

DISTRICT OF WEST VANCOUVER
750 17TH STREET, WEST VANCOUVER BC V7V 3T3

10.3.

COUNCIL REPORT

Date:	January 7, 2021
From:	Erika Syvokas, Assistant Planner
Subject:	Proposed Heritage Alteration Permit for the Ferry Building
File:	1010-20-20-111

RECOMMENDATION

THAT Proposed Heritage Alteration Permit No. 20-111 for alterations to the Ferry Building, with zoning bylaw variances, as described in the report dated January 7, 2021 be considered at the February 22, 2021 Council meeting; and that notice be given of consideration of the proposed Heritage Alteration Permit.

1.0 Purpose

To consider proposed Heritage Alteration Permit No. 20-111 which would allow for alterations to the Ferry Building at 1414 Argyle Avenue, 101 14th Street, 1420 Argyle Avenue and 1430 Argyle Avenue (the Site).

2.0 Executive Summary

The District is proposing to restore the Ferry Building. The project objectives include rehabilitation of the building, raising the building above the flood construction level, upgrading the building structure and building systems to be serviceable for future use, and provision of accessible public washrooms. The building is heritage designated and a heritage alteration permit (HAP) is required for the proposed work. A grant has been received to help fund the project.

3.0 Legislation/Bylaw/Policy

Provincial Legislation

Under the *Local Government Act*, a local government, by bylaw, may designate properties as protected if the local government considers that the property has heritage value or heritage character, or that designation of the property is necessary or desirable for the conservation of a protected heritage property. A heritage alteration permit is required to alter a designated property.

Community Charter

For development sites that may be subject to flooding, such as the subject site, Section 56 of the Community Charter authorizes the District's Chief

Building Inspector to require a qualified professional report to certify the conditions under which the land may be used safely for the intended use. Furthermore, on this basis, a building permit may only be issued following the condition that the owner of the land covenants with the municipality to use the land in accordance with the conditions specified in the qualified professional's report.

Zoning Bylaw

The subject site is zoned CU5 (Ambleside Waterfront Community Use Zone 5), which allows for arts and cultural facilities as accessory to the park use on the subject site.

Committees

The Heritage Advisory Committee (HAC), an advisory committee of Council, was formed in 2018 to assist in the review of heritage applications; to identify and support the conservation of structures and landscapes recognized by the District of West Vancouver (District) as having significant heritage value; and to undertake education and engagement opportunities related to heritage conservation.

The Design Review Committee (DRC) is an advisory committee of Council that makes recommendations to staff and Council on matters of design, and physical and aesthetic impact, including the impartial and professional review of development applications, relevant policies and regulations, major infrastructure and capital projects, and other matters that may be referred to the DRC by Council or staff.

4.0 Council Strategic Objective(s)/Official Community Plan

2020-2021 Council Strategic Goals and Objectives

6.10 Create a policy for the preservation of heritage assets.

Official Community Plan Bylaw 4985, 2018

Under Housing & Neighbourhoods, the Official Community Plan (OCP) identifies the importance of respecting character and protecting heritage:

2.1.9 Protect buildings, structures and landscapes on the District's Heritage Register by:

h. supporting restoration through Heritage Revitalization Agreements; and

i. expediting the review process for the retention of heritage properties.

Under Natural Environment, the OCP supports protecting lands from sea level rise:

2.6.11 Update shoreline protection strategies and flood construction level requirements to further increase protection from sea level rise,

reduce shoreline erosion, preserve and enhance habitat and improve public access.

Under Social Well-Being, the OCP supports access and inclusion:

2.8.2 Incorporate universal accessibility design in public spaces, facilities and programs to allow barrier-free access, inclusive of users of all ages and abilities.

The development proposal is consistent with the OCP.

5.0 Financial Implications

The restoration of the Ferry Building is co-funded by the District and the federal and provincial governments. Through the *Canada-British Columbia Investing in Canada Infrastructure Program – Community, Culture and Recreation (ICIP-CCR)*, the Government of Canada and the Government of British Columbia are investing \$1,852,242 towards the project. The balance of funds required for the project has been allocated from Community Amenity Contributions and was incorporated into the District's 2020-2024 Five-Year Financial Plan.

6.0 Background

6.1 Previous Decisions

At the July 6, 2015 regular Council meeting, Council passed the following resolution:

THAT as described in the report dated June 19, 2015 regarding Canada 150 Community Infrastructure Grant for Ferry Building Gallery Restoration, up to \$726,000 in the 2016 capital budget for the restoration of the Ferry Building Gallery based on grant funding of up to \$500,000 being provided under the Canada 150 Community Infrastructure Program, be approved.

At the June 20, 2016 regular Council meeting, Council passed the following resolutions:

THAT

- 1. the submission of a grant application to the Canada 150 Community Infrastructure Program of \$500,000 towards the total cost of \$1,268,000 for the restoration of the Ferry Building Community Arts Centre be authorized;*
- 2. the project be authorized to proceed, subject to confirmation that full grant funding has been approved by the federal government, community consultation has been completed, and regulatory/environmental approvals are obtained where necessary; and*
- 3. subject to full project grant funding being approved by the federal government, staff be directed to bring forward expenditure bylaws*

totaling \$768,000 funded from a combination of Community Amenity Contributions (CAC), District Asset Reserves, Gas Tax Fund Reserve, and/or external funding.

At the February 11, 2019 regular Council meeting, Council passed the following resolutions:

THAT

- 1. the submission of a grant application to the Canada-British Columbia Investing in Canada Infrastructure Program: Community, Culture and Recreation for \$1,852,242 towards the total cost of \$2,525,900 for the restoration of the Ferry Building be approved;*
- 2. subject to the full project grant funding by the Canada-British Columbia Investing in Canada Infrastructure Program: Community, Culture and Recreation, staff be directed to bring forward expenditure bylaws for funding from the Amenity Contribution Fund to a maximum of \$1,000,000 as its commitment to the Ferry Building restoration project; and*
- 3. the project be incorporated into the Five-Year Financial Plan 2019-2023.*

At the July 6, 2020 closed Council meeting, Council passed the following resolutions:

THAT

- 1. a maximum of \$1,350,000 be provided from the Community Amenity Contribution Fund for the Ferry Building Restoration Project;*
- 2. staff report back with improved design options for attached washrooms on the south, east, and west sides of the building, and an option for detached washrooms on the east side of the building;*
- 3. the Ferry Building Restoration Project be incorporated into the District of West Vancouver's 2020-2024 Five-Year Financial Plan; and*
- 4. Council's decision be released for public information once the grant funding has been officially announced by the federal government.*

At the October 5, 2020 Council meeting, Council passed the following resolution:

THAT the accessible washrooms for the Ferry Building Restoration Project be located adjacent to the west side of the building as conceptualized in Option 1b in the September 2020 Ferry Building Rehabilitation Project document, attached to this report as Appendix A.

6.2 History

The Ferry Building has been an important asset in the community for more than a century.

For the first 70 years the building played a role in municipal transportation. Ferry service to West Vancouver was first established in 1906 as a private business by John Lawson. In 1912 the newly-formed municipality of West Vancouver took over the service and built what is now known as the “Ferry Building” in 1913 to serve as the terminal and offices for the ferry service. Located at the foot of 14th Street adjacent to the 14th Street wharf in Ambleside, the new building provided a space to buy tickets, wait for the ferry and socialize. The businesses that opened up nearby also drew residents and visitors to the area.

With the opening of the Lions Gate Bridge in 1939, the number of people using the ferry service started to decline. When the ferries stopped sailing in 1947, the West Vancouver Bus Company (now West Vancouver Transit) took over the Ferry Building for its head office.

Operating as a gallery since 1989, the Ferry Building Gallery now serves as a hub for arts and culture in West Vancouver. The Ferry Building Gallery is a public community gallery operated by the District of West Vancouver. The gallery promotes local artists and art education through a range of events and programs, including the annual Harmony Arts Festival. The building is used by community groups and other community users, however, it is currently closed to the public for restoration.

Along with its historical value, the Ferry Building also has architectural value for its use of Arts and Crafts features. One of the oldest buildings in the municipality, the Ferry Building was designated as a municipal heritage site in 1987 to acknowledge its long and influential history in West Vancouver. The building received a Heritage Achievement Award in 1995 for its extensive rehabilitation. A Statement of Significance was prepared by Commonwealth Historic Resources in 2008 (**Appendix A**).

7.0 Analysis

7.1 Discussion

Site and Context

The site is located at the foot of 14th Street between Argyle Avenue and the waterfront in Ambleside. The site is comprised of 5 parcels of land addressed 1414 Argyle Avenue (2 parcels), 101 14th Street, 1420 Argyle Avenue and 1430 Argyle Avenue (Figure 1). The site is owned by the District of West Vancouver and is part of Ambleside Landing Park. The site is occupied by the Ferry Building which currently straddles two of the four lots. The site is zoned CU5 (Ambleside Waterfront Community Use Zone 5).



Figure 1: Subject site - 1414 Argyle Avenue, 101 14th Street, 1420 Argyle Avenue and 1430 Argyle Avenue

A gallery is located on the ground floor of the building and is wheelchair accessible. The office space on the second floor is accessible by stairs only.

The building is showing signs of deterioration and is in need of repair and upgrading. As well, the building is located within the floodplain and at risk of flooding, is seismically deficient, and does not currently have publicly accessible washrooms.

Development Proposal

The proposal is to restore the Ferry Building. The scope of work includes raising the Ferry Building in order to protect it from rising flood levels due to impacts of climate change; providing improved accessibility to the structure at its higher elevation; restoring and rehabilitating elements of the building (e.g. the foundation, roof, windows, siding, paint and lighting); upgrading seismic and building systems (mechanical, sprinkler system and electrical); and providing publicly accessible washroom facilities.

An addition is proposed to be built on the west side of the building to provide public washroom facilities. The washroom addition is proposed to straddle the property line between 1420 Argyle Avenue and 1414 Argyle Avenue and between 1414 Argyle Avenue and 101 14th Street. The

washrooms are proposed to be accessible and gender neutral. A rendering of the proposal is shown in Figure 2.

Various options were explored for the proposed washroom facilities. A heritage consultant evaluated the options against federal heritage guidelines. In addition to the potential impact on the heritage value of the Ferry Building, other factors were considered in the selection of the preferred option including accessibility, potential impact on the flexibility of gallery and meeting space and potential impact on the visual prominence of the Ferry Building and relationship to the adjacent plaza. Balancing all of the considered factors, a preferred option was selected to locate the washroom addition on the west side of the building. On October 5, 2020 Council endorsed the preferred option on the west side of the building.



Figure 2: Rendering of the Ferry Building (looking south)

Given that the Ferry Building will be raised by approximately five feet above its current elevation, a set of stairs and gently sloping accessible path will be required to access both the gallery and the washrooms. The pathways are proposed to be concrete pavers and concrete stairs and retaining walls are proposed. Minimal soft landscaping is proposed as the overall area is subject to a Master Plan for the waterfront park, however, the proposal includes shrubbery around the building.

Proposed HAP No. 20-111, including the architectural drawings, is attached as **Appendix B**.

A heritage conservation plan was prepared by Cummer Heritage Consulting attached as **Schedule B** to **Appendix B**. The plan identifies the building's character defining elements, identifies conservation objectives, provides condition assessment and recommended conservation procedures.

Flood Construction Level

For any proposed building, within an area that is subject to sea level rise and coastal flooding, there are specific considerations that are required to be considered during the planning phase. Under Section 56 of the Community Charter, the District's Chief Building Inspector may require a flood hazard assessment report from a suitably qualified professional certifying that the site may be safely used for the intended purpose. The report needs to demonstrate that the proposed building elevation adheres to the *Provincial Flood Hazard Area Land Use Management Guidelines*, in particular Sections 3.5 and 3.6, which define the method to determine the Flood Construction Level (FCL) to allow for sea level rise (SLR) to the year 2100.

The building is proposed to be raised 1.47 m (4'10") to comply with the recommended Flood Construction Level (FCL) of 4.86 m per the report prepared by WSP Canada Inc. (WSP) dated December 11, 2020 attached as **Schedule C to Appendix B**.

Variances

The existing Ferry Building is legally non-conforming to zoning setbacks and straddles lot lines. As well, the proposed washroom addition requires the following zoning variances:

- Sites Composed of More than One Legal Lot:
 - Section 120.05 (2) (a) states that any site composed of more than one lot may be used as a single site for accessory buildings, structures and uses only. As the site is proposed to be used as a single site for the purposes of the principal building a variance is required; and
 - Section 120.05 (2) (b) requires that the principal building on a site comprised of more than one lot shall be sited upon a single lot. As the proposed addition is straddling multiple lot lines, a variance is required.
- Rear Yard Setback: Section 505.03 requires a minimum rear yard of 10 m. The washroom addition is proposed to be sited 9.5 m from the rear property line. A variance of 0.5 m is required.

Staff support the proposed variances as the subject site is located within a larger park area and there is no impact on neighbouring properties.

Process

As per the *Development Procedures Bylaw*, prior to Council consideration of the heritage alteration permit:

- the Director or Council may refer the application to the Heritage Advisory Committee;
- notification within 50 m of the subject site is required; and
- unless waived by the Director, the applicant shall organize host and facilitate a "Proposed Development Information Meeting".

Heritage Advisory Committee

The Heritage Advisory Committee (HAC) reviewed the proposed restoration plans at its meeting on September 1, 2020. The committee expressed concerns about having an additional structure attached to the building as it would interfere with the heritage value of the building and its viewscape. A separate structure for the washrooms independent of the building was the preference.

It was Moved and Seconded:

THAT the Heritage Advisory Committee (HAC) does not support the washroom options presented as they compromise the heritage character of the Ferry Building.

However, staff note that due to the building code requirements of providing public washrooms and the functional requirement of ease of access to a washroom from the Ferry Building in the funding agreement with ICIP-CCR, a stand-alone washroom building away from the Ferry Building would increase costs and be outside the scope of the District's funding agreement. Council endorsed the preferred washroom location at its meeting on October 5, 2020.

Design Review Committee

The Design Review Committee (DRC) reviewed the washroom options for the Ferry Building at its meeting on November 19, 2020.

It was Moved and Seconded:

THAT the Design Review Committee SUPPORT the application subject to further review of the following items by staff:

1. Design development of the landscape plan to consider:
 - a. The overall safety and security of the site and surrounding park;
 - b. Concrete and hard surface elements integrating better with the heritage qualities of the Ferry Building;
 - c. Softening edges of washroom building and pedestrian walkways; and
 - d. Integration with the Master Plan for the surrounding site.
2. Request that the applicant work with staff to review the choice of materials and colour of the washroom building.

In response to the DRC comments:

- A landscape plan will be submitted at building permit stage and the proposed plan will be easily adaptable to a future Master Plan for the Waterfront Park; and
- the siding on the washroom addition was changed from prefinished tongue and groove aluminum siding to painted tongue and groove wood siding. This will be painted to match the Ferry Building.

7.2 Sustainability

Heritage conservation is a fundamental component of community sustainability, and is particularly significant in preserving community identity and character, and the cultural values around our built environment. The proposed restoration of the existing building will allow for continued arts and cultural use, including improved usability with the addition of public washroom facilities and increased accessibility to the site. Additionally, the proposed raised flood construction level protects the subject property from future storm events and sea level rise, which will make the Ferry Building more resilient from an environmental perspective. Further, areas around the building will be improved with additional planting.

7.3 Public Engagement and Outreach

Notification of Council's consideration of the application is to be mailed out to all owners/occupiers of property within 50 metres of the subject site. Information about the proposal is also posted on the District website.

Should Council choose to set the date for consideration of the Heritage Alteration Permit as per the *Development Procedures Bylaw No. 4940, 2017*, District staff will be required to organize, host and facilitate a "Proposed Development Information Meeting". The meeting is to be held virtually due to the current pandemic as per the requirements outlined in the staff report titled "Interim COVID 19 Public Consultation Strategy for Development Projects", dated June 4, 2020. The Proposed Development Information Meeting is required to be held prior to issuance of the subject permit.

7.4 Other Communication, Consultation, and Research

Planning staff has consulted with District staff on the application and proposed conditions are included in the draft Heritage Alteration Permit addressing staff comments.

The HAC and DRC meetings were posted on the District's website and were open to the public.

8.0 Options

8.1 Recommended Option

That Council set the date for consideration of the application; and that notice be given of consideration of the Heritage Alteration Permit.

8.2 Considered Options

Council may:

- a) Set the date for consideration of the application and request that additional information (to be specified) be provided and available to assist in consideration of the application; or

- b) Defer further consideration pending receipt of additional information (to be specified); or
- c) Reject the application.

9.0 Conclusion

Staff support the proposed Heritage Alteration Permit as the proposal would see the revitalization and continued use of the Ferry Building and the proposed restoration and publicly accessible washroom addition is in keeping with the existing character of the building. Subject to any additional comments or concerns being raised during the public notification period, staff recommends that the proposed Heritage Alteration Permit be approved by Council.

Author:



Erika Syvokas, Assistant Planner

Concurrence:



Michelle McGuire,
Senior Manager of Current Planning and Design

Appendices:

- A. Statement of Significance, Ferry Building Gallery, May 2008
- B. Proposed Heritage Alteration Permit No. 20-111

This page intentionally left blank

This page intentionally left blank

**Statement of Significance
Ferry Building Gallery
101 14th Street at Argyle Avenue
West Vancouver, BC
May 2008**



Historic Place

The historic place is the Ferry Building Gallery, also known as the West Vancouver Ferry Building, a wood-frame building constructed in 1913. It is located on a narrow lot on the south side of Argyle Avenue, at the water, at the foot of 14th Street. The building was designated as a Municipal Heritage Property in 1987. The recent landscaping in front of it and the open space to the west side are not part of the historic place.

Heritage Value

The historic place has historical value for its associations with the municipal ferry and bus services, both of which were very important to the development of West Vancouver; and for its present use as a community art gallery, reflecting the municipal commitment to cultural presentation. It also has architectural value for its use of Arts and Crafts features. Its longstanding public use has made it part of the ongoing historical experience of countless residents and visitors.

The primary heritage value of the Ferry Building Gallery is in its association with West Vancouver's ferry and bus services, both of which were essential to the development of a community in which commuting has long been so important a way of life. Regular ferry service to and from Vancouver was initiated in 1906 by John Lawson; the service was acquired by the Municipality in 1912 in response to local landowners who wanted to promote property development. The acquisition coincides with the establishment of West Vancouver as a district municipality. The Ferry Building opened as the Ambleside terminus in 1913.

The completion of the Lions Gate Bridge in the late 1930s cut into ferry passenger traffic, and as a result ferries ceased operation in 1947. The historic place was adapted for use as a terminus for bus service, and it continued in this use until 1986. The building therefore symbolizes the active role played by the municipality in transportation, a purpose for which it was used for more than 70 years.

The building continued in public use. It has value for having been the first of the 'Arts on Argyle' buildings to be adapted for the arts, in 1989. It continues to be a popular public gallery that showcases local art. Council Policy is that it is 'to be used by community groups, Historical Society, local artists and other recreational users as appropriate,' representing a strong municipal commitment to cultural use.

The historic place has architectural value for using features of the Arts and Crafts style, here in a modestly-scaled public building. It was designed by architects Thompson and Campbell, with the waiting room located downstairs and the board room upstairs. The latter saw community use in early years. Its historical character was retained in the alterations for adaptive re-use in 1989, by Howard Yano, Architect.

Character-Defining Elements

The character-defining elements of the Ferry Building Gallery include:

- Setting on the water, which recalls its use as a ferry terminal
- The small, domestic scale, despite its original public use
- Continuous tradition of public use
- Arts and Crafts design, seen in features such as the structural and decorative use of wood
- Cross-gable roof with exposed rafters
- Smaller gables over the entrances
- Original multi-paned wood-sash windows
- Clock

Sources

Portals of Our Past: A History of the Ferry Building, 1997; West Vancouver Heritage Inventory, updated to 2003; West Vancouver Heritage Inventory Worksheets and Evaluation Sheet. Other information provided by District of West Vancouver.



District of West Vancouver
Proposed Heritage Alteration Permit No. 20-111

Current Owner: **THE DISTRICT OF WEST VANCOUVER**

This Alteration Permit applies to:

Civic Address: **1414 ARGYLE AVENUE, 101 14TH STREET, 1420 ARGYLE AVENUE AND 1430 ARGYLE AVENUE**

Legal Description: **PID No. 011-474-955
 LOT A, EXCEPT PART IN REFERENCE PLAN 953, OF LOTS 13 TO 15
 BLOCK 24 DISTRICT LOT 237 PLAN 4590**

and

**PID No. 011-474-980
 LOT B OF LOTS 13 TO 15 BLOCK 24 DISTRICT LOT 237 PLAN 4590
 (PART FERRY BUILDING)**

and

**PID No. 011-474-998
 LOT C OF LOTS 13 TO 15 BLOCK 24 DISTRICT LOT 237 PLAN
 4590**

and

**PID 011-446-048
 LOT 12, EXCEPT THE PACIFIC GREAT EASTERN RAILWAY
 COMPANY RIGHT OF WAY AS SHOWN ON REFERENCE PLAN 953
 BLOCK 24 DISTRICT LOT 237 PLAN 3459**

and

**PID 010-119-639
 LOT 11, EXCEPT THE PACIFIC GREAT EASTERN RAILWAY
 COMPANY RIGHT OF WAY AS SHOWN ON REFERENCE PLAN
 953, BLOCK 24 DISTRICT LOT 237 PLAN 3459**

(the 'Lands')

1. This Heritage Alteration Permit:
 - (a) imposes requirements and conditions for the development of the Lands, which are listed on the Community Heritage Register; and
 - (b) is issued subject to the Owner's compliance with all of the Bylaws of the District applicable to the Lands, except as varied or supplemented by this Permit.

2. The following requirements and conditions shall apply to the Lands:
 - 2.1 The proposed structures and site landscaping including the siting, dimensions and general design, shall substantially be in accordance with the drawings, attached as **Schedule A**.
 - 2.2 Zoning Bylaw No. 4662, 2010, as amended, shall be varied as follows:
 - 2.2.1 Section 120.05 (2) (a) (Sites Composed of More than One Legal Lot) is varied to allow the site to be used as a single site for the purposes of the principal building.
 - 2.2.2 Section 120.05 (2) (b) (Sites Composed of More than One Legal Lot) is varied to allow the principal building to be sited on more than one single lot.
 - 2.2.3 Section 505.03 (Yards) is varied to allow the required rear yard for the washroom addition to be reduced from 10 m to 9.5 m.
all in accordance with the drawings attached as **Schedule A**.
 - 2.3 Restoration of the Ferry Building shall take place generally in accordance with the Conservation Plan attached as **Schedule B**.
3. Prior to commencing site work or Building Permit issuance, whichever occurs first:
 - 3.1 a plan for traffic management (including trades parking) during construction must be submitted to and approved by the District's Manager of Development Engineering; and
 - 3.2 a "Sediment and Erosion Plan" must be submitted to the District's Environmental Protection Officer for approval, which the Owner shall comply with and be responsible for maintaining, repairing and implementing the sediment control measures.
 - 3.3 a suitably qualified professional will identify conditions as enabling the safe use of the land for the use intended with consideration to coastal flooding hazards. A section 219 covenant, in accordance with the Land Titles act, shall be registered against the certificate of title for the Lands certifying that the land will be used in accordance with the conditions specified in the report attached to this permit as **Schedule C**.
 - 3.4 the following conditions of the flood hazard assessment report attached to this permit as **Schedule C** must be addressed in the building plans:
 1. The building crawl space should be designed to be sealed to prevent ingress of water. Alternatively, if not sealed then all permanent materials should be constructed of durable materials considering the possibility of the area being inundated with sea water at some time.
 2. All mechanical and electrical equipment should be located on raised pinths.
 3. Electrical sockets should be located above the FCL.
 4. Evaluate whether the protection measures from future beach erosion as outlined in **Schedule C** should be incorporated during the construction of the new ferry building.
4. In the event that the requirements and conditions as described in Section 2.1 are not completed as provided for in this Permit, the District may, at its option, enter upon, carry out and complete the requirements and conditions so as to recover the costs of

doing so from the security deposited, including the costs of administration and supervision.

