Dept. Manager	Director	City Manager

The Corporation of **THE CITY OF NORTH VANCOUVER**
COMMUNITY DEVELOPMENT DEPARTMENT

REPORT

To: Mayor Darrell R. Mussatto and Members of Council

From: Emilie K. Adin, Deputy Director, Community Development

SUBJECT: DEVELOPMENT REVIEW PROCESS, REZONING APPLICATION, 801 - 925 HARBOURSIDE DRIVE, 18 FELL AVENUE (CONCERT PROPERTIES LTD./HCMA)

Date: December 5, 2012 File No: 3360-20 REZ2012-00025 801 889 and 925

The following is a suggested recommendation only. Please refer to Council Minutes for adopted resolution.

RECOMMENDATION:

PURSUANT to the report of the Deputy Director, Community Development, dated December 5, 2012, entitled "Development Review Process, Rezoning Application, 801 – 925 Harbourside Drive, 18 Fell Avenue (Concert Properties Ltd. and Knightsbridge Properties Ltd./HCMA)":

THAT upon the receipt of a temporary 3 metre Right of Way over the property at 18 Fell Avenue to accommodate the Spirit Trail, that staff be directed to process the development application for the subject properties;

AND THAT the proposed public consultation and development approval process, outlined in said report, be endorsed by Council;

AND THAT a Town Hall Meeting be scheduled for this rezoning application in February 2013.

ATTACHMENT:

1. Harbourside waterfront rezoning submission

PURPOSE:

The purpose of this report is to advise Council that a rezoning application has been received for the Harbourside waterfront and to seek Council endorsement of a proposed development review approach and process.

BACKGROUND:

An OCP amendment application by Concert Properties and Knightsbridge Properties for the four lots at 801, 889, 925 Harbourside Drive and 18 Fell Avenue was processed by the City between 2009 and 2012, and was successfully completed in spring 2012. This OCP Amendment Process was put on hold while a comprehensive planning study was performed and completed, which in turn had informed the OCP Amendment Bylaw that was proposed and adopted.

During the OCP Amendment Process, by Council direction, a covenant was registered to title to codify various commitments from the applicants to the City, which would be delivered at future steps in the development review process, including:

- Detailed traffic and parking studies
- Commitment to traffic demand measures
- Kings Mill Park Plan
- Utility upgrades plan
- Commercial building as an industrial buffer to Seaspan
- Phasing Plan
- Community Amenity Contributions strategy
- Noise attenuation strategy
- Confirmation that the lands will not be sold without the purchaser being notified of the obligations contained within the covenant

Since the time of the OCP Amendment being completed, Concert has been preparing a more detailed rezoning application. That rezoning contemplates the implementation of a Development Permit process for the subsequent approval of individual buildings in a phased manner through Development Permits. Concert's effort to prepare this application has been complicated due to their need to address the potential for sea level rise. This rezoning application has now been submitted, and is the subject of this preliminary report.

DISCUSSION:

A rezoning application has been received by the City for a mixed-use residential commercial development at 801, 889 and 925 Harbourside Drive and at 18 Fell Avenue. This rezoning application conforms on those four lots to the densities, heights, land uses, massing and layout of buildings that was presented to Council during the OCP amendment process. The full rezoning submission can be found as an attachment to this report and also on the City's website at http://www.cnv.org//server.aspx?c=2&i=398.

This application proposes amending the zoning for the subject property from the existing CD-359 and to a new Comprehensive Development Zone allowing for residential uses and densities consistent with the Official Community Plan Amendment adopted in July 2012. The development site includes 4 complete blocks combining to a total area of 3.7447 Ha or roughly 9.25 acres. A breakdown of uses proposed on the site includes 1.35 FSR of market residential floorspace (i.e., 1.35 times the lot area), 0.15 FSR of rental residential floorspace, and 0.70 FSR of commercial (office and retail) floorspace.

The current development review process will be focused mainly on the Zoning Amendment Bylaw, including the Design Guidelines which are to be appended to the Zoning Bylaw, the developer's community amenity contributions, infrastructure upgrades and transportation solutions, which will all be secured in Section 219 covenants registered to title. A separate and more lengthy City-led parks planning process will follow, and the only changes to the park that are proposed during this rezoning process are those changes that are critical to the City's and developer's response to sea level rise.

A successful rezoning of this site will result in a number of changes to surrounding public infrastructure including but not limited to interface with the existing parkland, road realignment, on-street parking changes, public transportation service, Spirit Trail upgrades, and changes to grade so as to adapt to an anticipated rise in sea level. In addition to these changes to the public realm, staff will also be evaluating building orientation, interface with existing uses, shadow and view impacts, contributions to City sustainability goals, and traffic and parking impacts on the surrounding communities throughout the course of the application review process, with the assistance of the City's Advisory Bodies.

The new Comprehensive Development Zone, which is proposed to be created, will regulate density, height, setbacks, and other quantitative restrictions on a lot by lot basis throughout the site. The zoning amendment bylaw to be considered by Council will also propose a set of Design Guidelines that are to be appended to the Zoning Bylaw and used to evaluate future required Development Permits for the site. These Design Guidelines will control the form and character of the development, and also regulate the look and feel of the public realm inclusive of street width, parking access, public amenities, materials, and architectural styles.

Staff are also working with the applicants to create a set of legal agreements that will regulate easements, right-of-ways, servicing, LEC connection requirements, as well as solidify any commitments for community amenity contributions, off-site improvements and infrastructure upgrades that may be negotiated through the rezoning process.

To be clear, should this rezoning process be successful, the applicant would be required to submit development permit applications on a building-by-building basis to ensure that each parcel within the site is developed in accordance with the Zoning Bylaw, Design Guidelines and legal agreements discussed above. Furthermore, this

rezoning application does not finalize a City parks plan for the Harbourside area, but sets the groundwork for a City-led and developer-paid planning process that will follow. Funding for that park upgrade and the planning process that will determine any changes to Kings Mill Walk Park will be secured through the rezoning.

Spirit Trail

A temporary 3 metre Right of Way over the property at 18 Fell Avenue to accommodate the Spirit Trail has been agreed to by all parties. However the requisite legal agreement has not yet been registered to title to enable the construction of the Spirit Trail over these lands. Council may wish to place as a condition of further consideration of the rezoning application the registration of the requisite legal agreement to title.

Staff advise that the conversion of the aforementioned temporary Right of Way to a permanent Right of Way can be negotiated as a condition of rezoning.

Proposed Consultation Process and Timelines

A proposed consultation process and timeline has been provided by the applicant.

Generally, the timelines proposed by the developer, at the direction and discretion of Council, are as follows:

<u>December 2012</u>

- Presentation to 5 advisory bodies (scheduled for Dec. 12, 2012)

<u>January 2013</u>

- Public Open House – Date and venue to be announced Dec. 12/12
- Developer Information Session – Date and venue to be announced Dec. 12/12
- Additional Advisory Body Review follow up

<u>February 2013</u>

- Town Hall Meeting – Date and venue to be determined in consultation with the City and with regard to the availability of members of Council
- Additional Advisory Body Review (as required)

<u>April 2013</u>

- Public Hearing on the Zoning Bylaw Amendment that is proposed to be drafted

The applicant has noted additionally that there may be additional public consultation being proposed in February and March, dependent on the feedback that is received from the Public Open House, the Developer Information Session, and the Town Hall Meeting.

OPTIONS FOR CONSIDERATION:

Technically, for a rezoning application that does not also require an OCP amendment and that does not propose a density bonus over 10%, a Town Hall Meeting is not required. A Town Hall Meeting is being proposed in this case due to the public interest and attention that has been provided to this potential development during the subject property's OCP Amendment review process. Should Council wish not to require a Town Hall meeting, an option would be to remove the third active clause from the recommendation of this report.

Should Council choose to support a more protracted timeline for development review, Council has the option of directing staff to proceed on an alternate timeline to the one that was proposed in this report.

FINANCIAL IMPLICATIONS:

None. Public consultation costs will be borne by the applicant.

INTER-DEPARTMENTAL IMPLICATIONS:

The recommendation in this report was endorsed by the Civic Projects Team on December 4th, 2012.

SUSTAINABILITY COMMENTS:

Sustainability commitments of this development proposal will be detailed in the staff report to accompany consideration of first reading of the zoning amendment bylaw.

CORPORATE PLAN AND/OR POLICY IMPLICATIONS:

None.

RESPECTFULLY SUBMITTED:

Emilie K. Adin
Deputy Director, Community Development

EA/skj

Harbourside Waterfront Rezoning Submission
Concert Properties

30th November 2012

Contents

1.1 Introduction

Harbourside Waterfront was once known as the “Fullerton Fill,” a vacant, contaminated lumber mill and log sort created by filling in a portion of the Burrard Inlet at the foot of Fell Avenue.

Concert Properties acquired the site in 1996 and rezoned the site in 1998 to a mix of commercial, light industrial and auto mall uses to create the Harbourside Business Park. Harbourside provides approximately 3,000 quality jobs to the City of North Vancouver.

In conjunction with rezoning, Concert remediated, serviced and upgraded access to the site, including constructing the Fell Avenue rail overpass. Major on-site community contributions were also provided, including the creation and dedication of “Kings Mill Walk,” the City’s longest stretch of waterfront park, and habitat restoration and conservation of the east bank of MacKay Creek. Concert also provided an off-site financial contribution to the City’s first all-weather playfield.

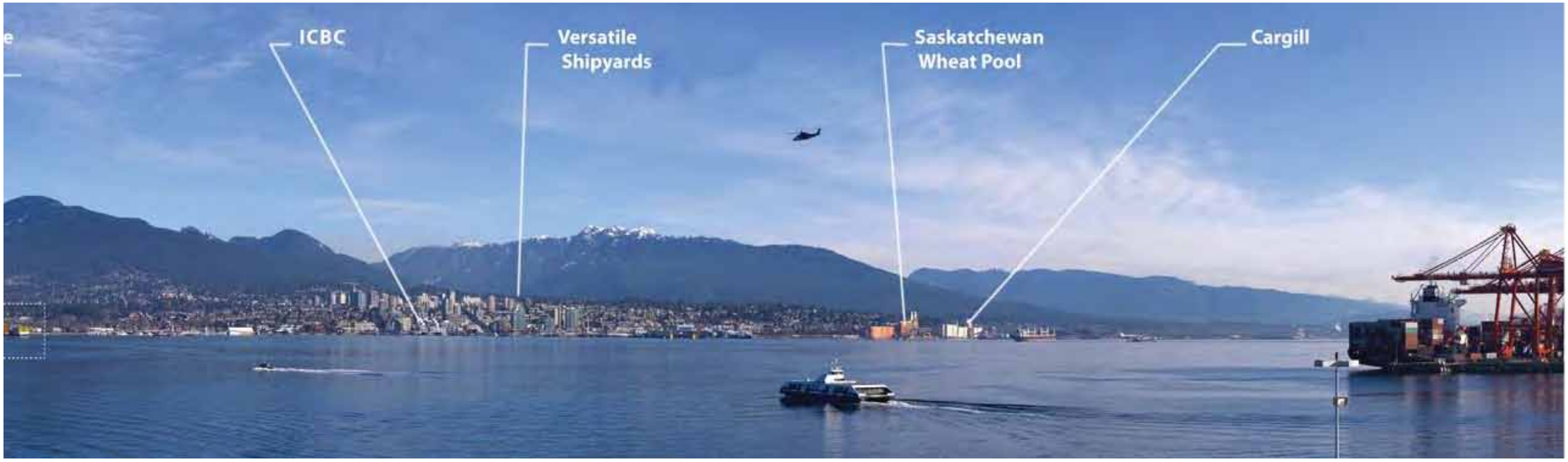
Currently, the Harbourside Business Park is daytime-oriented and lacks a distinctive “sense of place”, with little vitality or feeling of community.

The proposed mixed-use development along the Harbourside Waterfront will create a vibrant destination anchoring the western end of the City and enhancing the waterfront experience along the North Shore. Located south of Harbourside Drive, most of this area has been vacant for decades. Development of these lands to mixed commercial and residential uses will create a dynamic waterfront destination aligned with the City’s 2005 Waterfront Project West Waterfront goal.

The Harbourside Waterfront development will yield significant community and financial benefits, not the least of which will be the increased employment opportunities from the accelerated development of office and retail space. In addition, it will support not only the Harbourside Waterfront but also adjacent lands in reaching critical mass of employment, shopping and dining opportunities to animate the waterfront.

Significant employment will be combined with commercial uses that serve local residents, employees and waterfront visitors to create a dynamic and active waterfront. Housing opportunities will include rental and strata housing opportunities. The interface with nearby industrial uses and park space has been taken into consideration to contribute to a more complete and sustainable community on the North Shore. The development will support energy conservation, water conservation and the reduction of greenhouse gas emissions.

Harbourside Walk - Concept Sketch



Panorama of North Vancouver

1.2 Basic Information

Site Location

Exisiting Lot Areas

Site Address and Legal Description:

Concert:
925 Harbourside Drive
Lot A of the Public Harbour of Burrard Inlet, New Westminster District Plan LMP 51190
PID 025-120-581

889 Harbourside Drive
Lot B of the Public Harbour of Burrard Inlet, New Westminster District Plan LMP 51190
PID 025-120-590

801 Harbourside Drive
Lot 43 of the Pubic Harbour of Burrard Inlet, New Westminster District Plan LMP 49271
PID 024-984-001

801 Harbourside Drive
Lot 44 of the Pubic Harbour of Burrard Inlet, New Westminster District Plan LMP 49271
PID 025-984-025

Knightsbridge:
18 Fell Avenue
Lot 45 District Lot of 2654 Group 1, New Westminster District Plan LMP 49271
PID 024-984-094

Site Dimensions: Refer to Subdivision Plan – Section 11.0 this document

Existing Lot Area:

	Lot A	1.100 ha
	Lot B	0.886 ha
	Lot 43	0.630 ha
	Lot 44	0.630 ha
Lot Area Concert		3.246 ha (32,460 square metre)
Lot Area Knightsbridge		
	Lot 45 (excluding Lot 46)	1.660 ha
	Total area	4.906ha (49,070 square metre)

Current Zoning: Harbourside Waterfront Mixed - Use

Statement of Purpose of the rezoning:
The purpose of this rezoning is to permit the mixed use development proposed for the Harbourside Waterfront site as per the Official Community Plan (OCP) enacted by CoNV Council, the Policy Statement endorsed by the City of North Vancouver City (CoNV) Council in February 2011, and the Official Community Plan Amendment (OCPA) enacted by CoNV Council. The project is comprised of four (4) blocks, all of which are mixed use. Generally, the blocks include a ground floor of commercial with retail and office uses with three to 7 storeys of residential use above. There are five (5) buildings that are residential use only and one (1) building that is intended as affordable rental or seniors' housing. At the foot of Fell Street a nine (9) storey hotel is proposed. All blocks have a minimum of one storey of underground parking with some blocks having an additional partial level.

This rezoning also enhances the public realm infrastructure envisioned in the OCP and established in the OCPA, providing more detail on waterfront experience, Spirit Trail upgrades, streets and public open space.

Floor Space Ratio:

Residential	1.35 FSR
Commercial	0.70 FSR
Subtotal	2.05 FSR*
Rental Housing	0.15 FSR
Total	2.20 FSR*

***** Based on existing Lot Areas

Building Height
No more than four buildings shall exceed 21.4 m height in Harbourside Waterfront. No buildings exceed 27.6 metres height. Building height is calculated from the Flood Construction Level of 5.24m as defined in the Harbourside Village Sea Level Rise Flood Management Plan - Appendix A.


View North from Harbourside


View West to Shipyard from Harbourside

1.3 Statement of Rezoning Rationale

Statement of Rezoning Rationale

With zoning in place that would allow for a final phase of commercial development along the waterfront, Harbourside is slated to continue building on the City of North Vancouver's original vision of commercial business park. But the status quo is not the optimal future for Harbourside. A more imaginative, more sustainable and more appropriate use for these lands is envisioned.

With the amended OCP that allows a broader range of uses at Harbourside Waterfront, the purpose of this rezoning submission is to develop and elaborate on the concepts initiated. This proposal seeks to create a neighbourhood destined to be a model of mixed-use, a truly sustainable community for the City of North Vancouver and the North Shore.

Connectivity is a fundamental aspect of this rezoning submission, focusing specifically on improving pedestrian, cyclist and auto networks. This proposal explores several options to improve connections to and from Harbourside Waterfront, be it by foot, bike, bus or car. While impediments to the Spirit Trail currently exist between Harbourside and Lonsdale Quay, the applicant is committed to bridging discussions to help resolve them. Transit, and the applicant's commitment to enhance the existing service, is similarly critical to improving connectivity. Traffic improvements are likewise essential, and are closely related to the sustainability objectives proposed.

An extensive public consultation process has helped to shape the development with respect to building scale and form, placement of uses, and private and public views. Concerns of views of the water and downtown Vancouver from the north, and views of the mountains from Kings Mill Walk, have had a significant effect on building heights, configurations and orientations.

A strong focus on the public realm, street design, internal pathways and building interfaces help to create a range of experiences for users. Dedicated public areas have been created in response to the public input with an expansion of the public realm into the private. The proposal increases the public park space from the original Harbourside rezoning, and the public open space has been increased considerably more.

Retail and storefront office uses energize the area and provide an amenity for new and existing employees, Seaspan workers, park users, and the broader community. Office uses are provided in a variety of forms, and maintain and enhance the existing workplace nature of the area. Residential uses enhance the security of public spaces, provide vibrancy to Harbourside outside business hours, and also provide opportunities to live and work in the same community transforming Harbourside into a true, mixed-use community.

Community Character Montage

1.4 Affordability and Adaptability

Harbourside Waterfront is envisioned to be an inclusive mixed-use community welcome to all, regardless of social, cultural and economic status. It will contain places to live, work, shop and play all in a highly connected and compact environment.

Within this rezoning submission, the residential portion of the development will comprise fourteen residential buildings in a combination of townhouse, low-rise and mid-rise forms. Buildings will be designed and positioned for its target market at the development permit stage, each with a mix of homes ranging from studio, 1-bedroom, 2-bedroom and 3-bedroom homes.

Both strata ownership and rental tenures are being proposed. Ten percent of the residential development area is proposed as market rental, providing over 100 affordable homes, and an additional 700 homes are being proposed as strata ownership. Pricing for the strata homes will be subject to the prevailing market conditions; however, buildings will be designed with varying unit types and specifications to ensure a continuum of housing affordability.

With a range of housing costs and types available in both rental and strata ownership housing, Harbourside Waterfront will provide diverse housing options for current and future residents of the City of North Vancouver..

Adaptable design refers to housing or housing features that are intended for use by people with disabilities or those who are limited in mobility. Adaptable design features will be integrated throughout the building and within individual homes to ensure homes are liveable for all. In accordance with the “Adaptable Design Policy,” 20% of the units will be designed to Level Two or better guidelines. In exchange, the following exclusions are being requested:

- For each Level Two home, 20 square feet will be excluded from floor area calculations; and
- For each Level Three home, 45 square feet will be excluded from floor area calculations.

