	Permanent, fish bearing	30 m from top of bank	Major watershed and natural stream that provides the majority of water for the local water supply system. A significant priority for conservation and protection by local and regional government.

5. REGULATORY CONSIDERATIONS AND RECOMMENDATIONS

5.1 Terrestrial Ecosystems and Wildlife

The following is to be considered in advance of Site development.

- All Site activities should abide by available best practices and guidelines in the 2014 *Environmental Guidelines for Urban and Rural Land Development* (BC MOE 2014a) and supporting documents (BC MOE 2014b; 2013).
- Provincial permitting may be required under the *Wildlife Act* for a QEP led salvage and relocation of herptiles in advance of de-watering and re-contouring the inundated area and Site ditches (i.e., should ditch infilling occur).
- Adhere to best practices and regulatory guidance of the *Migratory Birds Convention Act* and provincial *Wildlife Act* by avoiding vegetation removal (e.g., tree / shrub clearing, grubbing, stump removal) during the regional bird nesting period (March 1 to August 31). If working outside the period is not possible and vegetation clearing is required, a QEP should conduct pre-clearing bird nest surveys to identify, and thereby avoid, any active nesting within and in proximity to the Site. Under the *Wildlife Act*, active nests of most bird species and active and inactive eagle, heron, osprey, and peregrine falcon are protected year-round.
- Ensure the retention of trees and their appropriate replacement are as directed in the DOS Bylaw 484.
- All works should abide by available BMPs to mitigate the continued spread of invasive plants or the introduction of noxious plants to the Site and its access routes (Coastal ISC 2022; Metro Vancouver 2022).
  - Suitable methods for disposal of invasive and/or noxious plants may include burial[2] within the Site to a suitable depth (i.e., a minimum depth of 5 metres is considered adequate for disposal of Japanese knotweed a noxious weed[3], 3 feet is considered adequate for general invasive plant removal by some local governments[4]). Burial should occur within areas not subject to structural building requirements.

5.2 Watercourses

The setbacks proposed herein are consistent with the DOS's Zoning Bylaw (No. 25, 1987) for watercourses. Ditch setbacks are consistent with RAPR detailed assessment for ditches. It must be noted that the setbacks provided herein are preliminary and will require further review and discussion with the District of Sechelt, and potentially the Province and DFO. In particular, if Ditch 1 and Ditch 2 discharge direct to marine environments via stormwater infrastructure, it is the understanding of Keystone Environmental that they would not be subject to the RAPR and would accordingly not require setbacks.

[2] https://www2.gov.bc.ca/assets/gov/environment/plants-animals-and-ecosystems/invasive-species/guidance-resources/7stepstomanagingyourweeds.pdf
[3] http://www.metrovancouver.org/services/regional-planning/PlanningPublications/KnotweedsBMP.pdf
[4] https://www.cswm.ca/hazardous-waste/invasive-plants

Chapman Creek will require a riparian setback. The DOS Zoning Bylaw stipulates a 30 m setback from top of bank is required. Field surveys indicate this setback does not infringe on Site development.

It must also be understood that the setback origins utilized in this report are from approximate top of bank and high-water mark boundaries and are a best estimate at this time given the survey intensity. If greater spatial accuracy is desired, the top of bank and high water mark will need to be flagged by a QEP and surveyed in by a BC Land Surveyor (BCLS). No development is to occur within these streamside setbacks unless approved by senior regulatory agencies.

Proposed infilling of ditches will require consideration of municipal, provincial, and federal regulatory agencies. Typically, eliminating non-stream aquatic features (i.e., ditches) would require the submission of a Stream Determination Assessment that considers the application of the *Water Sustainability Act* and is submitted to the Province for review. In addition, if ditches are connected to fish habitat, their infilling requires review by DFO in the context of the *Fisheries Act*. Infilling of the Site's depressional feature and/or ditches may require provincial permitting (i.e., for wildlife salvage) under the *Wildlife Act* due to the ability to support herptiles.

6. CONCLUSION

Keystone Environmental completed an environmental assessment of the Site to identify potential constraints on future development of the Site. Constraints identified during this assessment consisted of nearby watercourses including roadside and property margin drainages as well as Chapman Creek to the east. Other constraints included wildlife habitat and the presence of invasive plant species. Best management practices and applicable regulatory pathways to address environmental constraints have been described in this report.