5. This Heritage Alteration Permit lapses if the work authorized herein is not commenced within 12 months of the date this permit is issued.

THE COUNCIL OF WEST VANCOUVER APPROVED THIS HERITAGE ALTERATION PERMIT BY RESOLUTION PASSED ON _____.

MAYOR

MUNICIPAL CLERK

THE REQUIREMENTS AND CONDITIONS UPON WHICH THIS PERMIT IS ISSUED ARE ACKNOWLEDGED AND AGREED TO. IT IS UNDERSTOOD THAT OTHER PERMITS / APPROVALS MAY BE REQUIRED INCLUDING PERMITS / APPROVALS FOR BUILDING CONSTRUCTION, SOIL AND ROCK REMOVAL OR DEPOSIT, BOULEVARD WORKS, AND SUBDIVISION.

Owner: Signature

Owner: Print name above

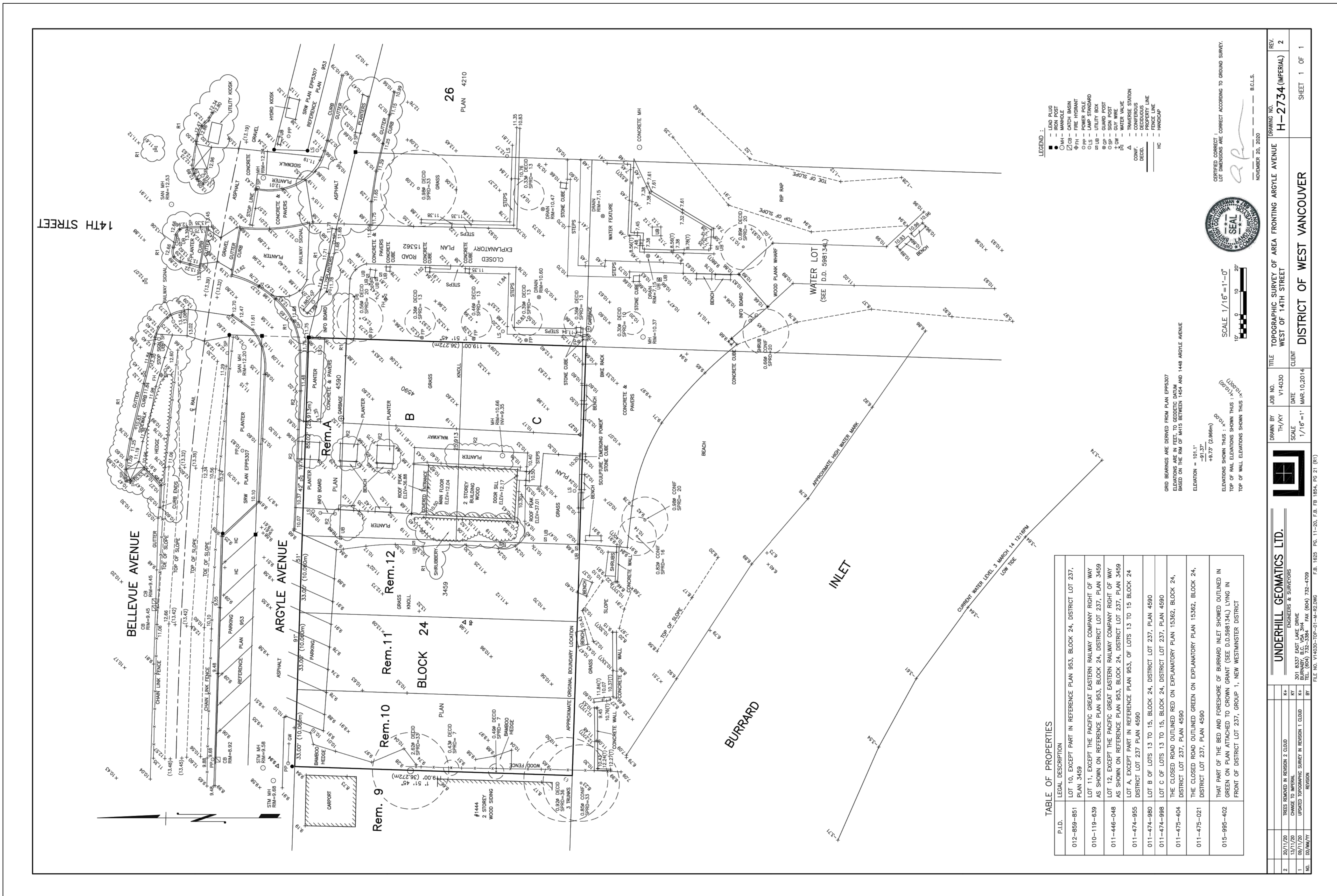
Date

FOR THE PURPOSES OF SECTION 5, THIS PERMIT IS ISSUED ON _____.

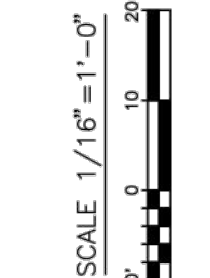
Schedules:

- A – Architectural Plans dated December 4, 2020 prepared by DA Architects + Planners
- B – Heritage Conservation Plan prepared by Cummer Heritage Consulting dated December 1, 2020
- C – Flood Hazard Assessment Report prepared by WSP Canada Inc. dated December 11, 2020

- NOTES:
1. ORIGINAL SURVEY IS PRODUCED BY UNDERHILL GEOMATICS LTD.
 2. ORIGINAL SURVEY SCALE IS 1/16" = 1'-0"
 3. SURVEY SCALE ON THIS SHEET IS 1/24" = 1'-0"
 4. SURVEY HAS BEEN ROTATED 90° TO FIT ON SHEET
 5. SURVEY HAS BEEN ATTACHED FOR REFERENCE ONLY - DO NOT SCALE OFF OF THIS SHEET



- LEGEND:
- IRON PIPE
 - MANHOLE
 - CATCH BASIN
 - POWER POLE
 - LAMP STANDARD
 - GUANO POST
 - WATER VALVE
 - TRANSVERSE STATION
 - CONCRETE
 - PROPERTY LINE
 - HANDCUP



GRID BEARINGS ARE DERIVED FROM PLAN EP38307
ELEVATIONS ARE IN FEET, TO GEODETIC DATUM
BASED ON THE RM OF WYTS BETWEEN 1404 AND 1448 ARGYLE AVENUE
ELEVATION = 101.1'
+97.37' (2.866m)
ELEVATIONS SHOWN THIS SURVEY
TOP OF WALL ELEVATIONS SHOWN THIS SURVEY

NO.	DESCRIPTION	DATE	DR.
-	ISSUED FOR HAP	DEC 04 2020	
-	ISSUED FOR PRICING	NOV 26 2020	
Revisions: Read Up			

DA
DA Architects + Planners
200 - 1014 Homer Street, Vancouver
British Columbia, Canada V6B 2W9
604 685 6312
604 685 0988
www.da-architects.ca

FERRY BUILDING
REHABILITATION PROJECT
1414 ARGYLE AVE.
WEST VANCOUVER, BC

Copyright Reserved. This plan and design are, and at all times remain the exclusive property of DA Architects + Planners, and cannot be used or reproduced without the Architect's written consent.

SITE SURVEY

Job No.	1334-400	Sheet No.	
Scale	1/4" = 1'-0"		
Drawn	MS		
Checked			
Approved	ME		
Date	2020.11.06	Revision	-

A1.01

No.	Description	Date	Dr.
-	ISSUED FOR HAP	DEC 04 2020	
-	ISSUED FOR PRICING	NOV 26 2020	

Revisions: Read Up

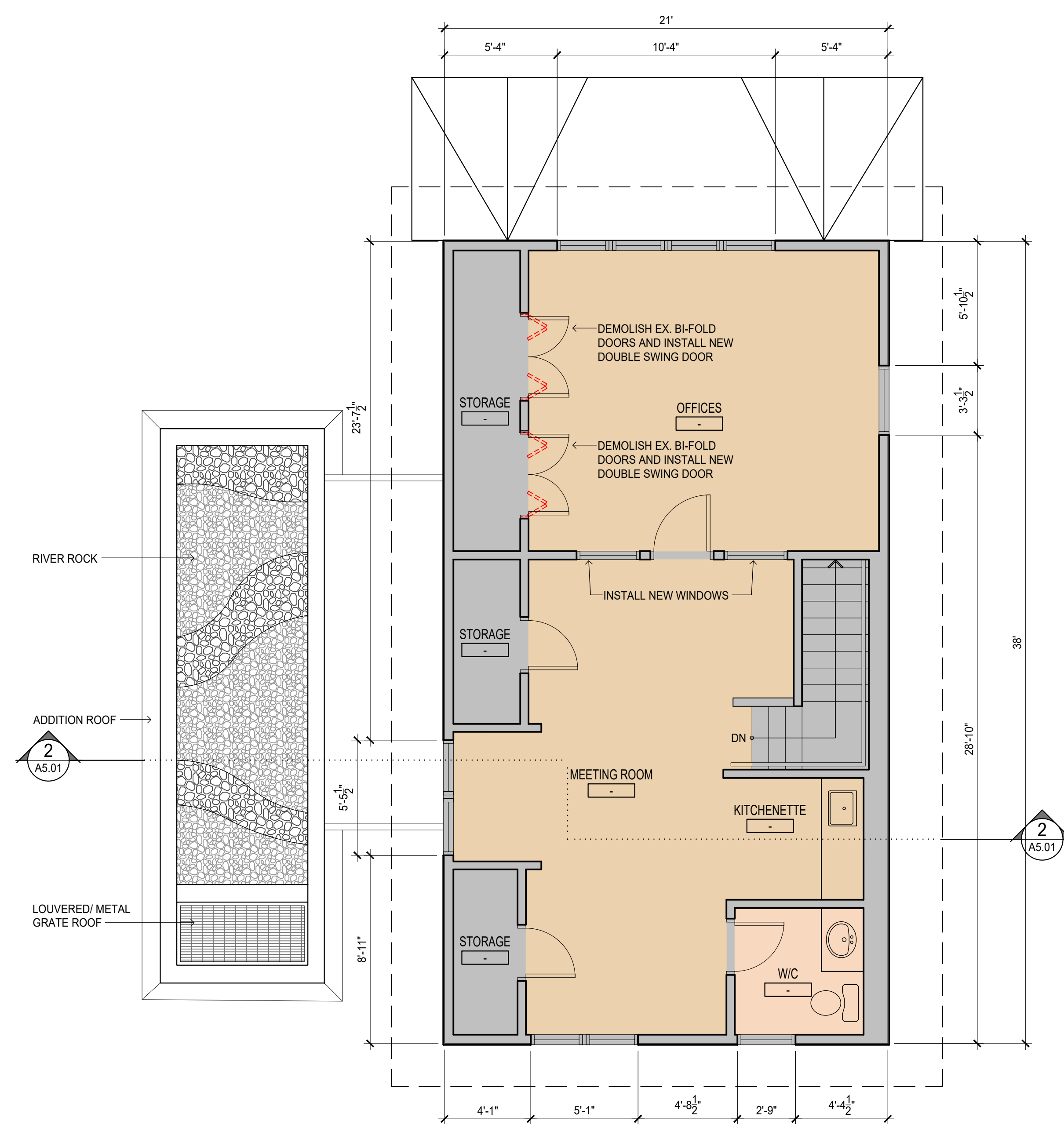
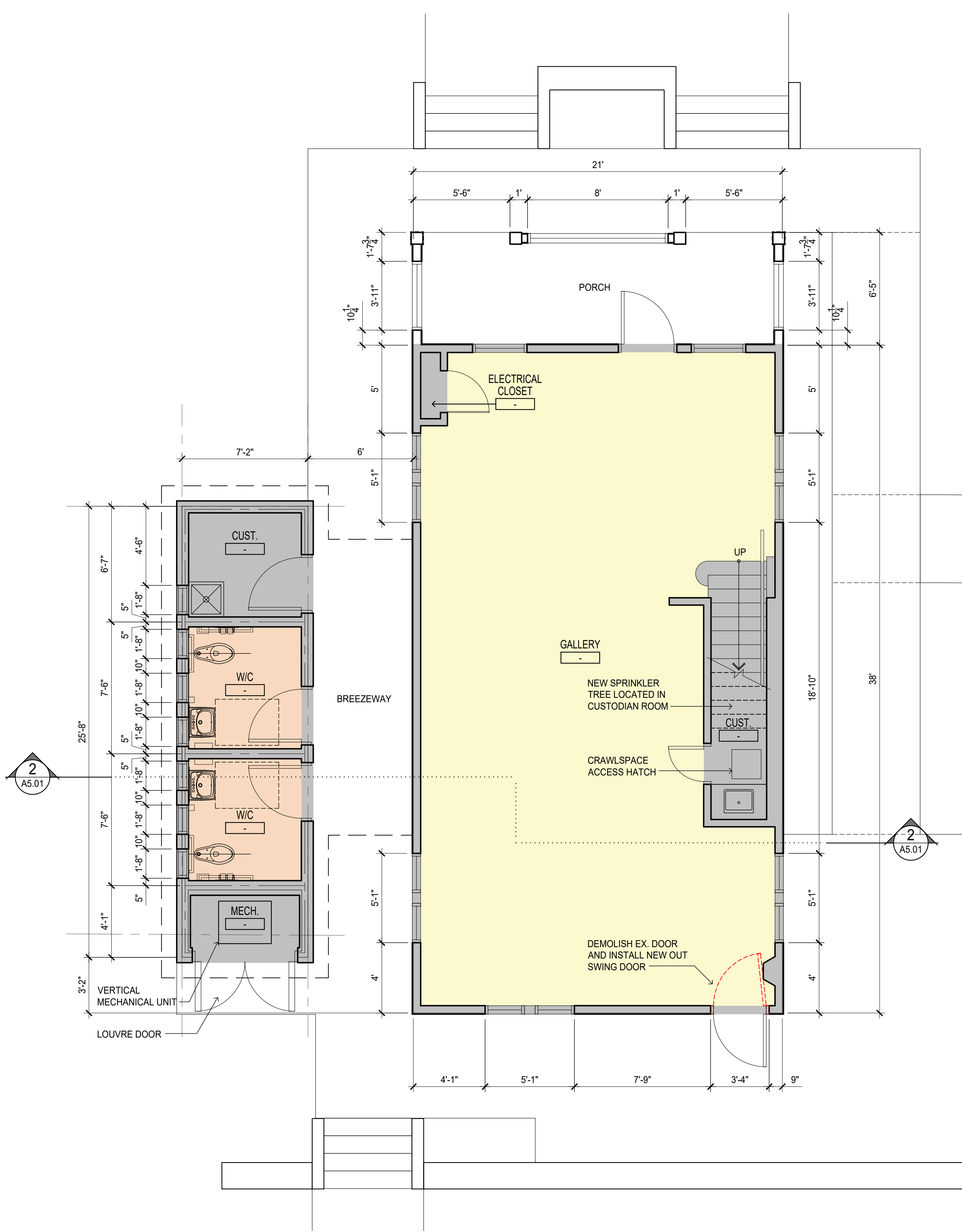
DA
DA Architects + Planners
200 - 1014 Homer Street, Vancouver
British Columbia, Canada V6B 2W9
T 604 685 6312
F 604 685 0988
www.da-architects.ca

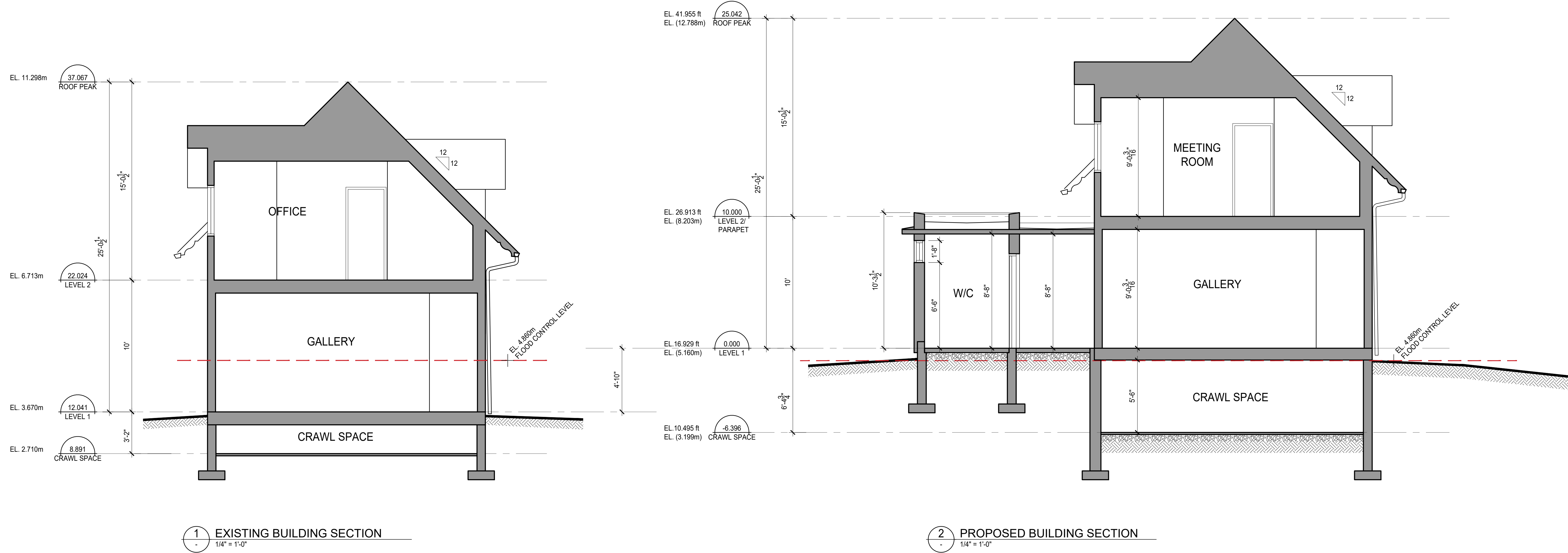
FERRY BUILDING
REHABILITATION PROJECT
1414 ARGYLE AVE.
WEST VANCOUVER, BC

Copyright Reserved. This plan and design are, and at all times remain the exclusive property of DA Architects + Planners, and cannot be used or reproduced without the Architect's written consent.

Sheet Title
FLOOR PLANS

Job No.	1334-400	Sheet No.	A2.01
Scale	1/4" = 1'-0"		
Drawn	MS		
Checked			
Approved	ME		
Date	2020.11.06	Revision	-





No.	Description	Date	Dr.
-	ISSUED FOR HAP	DEC 04 2020	
-	ISSUED FOR PRICING	NOV 26 2020	
Revisions: Read Up			

DA
DA Architects + Planners
200 - 1014 Homer Street, Vancouver
British Columbia, Canada V6B 2W9
T 604 685 6312
F 604 685 0988
www.da-architects.ca

FERRY BUILDING
REHABILITATION PROJECT
1414 ARGYLE AVE.
WEST VANCOUVER, BC

Copyright Reserved. This plan and design are, and at all times remain the exclusive property of DA Architects + Planners, and cannot be used or reproduced without the Architect's written consent.

Sheet Title
BUILDING SECTIONS

Job No.	1334-400	Sheet No.	
Scale	1/4" = 1'-0"	A5.01	
Drawn	MS		
Checked			
Approved	ME		
Date	2020.11.06	Revision	-



Cummer Heritage Consulting

Heritage Conservation Plan (Draft)

Ferry Building Gallery, 1414 Argyle Avenue, West Vancouver, BC

December 1, 2020

Prepared by Cummer Heritage Consulting (CHC) for DA Architects + Planners and the District of West Vancouver



Fig. 1: Front view of the Ferry Building Gallery, located at 1414 Argyle Avenue, West Vancouver, BC, 2020. (Source: Ehman)

Contents

1.0 Background Information and Introduction	3
2.0 Historic Context	4
3.0 Statement of Significance	7
3.1 Description of Historic Place	7
3.2 Heritage Value of Historic Place.....	7
3.3 Character Defining Elements	8
4.0 Archival Photographs	8
5.0 Conservation Objectives	12
6.0 Building Description	15
7.0 Condition Assessment	15
7.1 Structure and Foundations	15
7.2 Wood Elements.....	15
7.3 Roofing and Waterworks	15
7.4 Windows and Doors.....	17
7.5 Cladding and Trimwork.....	19
7.6 Finishes.....	20
7.7 Landscaping.....	20
8.0 Recommended Conservation Procedures	21
8.1 Structure and Foundations – Preservation and Rehabilitation	21
8.2 Wood Elements – Preservation and Rehabilitation	21
8.3 Roofing and Waterworks – Rehabilitation and Preservation	22
8.4 Windows and Doors – Preservation and Rehabilitation	22
8.5 Cladding and Trimwork – Rehabilitation	22
8.6 Finishes – Restoration	23
8.7 Landscaping.....	23
9.0 Proposed Alterations and Future Changes	23
9.1 Proposed Alterations	23
9.2 Future Changes	24
10.0 Maintenance Plan	24
10.1 Maintenance Checklist.....	25
11.0 References	27
12.0 Appendix A: 2014 Conservation Plan Excerpts	28

1.0 Background Information and Introduction

Neighbourhood: Ambleside

Address: 1414 Argyle Avenue

Folio: 10-0413

PID: 011-474-955 & 011-474-980

Postal Code: V7T 1C2

Legal Plan: 4590

Legal Description: Plan 4590, District Lot 237, Block 24, Lots A & B of Lots 13 to 15 Ferry Building

Zoning: CU5

Date of completion: 1913

Builder: Charlie Thompson

The subject structure, the Ferry Building Gallery, is a modest two-storey Arts and Crafts style wood-frame construction, located at 1414 Argyle Avenue in West Vancouver (Figs. 2 and 3). It is located in the southeastern corner of West Vancouver.