Community Priciples

1.5 Guiding Principles

The Harbourside Waterfront Policy Statement is based upon a set of Guiding Principles which were directed by a joint Steering Committee consisting of City staff and waterfront property owners (Concert and Knightsbridge). These principles were endorsed by CoNV Council and are now being adopted by the Owners in this rezoning submission.

1. **Approach the rezoning of Harbourside as a transformational opportunity to create a model of sustainability.**
   - Development should add life and vitality to the existing business park, while creating a liveable and sustainable part of a "complete community".
   - Create a compact community by utilizing developable land for higher capacity.
   - Offer a variety of opportunities to work, live, shop and play.
   - Provide amenities and services that support and contribute to a complete community.
   - Locate appropriate uses and densities along a transportation route, near amenities, services, and employment.

2. **Demonstrate active support of other City initiatives.**
   - Waterfront Project Vision – transform the western portion of the waterfront into a dynamic Burrard Inlet community amenity, regional tourist attraction and economic development driver;
   - 100 Year Sustainability Vision – support themes of liveability, sustainability, and resilience. Envisions the City achieving carbon-neutral status by 2017;
   - Community Energy and Emissions Plans – assists the City in achieving a deeper reduction in greenhouse gas emissions by way of a series of overarching targets, goals, and policies that lead toward a low carbon energy and emissions path.
   - Social Plan – maintain and enhance the quality of life and well-being; foster inclusion and cultural diversity; support and enhance arts, culture and heritage assets, and leisure services (including recreational opportunities); and support the well-being of youth, seniors and families; and
   - Parks Master Plan – guides the future planning, design, protection and maintenance of new and existing park infrastructure and amenities in both the natural and built environments.

3. **Demonstrate connectivity to Marine Drive and Lonsdale Quay.**

   CoNV Waterfront Development: Vision, Goals and Objectives
   - "Create a highly accessible and dynamic waterfront that also supports significant port industry, for the benefit of current and future generations."

   North Shore Spirit Trail
   - Contribute to the creation of the Spirit Trail as "a unique, waterfront-oriented, multi-use and fully accessible greenway that will provide access across the North Shore…"

   Marine Drive Land Use Study
   - Reinforce Marine Drive as "a safe neighbourhood where current and future area residents enjoy appealing places to live, work, and play; a place defined by its creeks, parks and natural areas; a vibrant, pedestrian / bicycle-friendly and diverse commercial centre; and a gateway to the City along a key transportation corridor."

4. **Set a High Green Building Standard.**
   - Development should be a key part of a "green" and environmentally sustainable community.
   - Building design should adhere to City policies regarding climate change e.g. - rising sea levels).
   - Buildings should demonstrate energy performance (efficient low-emissions energy), e.g.: connecting to Lonsdale Energy Corp (LEC).

5. **Ensure no loss of commercial density.**
   - Maintain current and future levels of employment by retaining the current commercial zoning capacity.

6. **Maintain, integrate and reinforce adjacent industrial areas.**
   - Avoid displacement or destabilization of adjacent non-residential land uses, including industrial and employment areas.

7. **Address the need for larger scale employment generators as well as small scale street and waterfront animation.**
   - Create high-quality larger employment space to suit a variety of tenant types and attract large-scale employment generators along the Harbourside Drive frontage.
   - Provide diverse and unique shopping, dining, and retail services.
   - Enhance vibrancy of pedestrian realm by incorporating sidewalk cafes, flex-space that supports a variety of activities, etc.

8. **Consider the distribution of commercial uses to animate the waterfront, with the intention of creating a significant focal point.**
   - Animate the waterfront with small-scale, pedestrian retail and service uses at grade.
   - Provide commercial / non-commercial public gathering spaces: art gallery, arts venues, marine / outdoor festivals and events, plazas, promenades, etc.

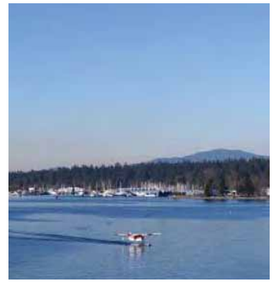
9. **Explore a range of housing options and affordability.**
   - Consider the inclusion of a range of housing forms, unit types and sizes.
   - Explore the potential to incorporate rental housing.

10. **Pursue alternative transportation solutions.**
    Encourage incorporation of alternative transportation options and amenities such as:
    - comprehensive trail network and pedestrian and bicycle connections;
    - end-of trip facilities, i.e.: showers, bicycle storage;
    - improvements to transit - require critical mass in population; and
    - implementation of Transportation Demand Management (TDM) measures such as: parking supply strategies; intersection improvements; shared parking opportunities; carpooling; etc.

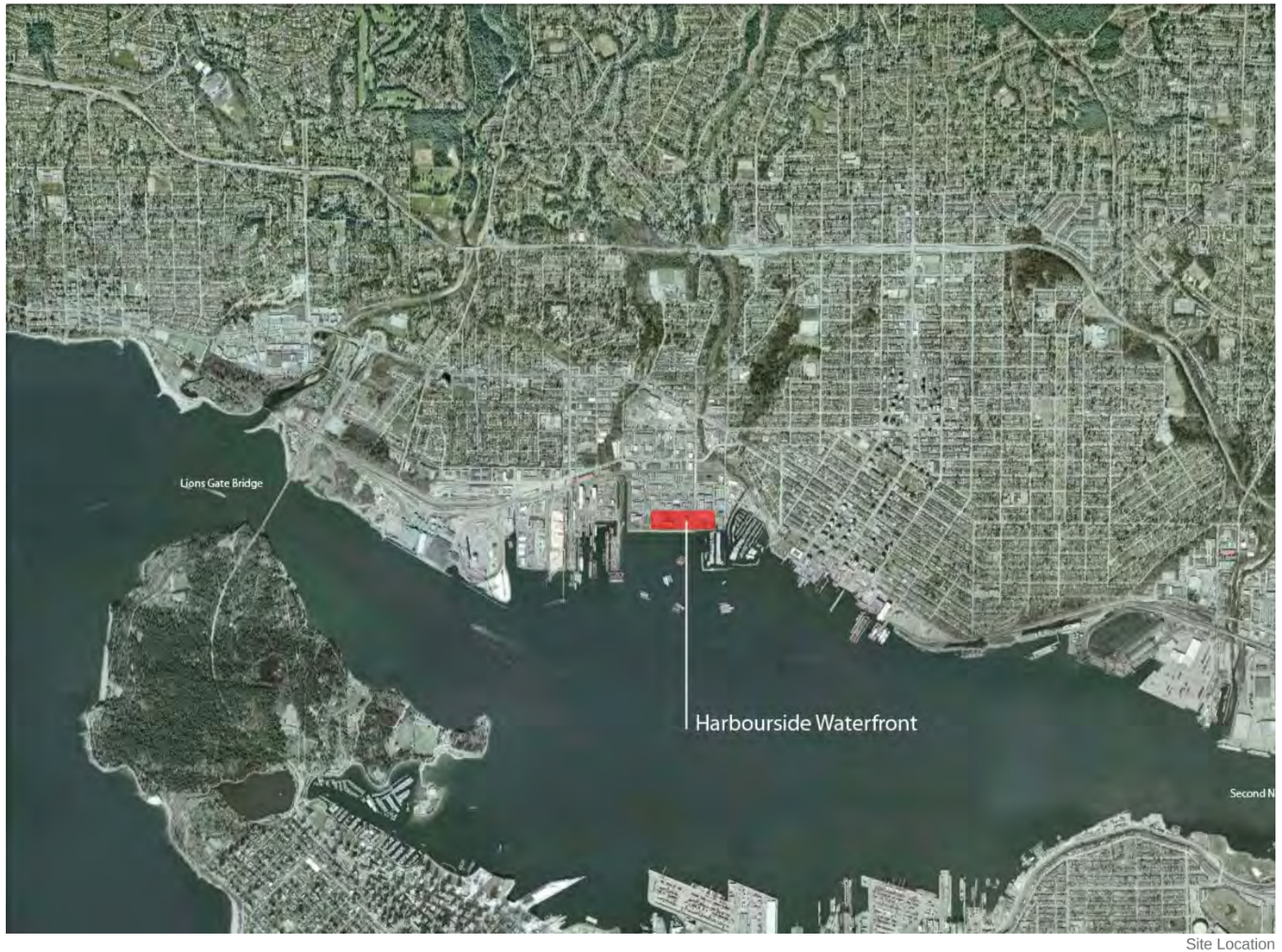
11. **Consider water uses, including a public dock at an appropriate and practical location.**
    - Consider incorporation of amenities such as floating walkways, kayak launch, viewing promontory, piers, etc.

12. **Create opportunities for water connections to downtown Vancouver, Lonsdale Quay & elsewhere.**
    - Pursue waterfront connectivity to Lonsdale Quay and downtown Vancouver.
    - Reinforce the waterfront walkway system with pedestrian and cycling routes.

13. **Include adjacent neighbours in the planning study and application.**
    - Consult key stakeholder groups including port authority, regulatory agencies, businesses, land owners and residents.



2.1 Site Location



Site Location

Site Location

The Harbourside Waterfront site is located in the southwest corner of the City of North Vancouver along the Burrard Inlet, between MacKay Creek and Gostick Place. The Harbourside Waterfront site area comprises a total of approximately 12 acres (4.86 hectares) of what is currently designated under the OCP amendment as mixed-use development. The neighbourhood is currently characterized by single-use buildings zoned as commercial or for light industrial use. The Site is defined to the west by Bodwell School, to the south by Kings Mill Park, to the north by Harbourside Drive and to the east by the Burrard Yacht Club. The study area also considers improvements along Fell Avenue, Gostick and Bewicke, which are important street connections that link Harbourside Waterfront to Marine Drive.

2.2 Context, Connectivity and Land Use

Site Context and Connections

Site Connections

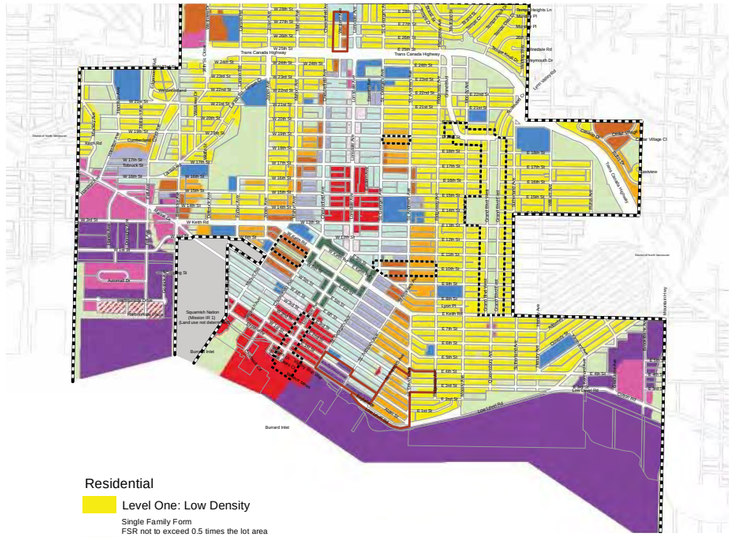
The site is connected to the main highway network, Marine Drive, via Fell Avenue, and is accessible on foot or by bike via the Spirit Trail. The site's immediate adjacency to the Seaspan shipyard to the West offers a great opportunity to provide new high quality office type space within walking distance of the shipyard itself. This relationship will add to both the sustainable future of the shipyard but also the sustainable mixed use future of Harbourside Waterfront.

The site has many characterful and amenity type neighbours such as the Burrard Yacht Club, the Bodwell School and the Capilano Mall. Over time the regenerative development of the Harbourside Waterfront has the potential to influence the future sustainable shape of its commercial neighbours to the north.

Land Use

Land Use plays a critical role in influencing the spatial pattern, character and livability of a community. A mixed-use development along the Harbourside Waterfront will create a vibrant destination anchoring the western end of the City and enhancing the waterfront experience along the North Shore. This development will yield significant community and financial benefits, not the least of which will be the increased employment opportunities from the accelerated development of office and retail space.

Local Context



Residential

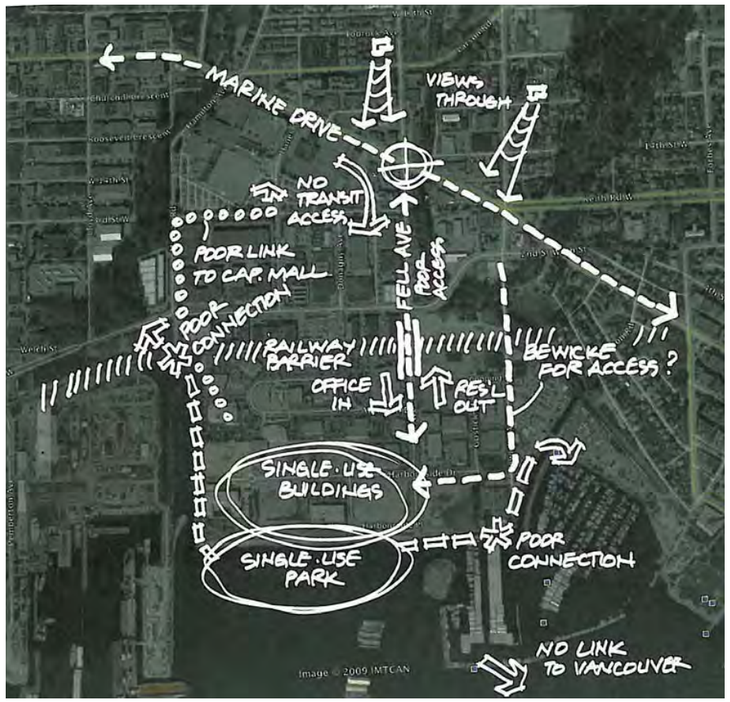
- Level One: Low Density
  Single Family Form
  FSR not to exceed 0.5 times the lot area
- Level Two: Low Density
  Attached Form
  FSR not to exceed 0.5 times the lot area.
- Level Three: Low Density
  Attached Form
  FSR not to exceed 0.75 times the lot area.
- Level Four: Med. Density
  Ground Oriented
  FSR not to exceed 1.0 times the lot area.
- Level Five: Medium Density
  Apartment
  FSR not to exceed 1.6 times the lot area.
- Level Six: High Density
  Apartment
  FSR not to exceed 2.3 times the lot area.
- Heritage Character Area
- Special Study Area
- City Boundary

Land Use Designation

- Urban Corridor
  (Mixed Use) FSR 2.3
- Harbourside Waterfront
  (Mixed Use) FSR 2.05
- Commercial
- Town Centre
  (Mixed Use) FSR 2.6
- Industrial
- School & Institutional
- Park, Rec. & Open Space

Local Landmarks

2.3 Constraints and Opportunities



Site Opportunities

Constraints and Opportunities

While Harbourside currently has some issues and challenges that impede its ability to achieve its full potential, such as:

- Poor vehicular access from Marine Drive
- Limited transit service
- Poor pedestrian, bicycle and recreational connectivity along the Spirit Trail
- No visual prominence as an important “pearl” along the green necklace
- Segregated land-use zoning promotes auto-use
- Limited use outdoor public space
- Difficult access to Capilano Mall
- Limited cultural, retail or other beneficial community uses
- Not the beacon of sustainability that it could be

…it also has many exceptional opportunities as well such as:

- Superbly located along the Spirit Trail
- Close to Marine Drive shopping and the Capilano Mall
- Waterfront views of the downtown Vancouver
- Views to North Shore Mountains
- Peaceful natural setting with ample natural habitat
- Working waterfront with close proximity to Seaspan
- Jobs and shopping nearby
- School and marina in close proximity
- Best dog walking spot on the North Shore

It is the purpose of this rezoning submission to address these apparent shortcomings and enhance these opportunities.

View South from Harbourside to Vancouver

2.4 Existing Lot Areas

A. 1.100 Ha B. 0.886 Ha 43. 0.630Ha 44. 0.630Ha 45. 1.660Ha

IMPORTANT : It is these parcel areas that are used to determine the floor space ratio allowable

2.5 Development Boundaries

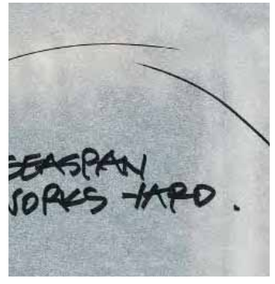
Future Park Improvements by the City

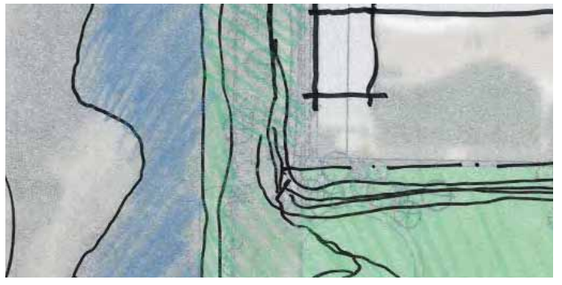
Affected Development Zone

A 1.095Ha B .0887 Ha C 1.239 Ha D 1.322 Ha

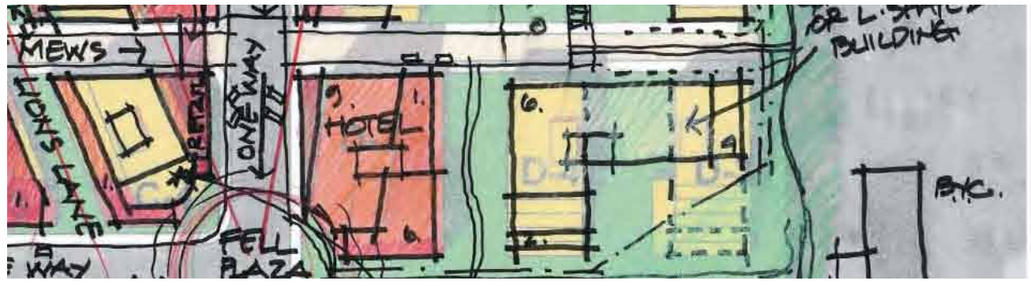
The proposed development area is comprised of 4 main parcel areas designated A,B,C, and D in addition to the park area to the south. Parcel A,B and C, are owned by Concert Properties, Parcel D is owned by Knightsbridge Properties.

Note : Areas shown are approximate


SEASPAN
WORKS HARD.




PODIUM
EXISTING COMM'L
NEW ENTRY
INTERACTIVE TREATMENT
BIKES + PEDESTRIANS
OBLIQUE VIEWS
RETAIL


MEWS
HOTEL
FELL PLAZA
ONE WAY
BUILDING

3.1 Urban Design Principles

Twelve distinct design principles have been identified for the Harbourside Waterfront development. They are:

1. Overall Development Form Legibility

Development is to create a legible overall form that reinforces the idea of “peaks and valleys” in which higher buildings oriented north south are interspaced with lower buildings oriented east west in order to frame views through to the north shore mountains and to the water, as well as to maximize light penetration into interior blocks.