7. PROFESSIONAL STATEMENT

This report has been prepared and reviewed by Keystone Environmental Ltd. approved personnel who have the credentials and knowledge of the applicable public laws, regulations and/or policies which apply to this report.

Findings presented in this report are based upon (i) reviews of available documentation and discussions with available personnel and regulatory representatives, (ii) review of available records and the terms and conditions for the Site, and (iii) observations of the Site and surrounding lands. Consequently, while conclusions and recommendations documented in this report have been prepared in a manner consistent with that level of care and skill normally exercised by other members of the environmental science and engineering profession, practising under similar circumstances in the area at the time of the performance of the work, this report is intended to provide information and to suggest mitigative strategies to reduce, but not necessarily eliminate, the potential for environmental impacts to occur as a result of planned construction activities within the project area. This preliminary report is meant to be a living and flexible document that can be used to provide guidance in the environmental management planning process and may be revised following discussions with regulatory authorities or changes in project scope.

This report has been prepared solely for the internal use of HOMEI Sechelt (Laurel) Limited Partnership pursuant to the agreement between Keystone Environmental Ltd. and HOMEI Sechelt (Laurel) Limited Partnership. By using this report, HOMEI Sechelt (Laurel) Limited Partnership agree that they will review and use the report in its entirety. Any use which other parties make of this report, or any reliance on or decisions made based on it, are the responsibility of such parties. Keystone Environmental Ltd. accepts no responsibility for damages, if any, suffered by other parties as a result of decisions made or actions based on this report.

Sincerely,

Keystone Environmental Ltd.



Jeremy Nilson B.Sc., R.P.Bio.
Project Manager

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ATTACHMENTS:

- Figure
- Appendix A: Photographic Record
- Appendix B: BC CDC Species and Ecosystems at Risk Output
- Appendix C: Species Observations

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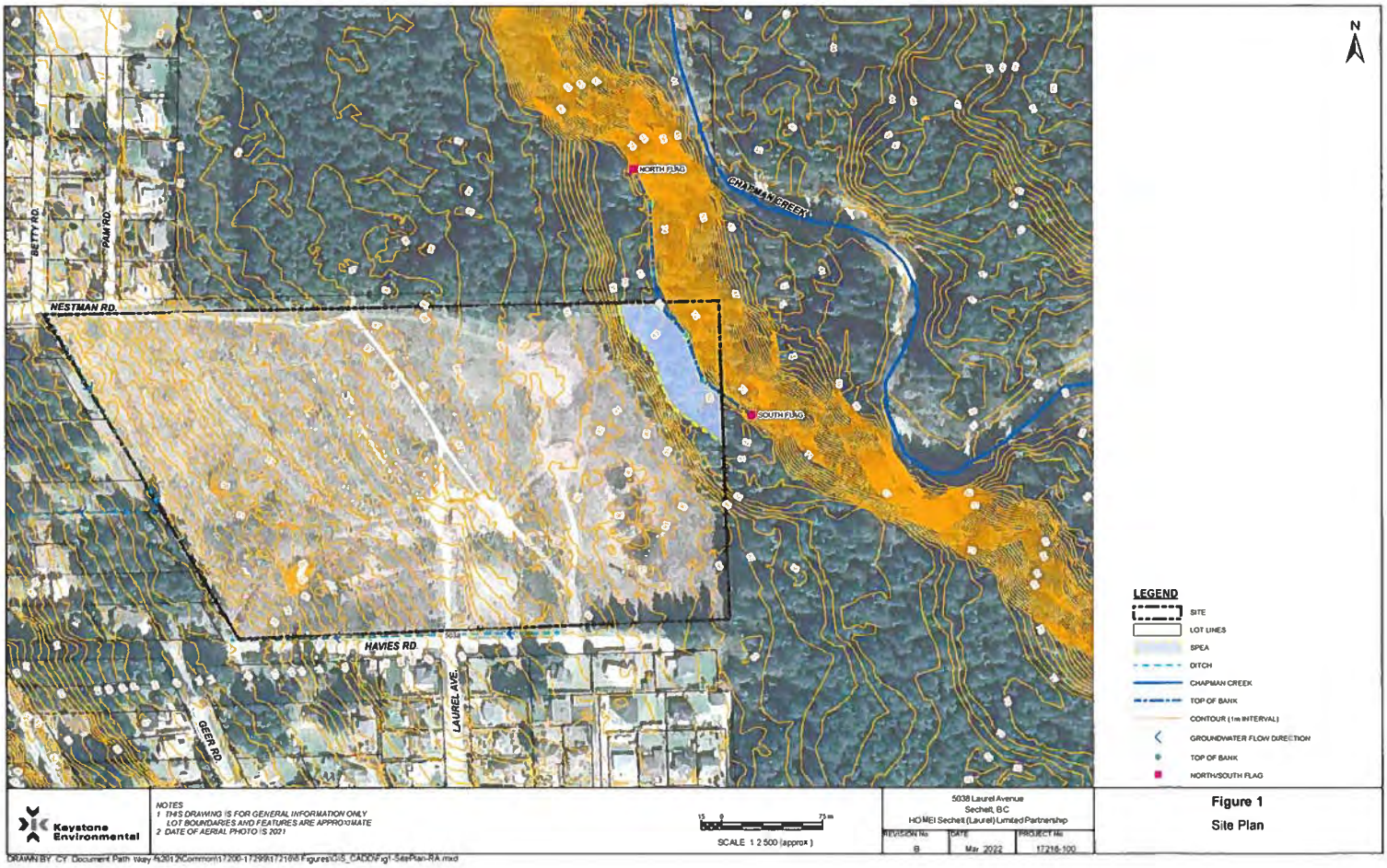
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FIGURE