Fig. 2: Location map of the Ferry Building located at 1414 Argyle Avenue in West Vancouver, BC, pinpointed with a red arrow. (Source: WEST map 2019, with author additions)



Fig. 3: Aerial view of the surrounding neighbourhood of 1414 Argyle Avenue, outlined in red. (Source: Google, 2020)

2.0 Historic Context

West Vancouver “began as a popular summer holiday destination. From the 1880s to the 1900s men and women canoed and eventually ferried across from Vancouver to picnic or camp in the fresh air upwind from what was literally ‘the Big Smoke’ in those early land-clearing and logging days...By 1912 the place was humming, thanks to a regular ferry service that started in 1909, triggering a small real estate boom and relieving many families from the grim row across the treacherous tides” (McPhedran 1997, p. 120). The Ferry Building is directly connected to this critical development of ferry service to the area, prior to the construction of the Lions Gate Bridge in the 1930s. “In 1913 the municipality built a wharf, ferry dock and Ferry Building at the foot of 14th Street on the relatively protected Ambleside waterfront, which helped ensure that this would be the largest West Vancouver community. The Shamrock Tearooms, just west of the Ferry Building, became a popular meeting place, and for many years this part of the waterfront was one of the main focuses of the community. The Pacific Great Eastern Railway (PGE) commenced operations in 1914, and a bus service from about 1915 also provided community access from the Ferry Building” (Mansbridge 2018, pp. 68-69). The PGE railway line and the ferry service route to the Ferry Building are visible in a 1929 map of the area (Figs. 4a and 4b), as is the building itself in a 1930 Fire Insurance Map outlining its original location (Fig. 5). The aforementioned Shamrock Tearooms are also visible in a 1915 photograph (Fig. 6) below.

Written by Katie Cummer, PhD CAHP – Cummer Heritage Consulting (CHC)



Figs. 4a and 4b: Topographic Map showing North and West Vancouver, 1929. Fig. 4a (above) shows the larger context, while Fig. 4b (below) shows a closer view of the Burrard Inlet, including the ferry route from downtown Vancouver to the pier at Ambleside (the Ferry Building’s pier), pinpointed with red arrows. (Source: West Vancouver Archives, 12001.LEY)

Written by Katie Cummer, PhD CAHP – Cummer Heritage Consulting (CHC)

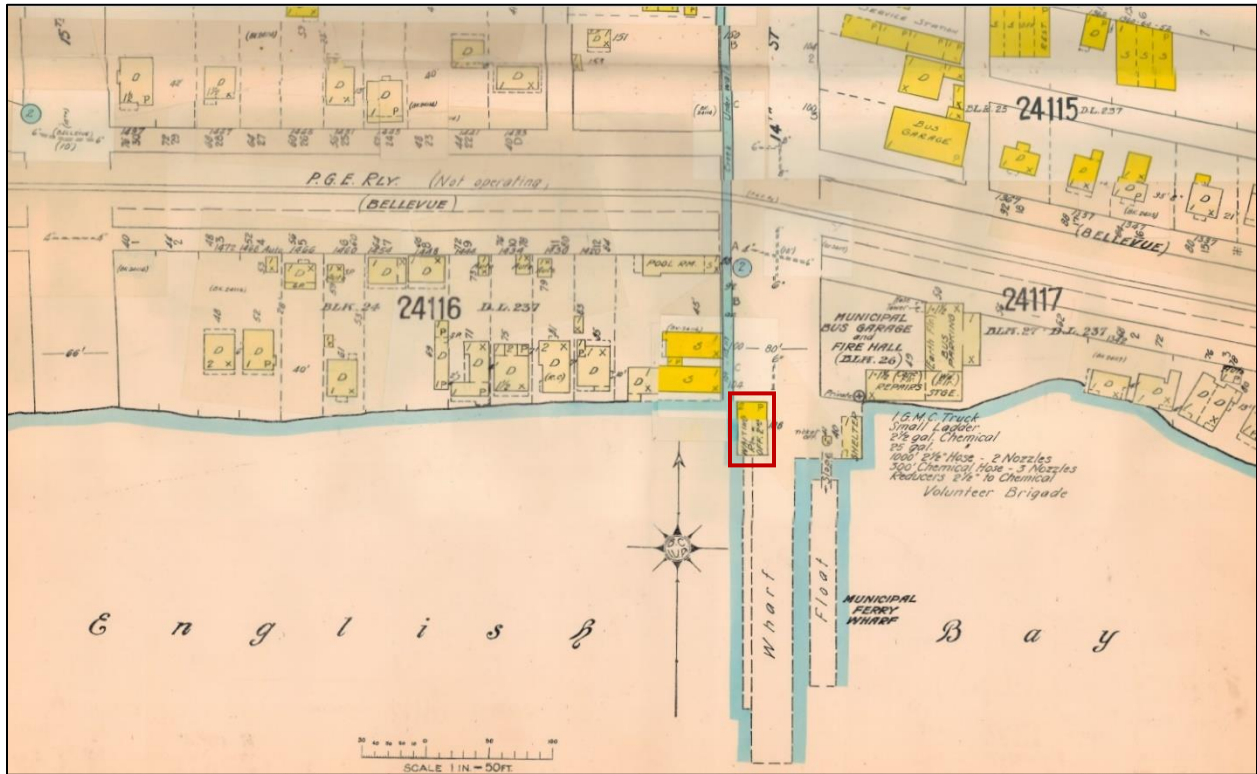


Fig. 5: Fire Insurance Map of the Ambleside neighbourhood of West Vancouver, 1930. The Ferry Building, outlined in red, is visible in its original location at the end of the Wharf. (Source: West Vancouver Archives, 1730-01.02.015.DWV, Sheet 2411)



Fig. 6: Historical photograph of the Ferry Building and its neighbour, the Shamrock Tea Rooms, 1915, visible in their original location at the end of the Wharf. (Source: West Vancouver Archives, 017.WVA.LEY)

Written by Katie Cummer, PhD CAHP – Cummer Heritage Consulting (CHC)

3.0 Statement of Significance

The following is the Statement of Significance of the Ferry Building Gallery written by Commonwealth Historic Resources in May 2008, with edits by Robert Lemon Architect Inc. (in bold italics below) from May 2014.

3.1 Description of Historic Place

The historic place is the Ferry Building Gallery, originally known as the West Vancouver Ferry Terminal, a wood-frame building constructed in 1913. It is located on the south side of Argyle Avenue, near the water, at the foot of 14th Street. ***The building was moved to its present location, rehabilitated as the Ferry Building Gallery*** and designated as a Municipal Heritage Property in 1987.

3.2 Heritage Value of Historic Place

The historic place has historical value for its associations with the municipal ferry and bus services, both of which were very important to the development of West Vancouver; and for its present use as a community art gallery, reflecting the municipal commitment to cultural presentation. It also has architectural value for its use of Arts and Crafts features. Its longstanding public use has made it part of the ongoing historical experience of countless residents and visitors.

The primary heritage value of the Ferry Building Gallery is in its association with West Vancouver's ferry and bus services, both of which were essential to the development of a community in which commuting has long been so important a way of life. Regular ferry service to and from Vancouver was initiated in 1906 by John Lawson; the service was acquired by the Municipality in 1912 in response to local landowners who wanted to promote property development. The acquisition coincides with the establishment of West Vancouver as a district municipality. The Ferry Building opened as the Ambleside terminus in 1913.

The completion of the Lions Gate Bridge in the late 1930s cut into ferry passenger traffic, and as a result ferries ceased operation in 1947. The historic place was adapted for use as a terminus for bus service, and it continued in this use until 1986. The building therefore symbolizes the active role played by the municipality in transportation, a purpose for which it was used for more than 70 years.

The building continues in public use. It has value for having been the first of the 'Arts on Argyle' buildings to be adapted for the arts, in 1989. It continues to be a popular public gallery that showcases local art. Council Policy is that it is 'to be used by community groups, Historical Society, local artists and other recreational users as appropriate, 'representing a strong municipal commitment to cultural use.

The historic place has architectural value for using features of the Arts and Crafts style, here in a modestly scaled public building. It was designed by architects Thompson and Campbell, with the waiting room ***and ticket booth*** located downstairs and a boardroom upstairs. ***The design reflects its historic usage having a symmetrical and open north elevation – with prominent clock - facing the village of Ambleside and a modest asymmetrical south façade with a single door which originally gave way directly to the wharf for passengers to embark the ferry.*** The building saw community use in early years. Its historical character was retained in the alterations for adaptive re-use in 1989, by Howard Yano, Architect. ***The present location and surrounding park-like landscaping has changed the building's historic functional and symbolic relationship to the wharf and waterfront.***

3.3 Character Defining Elements

The character-defining elements of the Ferry Building Gallery include:

- Setting on the water, which recalls its use as a ferry terminal
- The small, domestic scale, despite its original public use
- Continuous tradition of public use
- ***Symmetrical north elevation “village” façade compared to modest asymmetrical “wharf” elevation***
- Arts and Crafts design, seen in features such as the structural and decorative use of wood
- Cross-gable roof with exposed rafters
- Smaller gables over the entrances
- Original multi-paned wood-sash windows
- Clock

4.0 Archival Photographs

It is interesting and important to note that some of the Arts and Crafts design elements listed above (in section 3.3) are not in fact historical elements, in particular, the decorative wood brackets in the various gables. This is discernible in comparing historical photographs of the structure from the 1910s (Fig. 6 above and Fig. 7 below) to those from the 1980s (Figs. 8 and 9), when the building was moved and converted into its current use as an art gallery. It appears that at that time, the brackets were added in, likely inspired by the original architectural drawings, which showed the gables with the brackets (Figs. 10 to 12).



Fig. 7: Historical photograph of the Ferry Building's front entrance, 1913. (Source: West Vancouver Archives, 3041.WVA.PHO)



Fig. 8: 1986 photograph of the Ferry Building boarded up, on a flatbed truck, being moved. Note the continued lack of the decorative brackets in the various gables and also that the northwest corner front entrance is blocked off at this point in time, unlike originally and currently. (Source: West Vancouver Archives, 3199.WVA.PHO)



Fig. 9: 1988 photograph of the Ferry Building successfully restored and rehabilitated into an art gallery. Note the re-opened western entryway and the appearance of the decorative brackets in the various gables, illustrated in the original architectural drawings for the building below. (Source: West Vancouver Archives, 2585-03.1.0001.DWV)

Written by *Katie Cummer, PhD CAHP – Cummer Heritage Consulting (CHC)*

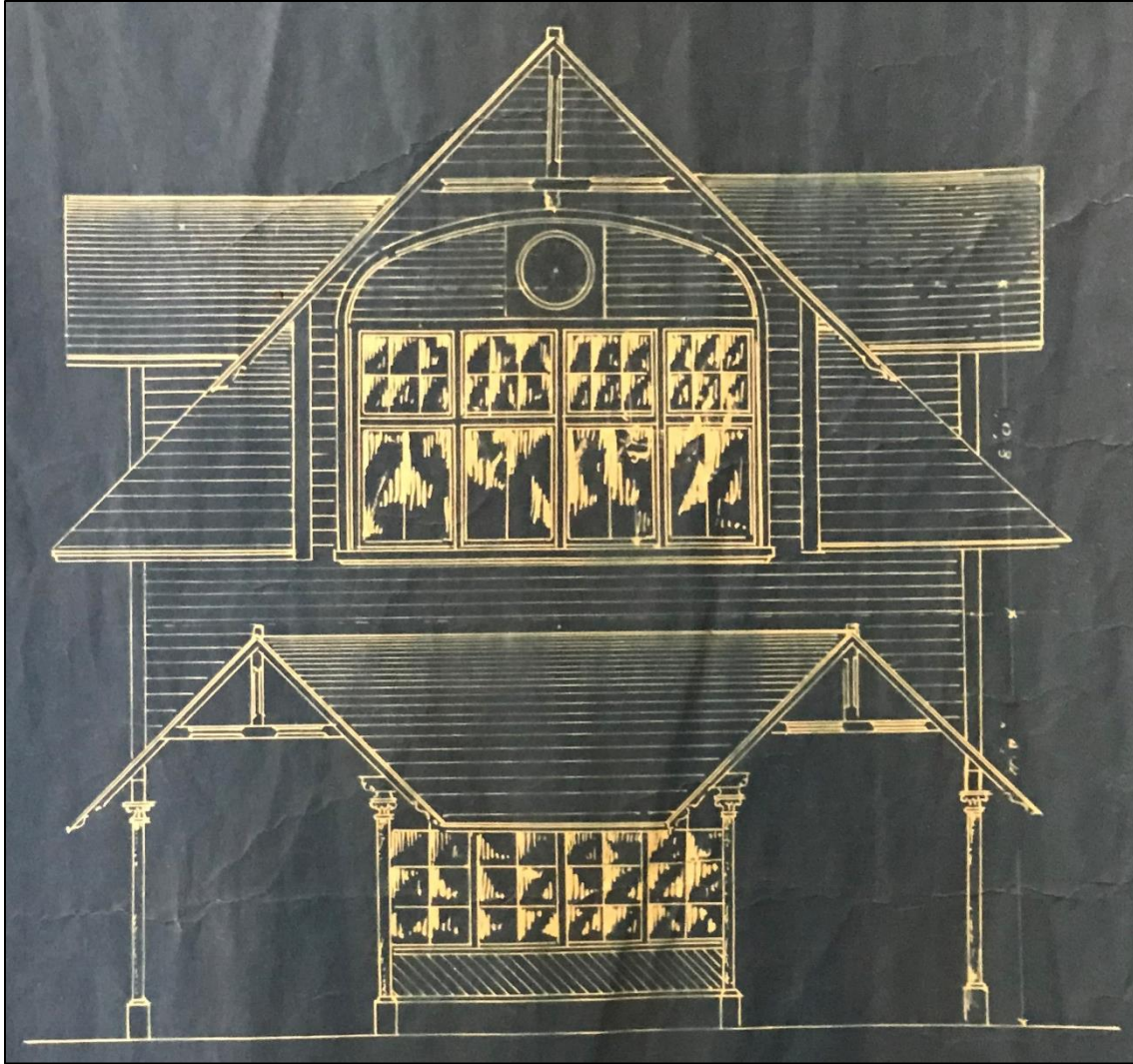


Fig. 10: Detail of the Front Elevation from the 1913 architectural drawings of the proposed Ferry Building. Note the inclusion of the gable brackets in these original plans. (Source: West Vancouver Archives, 0596-02.01)



Fig. 11: Detail of the Side Elevation from the 1913 architectural drawings of the proposed Ferry Building. Note the diagonal siding beneath the front windows (labelled "V. joint") and the annotation about the shingle roof, in addition to the inclusion of the gable bracket in the dormer. (Source: West Vancouver Archives, 0596-02.01)

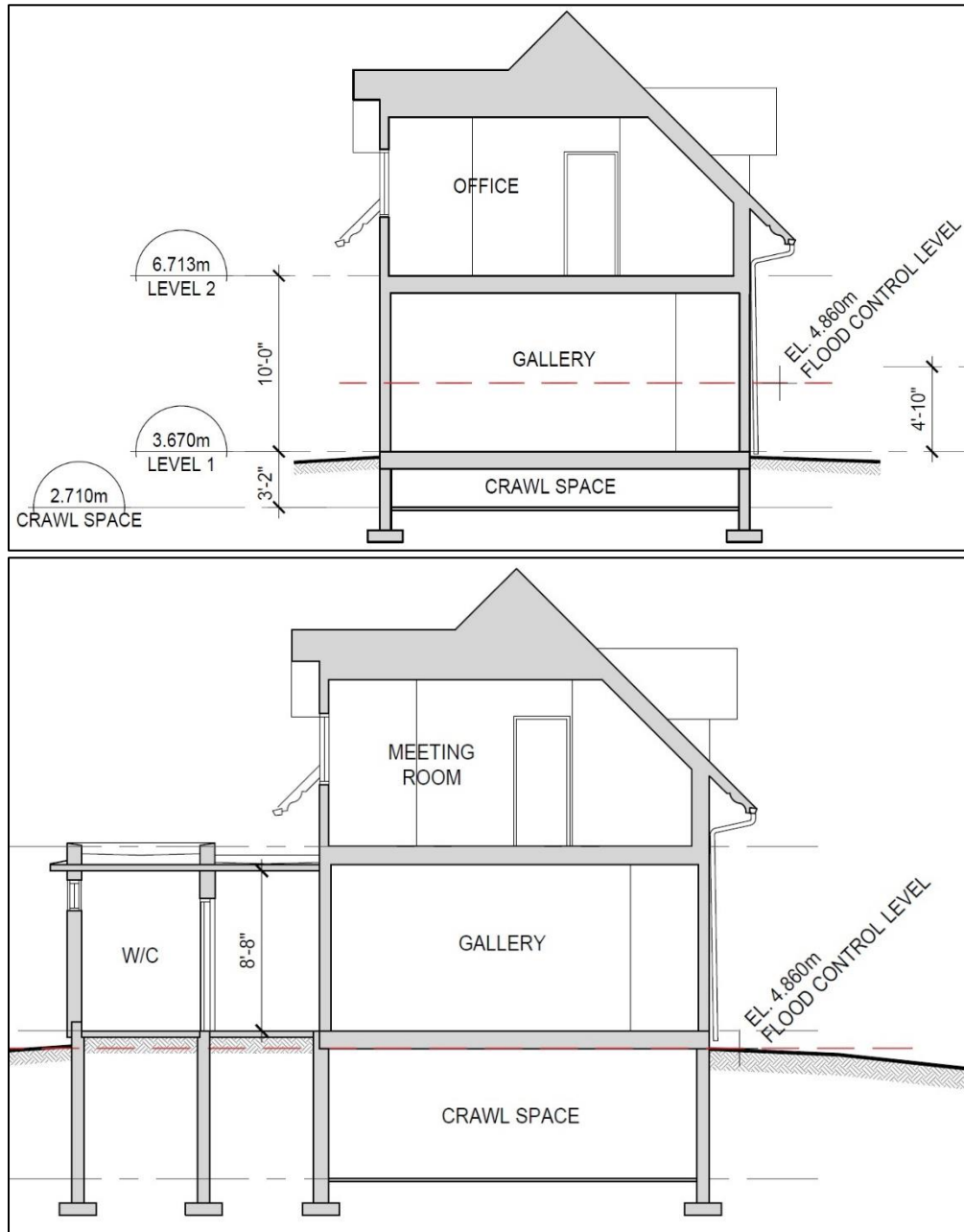


Fig. 12: Detail of the Back Elevation from the 1913 architectural drawings of the proposed Ferry Building. It is interesting to note the arched back doorway design that was never implemented (as visible in the 1915 historical photograph in Fig. 6 above). (Source: West Vancouver Archives, 0596-02.01)

5.0 Conservation Objectives

The Conservation Objectives for the Ferry Building at 1414 Argyle Avenue are fivefold:

- 1) Raise the building above the flood control level (Figs. 13 and 14);
- 2) Provide improved accessibility to the structure at its higher elevation (Fig. 15);
- 3) Preserve, restore and rehabilitate the existing building (Fig. 16);
- 4) Upgrade the structure and building systems; and
- 5) Build an addition next to the heritage building to provide public washroom facilities (Fig. 16).



Figs. 13 and 14: The current building section (Fig. 13 above) and proposed building section (Fig. 14 below), illustrating the raising of the building to be above the flood control level. (Sources: DA Architects + Planners)

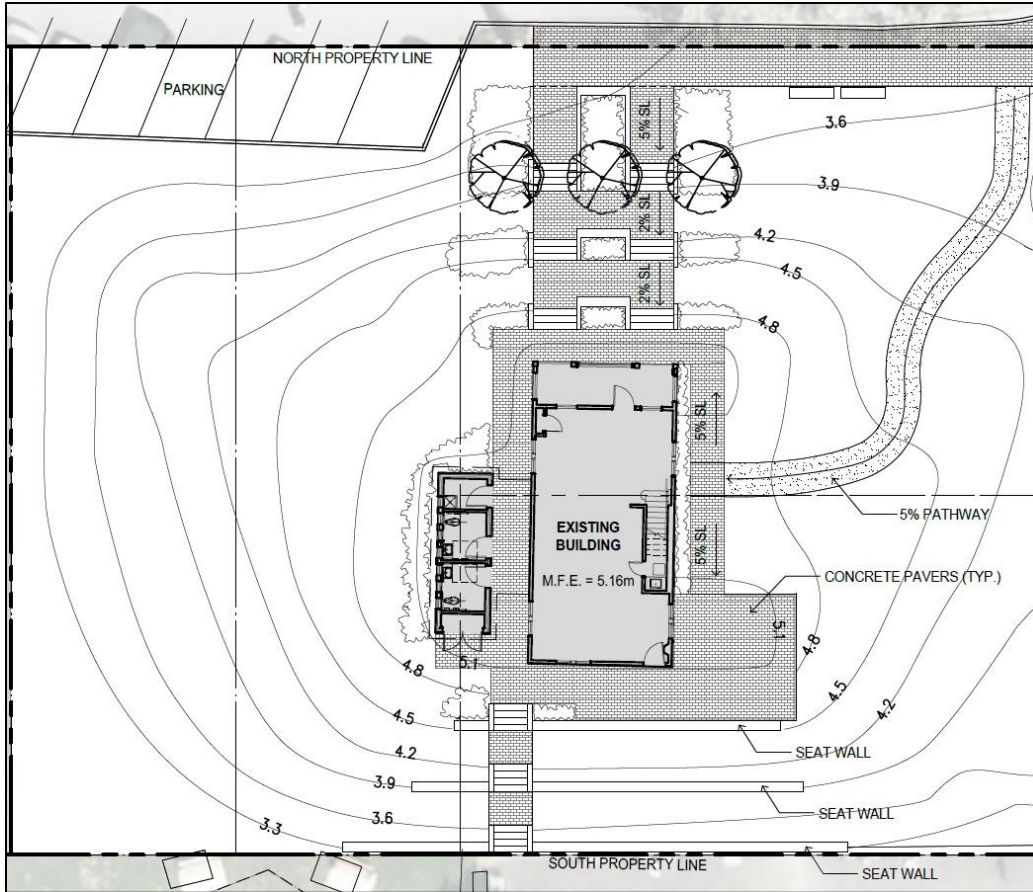


Fig. 15: The proposed site plan, illustrating the new access points to the raised building. (Source: DA Architects + Planners)



Fig. 16: Rendering of the restored Ferry Building and the proposed addition on its western side. (Source: DA Architects + Planners)

Written by Katie Cummer, PhD CAHP – Cummer Heritage Consulting (CHC)

All five objectives aim to better protect and extend the physical life of the Ferry Building Gallery. With regards to the third objective, in particular, the building itself will be preserved, with elements restored and rehabilitated, as appropriate and needed. As defined by the *Standards and Guidelines for the Conservation of Historic Places in Canada (2nd edition)*:

Preservation: The action or process of protecting, maintaining and/or stabilizing the existing materials, form and integrity of an historic place or of an individual component, while protecting its heritage value.

Restoration: The action or process of accurately revealing, recovering or representing the state of a historic place or of an individual component, as it appeared at a particular period in its history, while protecting its heritage value.

Rehabilitation: The action or process of making possible a continuing or compatible contemporary use of an historic place or of an individual component, through repair, alterations, and/or additions, while protecting its heritage value.