2. Distinct Public Realm Character Precincts

The Harbourside Waterfront Public Realm consists of three neighbourhood precincts that derive their character from the transition from the natural character inspired by the riparian corridor of Mackay Creek and the western section of Kings Mill Walk to a more urban/village character at the Foot Fell Avenue where there will be a concentration of retail activity, to a ‘working’ Marine character on the west side of the site where the community interfaces with the adjacent Burrard Yacht Club.

3. Integrated Community

Integration of all sub-areas is to occur through street pattern, lighting, ground plane design, and overall building form.

4. Street Hierarchy

The street network is to maximize pedestrian access and permeability while limiting access and through traffic circulation for motor vehicles to high activity commercial areas and underground parking and service access.

5. Connected Public Open Space and Parks

Parks and public open spaces are to be central features in organizing the community, and open spaces are to connect with adjacent areas by foot and bicycle paths to create a walking and cycling friendly neighbourhood.

6. Integrated Transit

Development is to allow for an integrated bus connection to serve Harbourside and adjacent neighbourhoods with stops along Harbourside Drive.

7. Vibrant Commercial Heart

A vibrant commercial focus along the Foot of Fell Avenue and Harbourside Place is to act as a “heart” for the community, anchored by a public plaza and waterfront terrace at the foot of Fell Avenue, and activated by retail frontages along Fell Avenue and Harbourside Place.

8. Waterfront Animation

Development is to engage and animate the public waterfront through the selection of land uses and design of shoreline features.

9. Clustered Community Services

Development is to include a centrally located broad range of community services and amenities with good access to parks and waterfront.

10. Contextual Recognition

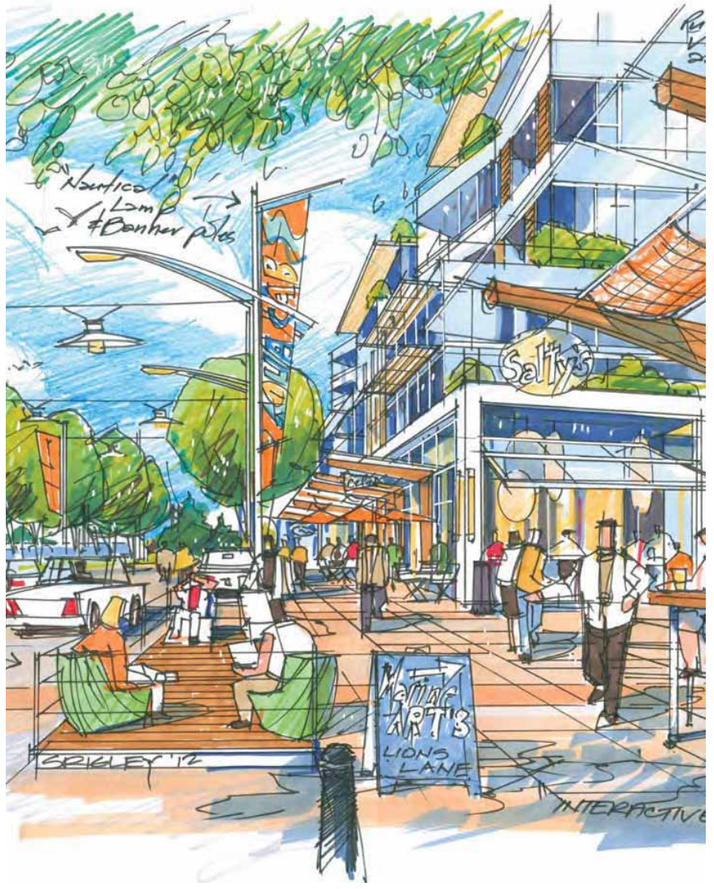
Recognition of adjacent patterns of natural features as well as industrial and marine activity is important in defining the character of the community.

11. Incremental Varied Development

Development is to encourage land parceling and a coordinated parking strategy that allows for incremental development at a variety of scales.

12. Demonstrated Sustainability

Harbourside Waterfront aims to demonstrate a comprehensive approach to sustainability reflected in both open space and building design.



3.2 Masterplan Structure

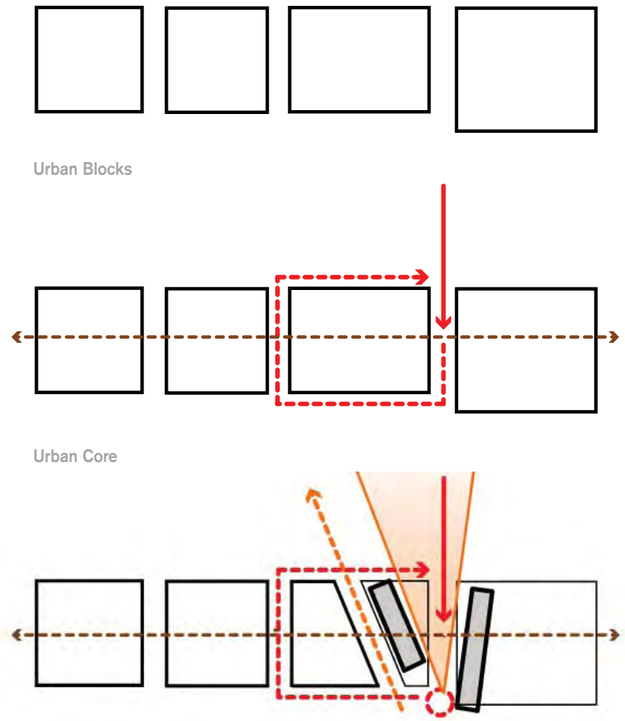
The heart of this mixed-use community is the central retail area down Fell Ave and across Harbourside Place which serves to provide a retail amenity for Harbourside Waterfront and the surrounding neighbourhoods, including Seaspan. A central “Mews” acts as the main connecting street to each of the parcels and their integral garden courtyards and provides a series of compressing and expanding visual experiences along its path. Harbourside Drive with its elevated “dock” path, both visually and physically, responds to the current sea level rise and places storefront work places opposite the commercial uses to the north.

Lions Lane provides a unique and very compressed street-like experience for pedestrians only and is comprised of multi-use artisanal work spaces with flats above, or residential townhouses. A semi-protected multi-purpose open space is publically accessible and is shared by all the users along this path.

A progressively phased park, both new and enhanced, responds to Harbourside Waterfront’s construction over time and expands Kings Mill Walk, originally provided by Concert to the community when Harbourside Business Park was first developed. The park also plays an important role in mitigating the effects of sea level rise and its risk to lives and property.

The Spirit Trail expansion is a critical part of Harbourside Waterfront and will be extended, together with the Kings Mill Walk, following consultation with the neighbours, City, and the greater community.

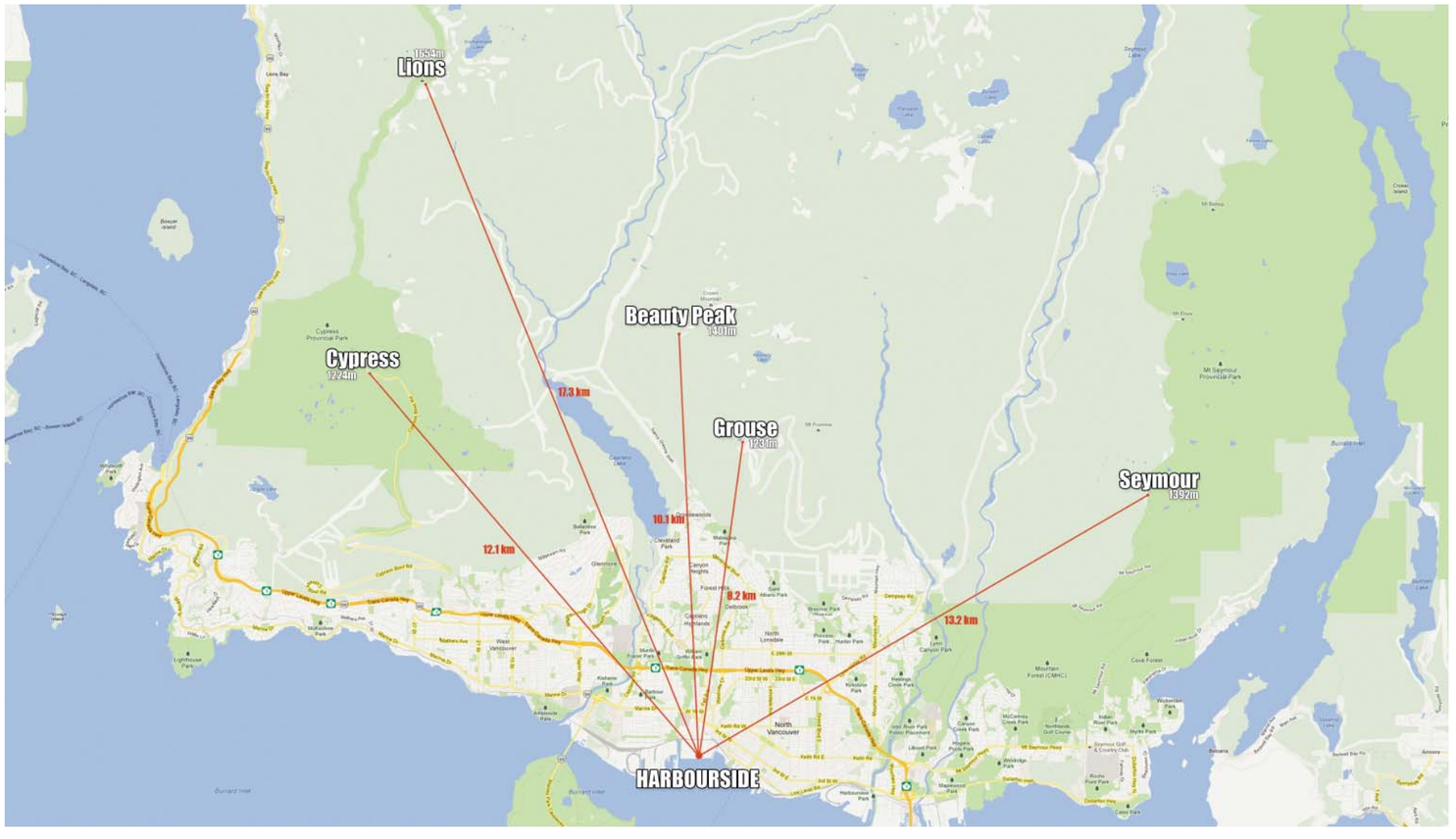
A. Large office complex located to provide buffer between the new residential areas and Seaspan Shipyards
B. Storefront offices along Harbourside Drive relate to the office and light industrial uses to the north
C. A special laneway frames an axial view to The Lions mountains and provides an opportunity for a unique kind of live and work accommodation.
D. Building forms splay to provide a panoramic view from The Lions to Grouse Mountain
E. Fell Avenue forms the “High Street” with shops on both sides and the water view entry to the development.
F. Taller buildings are orientated north/south to allow views through the site from within and from the north.
G. Public passages run throughout the project connecting streets and courtyards to the waterfront park and Spirit Trail
H. A hotel acts as the visual and functional anchor to the development and Fell Plaza.
I. Fell Plaza forms the activity intersection between the development and the Spirit Trail. It also forms the connection between land and water-based transportation.
J. Harbourside Place is an important “esplanade” street with spectacular views to the south and commercial retail to the north.
K. A substantial public space, with open weather protection provides for multi-purpose uses and events and relates to a “bike station” for public use.
L. Feature garden couryards provide open space along the central Mews, a beautiful overview, and use opportunities for the residents.
M. The Spirit Trail, for bikes and pedestrians, forms an important alternative east/west link along the north shore.
N. Courtyards expand, capturing and integrating park and water access and views to the south.



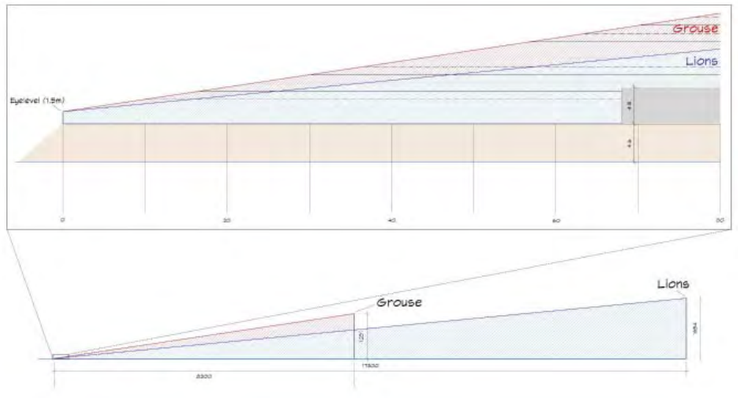
Conceptual Site Plan

3.3 Orientation Analysis

Views C,D,E



View Trajectory.
The diagrams below show the view trajectory to the landmark mountains peaks identified on the map, right. The sections demonstrate that the proposed scale of development will maintain direct visual links to these.



View A
Fell Plaza, as a major node along the Spirit Trail and terminus to Fell Avenue is highlighted as a position to capture a panoramic view of the mountainscape from The Lions to across to Grouse mountain. The buildings on either side have been set back to frame this spectacular view.

View B
Through-site potential has also been capitalized on Lot C with an angled axial view directly of the Lions. The passage is intended to be named Lions Lane in recognition of this special view.

View C, D, E
Other views of the mountains are possible through street extensions and courtyard passages through the development areas.

View B

View A

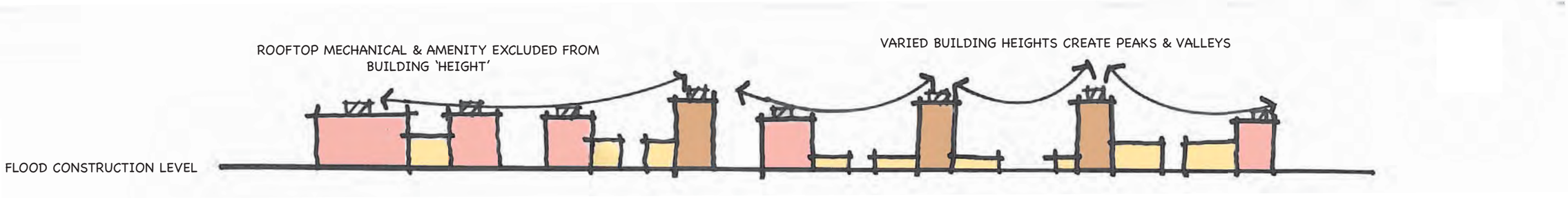
3.4 Scale and Massing

In response to desires from neighbours to the north and up the mountain foothills to enjoy the views to Vancouver and the water, tall buildings have been massed generally in a north/south orientation with lower buildings oriented in an east/west orientation. Heights have been calculated from the new FCL to the top of the main roof slab, with mechanical uses and rooftop amenity spaces exempt from this height calculation.

In accordance with the OCP Amendment, four buildings are proposed to have heights of 27.5m (90'); with the remaining buildings having a maximum height of 21.3m (70'). Gaps have been created between buildings and courtyards for more close range views through.

Buulding Elements 6m to12m (20' to 40') in height are intended to create a friendly interface with the park and Spirit Trail to the south. The proposed hotel on sub-area D and the south most buildings on sub-area A are planned to contravene this principle as a means to reinforce their landmark status.

Scale and Massing Axonometric Sketch



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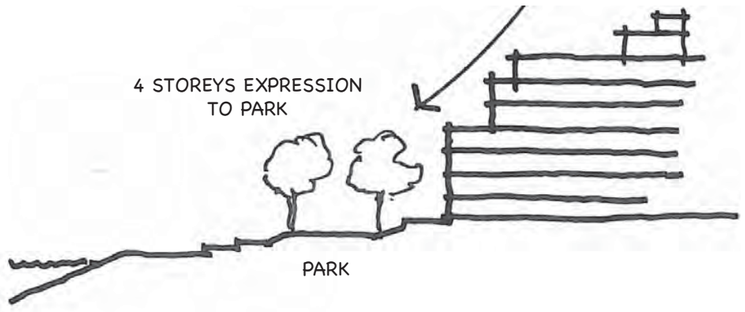
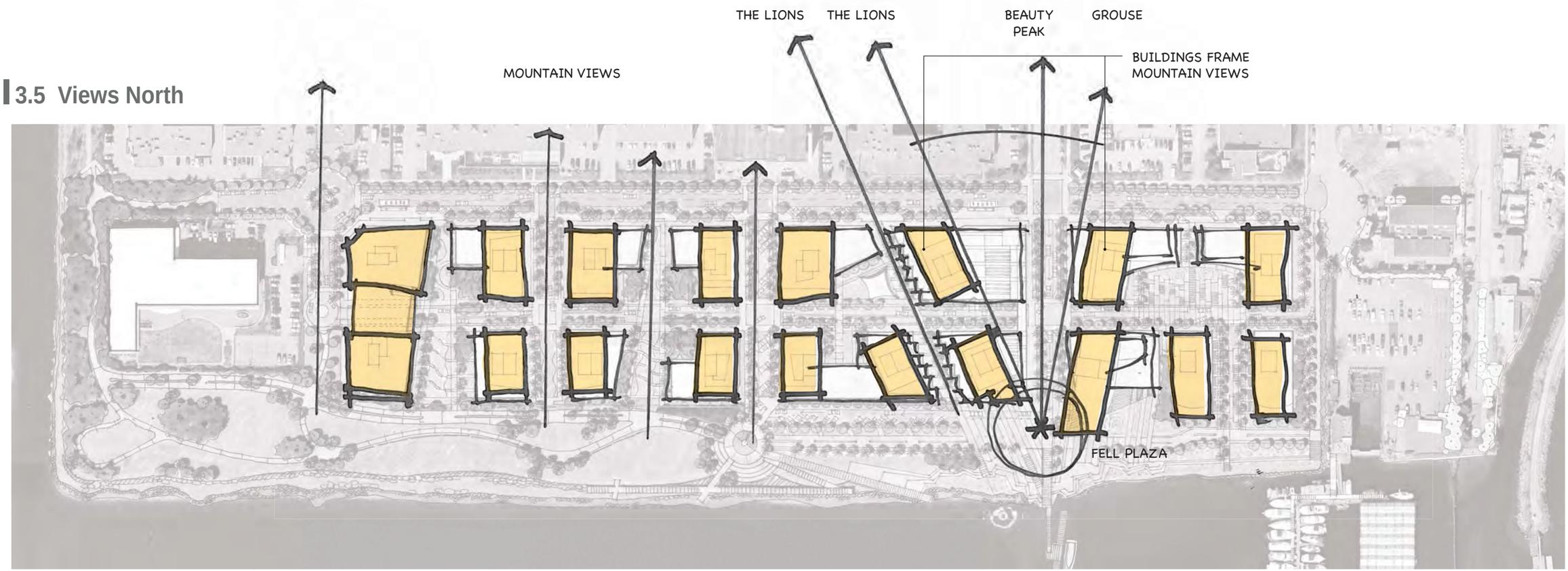