Keystone Environmental

NOTES
1 THIS DRAWING IS FOR GENERAL INFORMATION ONLY
LOT BOUNDARIES AND FEATURES ARE APPROXIMATE
2 DATE OF AERIAL PHOTO IS 2021

15 0 75 m
SCALE 1:2,500 (approx.)

5038 Laurel Avenue
Sechelt, BC
HOMEI Sechelt (Laurel) Limited Partnership

REVISION No.	DATE	PROJECT No.
B	Mar. 2022	17216-100

Figure 1
Site Plan

DRAWN BY: CY Document Path: Way 4\2012\Common\17200-17299\17216\Figures\GIS_CADD\Fig1-SitePlan-RA.mxd

APPENDIX A

PHOTOGRAPHIC RECORD



Photograph 1: Overview of existing Site conditions, facing north.



Photograph 2: Example of dumping within and adjacent the Site.



Photograph 3: Example of remnant forest understory vegetation in cleared sections of the Site.



Photograph 4: Suitable rock structure for snake hibernacula surrounded by invasive plants.



Photograph 5: Depressional feature inundated during Site assessment.



Photograph 6: Depressional feature with suitable habitat for lentic breeding amphibians.



Photograph 7: Mature forests along the Site's eastern boundary including a large wildlife tree.



Photograph 8: Ditch running along a portion of the Site's western boundary.



Photograph 9: Unmapped ditch along the Site's southern boundary along Havies Road.