(Canada’s Historic Places 2010, p. 255)

The proposed work would allow for a continued commercial use, with improved usability with the addition of public washroom facilities and increased accessibility to the site. The proposed changes do not affect the Heritage Values nor the Character Defining Elements of this historic place. The conservation of the Ferry Building will focus on the preservation of the heritage structure; restoration of the siding and exterior paint scheme; and rehabilitation of the foundation and roof, among others. The following table summarizes the specific elements of the Ferry Building that are to be preserved, restored and rehabilitated (Table 1).

Table 1: Consolidated lists of the elements of the Ferry Building Gallery to be preserved, restored and rehabilitated.

Preserved	Restored	Rehabilitated
Overall setting, structure and form	Overall paint scheme	New foundation when increasing height above flood control level
Continued public use	Horizontal and diagonal siding	Removal of the backdoor (repurposed on site if possible), to be replaced by another that allows proper egress. The back steps will also be removed to improve accessibility.
Rooflines and decorative detailing	Removal of the antennae attached to the back-gable bracket	New roof with repaired and/or replaced fascia boards and soffits, as needed, and an upgraded drainage system
Multi-paned wood-sash windows, as much as possible	Wood window elements, such as trims and sills, as needed	New replica wood windows, as needed
Overall Arts and Crafts design and ornamentation, including the clock and later addition roof brackets	Removal of current exterior lighting at the back of the property, replacing with more period-appropriate light fixtures	New stand-alone addition to provide washroom facilities

Although not currently planned, as mentioned by Robert Lemon in the 2014 Conservation Plan for the Ferry Building (p. 10), an Interpretation Plan could be put together for writing and designing interpretative signage to be installed on site to more fully tell the story of this historic place and the various efforts made to conserve it (both in the 1980s and this current 21st century initiative).

6.0 Building Description

The Ferry Building Gallery is a modest Edwardian-era Arts and Crafts style, two-storey front-gabled structure located at the end of 14th Street on Argyle Avenue, overlooking Burrard Inlet. It is a wood-frame construction with bevelled horizontal wood siding throughout, with sections of diagonal siding beneath multi-paned windows at the front entrance to the building. It has two dormers, one on the northeast side and one on the southwest side of the structure, with smaller gables at the front, over its two entryways. It has a large clock in the top of its front gable, along with decorative wood brackets in its gable peaks, with simple decorative carving in parts of its fascia boards throughout. It features a number of original multi-paned wood-sash windows throughout the property. The structure has simple garden beds on its east, west and south sides.

7.0 Condition Assessment

The following is an updated Condition Assessment for the Ferry Building Gallery, expanding upon an earlier assessment conducted by Robert Lemon in May 2014 (included in Appendix A of this report for reference). The exterior of the Ferry Building at 1414 Argyle Avenue appears to be in good to poor condition, with a number of areas needing attention, as discussed below.

7.1 Structure and Foundations

Overall, the Edwardian-era structure is in fair to good condition, although it is experiencing increased deterioration with its delayed restoration and rehabilitation. Please note an interior inspection was not conducted as part of this Heritage Conservation Plan drafting. A structural engineer should conduct a thorough investigation prior to the structure being lifted to ensure its stability.

7.2 Wood Elements

The visible, exterior wood elements, such as the doors, door frames, roof fascia, window trims and windowsills are in fair to good condition, as discussed in greater detail in their relevant sections below.

7.3 Roofing and Waterworks

In 2014, the overall roof condition was reported as good, however, nearly a half decade later, things have somewhat deteriorated. The roof shingles are in fair to good condition, in need of cleaning and requiring maintenance (Figs. 17 to 18). As for the waterworks, as Lemon outlined in 2014, the gutters and downspouts were in poor condition and in need of replacement then; this continues to be the case today (Fig. 19).



Fig. 17: Eastern side view of the Ferry Building Gallery, 2020, illustrating the current state of the roofing. (Source: Ehman)



Fig. 18: Western side view of the Ferry Building Gallery, 2020, illustrating the current state of the roofing. (Source: Ehman)



Fig. 19: Partial front view of the Ferry Building Gallery, 2020, illustrating the state of the front roofing and some of the eaves. (Source: Ehman)

7.4 Windows and Doors

Considering the age of the building, the windows and doors are in good to fair condition (Figs. 20 to 21), although there are areas showing greater signs of deterioration than others (Fig. 22). The doors and most of the windows (their frames and sashes) appear to be original from the 1910s, although Lemon outlined in 2014 that one window on the upper east side dormer is not, as well as the north facing upper floor multi-pane window, which was replaced in 2019. According to the 2014 building condition report, “the glazing appears to be second generation; however the date of replacement is unknown. Glazing putty in fair condition” (Morrison Hershfield 2014, p. 11).



Fig. 20: The front entrance of the Ferry Building Gallery, 2020, illustrating the largely good condition of its front door, windowsills and trims. Note also the more appropriate lighting, compared to the back of the property, as visible in Fig. 21 below. (Source: Ehman)



Fig. 21: The back entrance of the Ferry Building Gallery, 2020, illustrating the largely good condition of its back door and windows. Note the less appropriate lighting and the antennae that should be removed. (Source: Ehman)

Written by *Katie Cummer, PhD CAHP – Cummer Heritage Consulting (CHC)*



Fig. 22: Detail shot of one of the eastern windowsills and trims, showing signs of deterioration, including a large crack in its sill. (Source: Ehman)

7.5 Cladding and Trimwork

As visible in the photographs above (Figs. 21 and 22) and below (Figs. 23a and 23b), the exterior siding appears to be in fair condition, overall, showing wear, staining and paint cracking and peeling in places. As outlined in the 2014 building condition report: “the cedar wood siding is fastened into the wood panel boards with nail fasteners, which have rusted in most locations and failed in some locations, where the siding is found to be loose or detached” (Morrison Hershfield 2014, p. 8). Unfortunately, as outlined in the July 2020 Hazmat Report, there are concerns with regards to lead-based paint on the siding and exterior trimwork (Fig. 24), which may need to be removed in its entirety and replaced in kind to address and rectify the issue of these hazardous materials.



Fig. 23a: The eastern side of the Ferry Building Gallery, 2020, illustrating the condition of the siding, in particular showing areas with peeling paint (a detail shot of which is shown in Fig. 23b below). (Source: Ehman)

Written by *Katie Cummer, PhD CAHP – Cummer Heritage Consulting (CHC)*



Fig. 23b: Detail shot of the eastern side of the Ferry Building Gallery, 2020, illustrating the areas of peeling paint. Note this also reveals the earlier, inverse paint scheme with a darker red for the main body colour. (Source: Ehman)

Sample Number	Location	Material	Lead Concentration (mg/kg) ^{1,2}	Approx. Quantity ³	Control Measures Required
6445-L1	2 nd Floor – Closet Wall	White Paint	<2.0	-	NO
6445-L2	1 st Floor – On Wall Board	White Paint	<2.0	-	NO
6445-L3	Exterior – West Side – On Wood Siding	Beige Paint	<u>60,000</u>	2,000 ft² (All Wood Siding)	YES
6445-L4	Exterior – South Side – On Wood Siding	Red Paint	<u>258</u>	500 ft² (All Wood Siding)	YES
6445-L5	Exterior – On Window Frame/Trim	Beige Paint	<u>80,100</u>	12 Frames	YES

Fig. 24: Lead Summary Results Table from the July 2020 Hazmat Report. (Source: Kinetic OHS Services 2020, p. 5)

7.6 Finishes

As visible in Figs. 20 to 22 above, the finishes of the building are in fair to good condition.

7.7 Landscaping

The landscaping on site is concentrated in garden beds on the east, south and west sides. Certain plantings are possibly growing too close to the structure (Fig. 25), which could cause potential damage to the siding and foundations of the building if left unchecked. Once the building has been raised, it is recommended that any new landscaping be planted with sufficient distance from the structure and that a gravel bed surrounding it be considered to help improve drainage and to ensure that the new siding and foundations of the building are better protected in the long-run.



Fig. 25: View from the northwest corner, showing some of the landscaping growing very close to the heritage building. (Source: Ehman)

Despite the issues and concerns stated above, the overall condition of the property is good with the opportunity for improvement following the restoration and rehabilitation work outlined in section 8.0 of this Heritage Conservation Plan.

8.0 Recommended Conservation Procedures

8.1 Structure and Foundations – **Preservation** and **Rehabilitation**

- The main two-storey structure will, for the most part, be **preserved**.
- It is understood that, as part of the site's **rehabilitation**, on account of its increased height, the building will have a new concrete foundation, which should be covered with painted horizontal wood siding to match the rest of the building.

8.2 Wood Elements – **Preservation** and **Rehabilitation**

- As addressed in greater detail in the relevant sections below (in particular, windows and doors), the wood elements should be **preserved** where possible and **rehabilitated (repaired or replaced in-kind)**, as needed.

8.3 Roofing and Waterworks – **Rehabilitation and Preservation**

- The roof, in its current state, should be **rehabilitated**, specifically cleaned of debris and a review of its shingles conducted. While it may have additional service life at the moment, it should eventually be replaced with a new roof, which should be monitored and properly maintained to extend its physical life.
- The fascia boards and soffits should be cleaned and **preserved**, where possible, and **rehabilitated (repaired or replaced in-kind)**, as needed.
- The waterworks (the gutters and downspouts) should be **rehabilitated**, thoroughly cleaned to ensure their proper functioning or fully replaced, if needed, being painted appropriately to match the building as a whole.

8.4 Windows and Doors – **Preservation and Rehabilitation**

- A thorough investigation and documentation of the windows, in-situ, should be conducted prior to work commencement on the building.
- As Lemon outlined with regards to the conservation of the window and door trims: “inspect, remove loose paint, repair and repaint. Replace, where deteriorated, in kind with new wooden section and paint” (Lemon 2014, p. 7). As discussed in section 7.5 above, this may be more challenging than originally thought on account of the Hazmat Report, however, if these can be inspected and documented in-situ, prior to their potential removal for repair and maintenance, that would be preferable.
- Where possible, the original multi-paned, wood-sash windows should be **preserved**. If any are not salvageable, they should be **rehabilitated (repaired or replaced in-kind)**, matching profile, type and glazing).
- All doors should be **preserved**, where possible, and **rehabilitated (repaired or replaced in-kind)**, as needed. If the backdoor must be replaced on account of egress concerns (LMDG 2020, p. 5), repurposing it on site is desirable, if at all possible.
- Appropriate weather protection (“weatherization” as Lemon refers to it (2014, p. 7)) should be used on the exterior doors as well as the windows to help improve their energy efficiency.
- All windows and doors should be repainted according to the restored colour scheme outlined in section 8.6 below. Trims should have loose paint removed, be repaired, if needed, and repainted accordingly (following appropriate WorkSafe procedures on account of the lead-paint).
- As outlined in the code compliance report, some of the windows, particularly on the upper floor, do not appear to be “designed to withstand lateral loading for guards, and they are also fully openable (not provided with restrictors)” (LMDG 2020, p. 9). Any remediation of these issues should try to protect the historic fabric as much as possible.

8.5 Cladding and Trimwork – **Rehabilitation**

- Unfortunately, due to the required seismic upgrading needed on site, as well as on account of the hazardous lead paint on the siding and trims being “leachable” (Kinetic OHS Services 2020, p. 7), the siding must be **rehabilitated and replaced in-kind**, with bevelled horizontal wood siding for most of the structure and diagonal v-joint wood siding where appropriate.
- These should be painted in the restored colour scheme outlined in section 8.6 below.
- As outlined by Lemon, the replicated bevelled siding “should be air-dried to avoid shrinkage. Prime and paint” (Lemon 2014, p. 7).

8.6 Finishes – Restoration

- The current colour scheme does not need to be maintained. If possible, the original colour scheme should be determined by scraping down to the original layers of paint and, ideally, this scheme should be **restored** (as close as possible). Upon a simple inspection, it appears to have been a red-hue body with a light trim. This is corroborated looking at historical photographs that show a darker body and lighter trim (rather than the current lighter body, darker trim).
- On account of its era, a proposed historically appropriate colour scheme could be “dark earth tone body colours with cream or buff trim and dark sash,” typical of Arts & Crafts structures (VHF 2001, p. 4).
- The restored colour scheme should incorporate a combination of historical colours from the Benjamin Moore Historical True Colours Palette (VHF 2012), following a two-colour exterior scheme (as is often the case with industrial structures): a dark, earth tone body colour (VC-27 to VC-30) and a cream or buff trim (VC-1 to VC-8). In particular, VC-27 (Strathcona Red) could be an appropriate earth tone for the body.
- For areas that will be **restored** and repainted (rather than replaced in-kind), follow Master’s Painters’ Institute, Repainting Manual procedures, including removing loose paint down to next sound layer, clean surface with mild TSP solution with gentlest means possible and rinse with clean water; do not use power-washing.
- The exterior lighting at the back of the property should be replaced with a more period appropriate light fixture.
- The antennae currently protruding off the back gable-bracket should be removed.

8.7 Landscaping

- Once the structure is raised and the new addition built, it is highly recommended that a gravel bed surrounding the structure be considered and that any landscaping being put in should have a minimum 2-ft clearance between the vegetation and the building face. This is preferable to ensure there is sufficient space from the plantings to remove any threat to the foundation or the building’s finishes over time.

9.0 Proposed Alterations and Future Changes

9.1 Proposed Alterations

As discussed in section 5.0 above with the Conservation Objectives, the major proposed alterations to this structure are:

- 1) Raising the building above the flood control level.
 - a. This will somewhat alter the scale and massing of the building, however, this is an acceptable change to protect the building in the longer term.
- 2) Provide improved accessibility to the structure at its higher elevation.
 - a. This includes the access up the raised hill, replacing the back door and removing the back steps to the building, to allow all-access.
- 3) Preserve, restore and rehabilitate the existing building.
 - a. Although, material elements will be replaced (in-kind), conservation of the building is being achieved and its physical life appropriately extended.

- 4) Upgrade the structure and building systems, specifically:
 - a. Seismic upgrading (installing ½ inch plywood on the exterior sheathing to form a seismic box);
 - b. Mechanical upgrading (the HVAC system and new plumbing fixtures and pipes);
 - c. Sprinkler system checking and additions (checking current and adding them in the attic and crawl space); and
 - d. Electrical upgrading (service lighting, providing more outlets and improved IT infrastructure).
- 5) Build an addition next to the heritage building to provide public washroom facilities.
 - a. After careful consideration of its location and design, the simple and modest structure proposed successfully achieves Standards 11 and 12 of the *Standards and Guidelines for the Conservation of Historic Places in Canada* (Canada's Historic Places 2010, p. 23).
 - b. As outlined in the notes on Standard 11, physical compatibility "includes using materials, assemblies and construction methods that are well suited to the existing materials. New materials and assemblies should also have compatible service lives or durability, so that maintenance and repair work can be undertaken concurrently" (Canada's Historic Places 2010, p. 34). It is with this maintenance schedule in mind that it seems appropriate to use tongue and groove horizontal wood siding, painted following the Ferry Building's restored paint scheme, for the new addition; thus ensuring its compatibility, while remaining distinguishable, particularly through its contrasted roofline.

The proposed changes are considered a reasonable intervention given generally accepted conservation standards, rehabilitation needs and site conditions. These proposed changes do not affect the Heritage Values and Character Defining Elements of the building.

9.2 Future Changes

Changes to the building's configuration, particularly any further additions, should be carefully considered for minimal effect on the Heritage Values as embodied in the Character Defining Elements (CDEs) listed in the building's Statement of Significance (section 3.0 above).

10.0 Maintenance Plan

Following completion of the outlined conservation work, the owner must maintain the building and land in good repair and in accordance with generally accepted maintenance standards. All work should follow the *Standards and Guidelines for the Conservation of Historic Places in Canada*. As general upkeep is frequently overlooked and will lead to the deterioration of heritage resources, maintenance standards warrant special attention to help to extend the physical life of a heritage asset. Any building should be kept in a reasonable condition so that it continues to function properly without incurring major expenses to repair deterioration due to neglect. The most frequent source of deterioration problems is from poorly maintained roofs, rainwater works and destructive pests.

It is important to establish a maintenance plan using the information below:

10.1 Maintenance Checklist

a. Site

- Ensure site runoff drainage is directed away from the building.
- Maintain a minimum 2-ft clearance between vegetation and building face and a 12-inch-wide gravel strip against the foundation in planted areas.
- Do not permit vegetation (such as vines) to attach to the building.

b. Foundation

- Review exterior and interior foundations, where visible, for signs of undue settlement, deformation or cracking.
- If encountered, seek advice from a professional Engineer, immediately.
- Ensure perimeter drainage piping is functional.
- Arrange a professional drainage inspection every three to five years.

c. Wood Elements

- Maintaining integrity of the exterior wood elements is critical in preventing water ingress into the building. Annual inspection of all wood elements should be conducted.
- Closely inspect highly exposed wood elements for deterioration. Anticipate replacement in kind of these elements every 10 to 15 years.
- Any signs of deterioration should be identified and corrective repair/replacement action carried out. Signs to look for include:
 - Wood in contact with ground or plantings;
 - Excessive cupping, loose knots, cracks or splits;
 - Open wood-to-wood joints or loose/missing fasteners;
 - Attack from biological growth (such as moss or moulds) or infestations (such as carpenter ants);
 - Animal damage or accumulations (such as chewed holes, nesting, or bird/rodent droppings). These should be approached using Hazardous Materials procedures; and
 - Signs of water ingress (such as rot, staining or mould).
- Paint finishes should be inspected every three to five years and expect a full repainting every seven to ten years. Signs to look for include:
 - Bubbling, cracks, crazing, wrinkles, flaking, peeling or powdering; and
 - Excessive fading of colours, especially dark tones.
- Note all repainting should be as per the recommended historic colours in section 8.6 above.

d. Windows and Doors

- Replace cracked or broken glass as it occurs.
- Check satisfactory operation of windows and doors. Poor operation can be a sign of building settlement distorting the frame or sashes or doors may be warped.
- Check condition and operation of hardware for rust or breakage. Lubricate annually.
- Inspect weather stripping for excessive wear and integrity.

e. Roofing and Rainwater Works

- Inspect roof condition every five years, in particular looking for:
 - Loose, split or missing shingles, especially at edges, ridges and hips;
 - Excessive moss growth and/or accumulation of debris from adjacent trees; and
 - Flashings functioning properly to shed water down slope, especially at the chimneys.
- Remove roof debris and moss with gentle sweeping and low-pressure hose.
- Plan for roof replacement at around 18 to 22 years from installation of the new roofing.
- Annually inspect and clean gutters and flush out downspouts. Ensure gutters positively slope to downspouts to ensure there are no leaks or water splashing onto the building.
- Ensure gutter hangers and rainwater system elements are intact and secure.
- Ensure downspouts are inserted into collection piping stub-outs at grade and/or directed away from the building onto concrete splash pads.

f. General Cleaning

- The building exterior should be regularly cleaned depending on build up of atmospheric soot, biological growth and/or dirt up-splash from the ground.
- Cleaning prevents build up of deleterious materials, which can lead to premature and avoidable maintenance problems.
- Windows, doors and rainwater works should be cleaned annually.
- When cleaning, always use the gentlest means possible, such as soft bristle brush and low-pressure hose. Use mild cleaner if necessary, such as diluted TSP or Simple Green ©.
- Do not use high-pressure washing as it will lead to excessive damage to finishes, seals, caulking and wood elements and it will drive water in wall assemblies and lead to larger problems.

11.0 References



- Canada's Historic Places. *Standards and Guidelines for the Conservation of Historic Places in Canada (Second Edition)*. 2010. <https://www.historicplaces.ca/media/18072/81468-parks-s-g-eng-web2.pdf>.
- District of West Vancouver. "WEST map 2019." Online resource: https://mapping.westvancouver.ca/html5Viewer/?viewer=WestMap_2019.Default_Viewer.
- Kinetic OHS Services. *Pre-Renovation Hazardous Materials Survey: Ferry Building Gallery – 1414 Argyle Avenue, West Vancouver, BC*. West Vancouver, BC: Kinetic OHS Services, July 20, 2020.
- Lemon, Robert. *Conservation Plan: Ferry Building Gallery – 1414 Argyle Avenue, West Vancouver, BC*. Vancouver, BC: Robert Lemon Architect Inc., July 3, 2014.
- LMDG. *Fire Protection and Life Safety Building Code Upgrade Assessment Summary: Ferry Building Gallery*. Vancouver, BC: LMDG, Building Code Consultants Ltd, November 27, 2020.
- Mansbridge, Francis. *Dreamers & Designers: The Shaping of West Vancouver*. Madeira Park, BC: Harbour Publishing Co. Ltd, 2018.
- McPhedran, Kerry. "West Vancouver." In *The Greater Vancouver Book*, edited by Chuck David. Surrey, BC: Linkman Press, 1997, pp. 120-121.
- Morrison Hershfield. *Report: Building Envelope Condition Assessment – Ferry Building Gallery*. Morrison Hershfield, May 22, 2014.
- Vancouver Heritage Foundation (VHF). "True Colours Palette." 2012. Online resource: <http://www.vancouverheritagefoundation.org/wp-content/uploads/2012/09/TrueColoursPalette.pdf>.
- _____. "Your Old House: True Colours: Authentic Heritage Colour & Placement." Online resource: <https://www.vancouverheritagefoundation.org/wp-content/uploads/2014/03/True-Colours-Pamphlet.pdf>.




12.0 Appendix A: 2014 Conservation Plan Excerpts

The following excerpts are taken from the 2014 Conservation Plan (pp. 4 to 8 and pp. 10 to 11), written by Robert Lemon. They are provided here for reference.

3.0 CONSERVATION PLAN


3.1 Building Description & Condition Assessment: Exterior

Element	Description	Condition	Image
Exterior Form	Edwardian vernacular house with simple rectangular plan. Two-storeys with basement and attic.	Fair condition. Changes to the exterior over time. Fair amount of original components are retained.	
Roof	Cedar shingles, relatively new	Good	
Drains	Aluminum downpipes and metal gutters.	Replacements in poor condition. Some discontinuous	
Siding	Original cedar beveled siding with many rusting fastenings and coats of lead-containing paint	Repairs and painting needed; however due to high levels of lead paint it is advisable to remove and replace with new beveled siding to match profile and installation method of original	
Window Trim & Sills	Wooden plain trim boards.	Original in fair to poor condition.	
Door Trim	Elaborate trim at front door.	Good condition. Painted.	

General Windows	Wooden sash windows with operable awning transoms. One on upper east side is not original	Fair condition;	
Entry Door	Wooden paneled appears to be original	Good to fair condition. Painted.	
Rear Door	Original paneled wood door which historically lead to the ferry wharf.	Fair condition.	
Porch	Full front porch (now partly enclosed)	Fair to good conditions enclosure, repairs noted being done on site late June 2014	
Lighting	Unsuitable exterior lighting.	Fair but should be replaced	
Foundation	Painted wooden boards cover concrete foundation walls	Fair to poor condition	

3.2 Building Description & Condition Assessment: Interior

The interior of the building was renovated as part of its 1989 rehabilitation, and little of original historic material remains.