HIGH	27.4M	9 STOREYS RESIDENTIAL - HOTEL
MID	21.3M	4 STOREYS RESIDENTIAL 5 STOREYS OFFICE
LOW		VARIES 1 TO 4 STOREYS

3.5 Views North



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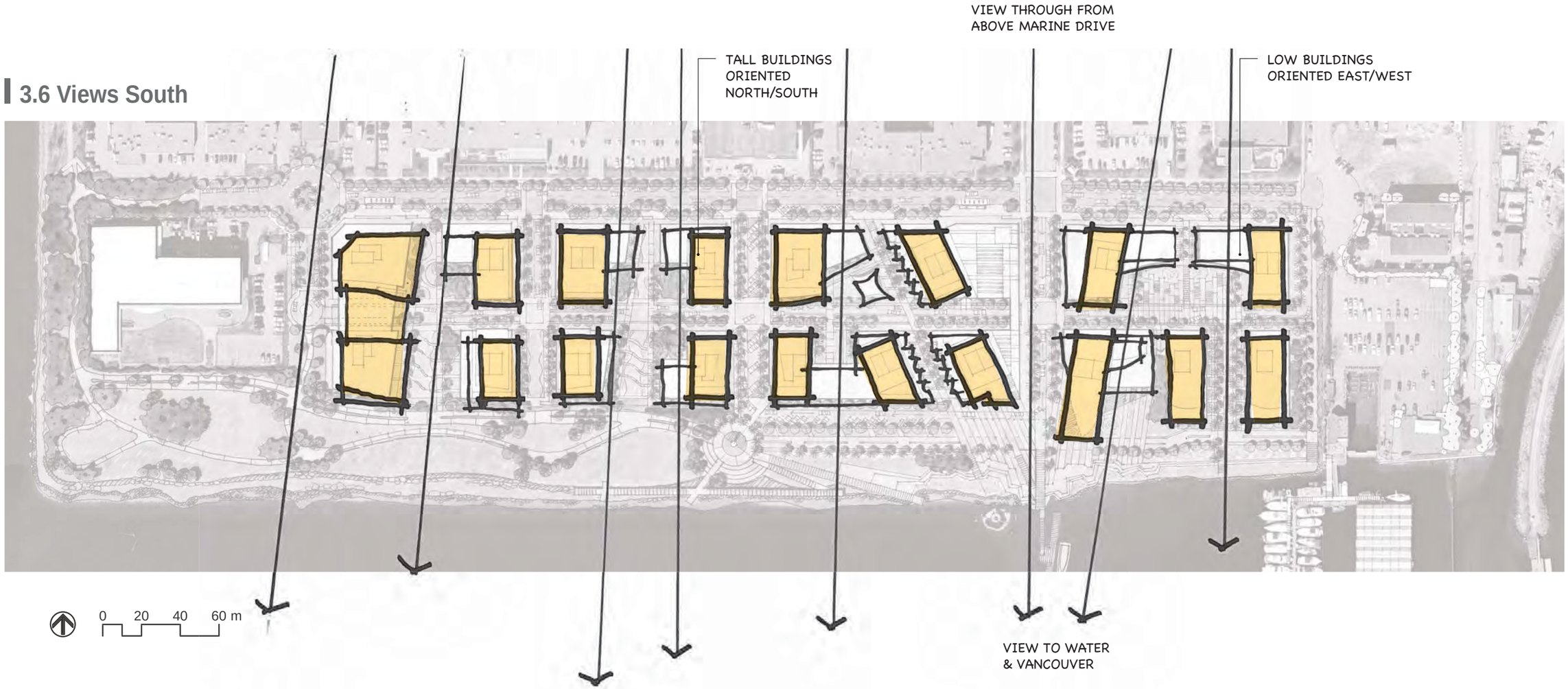
As important as views through to the water and Vancouver have been to the massing development of Harbourside Waterfront, the public process has indicated a similar concern for views of the mountains to the north. The building forms have been molded to facilitate these views. Lions Lane has been carefully articulated to provide an unobstructed view to The Lions and Fell Avenue Plaza with views to Crown and Grouse Mountains.

3.6 Views South



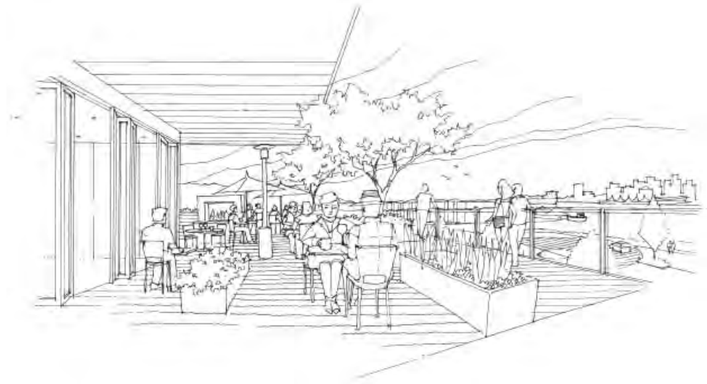
3.7 Context & Connectivity


Spirit Trail - Primary Route
Spirit Trail - On-road Route
Spirit Trail - Interim Route
Mackay Creek
Pedestrian Overpass
Bonker Creek
Mosquito Creek
Fell Avenue
Bridge Gateway
Harbourside Drive
KingsMill Walk Park
Bewicke Park
Mosquito Creek Marina
Seaspan Shipyard
Sea Bus Terminal

Open Space

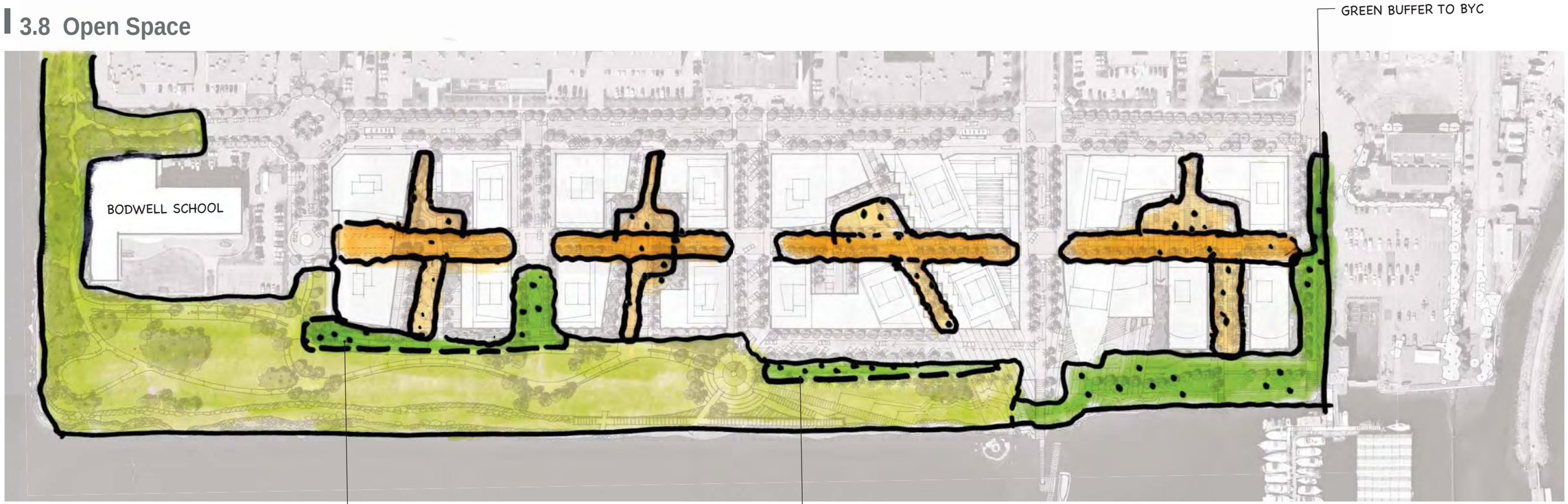
New dedicated park areas have been created in response to public input. A substantial new park on Lot D helps to extend the existing park to the east and a new public plaza at the foot of Fell Avenue further expand the public realm. A 5m widening of the park expands the existing park, helps to accommodate the Spirit Trail, and helps to mitigate effects of sea level rise, and a triangular park wedge to the west (on sub-area D) expands the existing park and helps transition park area in front of Bodwell School. A total of approximately 600 m2 of park has been added.

In addition to the park area, a considerable increase in public open space is being proposed. The central Mews provides pedestrian and vehicular access through the centre of Harbourside Waterfront and combined with portions of the courtyards increases the amount of publicly accessible surface parking for visitors. Publicly accessible pedestrian passages connect from Harbourside Drive through the courtyards to the park. A total of approximately 4800 m2 of public open space has been added.



View of second floor public rooftop

3.8 Open Space



Public Realm Concept

The heart of this mixed-use community is the central retail area down Fell Ave and across Harbourside Place which serves to provide a retail amenity for Harbourside Waterfront and the surrounding neighbourhoods, including Seaspan. A central “Mews” acts as the main connecting street to each of the parcels and their integral garden courtyards and provides a series of compressing and expanding visual experiences along its path. Harbourside Drive with its elevated “dock” path, both visually and physically, responds to the current sea level rise and places storefront work places opposite the commercial uses to the north.

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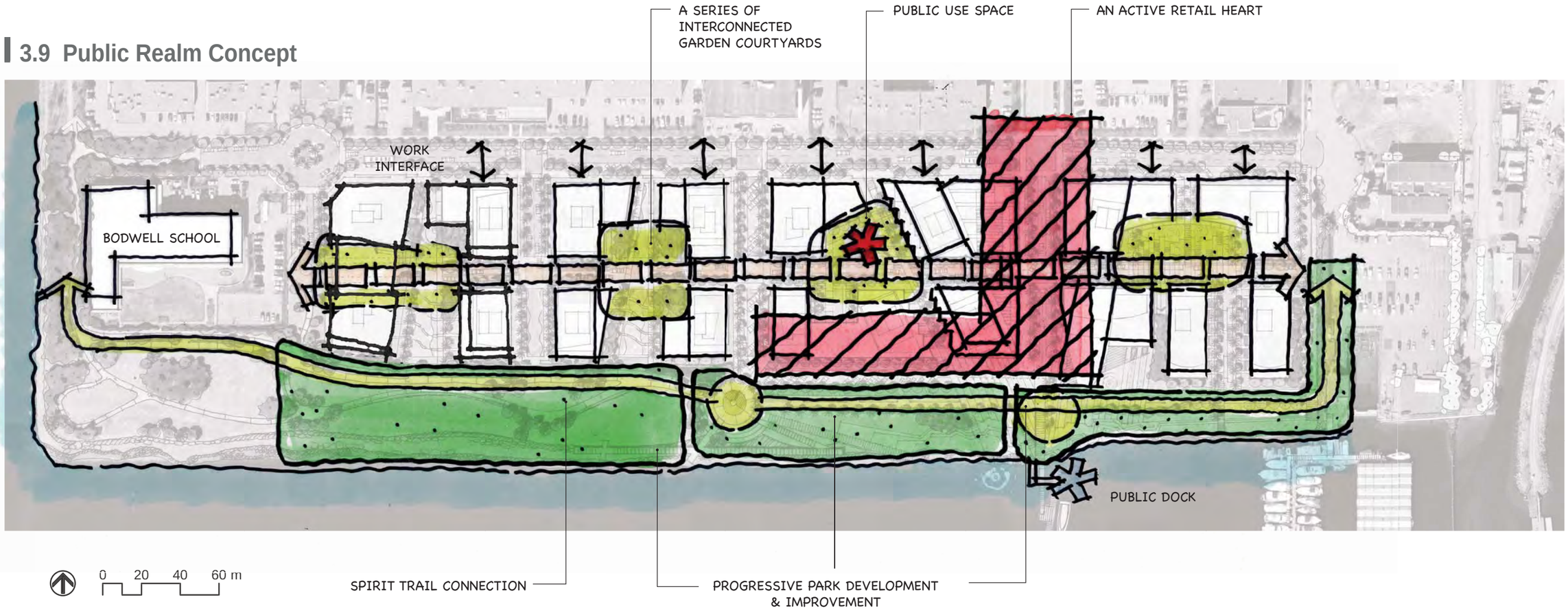
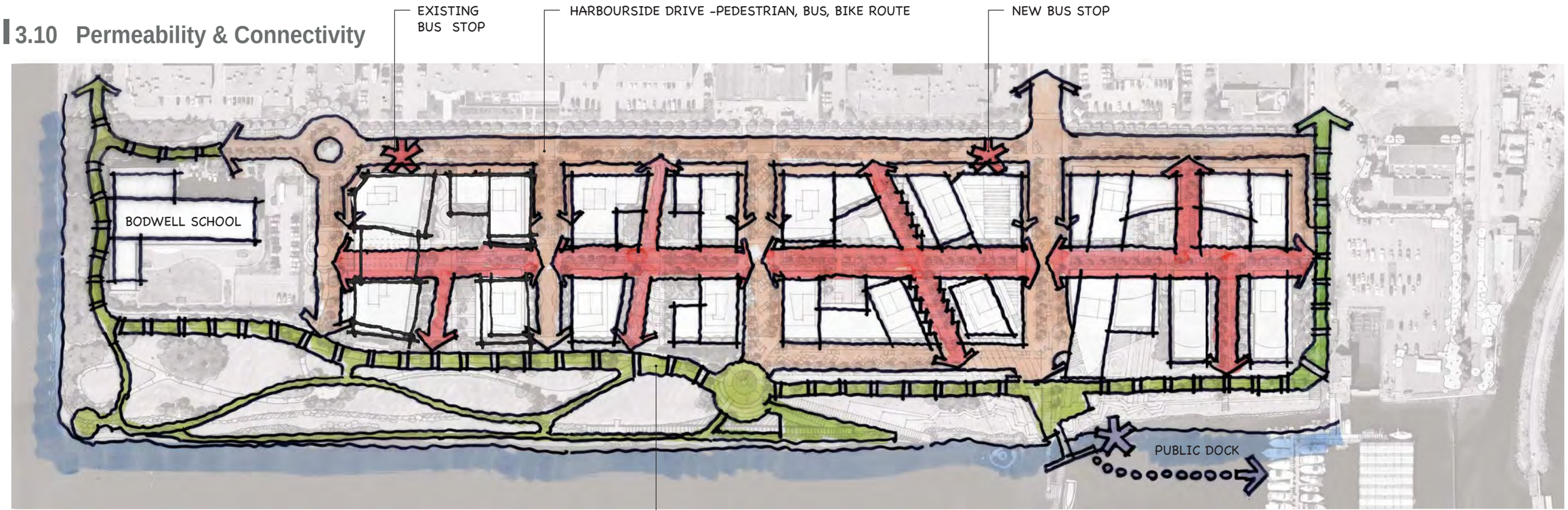
3.9 Public Realm Concept

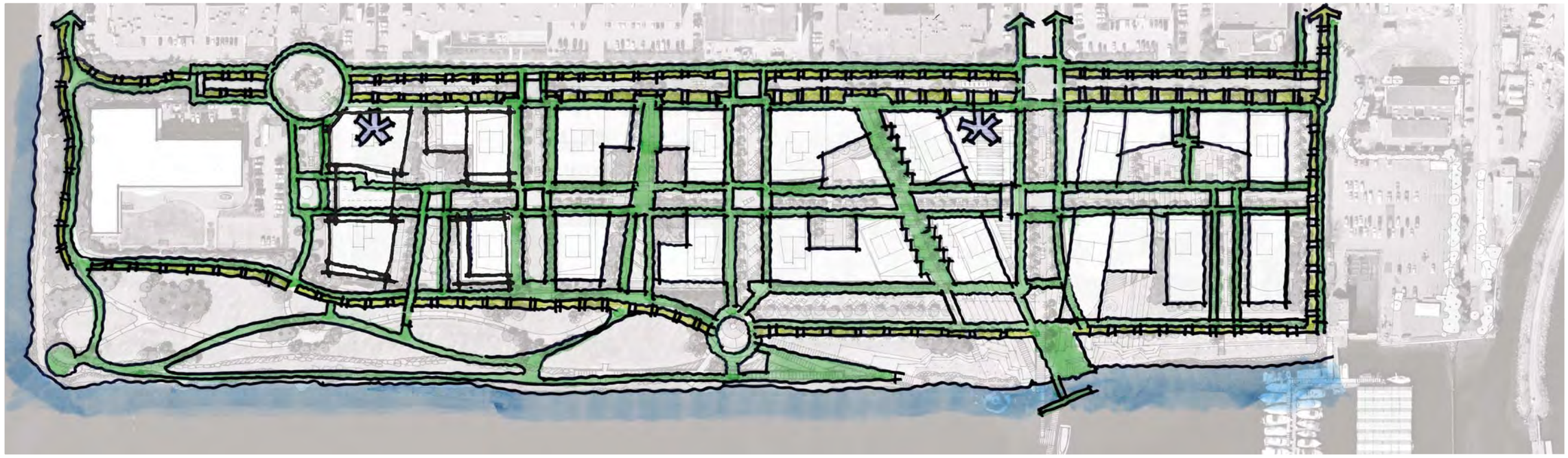


3.10 Permeability & Connectivity



A fine grain network of streets, lanes and pedestrian linkages provide for a high degree of permeability and connectivity for cyclists, pedestrians and vehicles. Two bus stops provide access to bus service and a ferry float is proposed at the foot of Fell Avenue for future ferry service. A normalized street grid through the site provides for improved vehicular circulation with the option of closing off Harbourside Place without limiting access to Harbourside Waterfront. Each sub-area would also provide north-south and east-west pedestrian access through mid-blocks, further improving connectivity between the private development and the park/waterfront. The Spirit Trail becomes the primary east-west connector linking Harbourside with Lower Lonsdale and West Vancouver for cyclists and pedestrians.

3.11 Pedestrian, Bikes & Transit



0 20 40 60 m

Harbourside Waterfront is a part of a new east west necklace of waterfront developments connected by the Spirit Trail, providing connectivity to West Vancouver, Lower Lonsdale and beyond. The community is easily accessible by the Spirit Trail, Fell Avenue and Bewicke Avenue enabling access to the Sea bus, Lonsdale Quay, and the retail and employment services along the Marine Drive corridor are within a matter of minutes on foot or by bike. Enhanced bus service will also improve transportation choices before resorting to private automobile use to access destinations within the community.

3.12 Shoreline Concept

0 20 40 60 m

Kingsmill Park and the easterly park extension can be separated into a series of distinctive program/use areas.
Area A includes the dog park and passive open space takes on an informal, naturalistic quality that extends from the riparian zone along Mackay Creek. Moving eastward the park becomes progressively more urban, transitioning into a more actively programmed waterfront, Area B, that includes a perched view deck, shoreline play area and seating terraces. The Fell Avenue Plaza, Area C, becomes a larger pedestrian 'landing' with a food and beverage kiosk with public washrooms, wharf and pier extension. The east extension of Kings Mill Walk, Area D, includes boardwalk segments fronting onto a perched beach that anticipates programming including volleyball, picnicking and sunbathing during the summer months with terraced access to the water's edge though an urban saltwater marsh.