APPENDIX B

BC CDC SPECIES AND ECOSYSTEMS AT RISK OUTPUT

Keystone Environmental
Knowledge-Driven Results

Scientific Name	English Name	Provincial	BC List	SARA	Potential to Occur on Site (low, moderate, high)
Herpitiles					
Rana aurora	Northern Red-legged Frog	S3 (2016)	Blue	1-SC (2005)	low
Contia tenuis	Common Sharp-Tailed Snake	S1S2 (2018)	Red	1-E (2003)	low
Birds					
Branta canadensis occidentalis	Canada Goose, *occidentalis* subspecies	S2M (2009)	Red		low
Patagioenas fasciata	Band-tailed Pigeon	S3S4 (2015)	Blue	1-SC (2011)	moderate
Aeronautes saxatalis	White-throated Swift	S3S4B (2015)	Blue		low
Cypseloides niger	Black Swift	S3S4B (2021)	Blue	1-E (2019)	low
Calidris canutus	Red Knot	S1S2M (2015)	Red	1-T/E (2010)	low
Brachyramphus marmoratus	Marbled Murrelet	S3B,S3N (2015)	Blue	1-T (2003)	low
Synthliboramphus antiquus	Ancient Murrelet	S2S3B,S4N (2020)	Blue	1-SC (2006)	low
Ardea herodias fannini	Great Blue Heron, *fannini* subspecies	S2S3B,S4N (2018)	Blue	1-SC (2010)	moderate
Botaurus lentiginosus	American Bittern	S3B, SNRN (2015)	Blue		low
Butorides virescens	Green Heron	S3S4B (2015)	Blue		low
Nycticorax nycticorax	Black-crowned Night-heron	S1 (2015)	Red		low
Accipiter gentilis laingi	Northern Goshawk, *laingi* subspecies	S2 (2010)	Red	1-T (2003)	low
Buteo lagopus	Rough-legged Hawk	S3N (2015)	Blue		low
Buteo swainsoni	Swainson's Hawk	S2B (2015)	Red		low
Tyto alba	Barn Owl	S2? (2015)	Red	1-T (2018)	moderate
Asio flammeus	Short-eared Owl	S3B,S2N (2015)	Blue	1-SC (2012)	moderate
Glaucidium gnoma swarthi	Northern Pygmy-owl, *swarthi* subspecies	S3S4 (2018)	Blue		low
Megascops kennicottii kennicottii	Western Screech-Owl, *kennicottii* subspecies	S2S3 (2017)	Blue	1-T (2005)	low
Falco peregrinus anatum	Peregrine Falcon, *anatum* subspecies	S2? (2011)	Red	1-SC (2012)	low

Scientific Name	English Name	Provincial	BC List	SARA	Potential to Occur on Site (low, moderate, high)
Falco peregrinus pealei	Peregrine Falcon, *pealei* subspecies	S3S4 (2019)	Blue	1-SC (2003)	low
Falco rusticolus	Gyrfalcon	S3S4B, SNRN (2015)	Blue		low
Contopus cooperi	Olive-sided Flycatcher	S3S4B (2015)	Blue	1-T (2010)	moderate
Eremophila alpestris strigata	Horned Lark, *strigata* subspecies	SXB (2019)	Red	1-E (2005)	low
Hirundo rustica	Barn Swallow	S3S4B (2015)	Blue	1-T (2017)	moderate
Progne subis	Purple Martin	S3S4B (2020)	Blue		low
Setophaga virens	Black-throated Green Warbler	S3B (2015)	Blue		low
Euphagus carolinus	Rusty Blackbird	S3S4B (2015)	Blue	1-SC (2009)	low
Mammals					
Myodes gapperi occidentalis	Southern Red-backed Vole, *occidentalis* subspecies	S1 (2006)	Red		low
Lepus americanus washingtonii	Snowshoe Hare, *washingtonii* subspecies	S1 (2011)	Red		low
Sorex rohweri	Olympic Shrew	S2? (2015)	Red		low
Sorex trowbridgii	Trowbridge's Shrew	S3 (2015)	Blue		low
Scapanus townsendii	Townsend's Mole	S1 (2015)	Red	1-E (2005)	low
Corynorhinus townsendii	Townsend's Big-eared Bat	S3S4 (2015)	Blue		moderate
Gulo gulo vancouverensis	Wolverine, *vancouverensis* subspecies	SH (2017)	Red	1-SC (2018)	low
Mustela frenata altifrontalis	Long-tailed weasel, *altifrontalis* subspecies	SH (2011)	Red		low
Mustela richardsonii anguinae	Ermine, *anguinae* subspecies	S3 (2010)	Blue		low
Ursus arctos	Grizzly Bear	S3? (2015)	Blue	1-SC (2018)	low
Cervus elaphus roosevelti	Roosevelt Elk	S3S4 (2017)	Blue		high - confirmed
Invertebrates					
Argia emma	Emma's Dancer	S3S4 (2015)	Blue		moderate
Argia vivida	Vivid Dancer	S2S3 (2015)	Blue	1-SC (2019)	moderate