Element	Description	Condition	Image
General	Location of original Wooden staircase exists, but the interiors spaces and materials have been renovated and changed at the time of conversion to gallery	In good condition,	

3.3 Proposed Conservation Strategy

The conservation approach for the Ferry Terminal Gallery is that of a relocation and rehabilitation for cultural / gallery purposes.

3.4 Conservation Procedures / Outline Specifications

The outline specification for conservation procedures, consistent with the Standards and Guidelines for the Conservation of Historic Places in Canada includes:

- 4.3 Guidelines for Buildings
- 4.5 Guidelines for Materials

A set of As-Found drawings is recommended to be commissioned prior to detailed conservation work.

Element	Condition	Conservation Work
<u>Exterior</u>		
Roof	good	Retain for now, monitor for repairs
Fascia and soffits	fair	Retain soffit boards and repair. Retain fascia where in good condition. Replace board and decorative moulding in kind, where deteriorated. Repaint.
Gutters	poor	To be replaced with painted metal gutters to appropriate historic detailing and colour.
Downspouts	poor	To be replaced with new painted metal downspouts to appropriate historic detailing and colour.
Wood Siding	poor	Following hazmat procedures, remove existing siding and replace with replication beveled siding; should be air-dried to avoid shrinkage. Prime and paint
Windows	fair	Detailed inspection of each window to be carried out; Repair existing wood windows or replace with replicas matching profile, type and single glazing, subject to warranty provider's requirement. Repaint in original colour, as historic paint research.

Window Casings and Trims	fair to poor	Inspect. Remove loose paint, repair and repaint. Replace, where deteriorated, in kind with new wooden section and paint.
Door trims	fair	Remove loose paint, repair and repaint. Replace, where deteriorated, in kind with new wooden section and paint.
Front door	good	Repair door and finish to historic paint research. Install new leaded glazing. Weatherization.
Doors	fair	Repair wood paneled; Prime and paint.
Lighting	poor	Install new period appropriate light fixture.
Foundation/plinth	fair	Install new concrete foundation in new location. cover with wooden siding to match existing clapboarding.

3.5 Colour Scheme

Originally the building was painted in a dark colour body with light coloured trim, the reverse of what is found today. Preliminary testing indicates that the original colour of the siding was a dark rusty red colour.

Historic paint research is to be undertaken to determine the original paint colours of the exterior of the building. Areas to be investigated are:

- Front Gables shingles
- Soffits
- Eaves board
- Original Exterior Window trim
- Original Exterior Sash Window & Mullion
- Exterior Doors and trim
- Beveled Siding

Should no evidence exist, appropriate colours and placement will be specified for typical buildings of this vintage in Vancouver, using the Vancouver Heritage Foundation's True Colours palette.

5.0 INTERPRETATION PLAN

Establish an Interpretation Plan with various devices (plaques, photos, artifacts) which tell the story of the building and its evolution.

6.0 MAINTENANCE PLAN

For the long-term protection of the heritage building a Maintenance Plan is recommended to be adopted by the building owner or party responsible for the heritage features of the rehabilitated building. The Maintenance Plan should include provisions for:

- Copy of the Maintenance Plan and this Conservation Report to be incorporated into the terms of reference for the management and maintenance contract for the building
- Cyclical maintenance procedures are adopted as outlined below
- Record drawings and photos of the building to be kept by the management / maintenance contractor
- Records of all maintenance procedures to be kept by owner
- Maintenance is not subject to a Heritage Alteration Permit, unless change in paint colour or material is contemplated
- All other changes to the building are subject to a Heritage Alteration Permit

Annual Maintenance

- Gutter and rainwater leader cleaning and flushing out; repair where necessary for good operation
- Vegetation and landscaping at building face is controlled
- Roof is maintained
- Perimeter drainage is in good working order

Five-Year Maintenance Cycle

- Inspect wooden siding surfaces for repainting as required
- Inspect wood windows and doors for repainting as required

Ten-Year Maintenance Cycle

- Inspect roof, gutters and rain water leaders for condition; repair or replace as required
- Inspect window sash, frames and sills for condition and repair as needed

Twenty-Year Cycle

- Inspect roof for condition and life span

7.0 SIGNAGE CONCEPT

To be developed as part of Interpretive Plan

8.0 STRUCTURAL ENGINEERING REPORT

A structural report will be submitted under separate cover.

9.0 CODE COMPLIANCE PROGRAM

A code report will be submitted under separate cover.

10. RECOMMENDATIONS

The following actions are recommended for the next steps of the project.

- Commission a set of as-found drawings / documentation
- Design Development of the detailing of the addition and link
- Design Development of the rehabilitation work on the heritage building
- Develop an Interpretation and Signage



2020-12-11

Confidential

John Wong, CFM, CPA, CMA
Manager of Facilities and Assets
District of West Vancouver
750 17th Street
Vancouver, BC, V7V 3T3

Subject: Flood Control for West Vancouver Water Front Buildings - Ferry Building Flood Control Level
Client ref.: PO 46387

Dear Mr Wong

We refer to the email from Michael Sayachack of DA Architects + Planners dated 26th November 2020 and the Ferry Building plans attached to that email. For reference the drawings are appended to this letter as Attachment A. The drawings show modifications planned for the Ferry Building to accommodate the year 2100 Flood Construction Level (FCL) of +4.86 m CGVD2013.

The District has asked WSP to review the drawings and to provide advice on the flood control mitigation measures for the project.

WSP has previously provided advice on the FCL for this site as part of a study that addressed the FCL and setbacks for three sites in Ambleside Park (including the Ferry Building), for a 50-year horizon to the year 2068 and to the year 2100. This work is described in our letters dated 21 January 2019 and 2 July 2020, included as Attachments B and C respectively to this letter. In this work the effects of water level (tide and storm surge), sea level rise, land subsidence, wave effects and freeboard were all considered. An FCL of +4.86 m CGVD2013 appropriate for the year 2100 was determined to apply to the Ferry Building site (Attachment C).

The modifications proposed for the Ferry Building as detailed on the drawings in Attachment A involve siting the building on a mound with a floor level of +5.16 m. The datum used is not noted on the drawings and we assume the same datum (CGVD2013) applies, however this should be confirmed.

We have reviewed the drawings and in respect to the building itself, areas that should be considered are:

1. The building crawl space should be designed to be sealed to prevent ingress of water. Alternatively, if not sealed then all permanent materials should be constructed of durable

Suite 1000
840 Howe Street
Vancouver, BC, Canada V6Z 2M1

T: +1 604 685-9381
F: +1 604 683-8655
wsp.com

materials considering the possibility of the area being inundated with sea water at some time.

2. All mechanical and electrical equipment should be located on raised plinths.
3. Electrical sockets should be located above the FCL.

The mound and building are sited behind the active beach zone, however as noted in the work described in Attachments B and C the area around the building is inundated when all items considered in the FCL analysis are taken into account.

Works to protect the buildings and foundations from future damage from beach erosion caused by waves combined with sea level rise, could include properly founded rock armour revetment protection, facing south and which is buried beneath the landscaped ground surface. The terracing and steps are considered to be minor landscaping elements. If there were to be some erosion of the bank then these elements would be subject to damage, unless founded well below the ground surface.

There are three ways to approach the protection of the building, which is appropriately situated above the FCL:

1. Construct the protective measures now as part of the initial construction.
2. Construct the protective measures in later years as adaptive management measures, to be installed when the magnitude and impact of sea level rise is clearer, with a review every 10 years.
3. Consider the protective measures as part of the broader scheme to address the more widespread Ambleside Park coastal flooding risk

As the District is looking to address the general flood risk in the area as part of the Ambleside Park Plan, Item 3 above represents an acceptable approach.

Please contact the undersigned if you have any questions.

Yours sincerely,

Michael Coull
Director Marine, Ports &
Coastal Engineering



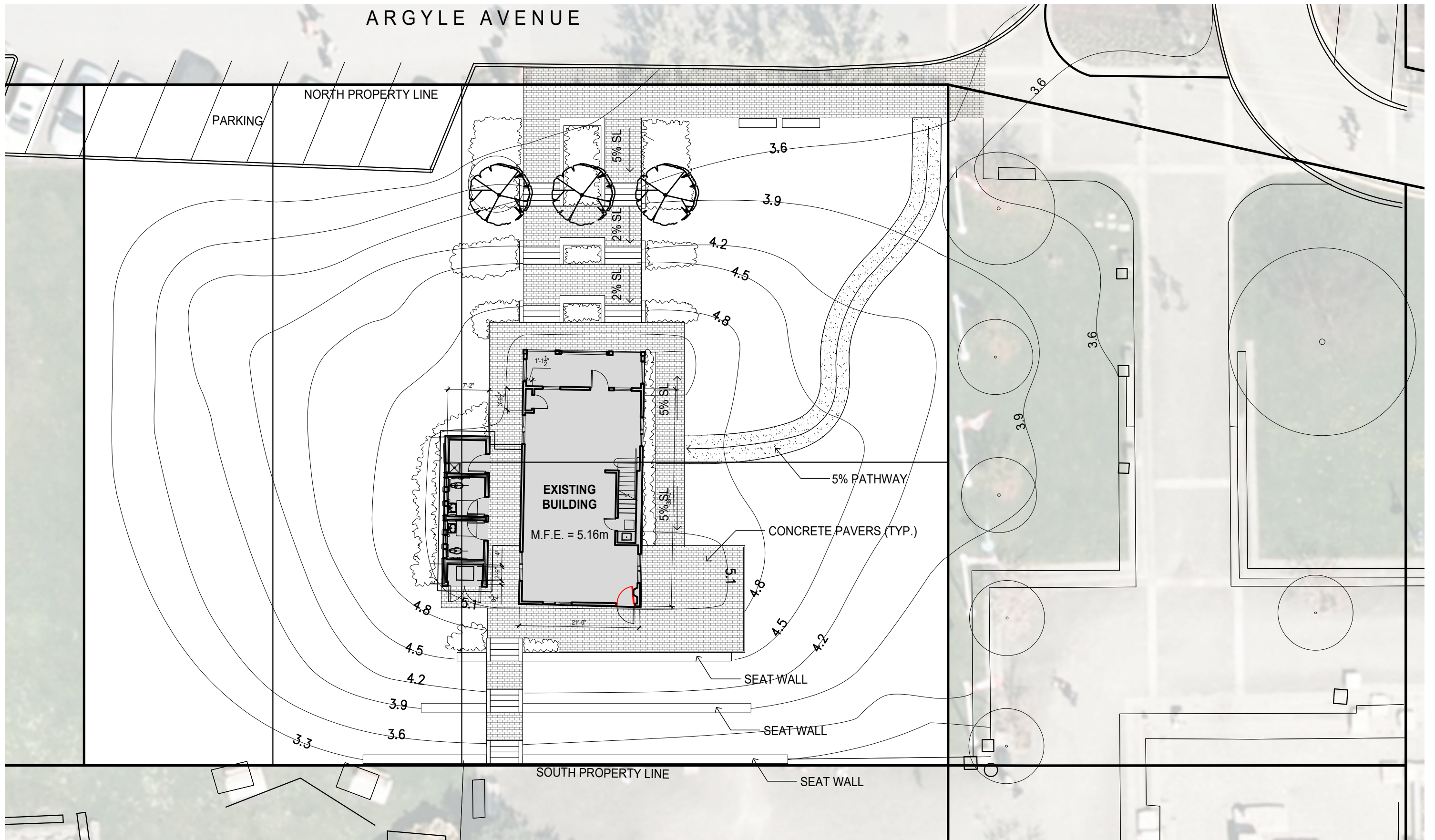
Jordan Matthieu
Project Manager Coastal
Engineering and Marine Works

MC/JM

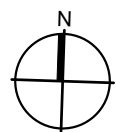
Encl. Attachments A, B, C
WSP ref.: 181-17165-00