3.13 Key Shoreline Elements

The shoreline character is defined through both the character of built form as well as open space. The waterfront is linked by the Spirit Trail which becomes a continuous thread lining distinctive moments or nodes along its path. A landmark residential building defines and creates a sense of arrival/departure at the most westerly extent of Harbourside Waterfront, as well as at the foot of Fell Avenue with the introduction of the waterfront hotel. Important nodes in the park space include a children's park alongside the perched view deck, a landmark sculpture and plaza defining the eastern end of Harbourside Place, and the Foot of Fell that is characterized as a pedestrian 'landing' with a food and beverage kiosk, wharf and pier extension.

Primary Uses

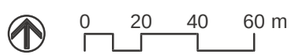
The area has been conceived as a complete, integrated, mixed-use community

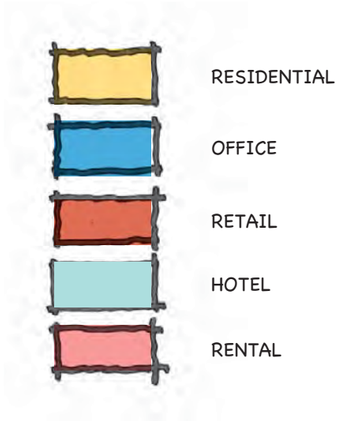
General allocation of uses as per the current OCP amendment and, with the exception of Rental which is not counted in FSR calculations, are distributed similarly within the Concert and Knightsbridge properties as follows;

Market Residential	1.35 FSR
Commercial (includes Office, Hotel and Retail	0.70 FSR
Rental (bonus density not counted in FSR)	0.15 FSR

Primary Land Uses - Axonometric

3.14 Primary Uses





Primary uses

The project has been designed as a complete and integrated mixed-use community with opportunities to live, work, shop, play and go to school. The shopping area at the foot of Fell Avenue and Harbourside Place are intended to be the heart and energy centre for the development.

Commercial uses have been maintained to the existing ratio of land as well as that of the OCP Amendment. A hotel forms the key landmark piece to the east of Fell Plaza atop this retail district. Residential uses distribute evenly across the site with an office “buffer” to the west between this area and the re-energized Seaspan Shipyards. This is placed for ease of access and to provide an acoustic buffer to the residential uses. Storefront offices form a connection to the light industrial uses found along Harbourside Drive.

Access and Parking

Generally speaking 1 to 2 levels of underground parking will serve each of the four principle parcels. 1 ramp to each parcel is anticipated in order to minimize curb cuts and disturbance to the street character. Access is proposed to be provided at aproximately 5.04 m, clkose to the elevated Flood Construction Level (FCL) along the Mews system or alternatively to the south of the Mews and off of the north/south streets.

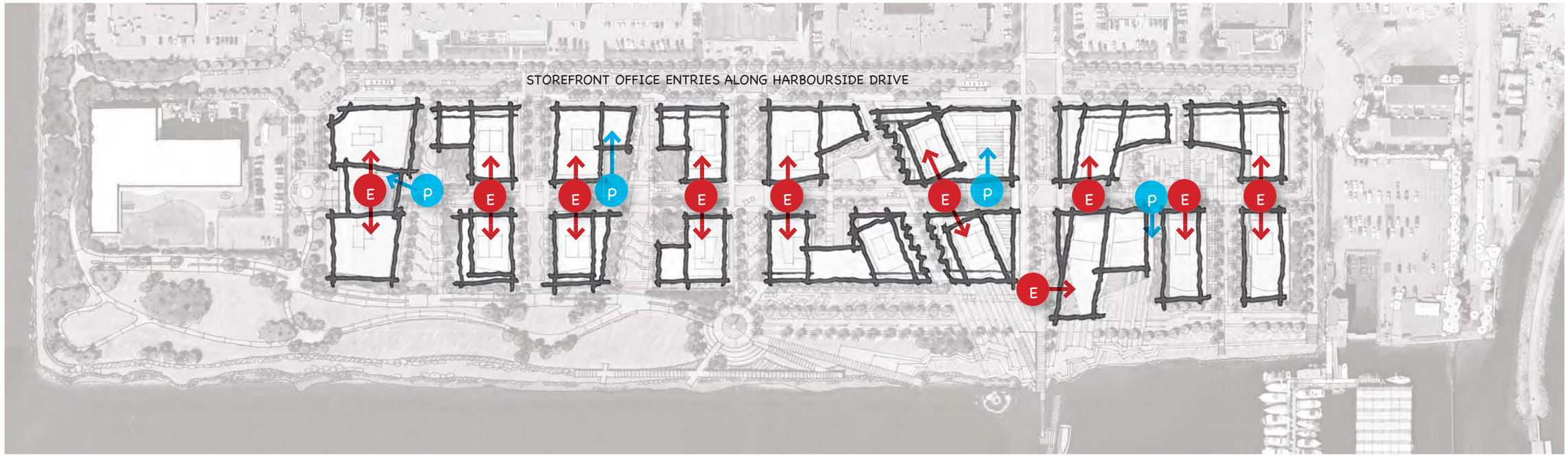
Pedestrian access to entrance lobbies will similarly be at the FCL and placed along the Mews and alternatively on the north/south streets to the south of the Mews. Individual unit entries will be located in residential buildings on the north south streets as well as along Lions Lane.

Ratios

Vehicle Parking
1.5 space / Unit - Residential
4 spaces / 1000sqm - Commercial

Bicycle Parking
1.3 spaces / Unit - Residential
1 space / 36sqm - Office
1 space / 31sqm - Retail

3.15 Access & Parking



Street Types

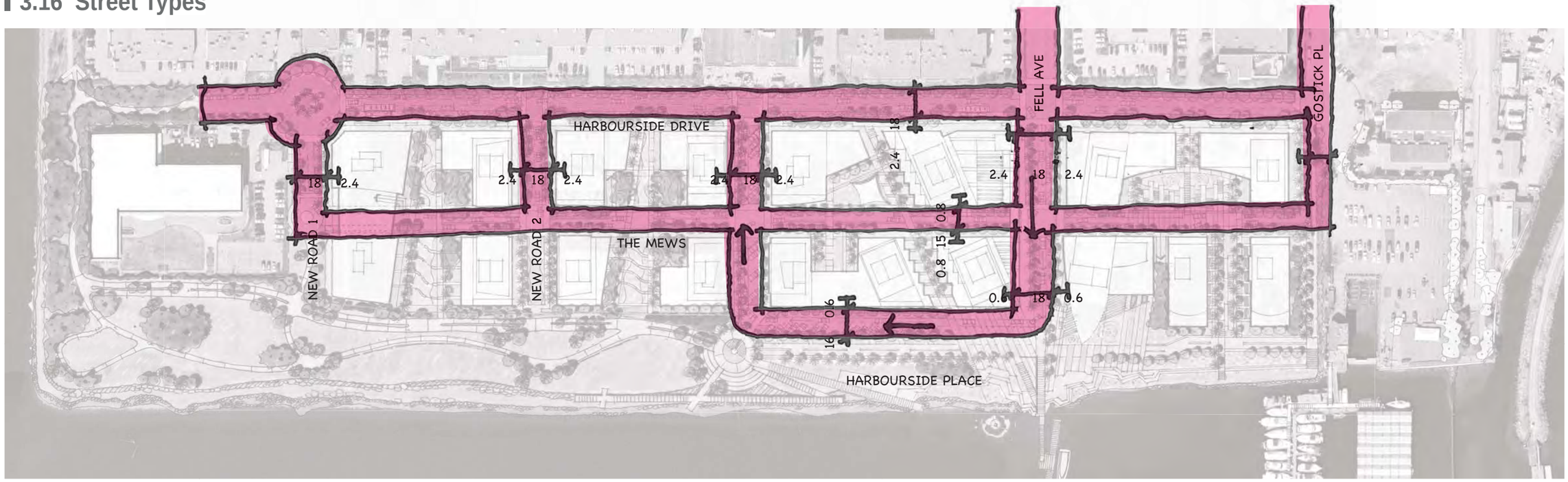
A variety of street types are proposed for the overall development including modifications and extensions to existing north/south roads, modifications to Harbourside Drive, and the introduction of a new central “Mews” connecting the various sub-areas.

The streetscape environment is intended to be an important part of the public realm in terms of defining the distinctive character of the community. The working waterfront-oriented character is defined through the use of distinctive ground plane materials, lighting, planting, street furnishings and spatial modulation between built forms that define the street walls and elevation changes. Each street is intended to be unique in terms of its spatial definition and character as a means to define a variety of unique corridors within the community.

Streetscape design at Harbourside Waterfront emphasizes pedestrian walkability though the provision of generously-sized sidewalks, seating and a high degree of permeability through sub-areas. Vehicular traffic is slowed through “shared space” street environments along Harbourside Place and the east/west Mews. The lines of separation between the pedestrian realm and vehicular realm are intended to become decidedly blurred to increased awareness between transportation modes, and to discourage a sense of entitlement among each transportation mode whether it is motor vehicles, cyclists or pedestrians. As an example, bollard separation is favoured over curbs and special paving runs continuously across the pedestrian and vehicular space to create the sense of a singular space.

In response to the sea level rise, many of the pedestrian walkways are elevated above the street to meet the required elevated building grades for the new flood construction level (FCL). The response to grade change has created unique opportunities to modulate level changes with steps, ramping and a variety of seating conditions that are oriented to the street and encourage a greater pedestrian vitality and animation in the public realm.

3.16 Street Types



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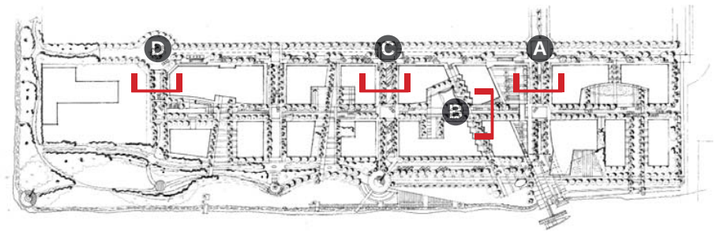
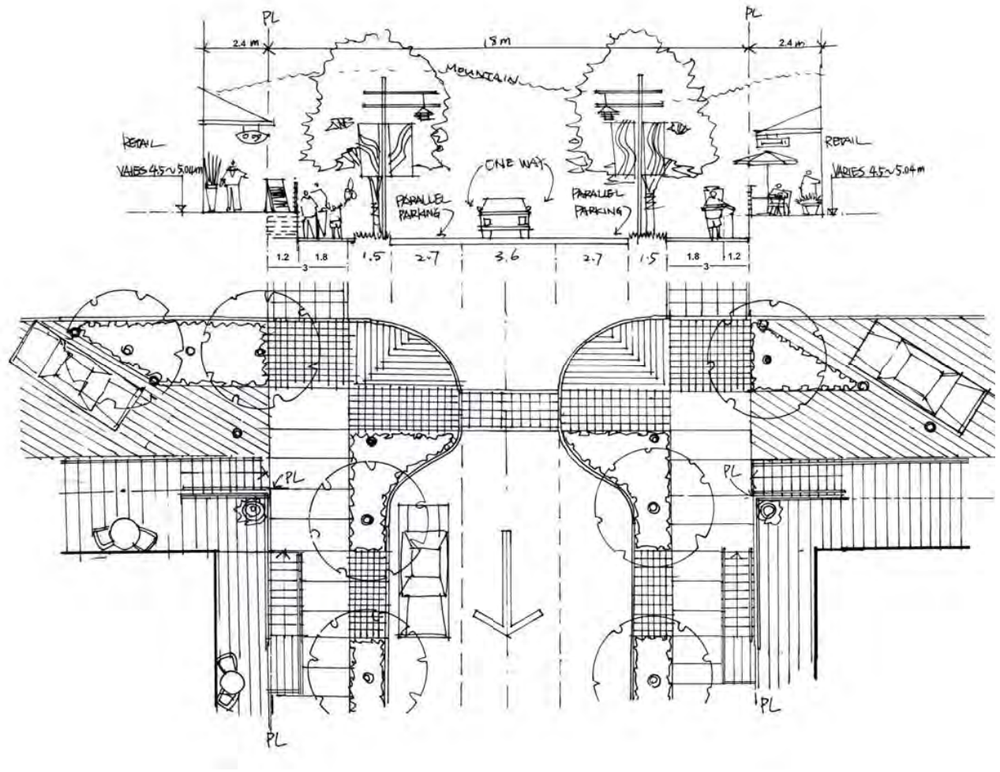
2.4 6.0 2.4

SETBACK ROW ONE WAY

3.17 Street Types - Sections

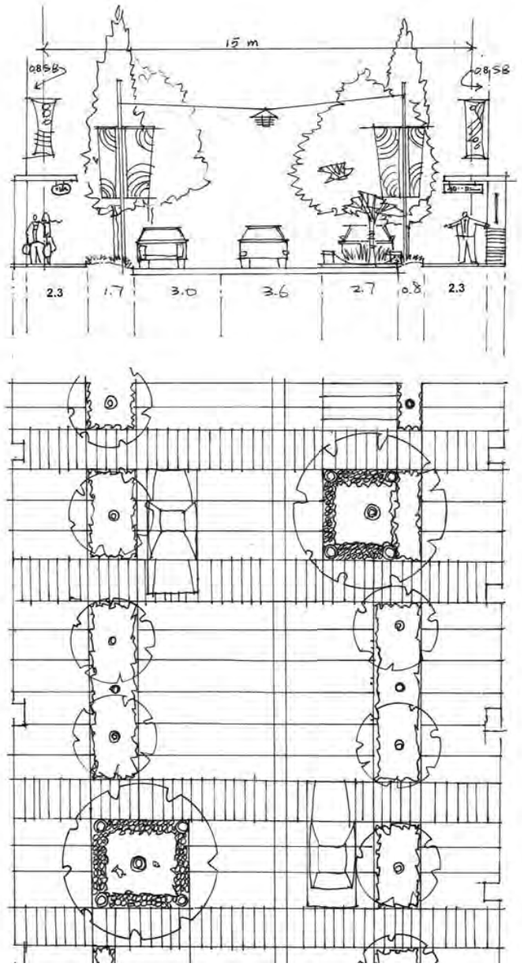




A. Fell Avenue

Fell Avenue south of Harbourside Drive is proposed to be changed to one-way, with parallel parking on both sides of the street. Parallel parking framed by tree-lined boulevards along Fell contribute to an urban streetscape environment that maximizes views to the water. The one-way traffic pattern affords a reduction in row width from 20m to 18m.

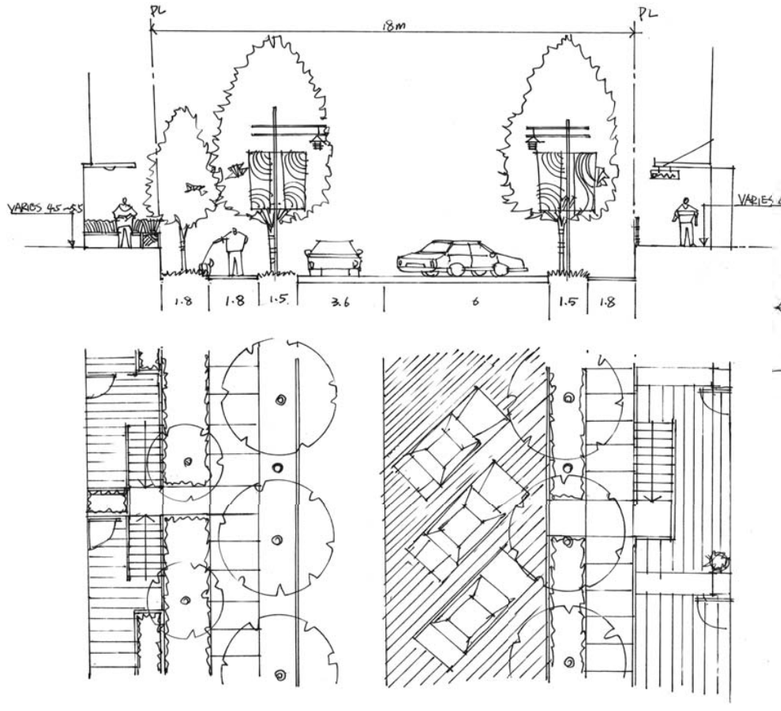
The north section will have elevated “dock” commercial access walkways and a minimum building setback of 2.4m with an elevated walkway extension of 1.2m into the ROW. The road and lower sidewalks will ramp up at 5% to the new Mews and will be universally accessible. Grade changes between sidewalks are defined by steps and seating edges that create greater pedestrian comfort and amenity in the streetscape environment.



B. The Mews

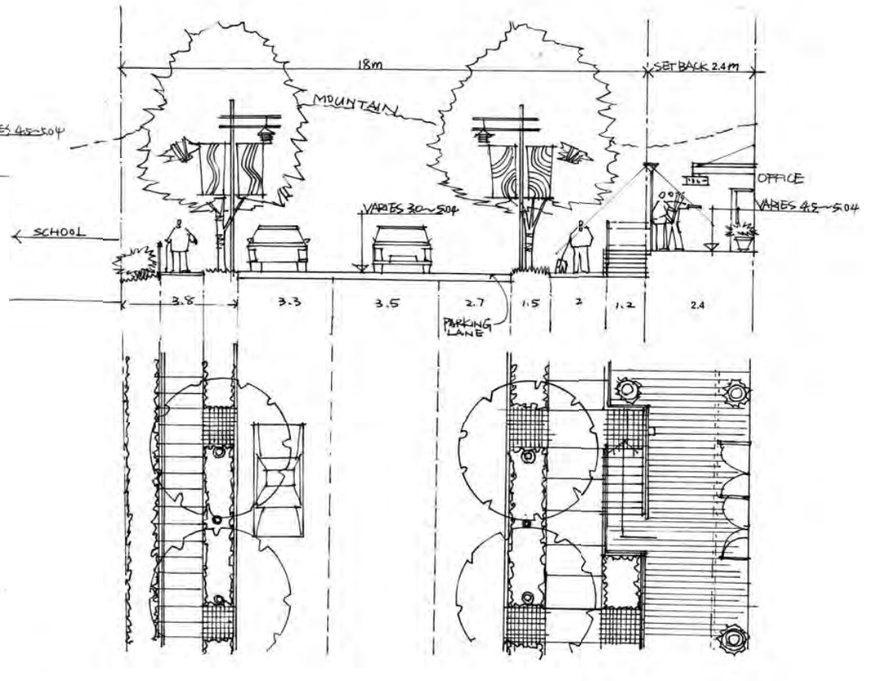
This new street is intended to be the main connector between the various sub-parcels. Character-wise, it is designed to be an intimate traffic calmed, pedestrian oriented laneway. The ROW is proposed to be 15m with a minimum building setback of 0.8m for building ends conditions, with open courtyards expanding the visual width of each of the parcels. It will be raised up to very close to the new FCL.