Scientific Name	English Name	Provincial	BC List	SARA	Potential to Occur on Site (low, moderate, high)
Tanypteryx hageni	Black Petaltail	S3 (2015)	Blue		moderate
Octogomphus specularis	Grappletail	S2 (2015)	Red		moderate
Erythemis collocata	Western Pondhawk	S3S4 (2015)	Blue		moderate
Pachydiplax longipennis	Blue Dasher	S3S4 (2015)	Blue		moderate
Sympetrum vicinum	Autumn Meadowhawk	S3S4 (2015)	Blue		moderate
Epargyreus clarus	Silver-spotted Skipper	S3 (2020)	Blue		moderate
Epargyreus clarus californicus	Silver-spotted Skipper, *californicus* subspecies	S1 (2016)	Red		moderate
Erynnis propertius	Propertius Duskywing	S2 (2020)	Red		moderate
Euphyes vestris	Dun Skipper	S2S3 (2020)	Blue	1-T (2003)	moderate
Hesperia colorado oregonia	Western Branded Skipper, *oregonia* subspecies	S2 (2021)	Red		moderate
Papilio indra	Indra Swallowtail	S1 (2020)	Red		moderate
Parnassius clodius claudianus	Clodius Parnassian, *claudianus* subspecies	S3S4 (2013)	Blue		moderate
Parnassius clodius pseudogallatinus	Clodius Parnassian, *pseudogallatinus* supspecies	S3S4 (2013)	Blue		moderate
Callophrys eryphon sheltonensis	Western Pine Elfin, *sheltonensis* subspecies	S3 (2013)	Blue		moderate
Callophrys johnsoni	Johnson's Hairstreak	S2? (2020)	Red		moderate
Callophrys mossii mossii	Moss' Elfin, *mossii* subspecies	S2 (2021)	Red		moderate
Icaricia icarioides blackmorei	Boisduval's Blue, *blackmorei* subspecies	S3 (2021)	Blue		moderate
Icaricia saepiolus insulanus	Greenish Blue, *insulanus* subspecies	SH (2021)	Red	1-E (2003)	moderate
Cercyonis pegala incana	Common Wood-nymph, *incana* subspecies	S2? (2021)	Red		moderate
Chlosyne hoffmanni	Hoffman's Checkerspot	S2 (2020)	Red		moderate

Scientific Name	English Name	Provincial	BC List	SARA	Potential to Occur on Site (low, moderate, high)
Coenonympha tullia insulana	Common Ringlet, *insulana* subspecies	S1 (2021)	Red		moderate
Danaus plexippus	Monarch	S1?B (2020)	Red	1-SC (2003)	low
Euphydryas editha taylori	Edith's Checkerspot, *taylori* subspecies	S1 (2021)	Red	1-E (2003)	moderate
Speyeria zerene bremnerii	Zerene Fritillary, *bremnerii* subspecies	S2 (2013)	Red		moderate
Bombus occidentalis	Western Bumble Bee	S2S4 (2016)	Blue		moderate
Ostrea lurida	Olympia Oyster	S3 (2003)	Blue	1-SC (2003)	nil
Galba bulimoides	Prairie Fossaria	S3? (2015)	Blue		moderate
Galba dalli	Dusky Fossaria	S3S4 (2015)	Blue		moderate
Galba parva	Pygmy Fossaria	S3S5 (2015)	Blue		moderate
Galba vancouverensis	Vancouver Fossaria	SH (2015)	Red		moderate
Physella propinqua	Rocky Mountain Physa	S3S4 (2015)	Blue		moderate
Planorbula campestris	Meadow Rams-horn	S3S4 (2015)	Blue		nil
Promenetus umbilicatellus	Umbilicate Sprite	S2S3 (2015)	Blue		low
Carychium occidentale	Western Thorn	S3 (2015)	Blue		low
Nearctula sp. 1	Threaded Vertigo	S3 (2015)	Blue	1-SC (2012)	low
Hemphillia dromedarius	Dromedary Jumping-slug	S2 (2015)	Red	1-T (2005)	low
Hemphillia glandulosa	Warty Jumping-slug	S2? (2015)	Red	1-SC (2005)	low
Prophysaon coeruleum	Blue-grey Taildropper	S2S3 (2015)	Blue	1-T (2019)	low
Pristiloma johnsoni	Broadwhorl Tightcoil	S3 (2015)	Blue		low
Deroceras hesperium	Evening Fieldslug	SH (2015)	Red		low
Plants/ Lichens/ Macrofungi					
Woodwardia fimbriata	giant chain fern	S3 (2019)	Blue		low
Claytonia washingtoniana	Washington springbeauty	S2 (2017)	Red		low
Limnanthes macounii	Macoun's meadow-foam	S2? (2019)	Red	1-T (2006)	low
Meconella oregana	white meconella	S1S2 (2019)	Red	1-E (2006)	low