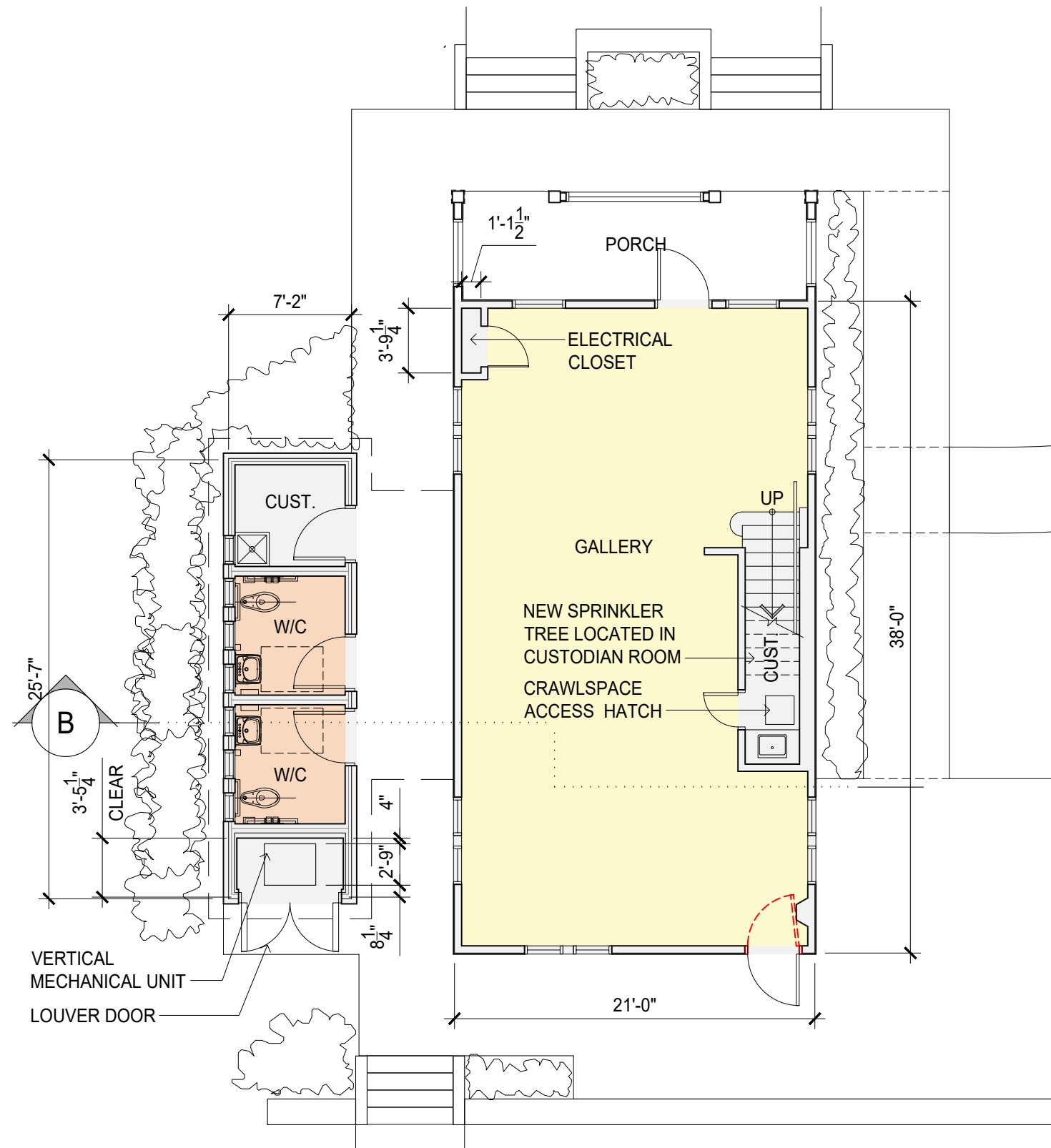
Attachment A

Ferry Building plans prepared by DA Architects + Planners

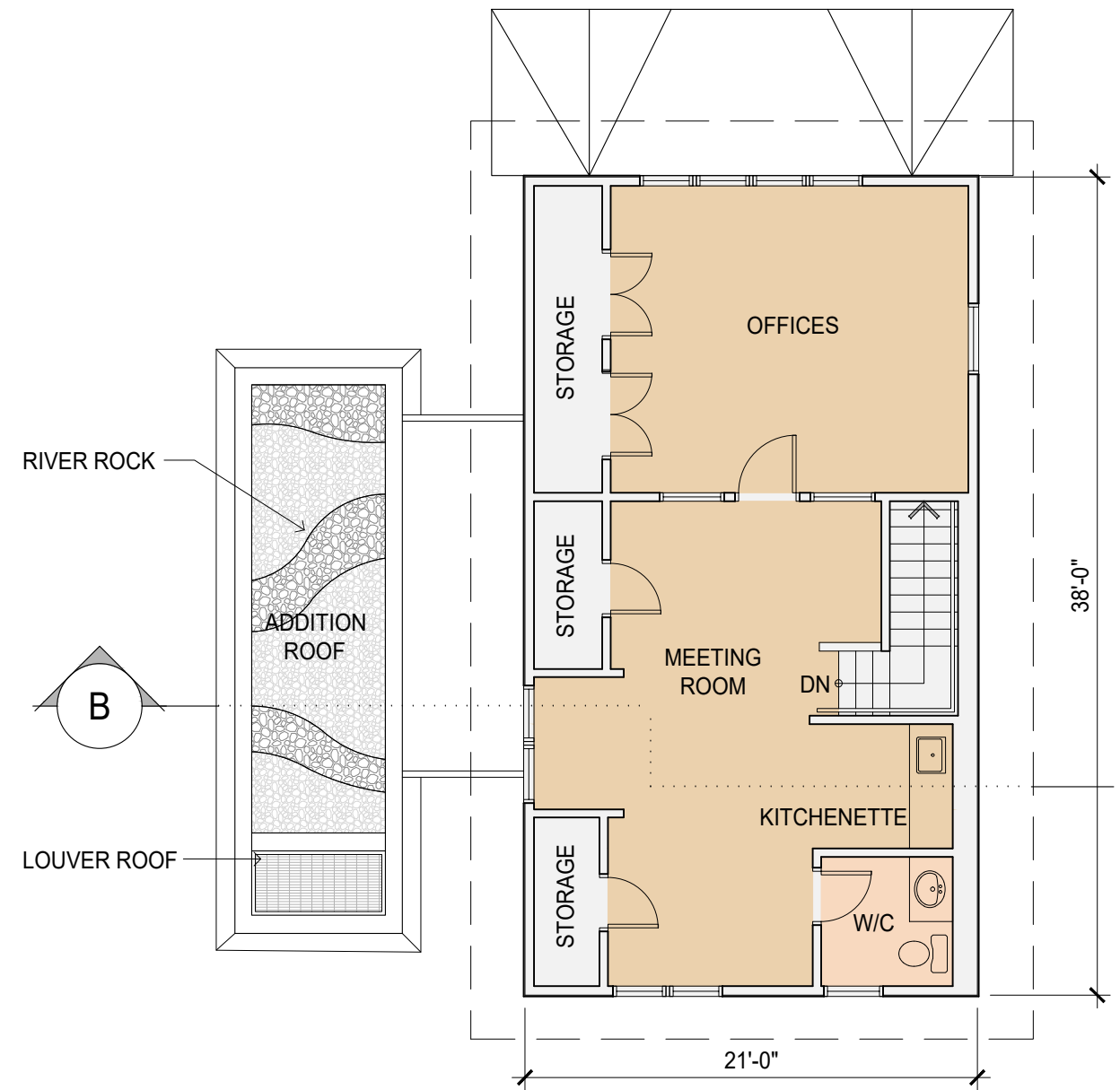


SITE PLAN
FERRY BUILDING REHABILITATION PROJECT
 1/16" = 1'-0" 2020.11.26

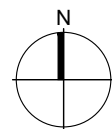


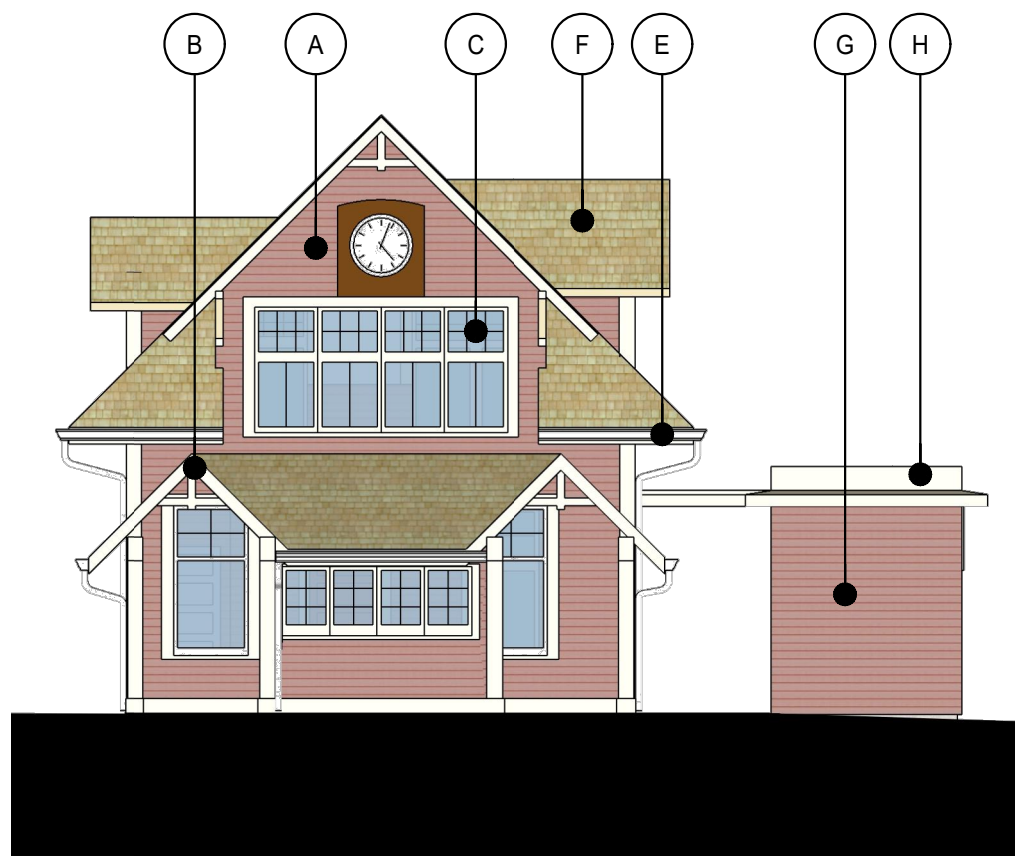


PROPOSED LEVEL 01

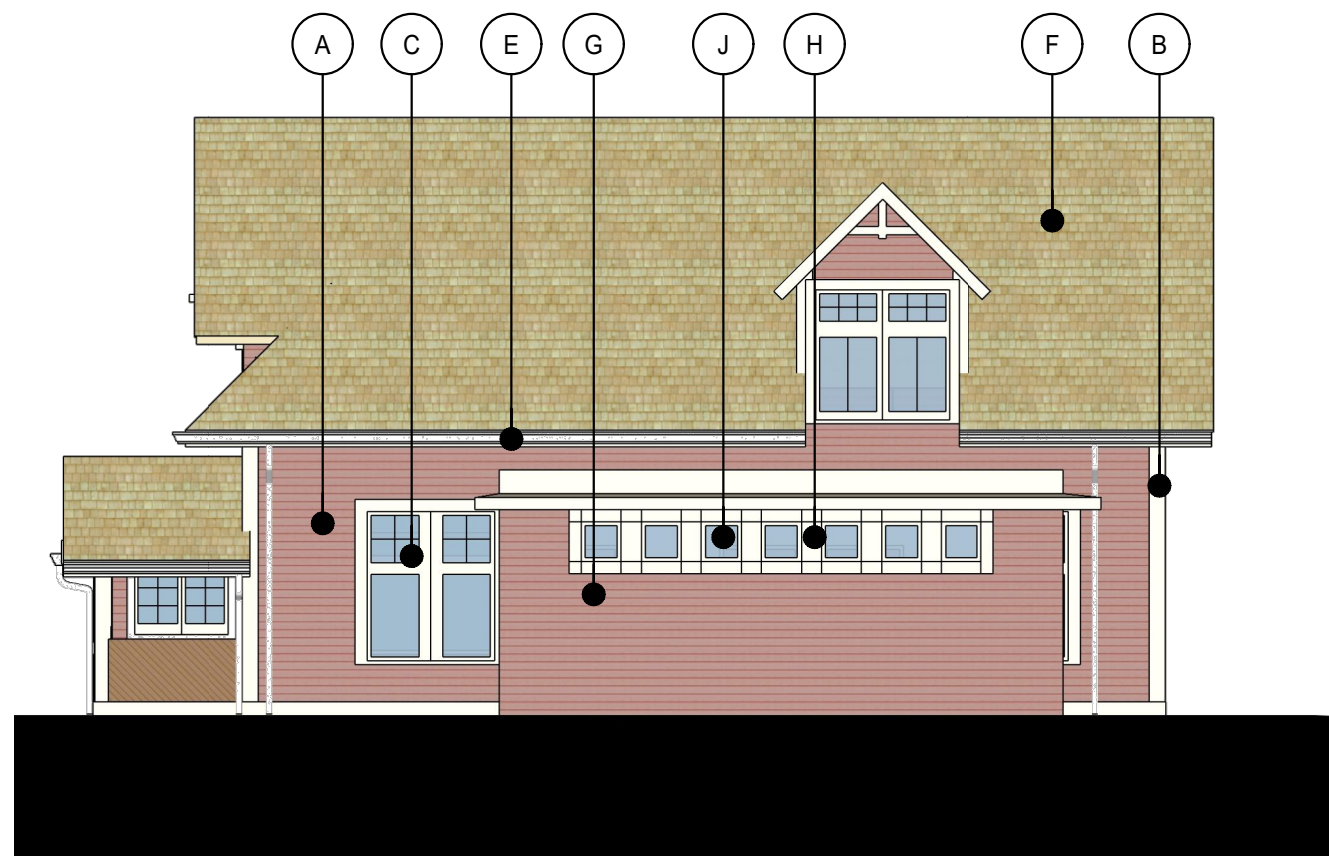


PROPOSED LEVEL 02

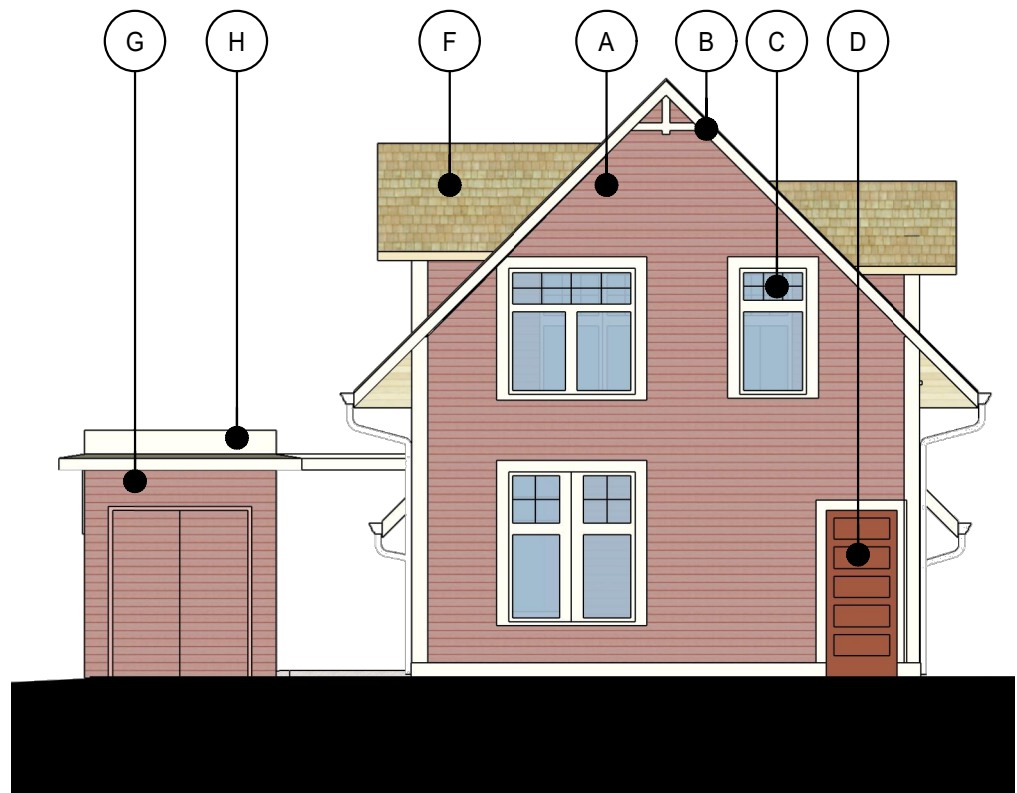




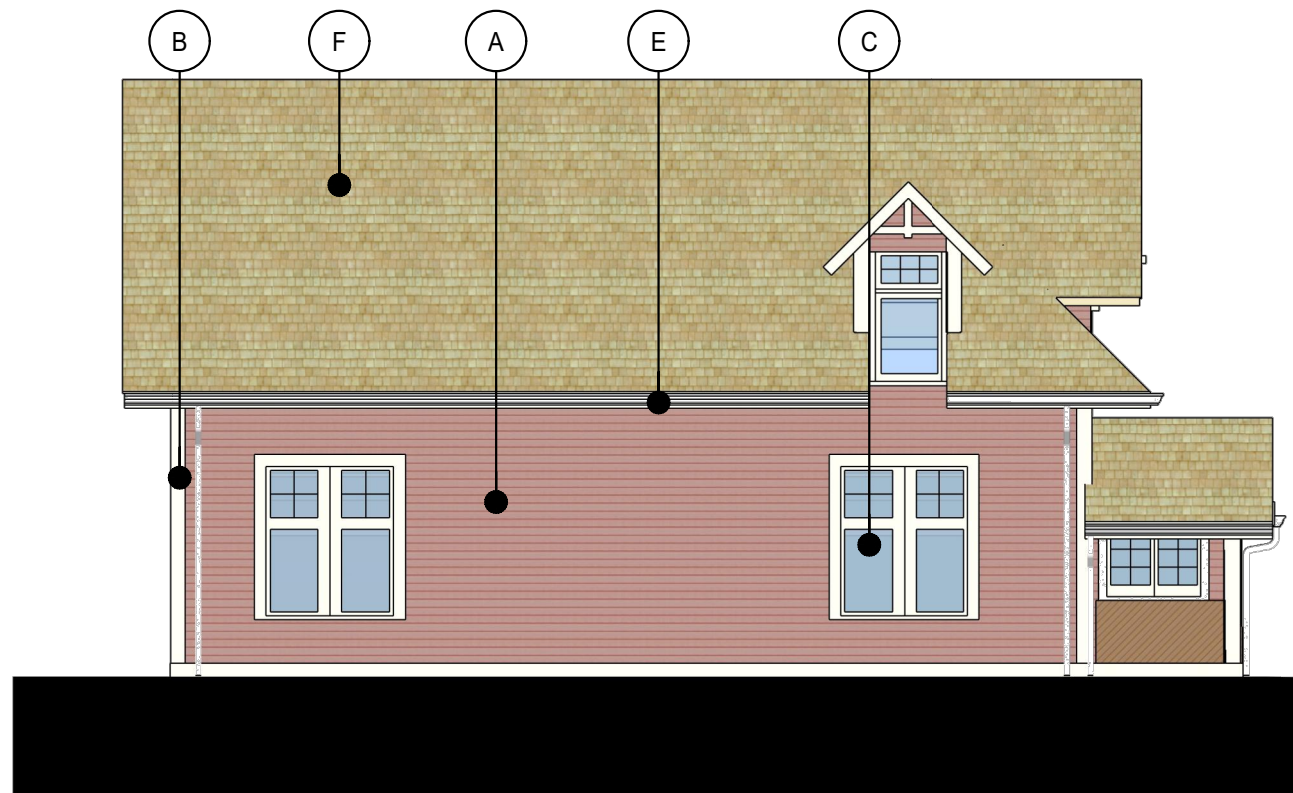
NORTH ELEVATION



WEST ELEVATION



SOUTH ELEVATION



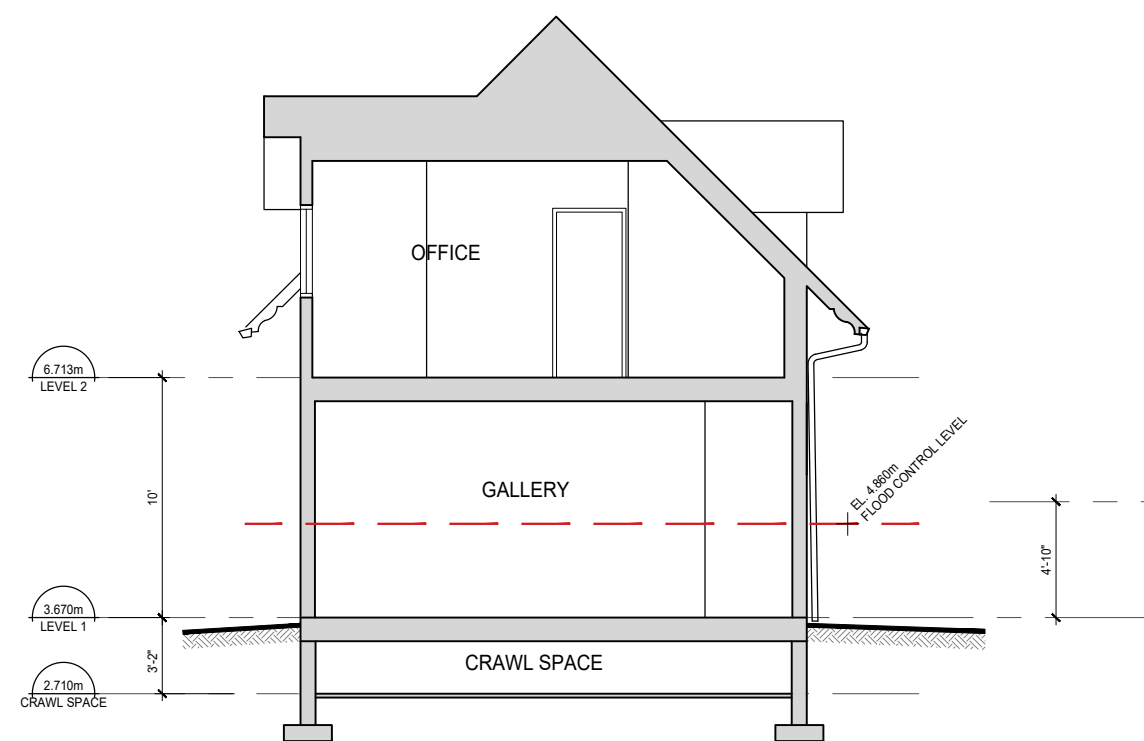
EAST ELEVATION

**EXISTING BUILDING
MATERIAL LEGEND**

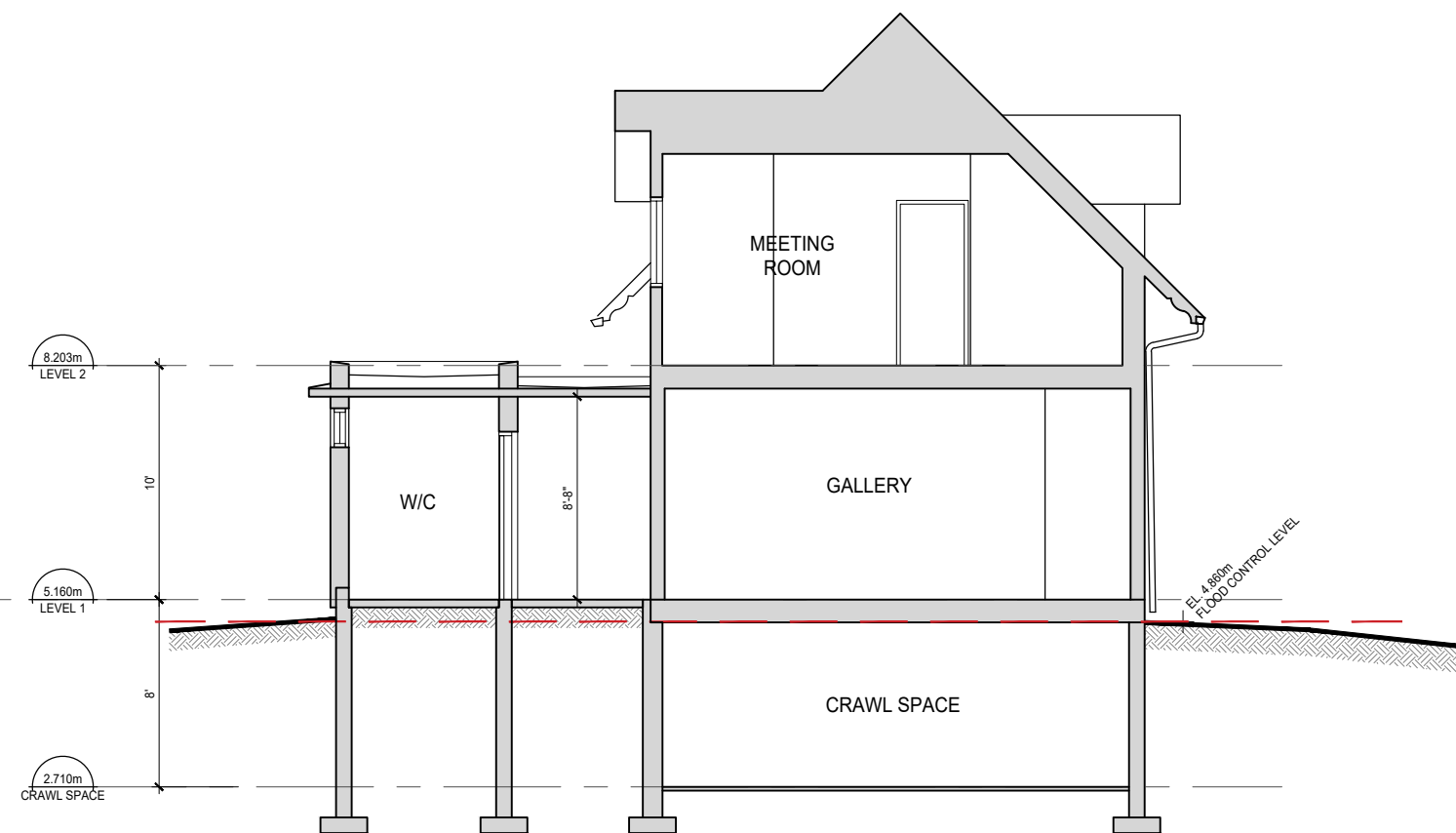
- (A) 3-1/2" WOOD BEVELLED SIDING (3" EXPOSURE) - PAINTED: RUSTY RED
- (B) WOOD TRIM PAINTED: LIGHT BEIGE
- (C) WOOD WINDOWS PAINTED: LIGHT BEIGE
- (D) WOOD DOORS PAINTED: RED
- (E) PRE-FINISHED ALUMINUM GUTTERS COLOUR: BEIGE
- (F) CEDAR SHAKES

**ADDITION
MATERIAL LEGEND**

- (G) 2-1/2" ALUMINUM TONGUE AND GROOVE SIDING - COLOUR: BRICK RED
- (H) ALUMINUM COMPOSITE PANEL TRIM COLOUR: LIGHT BIEGE (OYSTER)
- (J) DOUBLE GLAZED ALUMINUM WINDOWS COLOUR: LIGHT BEIGE



EXISTING BUILDING SECTION



PROPOSED BUILDING SECTION



EXISTING



PROPOSED



PROPOSED



PROPOSED

Attachment B
WSP Letter dated 21 January 2019



2019-01-21

Confidential

Mr John Wong, CFM, CPA, CMA
Manager of Facilities
District of West Vancouver
750 17th Street
Vancouver, BC, V7V 3T3

Subject: Flood Control for West Vancouver Water Front Buildings
Client ref.: PO 46387

Dear Mr Wong:

WSP Canada Inc. (WSP) was retained by the District of West Vancouver to estimate Flood Construction Levels (FCL) in the years 2068 and 2100 for redevelopment of structures at three locations in Ambleside, West Vancouver, BC. FCL is the minimum elevation for the underside of wooden floor system or top of concrete slab for habitable buildings. This letter report provides the approach, data used, results, conclusions and recommendations.

STUDY AREA

The study area is located on the northshore of Burrad Inlet, just west of Capilano River mouth, as shown in Figure 1. The FCLs are required at Ferry Building, Navy Jack House and Ambleside Concession sites (Figure 1). The study area is exposed to wind waves from southwest, west, and northwest directions and is not subjected to significant tsunami hazard.

Suite 1000 840 Howe Street
Vancouver, BC V6Z 2S9

T: +1 604 685 9381
F: +1 604 683 8655
wsp.com



Figure 1 Site Location

APPROACH

The FCL is comprised of several water level components caused by different physical processes:

- Astronomical tidal level
- Storm surge
- Wave effects
- Sea Level Rise (SLR)
- Land subsidence or uplift

Flood Hazard Area Land Use Management Guidelines (Ausenco Sandwell, 2011a, 2011b, 2011c) provides recommendations on estimation of FCL for coastal shoreline areas. Amendment Sections 3.5 and 3.6 “Flood Hazard Area Land Use Management Guidelines” provides updated guideline on estimating the FCL for coastal areas (British Columbia Ministry of Environment 2018). This amendment recommends two approaches, a Probabilistic Method and a Combined Method which are presented below. The combined method is considered as a more conservative approach and will result in a higher FCL.

PROBABILISTIC METHOD

The FCL shall be determined as the sum of:

- The 1:200 Annual Exceedance Probability (AEP) total water level as determined by probabilistic analyses of tides and storm surge;
- Allowance for future SLR to the years 2068 and 2100;
- Allowance for regional uplift, or subsidence to the years 2068 and 2100;
- Estimated wave effects associated with the Designated Storm with an AEP of 1:200; and
- A minimum freeboard of 0.6 m.

These components are illustrated in Figure 2.

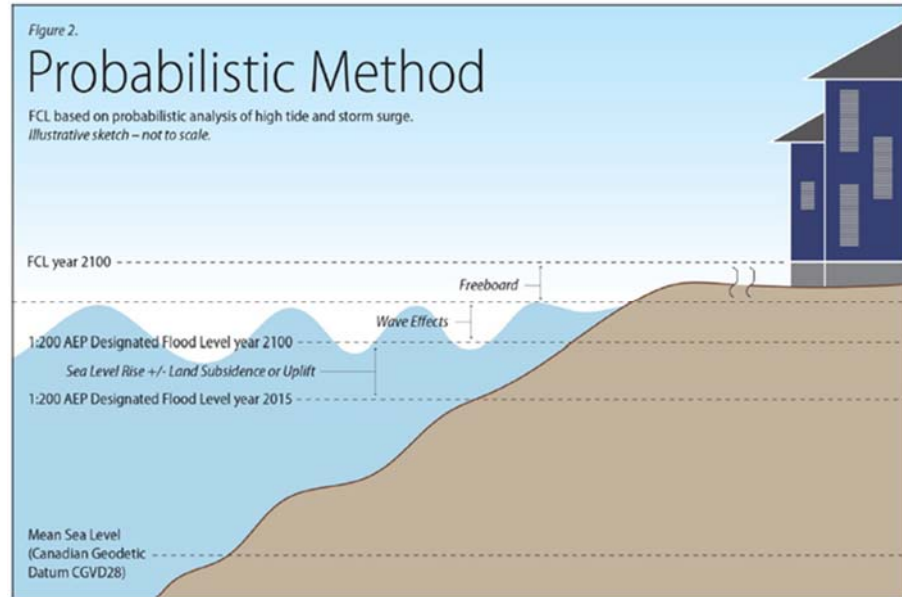


Figure 2 Probabilistic Method

COMBINED METHOD

The FCL shall be determined as the sum of:

- Allowance for future SLR to the years 2068 and 2100;
- Allowance for regional uplift, or subsidence to the years 2068 and 2100;
- High high water large tide (HHWLT);
- Estimated storm surge for the Designated Storm with an AEP of 1:200;
- Estimated wave effects associated with the Designated Storm; and
- A minimum freeboard of 0.3 m.

These components are illustrated in Figure 3.

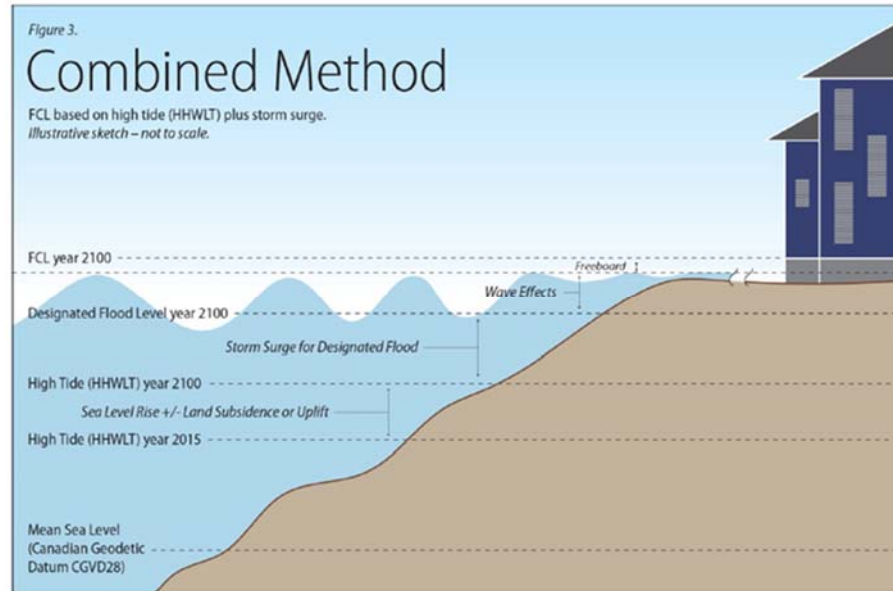


Figure 3 Combined Method

ASSESSMENT

The following data were used in estimating the FCL at the study areas:

- long-term water level data from Point Atkinson tide gauge (# 7795);
- tidal constituents for Point Atkinson;
- SLR estimates provided by the Province of British Columbia;
- crustal movements (uplift/subsidence);
- long-term wind data from Vancouver Airport climate station; and
- study area bathymetry and topography.