The new street is intended to be a “woonerf” style laneway with alternating bands of trees and bollards to create narrower stretches that help to slow traffic. Bollard separation over a continuous expanse of special paving creates a singular street environment while providing safe separation of pedestrians and vehicles. Alternating stretches of parallel parking are provided for public use and limited time drop-off and loading. Catenary lighting over the Mews creates a more intimate scale and ambiance by creating an overhead “ceiling” of suspended lighting over the space while minimizing the need for conventional streetlight light standards.



C. Harbourside Place (North - South)

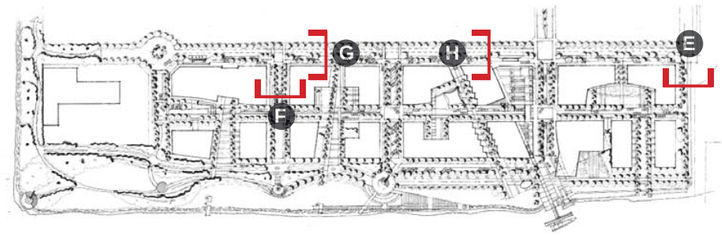
This is a one-way road with 3.6m wide travel lane and 6m wide 45 degree angled parking. A road modification is being proposed to ramp down to the north from the Mews at 5% slope with sidewalk on both sides of the road to access the office and residential spaces.

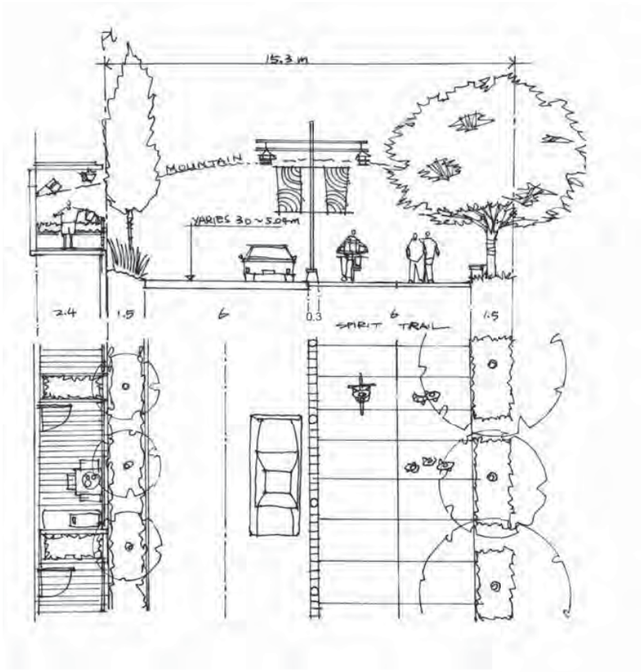


D. New Road 1

An existing 18m ROW extends south from the Harbourside Drive turnaround. It is proposed that this ROW will become a new road that will ramp up to the elevation of the Mews. The road is intended to provide vehicular and pedestrian access to the Mews and pedestrian access to the park. An elevated path system is proposed to access the offices to the east and will display an attractive exposure to Bodwell School to the west.

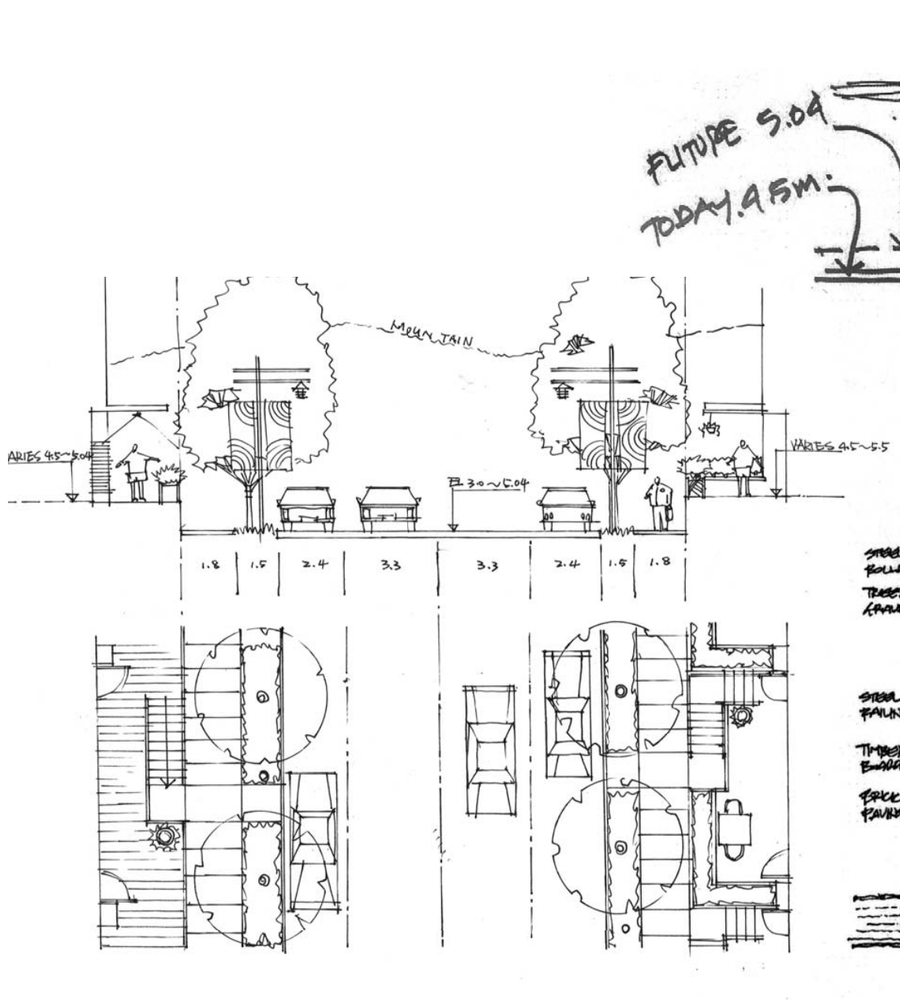
3.17 Street Types - Sections





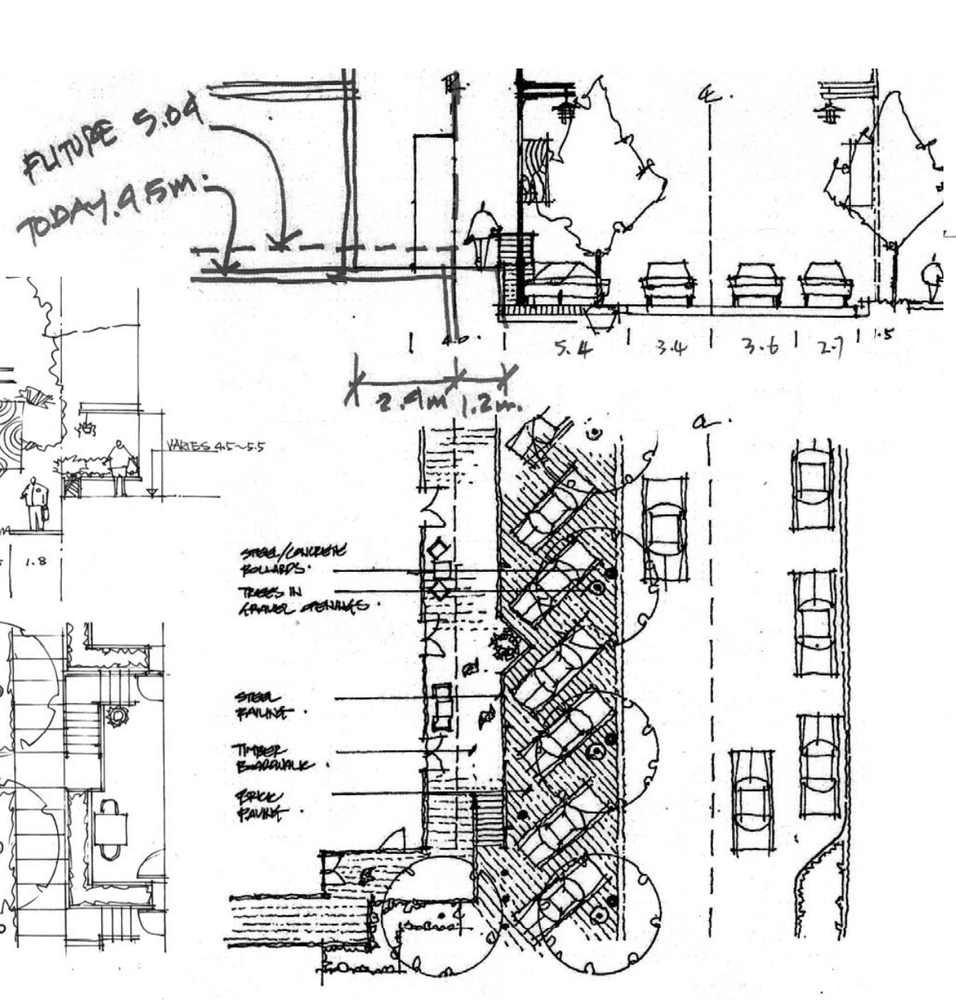
E. Gostick Extension

An extension of Gostick Place is proposed to the south to provide road access to the Mews. Its character and materiality would be an extension of the Mews with special paving, a narrow street width and bollard separation from the pedestrian path. It will ramp up close to the proposed new FCL and will be shared with the Spirit Trail linkage to connect to Bewicke Avenue. Attention will be paid to display an attractive exposure to the Burrard Yacht Club to the east. The road is intended be a 15.3 m ROW, with 6 m dedicated for the Spirit Trail. Buildings will be set back at a minimum of 2.4m. The Gostick Place extension will also provide a buffer between sub-area D and the Burrard Yacht Club.



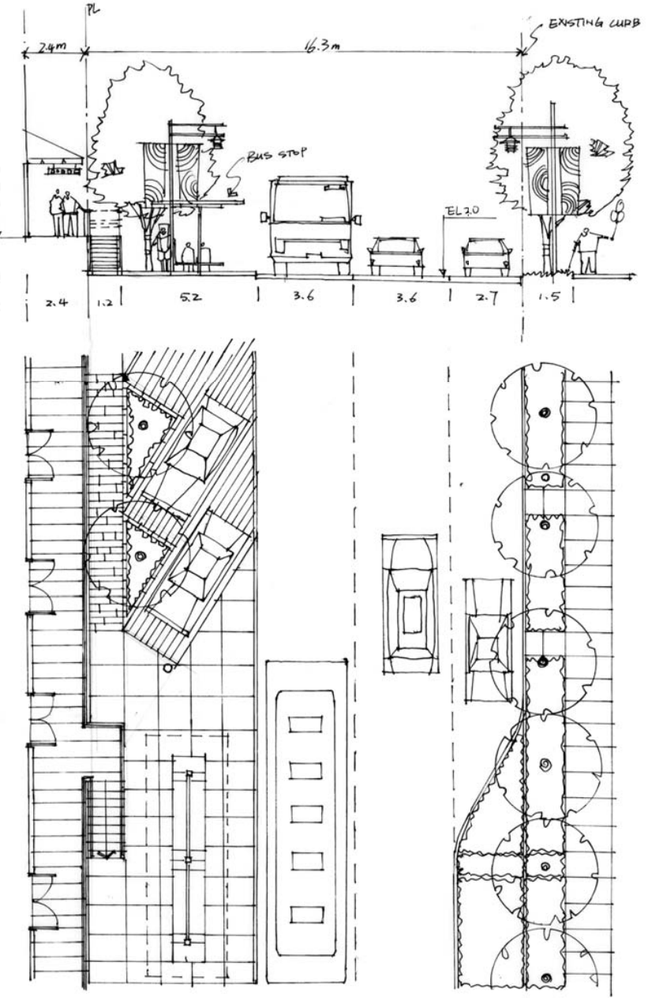
F. New Road 2

This 18m ROW has a roadway north of the Mews with a 6.6m width and parallel parking on each side. The north end is being proposed to ramp down from the Mews to Harbourside Drive at 5% with elevated walkways on both sides of the road to access the office and residential spaces. The ROW portion south of the Mews is dedicated to public passage to the park.



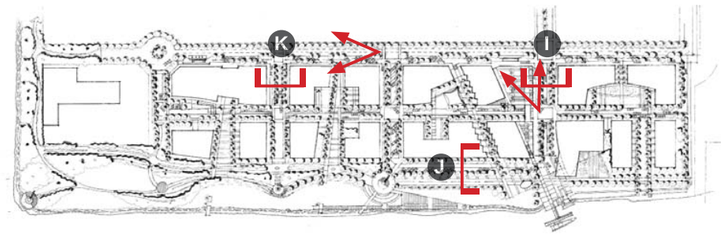
G. Harbourside Drive

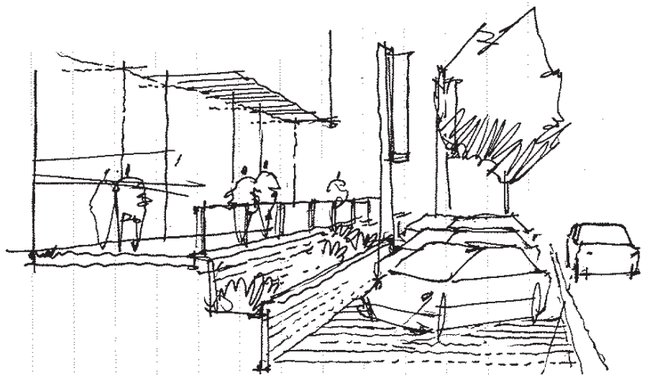
Harbourside Drive is a unique situation in that it will remain at its existing elevation of approximately 3.0m; until such time it could be raised by the City. Storefront offices along Harbourside Drive have been lowered to 4.5m to maintain a suitable exiting distances to grade. These spaces have been designed with over-height ceilings and can be adapted in the future by raising the finished floor elevation to the new FCL when Harbourside Drive is raised in the future. Raised walkways will provide access to the offices and borrow 1.2m of the ROW for that purpose. The south side of the street provides pockets of angled and parallel parking with the north side remaining as parallel parking. Lay-bys will be provided for transit along with transit infrastructure (bus stop, shelter, signage, etc.). The street also incorporates the on-street Spirit Trail route.

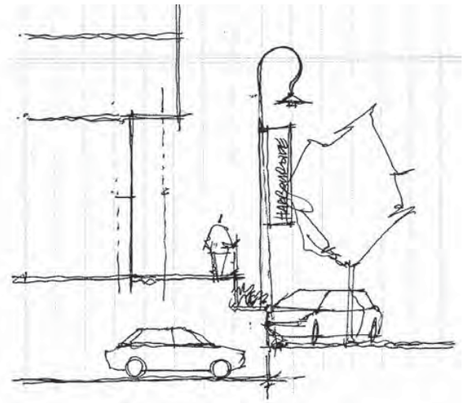


H. Harbourside Drive (Bus Stop)

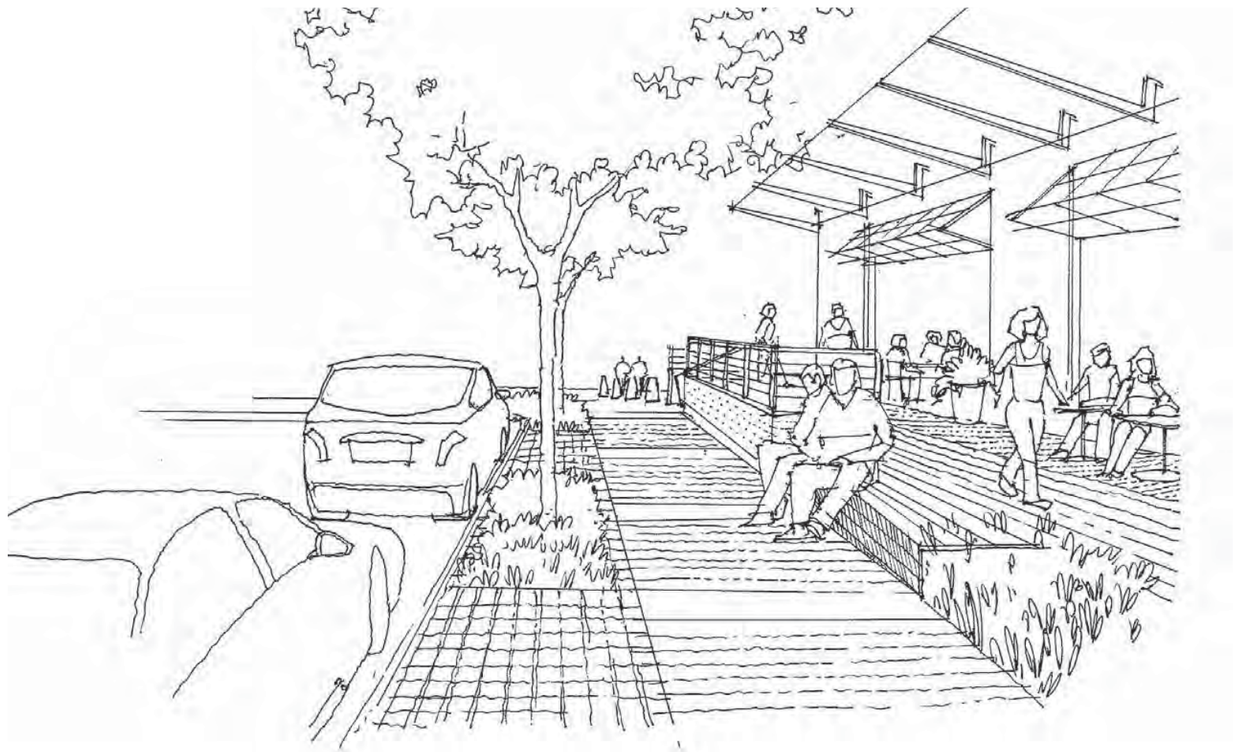
3.17 Street Types - Sections



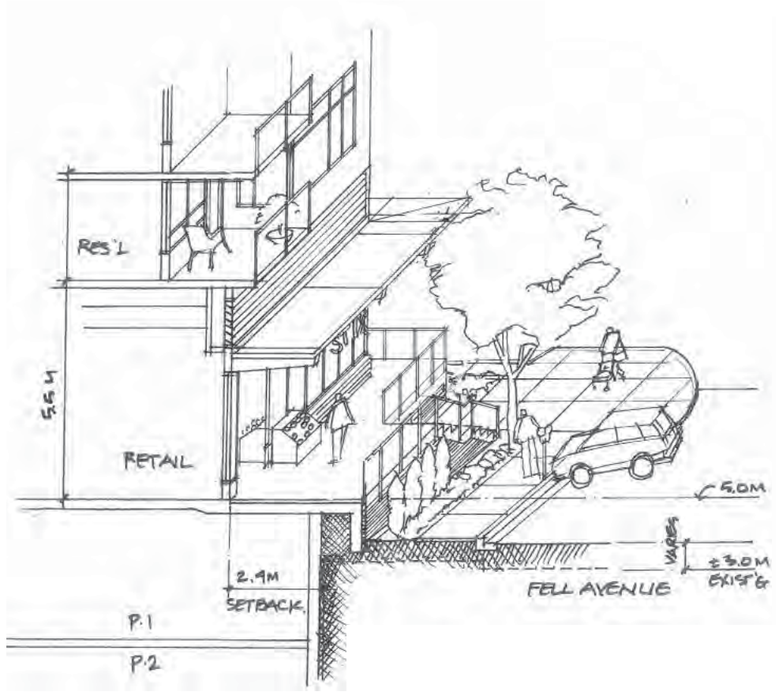




Perspective of elevated walkway and angled parking interface along Harbourside Drive