Scientific Name	English Name	Provincial	BC List	SARA	Potential to Occur on Site (low, moderate, high)
Nuttallanthus texanus	Texas toadflax	S3 (2019)	Blue		low
Polygonum paronychia	black knotweed	S3 (2019)	Blue		low
Pyrola aphylla	leafless wintergreen	S3 (2019)	Blue		low
Sericocarpus rigidus	white-top aster	S3 (2019)	Blue	1-SC (2003)	low
Silene scouleri ssp. *scouleri*	coastal Scouler's catchfly	S1 (2019)	Red	1-E (2005)	low
Trifolium depauperatum var. *depauperatum*	poverty clover	S3 (2019)	Blue		low
Trifolium dichotomum	Macrae's clover	S2 (2021)	Red		low
Utricularia ochroleuca	ochroleucous bladderwort	S2S3 (2019)	Blue		nil
Allium amplectens	slimleaf onion	S3 (2019)	Blue		nil
Bartramia aprica	rigid apple moss	S2 (2015)	Red	1-E (2003)	nil
Brotherella roellii	Roell's brotherella	S1S2 (2011)	Red	1-E (2018)	nil
Entosthodon fascicularis	banded cord-moss	S2S3 (2015)	Blue	1-SC (2006)	nil
Collema flaccidum	flaking tarpaper	S1S3 (2019)	Red		nil
Dermatocarpon intestiniforme	quilted stippleback	S2S3 (2019)	Blue		nil
Deschampsia cespitosa - Sidalcea hendersonii	tufted hairgrass - Henderson's checker-mallow	S1S2 (2004)	Red	N/A	nil
Erioderma sorediatum	vole felt	S2S3 (2019)	Blue		nil
Leioderma sorediatum	felted elf	S2S3 (2010)	Blue		nil
Lobaria silvae-veteris	oldgrowth lung	S1 (2010)	Red		nil
Pannaria rubiginosa	considerable gingerbread	S2 (2019)	Red		nil
Peltigera gowardii	northwest waterfan	S2 (2019)	Red	1-SC (2018)	nil
Ecological Communities					
Picea sitchensis / Rubus spectabilis Dry	Sitka spruce / salmonberry Dry	S1S2 (2010)	Red	N/A	nil

Scientific Name	English Name	Provincial	BC List	SARA	Potential to Occur on Site (low, moderate, high)
Picea sitchensis / Rubus spectabilis Very Dry Maritime	Sitka spruce / salmonberry Very Dry Maritime	S2 (2004)	Red	N/A	nil
Pinus contorta / Sphagnum spp. *Very Dry Maritime*	lodgepole pine / peat-mosses Very Dry Maritime	S2S4 (2021)	Blue	N/A	nil
Populus tremuloides / Malus fusca / Carex obnupta	trembling aspen / Pacific crab apple / slough sedge	S1 (2018)	Red	N/A	nil
Populus trichocarpa - Alnus rubra / Rubus spectabilis	black cottonwood - red alder / salmonberry	S3 (2010)	Blue	N/A	nil
Populus trichocarpa / Salix sitchensis	black cottonwood / Sitka willow	S2S3 (2004)	Blue	N/A	nil
Pseudotsuga menziesii - Tsuga heterophylla / Gaultheria shallon Dry Maritime	Douglas-fir - western hemlock / salal Dry Maritime	S2 (2019)	Red	N/A	nil
Selaginella wallacei / Cladina spp.	Wallace's selaginella / reindeer lichens	S3 (2012)	Blue	N/A	nil
Thuja plicata - Picea sitchensis / Lysichiton americanus	western redcedar - Sitka spruce / skunk cabbage	S3? (2004)	Blue	N/A	nil
Thuja plicata / Carex obnupta	western redcedar / slough sedge	S2 (2021)	Red	N/A	nil
Thuja plicata / Lonicera involucrata	western redcedar / black twinberry	S1 (2019)	Red	N/A	nil
Thuja plicata / Polystichum munitum - Lysichiton americanus	western redcedar / sword fern - skunk cabbage	S3? (2012)	Blue	N/A	nil
Thuja plicata / Polystichum munitum Dry Maritime	western redcedar / sword fern Dry Maritime	S2? (2016)	Red	N/A	nil
Thuja plicata / Polystichum munitum Very Dry Maritime	western redcedar / sword fern Very Dry Maritime	S1S2 (2021)	Red	N/A	nil