The following sections describe tidal conditions, extreme water levels, sea level rise and crust movements and wave effects.

TIDAL CONDITIONS

Tide levels due to astronomical tides are available from the Canadian Hydrographic Services (CHS). Table 1 provides the tidal ranges for Point Atkinson. The tidal levels are published in Chart Datum (CD), defined as the plane of lowest normal tide, and must be converted to Canadian Geodetic Datum (CGD). CD is approximately 3.066 m CGD at Point Atkinson based on the most recent information obtained from the CHS (Canadian Hydrographic Service, 2018). Several different conversions have been adopted in past studies using Point Atkinson as a data source:

- 3.04 m: Triton (2006)
- 3.10 m: NHC (2014)
- 3.06 m: Kerr Wood Leidal (2015)

Discrepancies between the current CHS conversion from CD to CGD and those applied in previous studies should be accounted for in any comparison of results.

TABLE 1 SUMMARY OF TIDAL CONDITIONS AT POINT ATKINSON

Tides	Water Level (m, CGD)
Higher High Water, Large Tide (HHWLT)	1.9
Higher High Water, Mean Tide (HHWMT)	1.3
Mean Water Level (MWL)	0
Lower Low Water Mean Tide (LLWMT)	-2.0
Lower Low Water, Large Tide (LLWLT)	-3.2

EXTREME WATER LEVELS

Water level data from Point Atkinson tide gauge station (# 7795) were downloaded from DFO website. The water levels were referenced to CD and converted to CGD (CGVD28) using an offset of 3.066m based on the most recent information obtained from the CHS (Canadian Hydrographic Service, 2018). Hourly data are available over 104-year period from 1914 to 2018. Overall the record is 74% complete, with 34% completeness before 1950, 95% completeness from 1950 to 2018 and 98% completeness between 1961 and 2018. The Point Atkinson water level record is generally considered to be continuous from 1961 onwards. A frequency analysis was conducted to estimate flood levels for various return period using all 82 years of complete annual water level data. The frequency analysis was performed using the Weibull distribution. The extreme water levels from the frequency analysis are presented in Table 2 and shown in Figure 4.

The highest recorded water level as Point Atkinson was 2.54 m CGD on December 16, 1982. The storm surge associated with this historical high-water level was approximately 0.92 m, which is an approximately 1 in 13-year storm surge and below the 1.04 m highest recorded storm surge. Therefore, this extreme water level was the result of a combination of a relatively high tide concurrent with strong winds, low atmospheric pressure and a particularly strong El Niño driving a regional rise in sea-levels (Tinis 2014). For the Georgia Strait extreme water levels tend to be associated with large (> 95th percentile) tides and moderate (e.g. 1 in 10 year) storm surges. Large storm surges (e.g. 1 in 100 year) tend to be associated more with moderate tides (50th to 75th percentile). In general, the concurrence of very high tides with storm surge is relatively rare in coastal British Columbia (Abeysirigunawardena et al. 2011).



TABLE 2 EXTREME WATER LEVELS

Annual Exceedance Probability (AEP)	Average Return Period	Water Level	
		m, CD	m, CGD
%	Years		
50	2	5.33	2.26
20	5	5.41	2.34
10	10	5.46	2.39
4	25	5.52	2.45
2	50	5.56	2.49
1	100	5.60	2.53
0.5	200	5.63	2.56

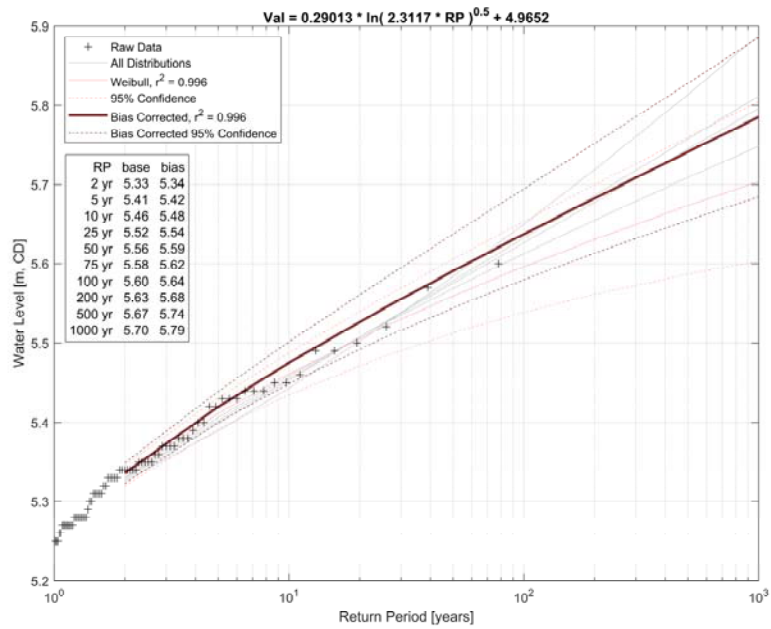


Figure 4 Predicted Extreme Water Level Frequency

EXTREME STORM SURGES

Long-term storm surge levels were estimated by subtracting predicted tidal levels from measured water levels at Point Atkinson to derive the non-tidal residual of the measured water levels. The tide levels at Point Atkinson were obtained from the CHS. A frequency analysis was conducted to estimate storm surge levels for various return period using 82 years of complete annual water level residual records. The extreme storm surge levels are presented in Table 3 for various return periods and shown in Figure 5.

TABLE 3 EXTREME STORM SURGE LEVELS

Annual Exceedance Probability (AEP)	Average Return Period	Storm Surge Level
%	Years	m
50	2	0.78
20	5	0.85
10	10	0.90
4	25	0.96
2	50	1.00
1	100	1.03
0.5	200	1.08

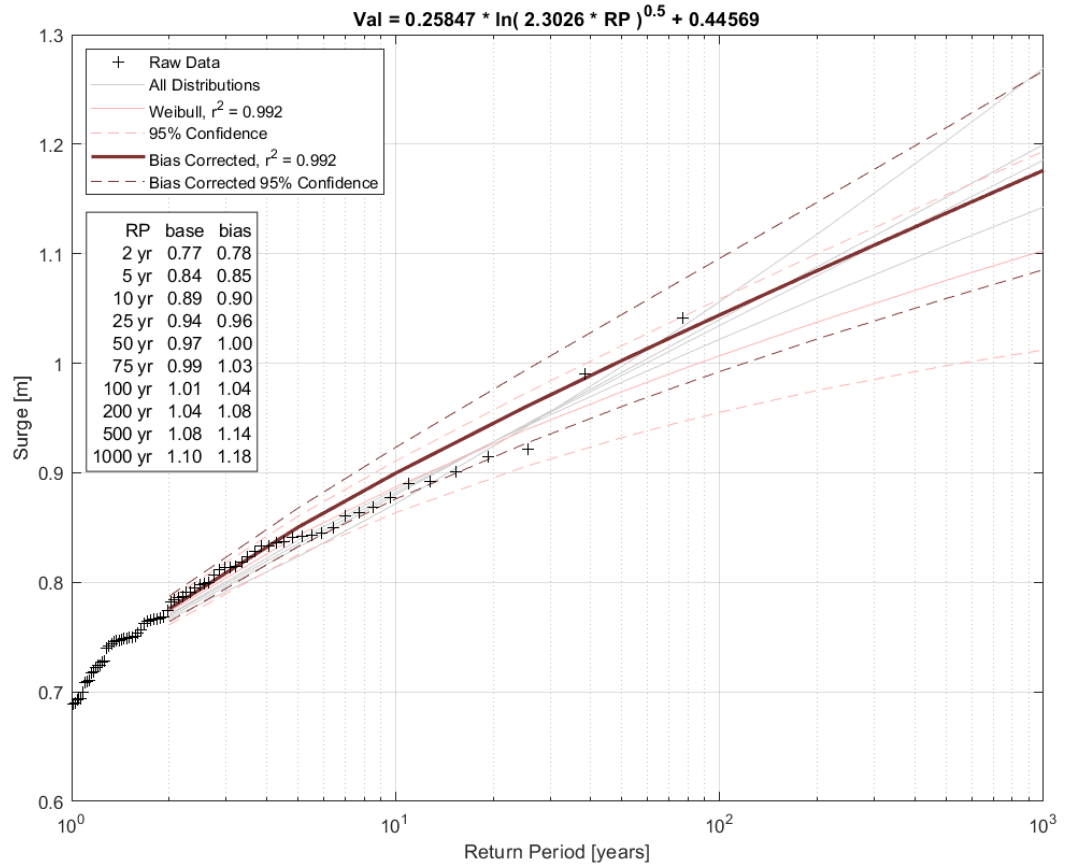


Figure 5 Extreme Storm Surge Level Frequency

SEA LEVEL RISE PROJECTIONS

BC Ministry of Environment (Ausenco Sandwell, 2011) has recommended that the SLR curve presented below in Figure 6 should be used for BC sea level rise policy and adaptation planning. The recommended curve is slightly higher than the high projection for the years from the present up to approximately 2070 and moves below the current median projection with the recognition that in a planning network, time remains to revise the recommended curve upwards, if the science or the required response warrants.

Accordingly, SLR at time frame of 2020, 2070 and 2100 are projected to be increased by 0.2 m, 0.7 m and 1.0 m respectively. BC SLR projections need to be adjusted to account for local/regional geological conditions. The specific SLR increases for common time frames are summarized in Table 4 along with their likely application and the underlying rationale.

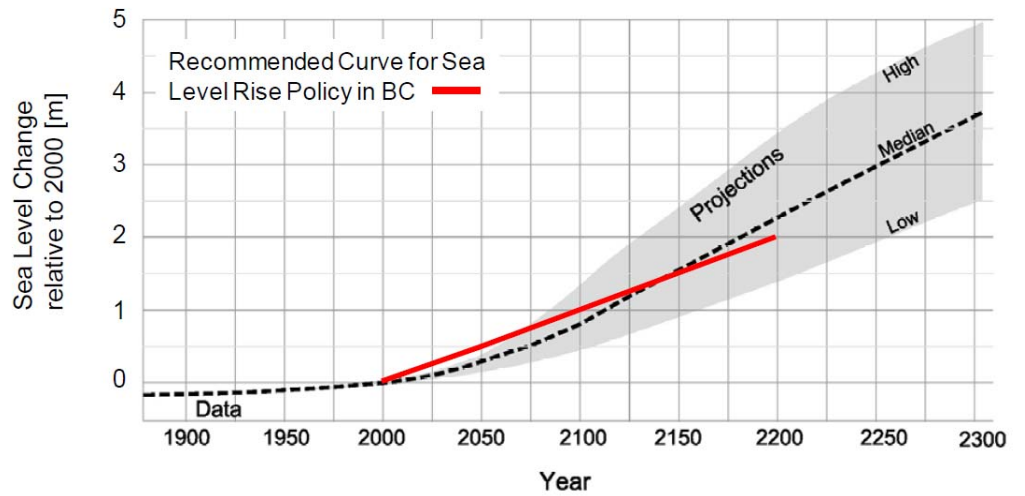


Figure 6 Recommended Global Sea Level Rise Curve for Planning and Design in BC (Ausenco Sandwell, 2011)

TABLE 4 SEA LEVEL RISE RECOMMENDATIONS (AUSENCO SANDWELL, 2011)

Development/Land Use Frame	Global SLR (m)	Regional SLR	Application
For short to medium term – life of 25 to 50 years	0.5		Evaluation of existing structures (e.g. sea dikes)
For longer term – life of up to year 2100	1.0	To be developed on a site-specific basis. Refer Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Land Use Draft Policy Paper for existing crustal movement along coastal BC shorelines (Ausenco Sandwell, 2011) for details. Uplift at Point Atkinson tidal gauge station = 1.3 mm/yr and uplift at Vancouver tidal gauge station = 1.2 mm/yr	Definition of requirements for permanent structures (e.g. sea dikes) that can be expected to be upgraded again in the future as science and knowledge increased.
For issues with long life (> 100 years), and as sensitivity example	2.0		Consideration of long-term land use and planning issues having long-term implications – especially where decisions may be made that allow or encourage concentration of high value or high population density uses.

WAVE EFFECTS

Recorded wave conditions for the study area were not available. Therefore, wave hindcasting was conducted to predict the wave conditions at the three sites using the WSP 1D wave hindcast model (Dupuis, et al. 1996). The WSP 1D wave hindcast model is based on a parametric approach described by Bretschneider (1964) with modified dimensional relations taken from the Shore Protection Manual (CERC, 1984). The model provides hourly significant wave heights and peak wave period by compass direction. Hourly wind and wind direction recorded at the Environment Canada (EC) climate station at Vancouver Airport for a period of 48 years from 1971 to 2018 were used for the wave hindcasting using the WSP 1D wave hindcast model.

Wind rose for the Vancouver Airport climate station is shown in Figure 7 based on 48 years of hourly wind data. Prevailing winds are from the east and west and the storms are generally from the west and west-northwest.

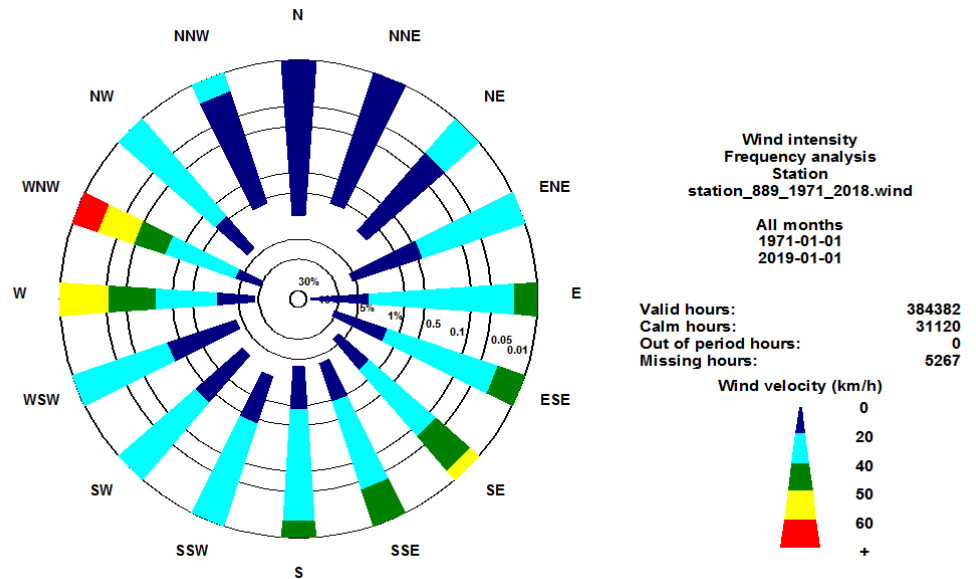


Figure 7 Wind Rose at Vancouver Airport Climate Station

Wave Conditions

Wave height rose is presented in Figure 8 based on 48 years wave height data from the wave hindcasting discussed above. A frequency analysis was conducted to estimate wave heights for various return period using 48 years of hindcasted wave heights. The predicted offshore extreme wave conditions for the study area is presented in Table 5 for various return periods and shown in Figure 9.

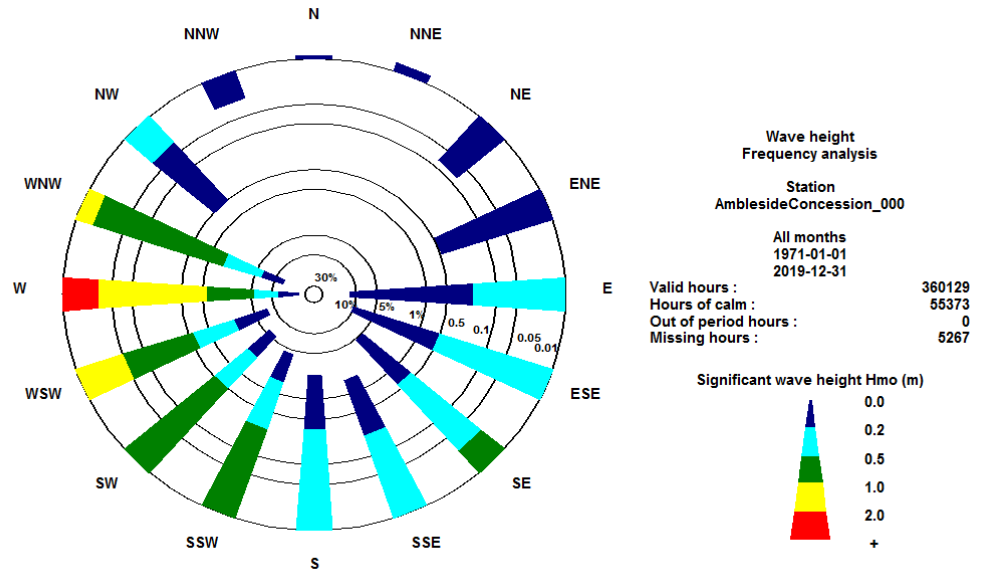


Figure 8 Offshore Wave Height Rose

TABLE 5 EXTREME OFFSHORE WAVE CONDITIONS

Annual Exceedance Probability (AEP)	Average Return Period	Significant Wave Height	Peak Wave Period
%	Years	m	sec
50	2	2.05	5.85
20	5	2.40	6.33
10	10	2.62	6.61
4	25	2.86	6.90
2	50	3.02	7.09
1	100	3.17	7.27
0.5	200	3.31	7.43

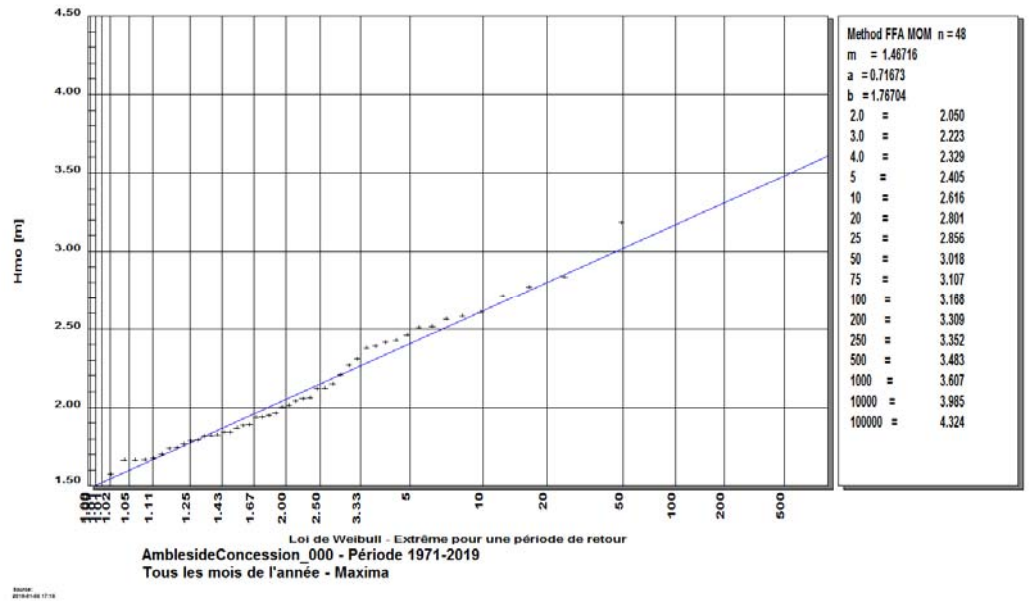


Figure 9 Wave Height Frequency

Wave Run-Up

Run-up is defined as the vertical distance that waves run-up the seaward slope of a structure or a shoreline. The vertical distance is measured from the mean sea level, which is the same as the designated flood level (Figure 2 or Figure 3). Wave run-up was estimated using the predictive equations developed by Mase (1989) for irregular run-up on a plane impermeable beaches based on laboratory data (beach slopes between 1/5 to 1/30 and $H_0/L_0 \geq 0.007$) and given by

$$\frac{R_{max}}{H_0} = 2.32 \xi_0^{0.77} \quad \text{Eqn 5}$$

$$\frac{R_{2\%}}{H_0} = 1.86 \xi_0^{0.71} \quad \text{Eqn 6}$$

$$\xi_0 = \tan\beta \left(\frac{H_0}{L_0}\right)^{-1/2} \quad \text{Eqn 7}$$

Where R_{max} = maximum run-up (m)

$R_{2\%}$ = run-up exceeded by 2 percent of the run up crests

H_0 = deepwater wave height (m)

L_0 = deepwater wave length (m)

β = beach slope

Field measurements of run-up (Holman 1986, Nielsen and Hanslow 1991) are consistently lower than by Eqns 5 and 6. Eqn 6 overpredicts the best fit to $R_{2\%}$ by a factor of two for Holman's data, but is roughly an upper envelope of the data scatter. Differences between laboratory and field results due to porosity, permeability, nonuniform slope, wave reformation across bar-trough bathymetry and wave directionality have not been quantified. The predicted wave run-up for the Ferry Building, Navy Jack House and Ambleside Concession sites are presented below in Table 6.

TABLE 6 WAVE RUN-UP

Return Period (Year)	Ferry Building (foreshore slope~1V:63H)		Navy Jack House (foreshore slope~1V:87H)		Ambleside Concession (foreshore slope~1V:96H)	
	R _{max} (m)	R _{2%} (m)	R _{max} (m)	R _{2%} (m)	R _{max} (m)	R _{2%} (m)
2	0.69	0.64	0.54	0.51	0.50	0.47
5	0.80	0.75	0.63	0.60	0.58	0.56
10	0.88	0.82	0.68	0.65	0.63	0.61
25	0.96	0.89	0.75	0.71	0.69	0.66
50	1.01	0.94	0.79	0.75	0.73	0.70
100	1.06	0.99	0.83	0.79	0.77	0.73
200	1.11	1.03	0.86	0.82	0.80	0.77

For coastal flooding hazard management, the wave run-up is taken as 50% of the calculated run-up elevation on the natural shoreline. For defining a sea dike crest elevation, the wave run-up is taken to be the vertical distance exceeded by no more than 2% of the waves during the designated storm at the toe of the sea dike (Ausenco Sandwell, 2011).

Freeboard Allowance

A freeboard is the vertical distance added to the flood construction reference plane (FCRP) to establish the FCL to account for uncertainty. The freeboard allowance may include uncertainties in the future changes to storm surge, wave run-up, and the effects of sea level rise. A freeboard allowance of 0.6 m is recommended for the Probabilistic Approach and 0.3 m for the Combined Approach in BC guidelines.

FLOOD CONSTRUCTION LEVELS 2100

The estimated FCLs are presented in Tables 7 and 8 for the Probabilistic Method and Combined Method, respectively. The FCLs range from 4.45 to 4.60 m CGD for the Probabilistic Method and 4.57 to 4.72 for the Combined Method. As discussed previously, the Combined Method approach is conservative and results in higher FCLs. The estimated FCLs among the three sites do not vary significantly as these sites are located to close to each other.