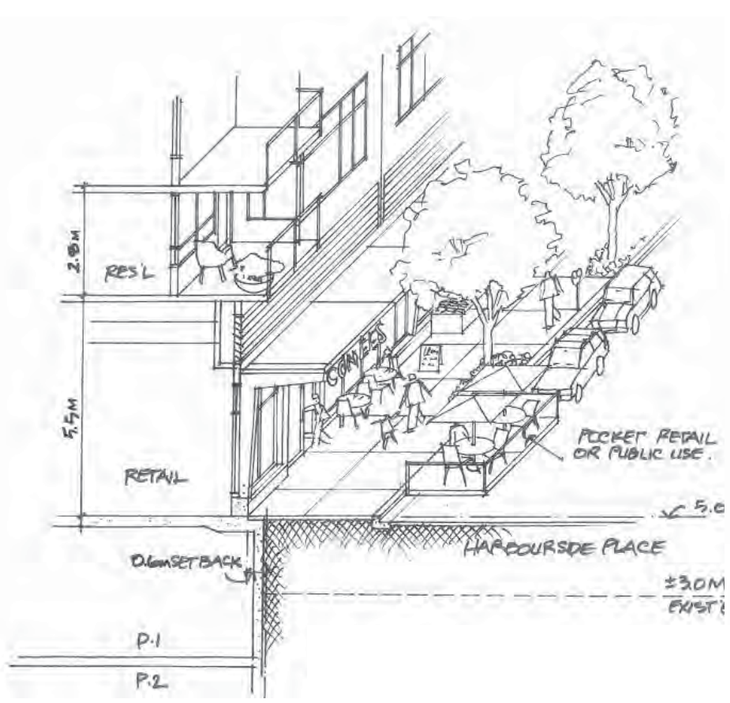


Section of seating step and elevated walkway along Fell Avenue



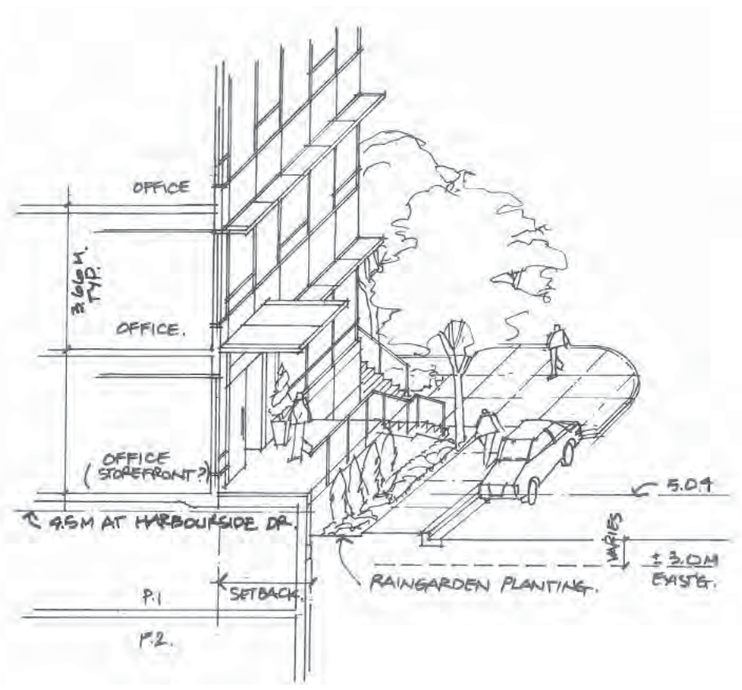
I. Fell Avenue North - Retail

As part of the project's response to sea level rise, the north end of Fell Avenue will ramp up to the FCL. This makes it necessary to provide an elevated walkway system to access retail shops in this area. Buildings will be set back 2.4m and the walkway will extend out into the ROW by 1.2m. Steps will provide access on the corners.



J. Harbourside Place - Retail

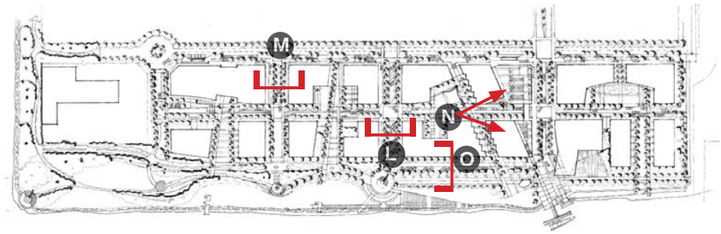
Harbourside Place will respond to sea level rise with an adaptive design. A more conventional flush relationship between shops and sidewalks is proposed here. Floors could be raised by 0.2m as time progresses to meet the new FCL. Opportunities for pocket retail pods occupying parking spaces are seen here to further activate the street.

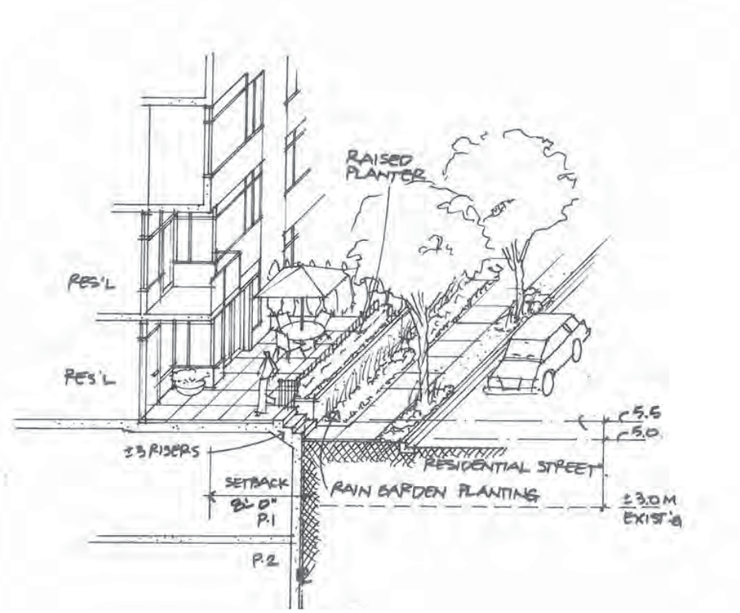


K. New Road - Office at Harbourside Drive

Like the north end of Harbourside Place, the road ramps up close to the new FCL and requires an elevated walkway system to provide access to the storefront offices at its base. In some cases, this will be reserved as terrace space for the ground floor tenants and public access will be blocked. An 8' building setbacks is being proposed from property line. Brick, together with planting screens, will provide an attractive exposure to Bodwell School to the west.

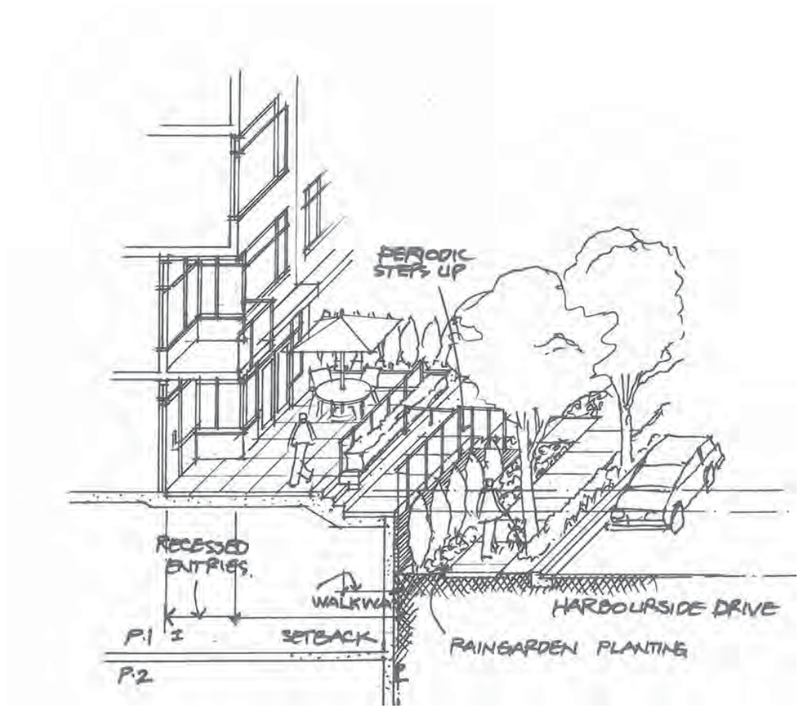
3.17 Street Types - Sections





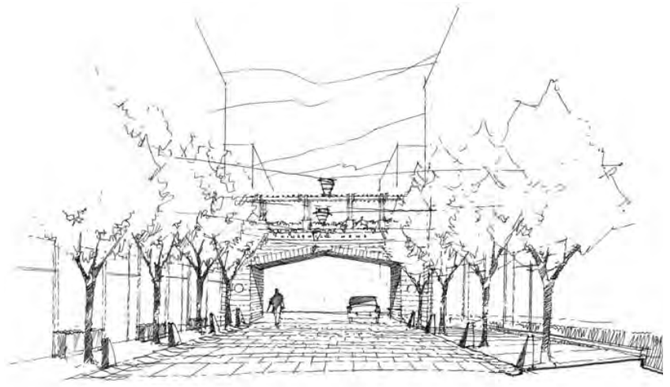
L. North/South Street Upper Residential

Once past the Mews close to the new FCL, slightly raised residential terraces and grade entries will overlook street, providing security and privacy for the owners. Planting will serve to transition between hard sidewalk and terrace guards.

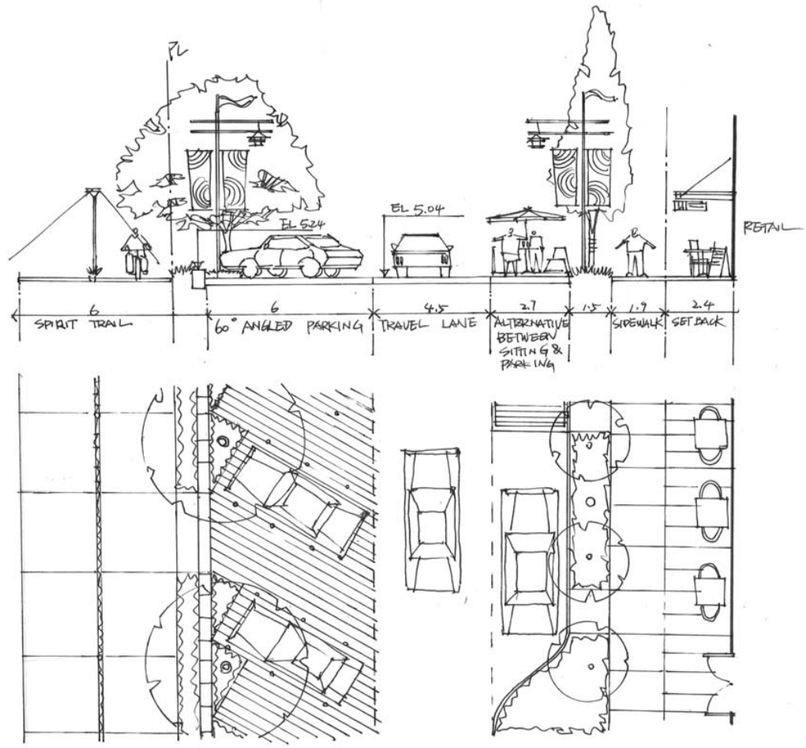


M. New Road - Residential at Harbourside Drive

For residential buildings along Harbourside Drive (if any) or at returns onto a north south street, a semi raised residential access walkway will be used to create a separation between the entry terraces and walkway. Brick and planting will be used to enhance the wall.

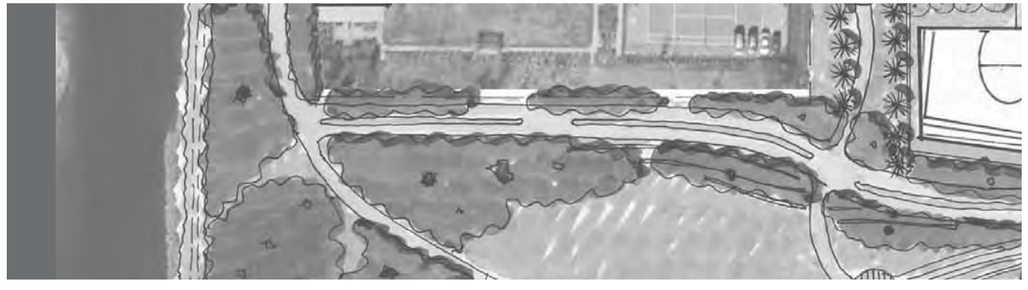


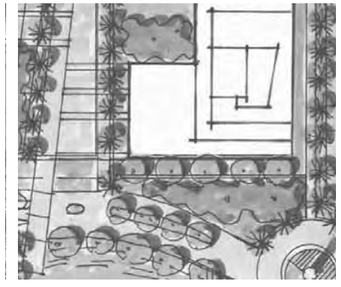
N. View from Mews to Fell Avenue

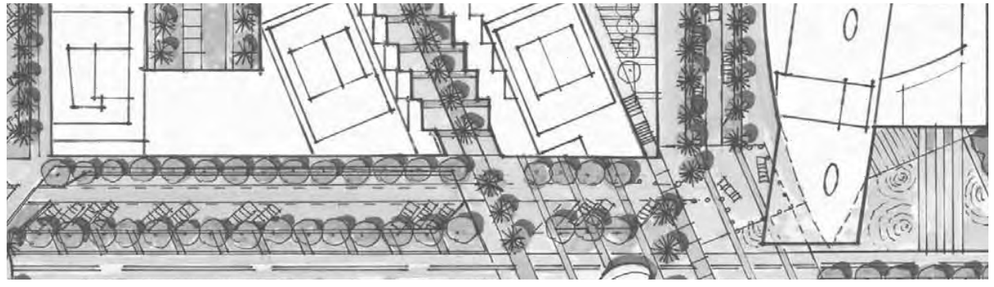


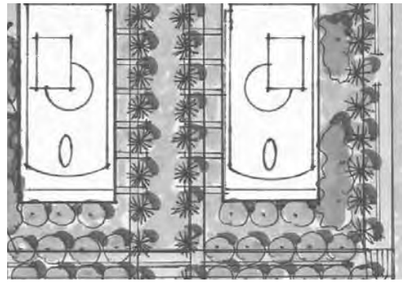
O. Harbourside Place (East-West)

The existing ROW for the south portion of this street has been adjusted 3m to the north to increase the park space to accommodate the Spirit Trail and has also been narrowed from 18m to 16m to incorporate sea level rise mitigation measures. The south side of the street is proposed as angled parking, looking directly to the Vancouver skyline while the north side is intended as parallel parking and street loading. A 2’ setback is proposed for buildings, with canopies allowed to span into the ROW for weather protection. The street is characterized by a continuous expanse of special paving between the vehicular and pedestrian spaces that are defi ned with bollard separation. This consistent ground plane treatment allows universal accessibility across the street and during event times when the street could be closed to motor vehicle traffi c.









4.0 Sea Level Rise

Introduction

With its proximity to Burrard Inlet and low elevation, the entire Harbourside area is vulnerable to flooding. This vulnerability will grow with sea level rise. As a rezoning condition, the owners for the proposed Harbourside Waterfront were requested to develop a SLR flood management plan. This is a summary of the Flood Management Plan and FCL analysis completed by Golder Associates. A more comprehensive Flood Management Plan can be found in the appendix. This full Flood Management plan should be used to guide more detailed design.

Management Plan Objectives

The Management Plan has several overriding objectives:

1. Define a 2100 FCL incorporating sea level rise, regional and site level knowledge that conforms to provincial guidelines.
2. Develop a strategy framework using mutually reinforcing management approaches that avoid, accommodate or protect Harbourside Waterfront from flooding risk, support adaptive management options as risks change over time, and capitalize on design features that enhance the neighbourhood's character.
3. Create a solid foundation for City action in the broader Harbourside neighbourhood in the short term, and flexibility for adaptive management in the future.
4. Develop strategies upon key socio-economic and environmental principles:
    a. manage private and public risks while minimizing costs;
    b. contribute to the living and working experience of the neighbourhood in short and long term;
    c. use defensible science and engineering knowledge; and
    d. improve ecosystem health and function within site constraints.

Methodology

The following is an overview of the approach taken to define site water levels and develop the management strategies:

- Review relevant policy and planning literature, specifically BC standards and guidelines, and municipal activity
- Solicit input from City staff on the general approach Concert is pursuing to manage flooding from sea level rise.
- Review literature of physical hydrologic and geologic conditions influencing SLR along BC and Vancouver coasts, including tides, storm surges, winds, waves, climate and tectonic stability.
- Collect and generate data on the site water levels and specifically the 2100 FCL, specifically site-specific topography and bathymetry, tidal levels, storm surge, relative regional/local sea level rise, wind and wave conditions to apply to Harbourside Waterfront's flood management design concepts.
- Meet with the City and their SLR advisors to gain insight into their methodology, data, scope of work, granularity of analysis, FCL results, and policy intentions.
- Develop basic design concepts relevant to flood management for the shoreline, park, roads, sidewalks and building finished floor elevations.
- Define draft site specific flood construction reference plane (FCRP) and a 2100 FCLs (FCL).
- Meet with the City and their SLR advisor to share draft management strategies and FCRPs and FCLs for planning horizons.
- Update management strategies and FCRPs and FCLs to reflect input from City and their SLR consultants.

The depth of analysis in this memo reflects the current stage in planning and design specificity. Further risk analysis and management consideration will be required with detailed designs.

Scope of the Management Strategies

The Management Plan scope is focused on the buildings, and the owners' infrastructure within Harbourside Waterfront for the service life of representative buildings, i.e. up to 2100.

Kings Mill Walk, and the proposed Spirit trail, are also vulnerable to SLR. To address the issue of SLR holistically, the owners are proposing to enhance the park as a public amenity, seaward of Harbourside Drive and to the east along the shoreline. Management strategies have been developed to reduce these vulnerabilities, and integrate the park into the broader flood management regime. An improved shoreline protection system has been developed from West of Burrard Yacht Club to a point perpendicular with the Western extent

of Harbourside Place – this is also integral to the protection of Harbourside Waterfront. The park and shoreline defence system would be designed in consideration of SLR for representative service lives. These assets would be maintained by the City.