Scientific Name	English Name	Provincial	BC List	SARA	Potential to Occur on Site (low, moderate, high)
Thuja plicata / Rubus spectabilis	western redcedar / salmonberry	S1S2 (2019)	Red	N/A	nil
Thuja plicata / Tiarella trifoliata Dry Maritime	western redcedar / three-leaved foamflower Dry Maritime	S2S3 (2018)	Blue	N/A	nil
Thuja plicata / Tiarella trifoliata Very Dry Maritime	western redcedar / three-leaved foamflower Very Dry Maritime	S2S3 (2013)	Blue	N/A	nil
Tsuga heterophylla - Pseudotsuga menziesii / Eurhynchium oreganum	western hemlock - Douglas-fir / Oregon beaked-moss	S2 (2013)	Red	N/A	nil
Tsuga heterophylla - Thuja plicata / Struthiopteris spicant	western hemlock - western redcedar / deer fern	S2 (2013)	Red	N/A	nil
Tsuga heterophylla / Buckiella undulata	western hemlock / flat-moss	S3 (2016)	Blue	N/A	nil

APPENDIX C

SPECIES OBSERVATIONS

Scientific Name	Common Name	Observation Comment
Plant Observations		
Cleared Area		
Native Plants		
Anaphalis margaritacea	pearly everlasting	
Arctium uva ursi	kinnikinnick	
Gaultheria shallon	salal	
Mahonia nervosa	dull Oregon grape	
Polystichum munitum	sword fern	
Rubus ursinus	trailing blackberry	
Sedum oragonum	Oregon stonecrop	
Invasive Plants		
Arctium minus	lesser burdock	Priority[1] – Control
Buddleja davidii	butterfly bush	Priority – Control
Cytisus scoparius	scotch broom	Priority – Control
Daphne laurea	daphne laurel	Priority – Control
Digitalis purpurea	purple foxglove	
Hedra helix	English Ivy	Priority – Control
Hypocharis radicata	hairy cat's ear	
Rubus armeniacus	Himalayan blackberry	
Verbascum thapsus	common mullein	
Inundated depressional area		
Carex macrocephala	large headed sedge	
Carex sp	unclassified sedge	
Juncus effusus	common rush	
Juncus sp	unclassified rush	
Scirpus atrocinctus	woolsedge	
Spirea douglasii	hardhack	
Forested Portion of Site		
Native Plants		
Acer circinatum	vine maple	
Acer macrophyllum	big leaf maple	
Betula papyrifera	paper birch	
Polypodium glycyrrhiza	licorice fern	

[1] Priority invasive plants listed by regulatory recommendation (prevent, eradicate, contain, control) are available on the Coastal Invasive Species Council website: https://www.coastalisc.com/priority-invasive-plants/

Scientific Name	Common Name	Observation Comment
Polystichum munitum	sword fern	
Populus trichocarpa	black cottonwood	
Pseudotsuga menziesii	Douglas fir	
Rubus spectabilis	salmonberry	
Tsuga heterophylla	western hemlock	
Thuja plicata	Western red cedar	
Invasive Plants		
Hedra helix	English ivy	Priority – Control
Ilex aquifolium	English holly	Priority – Control
Wildlife Observations		
Anas platyrhynchos	mallard duck	visual
Canis latrans	coyote	scat
Cervus canadensis roosevelti	roosevelt elk	scat
Corvus corax	common raven	visual
Dryocopus pileatus	Pileated woodpecker	cavity excavations in trees north of site
Poecile atricapillus	black-capped chickadee	visual