TABLE 7 FLOOD CONTROL LEVELS 2100– PROBABILISTIC METHOD

Parameter	Ferry Building	Navy Jack House	Ambleside Concession
Designated Flood Level – 2018 (m, CGD) ¹	2.56	2.56	2.56
Sea Level Rise (m)	1.00	1.00	1.00
Land Subsidence /Uplift (m) ²	-0.11	-0.11	-0.11
Designated Flood Level – 2100 (m, CGD)	3.45	3.45	3.45
Wave Effects (m) ³	0.55	0.43	0.40
Flood Construction Reference Plane (m, CGD)	4.00	3.88	3.85
Freeboard (m)	0.60	0.60	0.60
Flood Construction Level – 2100 (m, CGD)	4.60	4.48	4.45
Note: ¹ from Table 2. ² 1.3 mm/year uplift x 82 years (2018 to 2100) = 107 mm. ³ 50% of the calculated run up (Table 6)			

TABLE 8 FLOOD CONTROL LEVELS 2100– COMBINED METHOD

Parameter	Ferry Building	Navy Jack House	Ambleside Concession
High Tide – 2018 (HHWLT) (m, CGD) ¹	1.90	1.90	1.90
Sea Level Rise (m)	1.00	1.00	1.00
Land Subsidence /Uplift (m) ²	-0.11	-0.11	-0.11
High Tide – 2100 (HHWLT) (m, CGD)	2.79	2.79	2.79
Storm Surge (m) ³	1.08	1.08	1.08
Designated Flood Level -2100 (m, CGD) ⁴	3.87	3.87	3.879
Wave Effects (m) ⁵	0.55	0.43	0.40
Flood Construction Reference Plane (m, CGD)	4.42	4.30	4.27
Freeboard (m)	0.30	0.30	0.30
Flood Construction Level – 2100 (m, CGD)	4.72	4.60	4.57
Note: ¹ from Table 1. ² 1.3 mm/year uplift x 82 years (2018 to 2100) = 107 mm. ³ from Table 3. ⁴ Designated Flood Level -2100 = High Tide -2100 + Storm Surge. ⁵ 50% of the calculated run up (Table 6).			

FLOOD CONSTRUCTION LEVELS 2068

The FCLs for Year 2068 were estimated based on SLR in 2068. The estimated FCLs are presented in Tables 9 and 10 for the Probabilistic Method and Combined Method, respectively. The FCLs range from 4.13 to 4.28 m CGD for the Probabilistic Method and 4.25 to 4.40 for the Combined Method.

TABLE 8 FLOOD CONTROL LEVELS 2068– PROBABILISTIC METHOD

Parameter	Ferry Building	Navy Jack House	Ambleside Concession
Designated Flood Level – 2018 (m, CGD) ¹	2.56	2.56	2.56
Sea Level Rise (m)	0.68	0.68	0.68
Land Subsidence /Uplift (m) ²	-0.11	-0.11	-0.11
Designated Flood Level – 2068 (m, CGD)	3.13	3.13	3.13
Wave Effects (m) ³	0.55	0.43	0.40
Flood Construction Reference Plane (m, CGD)	3.68	3.56	3.53
Freeboard (m)	0.60	0.60	0.60
Flood Construction Level – 2068 (m, CGD)	4.28	4.16	4.13
Note: ¹ from Table 2. ² 1.3 mm/year uplift x 82 years (2018 to 2100) = 107 mm. ³ 50% of the calculated run up (Table 6)			

TABLE 8 FLOOD CONTROL LEVELS 2068– COMBINED METHOD

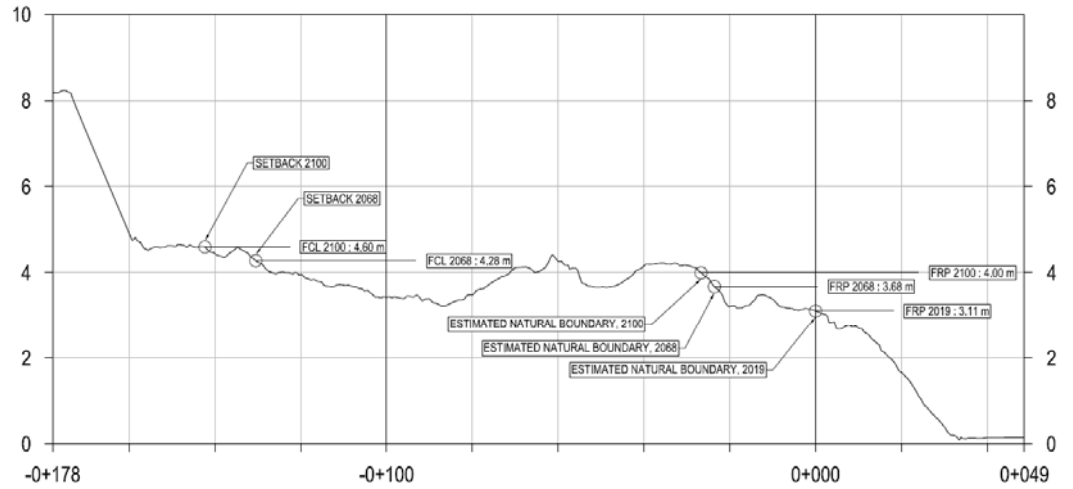
Parameter	Ferry Building	Navy Jack House	Ambleside Concession
High Tide – 2018 (HHWLT) (m, CGD) ¹	1.90	1.90	1.90
Sea Level Rise (m)	0.68	0.68	0.68
Land Subsidence /Uplift (m) ²	-0.11	-0.11	-0.11
High Tide – 2100 (HHWLT) (m, CGD)	2.47	2.47	2.47
Storm Surge (m) ³	1.08	1.08	1.08
Designated Flood Level -2068 (m, CGD) ⁴	3.55	3.55	3.55
Wave Effects (m) ⁵	0.55	0.43	0.40
Flood Construction Reference Plane (m, CGD)	4.10	3.98	3.95
Freeboard (m)	0.30	0.30	0.30
Flood Construction Level – 2068 (m, CGD)	4.40	4.28	4.25
Note: ¹ from Table 1. ² 1.3 mm/year uplift x 82 years (2018 to 2100) = 107 mm. ³ from Table 3. ⁴ Designated Flood Level -2100 = High Tide -2100 + Storm Surge. ⁵ 50% of the calculated run up (Table 6).			

2100 AND 2068 SETBACKS

Setback is based on the defined location of the Natural Boundary, which is a concept used in existing literature but with a tenuous technical definition. In general, the Natural Boundary is taken as the visible high-water mark, which is influenced by the recent history of storms at the site. As per provincial guidelines, the Natural Boundary is taken in this study as the Flood Construction Reference Plane (FRP) in a given assessment year. The 2100 and 2068 setbacks have been defined as the greater of:

- 15m beyond the 2100 (2068) estimated Natural Boundary, with the estimated Natural Boundary taken as the FRP;
- The intersection of the 2100 (2068) FCL with the ground surface.

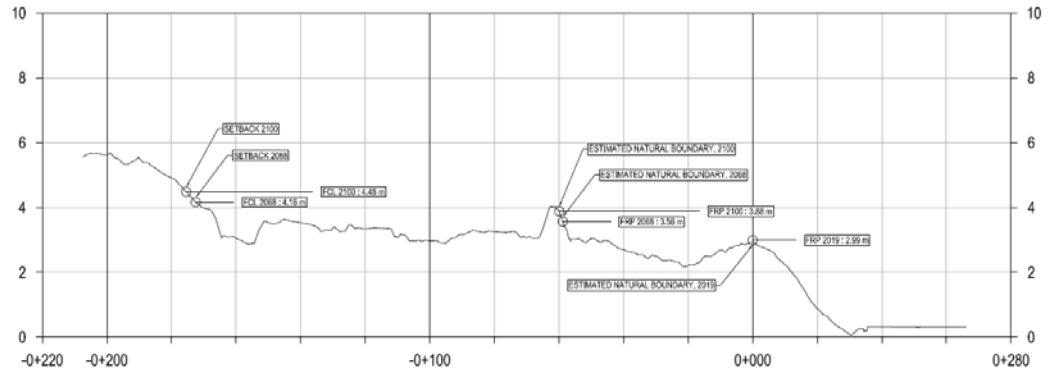
Figures 10 through 12 present the 2100 and 2068 setbacks for the three sites of interest based on data collected during the District’s 2013 LiDAR survey. The 2018 Natural Boundary has been taken as the 2018 FRP and aligns well to the visible high-water marks along the shoreline. In all cases, the 2100 and 2068 setbacks are considerably shoreward of the structures of interest and encompass the low-lying coastal zone of Ambleside. Figure 13 presents a map layout of the three sections and their respective setbacks.



FERRY BUILDING

HORIZONTAL : 1:1 000
 VERTICAL : 1:2 000

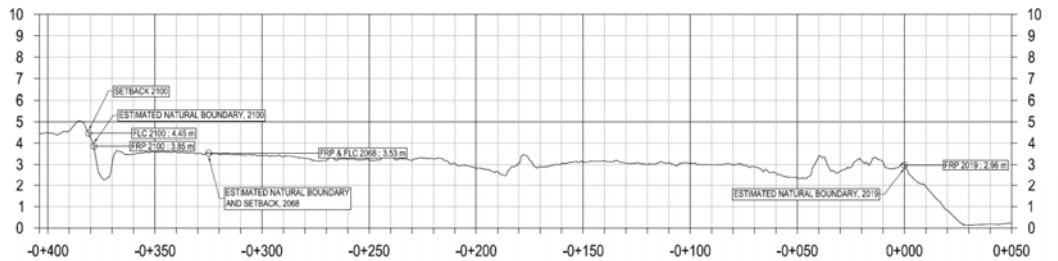
Figure 10 Ferry Building Cross-Section, CGD



NAVYJACK HOUSE

HORIZONTAL : 1:1 000
 VERTICAL : 1:2 000

Figure 11 Navy Jack House Cross-Section, CGD



AMBLESIDE CONCESSION

HORIZONTAL : 1:1 500
 VERTICAL : 1:3 000

Figure 12 Ambleside Concession Cross-Section, CGD



Figure 13 Summary Map of Cross-Sections and Setbacks

APPLICATION OF FCL AND SETBACK

PROVINCIAL GUIDELINES

The structures at each of the three locations of interest are within the 2068 and 2100 setback areas and below both the 2068 and 2100 FCLs. The area shoreward of the setback lines fall within the 2100 SLR planning area, which places several requirements on structures within the area (adapted from Section 4.2 of Ausenco 2011b):

- New construction should meet FCL and setback requirements in accordance with Provincial Guidelines or meet flood protection requirements as established by Qualified Professions.
- Adaptation measures should be identified for existing buildings, including approaches to minimize the impact of the flooding from the sea and provisions for evacuation during extreme storm events.
- Encourage or permit land uses that are compatible with coastal flooding risks during zoning or rezoning applications.
- Provide guidelines for land use practices that minimizes the impacts of flooding on high value economic and environmental assets.

Given the District is considering alterations to existing structures, rather than new construction, provincial guidelines recommend adaptation measures should be considered to minimize the risk of coastal flooding. In addition to any applicable local bylaws and building codes, the following sections of the provincial guidelines are relevant (quoted from Sections 6.5 and 6.6 of Ausenco 2011b):

- **Renovations or Additions to Existing Buildings:** Renovations to existing buildings within the existing footprint of the building are not affected by [FCL and setback requirements]. Additions of up to 25% of the floor area, at the elevation of the existing building can be allowed, provided that the addition is no closer to the existing natural boundary than the existing building.
- **Reconstruction of Existing Buildings:** Replacement or redevelopment of a building on an existing low-lying lot must meet the new FCL and setback guidelines. If meeting the guidelines would sterilize the lot (i.e. not allow even one of the land uses or structures permitted under the current zoning), the development approving official may agree to modifying setback requirements as recommended by a Qualified Professional provided this is augmented through a restrictive covenant stipulation of the hazard, building requirements and liability disclaimer.

Therefore, FCL and setback requirements may be relaxed at the District’s sites in the following cases, subject to local bylaws, building codes and approval by the development approving official:

1. The District is renovating existing structures, increasing the total floor area by less than 25% and any additional floor area is added to the landward side of the structure.
2. The District is replacing or redeveloping an existing structure and can demonstrate that meeting the FCL and setback requirements would prevent the currently zoned land-use of the site.

In all cases, the District should satisfactorily demonstrate to the development approving official that the structures have been designed to mitigate the risks of damage due to coastal flooding, with these design mitigations approved by a Qualified Professional.

DISTRICT OF WEST VANCOUVER BYLAWS

In addition to provincial guidelines local bylaws may limit any relaxation of FCL and setback lines at the District’s three sites.

Under Section 9.2.8 of Building Bylaw 4400:

“A Building or Structure on a parcel the Building Inspector believes is subject to or is likely to be subject to flooding, erosion, land slip, rock falls, subsidence or avalanche, and the requirement for Professional Design and a field review is in addition to a requirement under the Community Charter for a report certified by a professional engineer with experience in geotechnical engineering that the parcel may be used safely for the use intended and that the plans submitted with the application comply with the relevant provisions of the Building Code and applicable bylaws of the District;”

This implies that structures exposed of a flood hazard must be certified as safe to use for their intended purpose by a Qualified Professional, in addition to meeting relevant provisions of the Building Code and applicable bylaws. The steps to demonstrate that the District’s structures are safe for their intended purpose could include:

- Demonstrate that what could have been habitable building has been substituted for a non-habitable building so that there is less risk and danger to the users.
- Demonstrate that due to existing site characteristics that the building cannot be raised to meet the flood construction level requirements (e.g. due to technical difficulties or by preventing land uses permitted under the current zoning).
- Demonstrate to the satisfaction of the development approving official that the proposed construction methods are designed by a Qualified Professional to mitigate flood damage. Such measures could include but are not limited to:
 - (i) Concrete/Tile floors.
 - (ii) Concrete closed walls to the FCL level.
 - (iii) Electrical sockets raise above the FCL level.
 - (iv) Mechanical/Electrical equipment on raised plinths.

- (v) Emergency evacuation plan.
- (vi) Ensure there is emergency access/egress.
- Demonstrate that the buildings are setback far enough from coastal limit so that there will be no erosion implications around the building.

CONCLUSIONS AND RECOMMENDATIONS

The FCLs for the three sites have been estimated using the two recommended approaches given in provincial guidelines, the Probabilistic Method and Combined Method. Extreme water levels (tide + storm surge) and storm surges for the sites were estimated using frequency analysis based on the Point Atkinson water level gauge data. Sea level rise and land subsidence/uplift values for the sites were obtained from the BC guidelines. A wave hindcast was conducted to predict the wave conditions at the sites and to estimate the wave effects. The FCLs estimated from the Probabilistic Method are recommended for future planning use and FCL of 4.60 m CGD be used for the all three sites for Year 2100. The FCL of 4.30 m CGD is recommended for the Year 2068. Associated setbacks have been provided based on these FCL estimates.

When using the FCLs and setbacks presented in this letter report, the following limitations must be taken into considerations:

- A simplified method was used to predict the wave conditions. No wave transformation (refraction, diffraction, etc) was considered to estimate nearshore wave conditions.
- Wave run-up was estimated using an empirical equation developed based on laboratory data.

The required application of these FCLs and setbacks is subject to provincial and municipal guidelines and regulations. In instances of renovation or reconstruction of existing structures, the FCLs and setbacks presented in this document may be relaxed provided the District can demonstrate the structures are safe for their intended use.

Yours sincerely,



Michael Coull, MIEAust CPEng NER
Director Ports, Marine & Coastal Engineering
Western Canada

WSP ref.: 181-17165-00

REFERENCES

- Abeyirigunawardena, D.S., Smith, D.J., & Taylor, B (2011). Extreme Sea Surge Response to Climate Variability in Coastal British Columbia. *Annals of the Association of American Geographers*, 101(5), pp. 992-1010.
- Ausenco Sandwell (2011a). Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Land Use – Sea Dike Guidelines. Prepared for British Columbia Ministry of Environment.
- Ausenco Sandwell (2011b). Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Land Use – Guidelines for Management of Coastal Flood Hazard Land Use. Prepared for British Columbia Ministry of Environment.
- Ausenco Sandwell (2011c). Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Land Use – Draft Policy Discussion Paper. Prepared for British Columbia Ministry of Environment.
- Bretschneider C.L. (1964). Generation of Waves by Wind. State of the Art. International Summer Course, Lunteren, The Netherlands, National Engineering Science Company, NESCO Report SN-134-6, Washington DC, September 1964.
- British Columbia Ministry of Environment (2018). Amendment Section 3.5 and 3.6 – Flood Hazard Land Use Management Guidelines.
- CERC (1984). Shore Protection Manual. U.S. Army Corps of Engineers, Coastal Engineering Research Center, Fort Belvoir, Virginia, 3 Volumes, 1984 edition.
- Dupuis P., Tournier J.P., and Caron, O. (1996). Wave Climate on Large Reservoirs and a Revised Wave Hindcast Formula. Wave 96, Coastal Engineering Proceedings.
- Engineers and Geoscientists British Columbia (2012). Professional Practice Guidelines – Legislated Flood Assessments in a Changing Climate in British Columbia. 144 pp.
- Northwest Hydraulic Consultants (2014). City of Vancouver Coastal Flood Risk Assessment Final Report. Prepared for the City of Vancouver.
- Tinis, S. (2014). 2017-18 Storm Surge Almanac, Climate Outlook and Tidal Elevations for Fall/Winter 2017. *British Columbia Storm Surge Forecasting System*. Retrieved from <http://www.stormsurgebc.ca/files/reports/2017-2018.pdf>
- Triton Consultants, Northwest Hydraulic Consultants (2006). Lower Fraser River Hydraulic Model Final Report. Prepared for Fraser Basin Council.

Attachment C
WSP Letter dated 22 July 2020



2020-07-22

Confidential

John Wong, CFM, CPA CMA
Manager of Facilities
District of West Vancouver

Subject: Updated Flood Construction Levels for West Vancouver Water Front Buildings

Dear Sir:

WSP Canada Inc. (WSP) was retained by the District of West Vancouver (the District) to estimate Flood Construction Levels (FCL) in the years 2068 and 2100 for redevelopment of structures at three locations in Ambleside, West Vancouver, BC. A letter report dated January 21, 2019 presented these FCLs. This letter report provides updated FCL values following more detailed studies undertaken by WSP for the District.

SUMMARY OF FCL UPDATE

Based on WSP's more detailed assessments of FCLs along the District's shoreline, the following components comprising the FCL require updating:

- **Designated Flood Level:** WSP has updated the statistical analysis of the joint probability of storm surge and tides based on measured water levels at Point Atkinson to the year 2020. This update extended the measured water level record with the most recently collected data and improved the fit of the statistical model used to predict extreme water levels. This update results in a 0.07 m increase in the Designated Flood Level.
- **Land Subsidence:** A vertical land movement of +1.3 mm/year +/-0.2 mm/year had been applied based on values for Point Atkinson published in Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Land Use Draft Policy Paper (Ausenco Sandwell, 2011). Site-specific analysis presented by the Geological Survey of Canada (Mazzotti et al. 2009, Thompson 2008) indicates vertical land movement of -1.0 mm/year +/-0.5 mm/year in the subject area. Adopting -1mm/year results in a 0.11 m and 0.19 m increase in the Designated Future Flood Level for 2068 and 2100, respectively.
- **Value Correction and Rounding Accuracy:** Year 2100 values for land subsidence were applied for the year 2068 in the January 21, 2019 letter report. Correcting this results in a 0.04 m increase in the Designated Flood Level for 2068. Rounding accuracy to two significant figures results in a 0.01 m increase in the recalculated FCL.

Overall, FCL values for the year 2068 have been increased by 0.23 m and year 2100 FCL values have been increased by 0.26 m.

FLOOD CONSTRUCTION LEVELS 2068

The updated FCL for 2068 is presented in Table 1. FCL values have been updated as follows:

Ferry Building	Superseded FCL: 4.28 m Updated FCL: 4.51 m
Navy Jack House	Superseded FCL: 4.16 m Updated FCL: 4.39 m
Ambleside Concession	Superseded FCL: 4.13 m Updated FCL: 4.36 m

Table 1 Flood construction levels 2068, probabilistic method

Parameter	Ferry Building	Navy Jack House	Ambleside Concession
Designated Flood Level, 2020	2.63 m	2.63 m	2.63 m
Sea Level Rise, 2000 benchmark	0.68 m	0.68 m	0.68 m
Land Subsidence or Uplift, from 2020	0.05 m	0.05 m	0.05 m
Designated Flood Level, 2068	3.36 m	3.36 m	3.36 m
Wave Effects (m)	0.55 m	0.43 m	0.40 m
Flood Construction Reference Plane, 2068	3.91 m	3.79 m	3.76 m
Freeboard (m)	0.60 m	0.60 m	0.60 m
Flood Construction Level, 2068, CGVD2013	4.51 m	4.39 m	4.36 m

FLOOD CONSTRUCTION LEVELS 2100

The updated FCL for 2068 is presented in Table 1. FCL values have been updated as follows:

Ferry Building	Superseded FCL: 4.60 m Updated FCL: 4.86 m
Navy Jack House	Superseded FCL: 4.48 m Updated FCL: 4.74 m
Ambleside Concession	Superseded FCL: 4.45 m Updated FCL: 4.71 m

Table 2 Flood construction levels 2100, probabilistic method

Parameter	Ferry Building	Navy Jack House	Ambleside Concession
Designated Flood Level, 2020	2.63 m	2.63 m	2.63 m
Sea Level Rise, 2000 benchmark	1.00 m	1.00 m	1.00 m
Land Subsidence or Uplift, from 2020	0.08 m	0.08 m	0.08 m
Designated Flood Level, 2100	3.71 m	3.71 m	3.71 m
Wave Effects (m)	0.55 m	0.43 m	0.40 m
Flood Construction Reference Plane, 2100	4.26 m	4.14 m	4.11 m
Freeboard (m)	0.60 m	0.60 m	0.60 m
Flood Construction Level, 2100, CGVD2013	4.86 m	4.74 m	4.71 m

CLOSURE

Updated FCL values are given in Tables 1 and 2 above. Reference is made to the WSP letter of 21 January 2019 in which there is discussion of the implications of the properties being within the 2068 and 2100 setback areas and below both the 2068 and 2100 FCLs.

Yours sincerely,

Michael Coull, MIEAust CPEng NER
Director Ports, Marine & Coastal Engineering

Jordan Matthieu, M.Sc., P.Eng.
Senior Coastal Engineer

JM/MC

WSP ref.: 181-17165-00

REFERENCES

Ausenco Sandwell (2011). Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Land Use – Draft Policy Discussion Paper. Prepared for British Columbia Ministry of Environment.

Mazzotti, Stephane & Lambert, A. & Kooij, Marco & Mainville, Andre. (2009). Impact of anthropogenic subsidence on relative sea-level rise in the Fraser River delta. *Geology*. 37. 771-774. 10.1130/G25640A.1.

Thomson, R.E., Bornhold, B.D., and Mazzotti, S. (2008). An examination of the factors affecting relative and absolute sea level in coastal British Columbia. *Can. Tech. Rep. Hydrogr.Ocean Sci.* 260: v + 49 p.