The Dog Park and the Western part of the Spirit trail are excluded from this rezoning application.

Community Co-Benefits

The owners' management strategy would provide significant co-benefits in the short term to many property owners, employees, and residents in the area, as well as the City, including:

- contributing to reduce flooding risk to city streets in the Harbourside area for commercial, personal, public access, including emergencies;
- contributing to reduce the park's vulnerability and increase its resiliency to flooding, enhancing recreational access and ecosystem benefits; and
- contributing to reduce vulnerability to storm surge to much of the broader Harbourside area, notably North of Harbourside Drive.

As outlined in the scope of work, the Study Area focuses on the owners' property, and the key area of the park and a portion of the shore line. The fuller Management Plan outlines vulnerabilities and management considerations in the neighbouring areas.

The Management Plan, furthermore, provides a solid foundation for the City and senior governments to adapt to rising sea levels on a long term basis, post 2100, providing a precedent for a sustainable coastal development.

SLR Policy Context

British Columbia

SLR is compelling many governments to respond in a more systematic, proactive manner, the BC Government amongst them. In 2010, the BC Government embarked on a project focusing on strengthening land use planning and dikes in coastal areas. The project involved engineering analysis, scientific and policy review, and engagement. Three documents were generated out of this process to provide guidance for land use planning and dike design; a policy discussion paper, land use guidelines, and sea dike guidelines. This management plan is consistent and is shaped by this analysis.

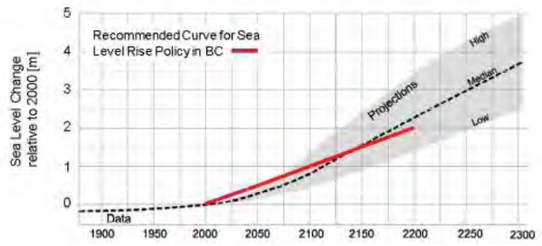
BC Government Recommended SLR Projections

As a basis for planning, the BC Ministry of Environment (MoE) has recommended using the SLR curve below. The guideline states that the recommended curve is slightly higher than the high projection for the years from the present up to year 2070, and moves below the current median projection with the recognition that in a planning framework, time remains to revise the recommended curve upwards.

Accordingly, sea level rises at time frames of 2020, 2070 and 2100 are projected to be increased by 0.2 m, 0.7 m, and 1.0 m respectively. These SLR projections need to be adjusted to account for local/regional geological conditions.

Key MoE land use guidelines

Key MoE land use guidelines relevant to this project are:



- **Building Life Cycle Planning:** "Given the prospect of rising sea level, it is necessary to establish a FCL that anticipates a level applicable to the end of the lifespan of the proposed building." [i]
- **2100 FCL for Current Planning:** "For land use management guidance in BC, allowances for SLR until the Year 2100 should be used in current planning and building approvals." [i]
- **Adaptive Management:** "Land use and building approvals based on FCL for 2100 should also include provisions for adaptive management of land uses to SLR to the Year 2200 and beyond." [i]
- **Dynamic FCLs**: "...FCL(s) will need to change over time as SLR continues. The pace of SLR and the arrival of more accurate projections will inform how often a revision to FCL needs to take place." [i]

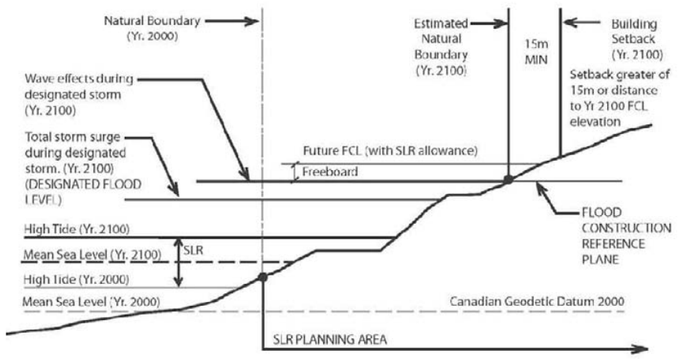
FCL Parameters

FCL are comprised of several parameters shown below [ii]

High Tide	The highest tides at a site. Professionally, this is the HHWLT (High High Water Large Tide)
Storm Surge	The allowance above the highest tide for local storm activity.
Wave Effect Allowance	The allowance for wave run up based on local winds, open water, and specific shoreline conditions
Regional Sea Level Rise	Sea level rise adjusted to regional/local conditions.
Freeboard	A margin of safety to account for uncertainty in climate impacts such as SLR height and storm intensity, and site conditions that may not be accounted for such as subsidence.

Several different flood levels are defined by MoE. The most important is the FCL

Designated Flood Level (DFL)	= Future SLR Allowance + Maximum Hight Tide (HHWLT)
Flood Construction Reference Plane (FCRP)	= Designated Flood Level (DFL) + Estimated Wave Effect
Flood Construction Level (FCL)	= Flood Construction Reference Plane (FCRP) + Freeboard Allowance



4.0 Sea Level Rise

City of North Vancouver

The following are key City activities related to flood management and SLR:

- The City's current FCL established in the 1980's is 3.35 m (Bylaw 6746), and the City is planning to update it.
- The City will be developing a community-wide SLR management strategy and updating its flood construction levels, but not before this rezoning application has been submitted.
- The City requested a SLR Flood Management plan from the Harbourside Waterfront owners as a rezoning condition, and indicated an interest in creative solutions with defensible flood construction levels.
- Until recently, the City indicated it would adopt the preliminary 2100 5.6 m FCL estimate for Vancouver Harbour referenced in the provincial guidelines.
- The City commissioned a study to evaluate vulnerability of its waterfront and establish preliminary FCLs. This study is still reasonably coarse, evaluating seven reaches between Second Narrows and Lions Gate Bridge.
- While this study has not been finalized, the preliminary, unpublished FCL being considering for the broader Harbourside site for 2100 is higher than the preliminary provincial FCL for Vancouver Harbour.

Site Water Levels and 2100 Flood Construction Level

Site water levels and the 2100 flood construction level were established using the following data and analytical approaches:

- **Topography & Bathymetry:** Marine and terrestrial elevations were defined through the available data and review of near-shore seabed bathymetry and onshore topography, including LIDAR, nautical charts, topographic and bathymetric surveys and a site visit to characterize features of the existing coastal morphology and shoreline protection.
- **Tidal Level:** Current tidal levels and specifically the High High Water, Large Tide (HHWLT) were defined based on historical water level records from Canadian Hydrographic Service (CHS) station at Point Atkinson and performing a site specific analysis of water levels.
- **Storm Surge:** The storm surge level was defined based on an extensive literature review concluding accurate Vancouver Harbour data requires further study. A conservative level for a 1/200 Annual Exceedance Probability (AEP) was established using data from Tofino Tide Station.
- **Sea Level Rise:** A sea level for 2100 was established using the Provincial SLR recommendation as a basis to which an adjustment was made for regional/local crustal uplift.
- **Wind & Wave Data:** 1/200 year wind speed was based on stations from Vancouver Harbour and Vancouver International Airport across a South East fetch. Wave run up and overtopping was calculated using several models over two cross sections representing the narrowest distances between the shore and buildings. The most conservative results were used to define the minimum slope and wave effect allowance.
- **Freeboard Allowance:** The BC Government's recommended freeboard allowance was used to cover uncertainties in sea level rise, storm surges, and local site conditions.

This data and analysis defined a Flood Construction Reference Plane of 4.64 m (Canadian Geodetic Datum) and 5.24 m (CGD) for 2100.

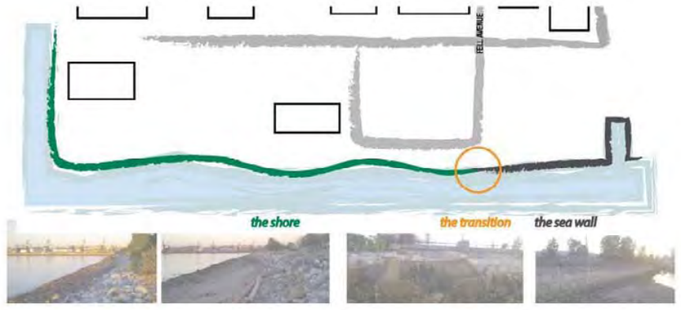
Parameters	Values
Flood Construction Level (FCL, m CGD) [1]	5.24
Freeboard (m)	0.6
Flood Construction Reference Plane (FCRP, m CGD) [1]	4.64
Wave Effect Allowance (m) [2]	0.6
Designated Flood Level (DFL, m CGD)	4.04
Regional Sea Level Rise (SLR, m) [3]	0.89
Storm Surge AEP 1/200 (m) [4]	1.25
High Tide (HHWLT, mCGD) [5]	1.9
Reference Vertical Datum (MWL, CGD)	0.0
Low Tide (LLWLT, m CGD) [5]	-3.1

Note:
1. Considering the effect of SLR, regional crustal movement, tide, storm surge, wind and wave.
2. The allowance will require consideration of wave overtopping in the drainage system design. Estimated according to the recommended global SLR curve for planning and design in BC (BC MoE – Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Land Use, January 2011) and the regional crustal movement of an uplift rate 1.2 mm/yr from 2010.
3. BC MoE Guidelines (same source as note 3)
4. Defined in Canadian Hydrographic Services (CHS) – Canadian Tide and Current Table Volume 5

Management Strategies

For planning and design purposes the site has been broken into three zones representing key coastal characteristics: the shore (West of Fell), the sea wall (East of Fell), and the transition in between the two (at the foot of Fell). The shore and the sea wall have been the base of the design assumptions for the wave-model analysis: a rip-rap revetment slope and a vertical wall.

The management strategies aim to enhance the natural and existing features of the site, while providing design adaptation to account for the estimated sea level rise to 2100.

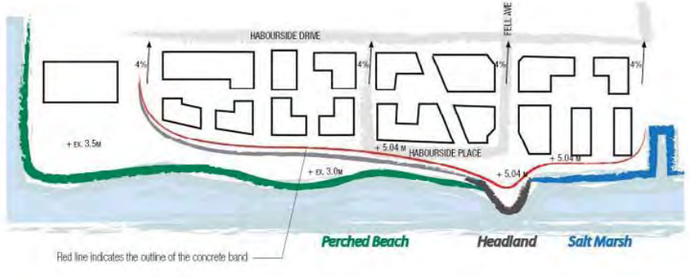


Basic Design Concepts

Concrete Band Dike Feature

A continuous concrete band throughout the site would act as a dike / line of defense for the buildings and roads. The concrete band should be constructed with a minimum height corresponding to 2100 FCL.

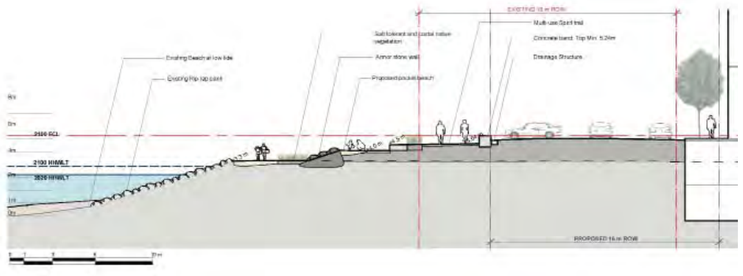
On a short to medium term basis, it can be extended East and West, and continuing North along Mackay and Mosquito creeks to protect the broader Harbourside area. In the latter part of the century, if not replaced by new construction, it can be adapted elevating the height of the concrete band into a retaining wall. The plan below shows a schematic outline of the proposed high point.

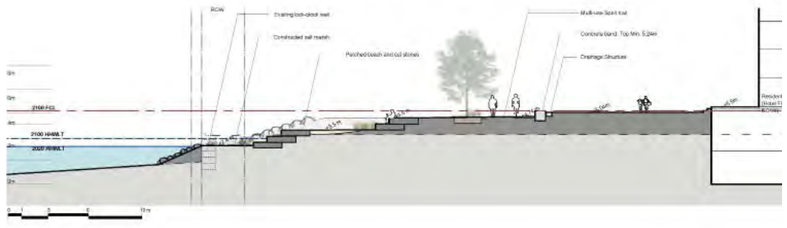


Enhanced Shoreline & Terracing

The design concepts involve terracing to transition between the existing conditions and elevated building sites with the intention of dissipating wave energy. Thus, a certain amount of open space can be subject to flooding in rare circumstances. Parks and open space are recommended uses for areas at increased risk of flooding in the BC MoE Guidelines. The most important park infrastructure is the greenway (Spirit Trail) which should be situated on one of the higher terraces. As part of the broader amenity package, the owners are proposing to complete the Spirit trail.

Two terraced cross sections are shown below, the shore zone enhanced with a perched beach, and the sea wall zone enhanced with a rip rap slope and salt marsh. The transition zone is not shown. A headland is envisioned for this area to further dissipate wave energy, and serve as an alongshore sediment control point.

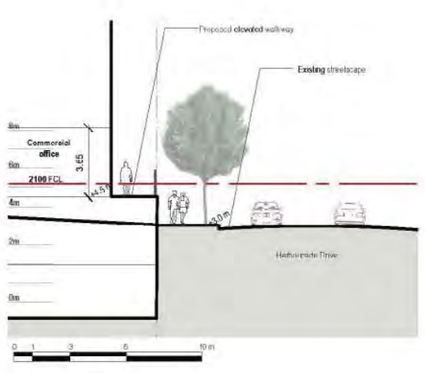




Harbourside Drive Elevated Sidewalk

On the Northern side of the site along Harbourside Drive, an elevated sidewalk would provide access to commercial offices. The sidewalk would be situated at shoulder height. The finished floor elevations of these commercial offices should be minimally set above the Designated Flood Level. (The DFL is the high, HHWLT (with SLR) plus the storm surge, excluding the wave effect.) The height of the ceiling, however, will be designed to accommodate for an increase of the FFE up to the 2100 FCL. Thus, the FFE would initially be at 4.5 m and could eventually be raised to 5.24 m.

It is possible that in the long term Harbourside Drive may be elevated along with neighbouring roads and adjacent properties to reduce vulnerability to flooding. The elevated sidewalk is designed to accommodate up to a 1.5 m increase in road elevation.



4.0 Sea Level Rise

Conclusions & Recommendations

1. Establish a sea flood control line using a concrete band or equivalent form of dike protection at an elevation of 5.24 m CGD (the 2100 FCL) seaward of all buildings and roads. This elevation should be incorporated into the development design and should be:
   - Continuous, or if broken in any case by narrow walkways or other penetrations, there must be emergency procedures in place to close these caps when extreme storm surge events are projected.
   - On public property or easement, so that maintenance of this flood control is under public jurisdiction.

2. Set a minimum FCL of 5.24 m CGD for habitable building FFE for new construction.

3. Given they are behind the concrete band dike feature, there are some FFEs that should be permitted below the FCL, for example, non-habitable uses (e.g. retail and office) and lobbies in residential buildings. They should all, nevertheless, be minimally above the Designated Flood Level. Moreover, all ground floor ceiling heights should be designed to accommodate increasing the FFEs to the FCL to accommodate more rapid SLR or changes in use.

4. Harbourside commercial office elevations should be minimally set above the Designated Flood Level, and that the risk of setting the commercial office elevation should be evaluated more closely with detailed design. Given the Northern location, situation behind the concrete band dike feature, the setback from Burrard Inlet, and the position above an elevated sidewalk, theDLFis considered an appropriate minimum elevation for these commercial offices at this stage in the planning process. (The DFL is the high, high water large tide (with SLR) plus the storm surge, excluding the wave effect.)
   - Additionally, the edge conditions on Harbourside Drive should be designed to accommodate the possibility of elevating the street in the event that the City and property owners elevate adjacent properties.

5. Sub-surface parking should be designed for flood control and accommodate for projected increase in the height of the water table to 2100. Given their setback and position behind the concrete band dike feature, parking lot entrances should be set minimally at the Flood Construction Reference Plane. Various management strategies can be used to manage flooding in sub-surface parking. The more freeboard above the Flood Construction Reference Plane, the less extensive these alternative management strategies would be. The final parking lot entrance elevation should be evaluated with more detailed design in consideration of the other management strategies, and the nature of the property being protected.
   - Mechanical, electrical and other utility rooms utility rooms situated below the 2100 FCL – typically in sub-surface parking lots – should be engineered to effectively manage flooding risks from a rising water table or marine flooding.
6. Design of the public park, greenway and associated utilities seaward of

the proposed sea flood control line (concrete band) should be designed to minimize flooding damage.

- The greenway, as the most critical community infrastructure in the Park, should be located on a upper terrace.
- Design should recognize the 'often dry, rarely wet' pattern, and also the changes in the elevation / location of this shoreline pattern as SLR progresses.
- Design slopes should be achieved of 1:4.3 or less for the perched beach concept area and 1:4.6 or less for the salt marsh concept area. The transition zone for which the creation of a headland is envisioned will require further wave analysis; the basic concept, nevertheless, would allow a wave effect allowance similar of a perched beach and salt marsh cross sections.

Flooding of this area due to extreme storm surge events combined with an extreme high tide are low probability events but could occur at any time, and the risk would increase in the latter part of the Century. The upper terraces will be above the DFL, and above normal daily tide ranges. When extreme storm surge or wave events occur, there may be a need to anticipate cleanup and repair of the landscape areas affected.

7. Projects within 30 m of the high water mark need to be reviewed by BERC. As currently envisioned, the management strategies would have a measurable impact on the local marine habitat. The proponent should, therefore, advise BERC and be prepared to make an application which would include inventory of the shoreline and demonstrate the quality of the habitat enhancement and compensation of the proposed design.

8. Conceptual and detail designs of building and site development within the Harbourside Waterfront should undergo a SLR Engineering Review to ensure that the recommendations of this plan are understood and implemented. Such a Review should include geotechnical analysis of the study area's vulnerability to subsidence, and make any necessary adjustments to local relative sea level rise, and, in turn, FCLs.

Harbourside Waterfront should be designed to accommodate the option of extending the concrete band East and West and back along Mackay and Mosquito Creeks, to increase protection to the broader Harbourside neighbourhood, and also the option of elevating this dike at approximately 2100, as part of a broader City initiative.

9. Given the scale for which there is reliable storm surge and wind data for Vancouver Harbour and the importance of this harbour (North America's 3rd busiest port), the City should work with other governments, senior and local, and large organizations with a stake in Vancouver Harbour (e.g. Port Metro Vancouver) to support more locally specific data.

These strategies may not reflect the most up-to-date building sites and site designs. Building setbacks and various site elevations are, nevertheless, sufficiently accurate to maintain the integrity of the FCL.

These recommendations are based on current knowledge, published science, and accepted data in the public domain. There will be a need to periodically review these recommendations as new scientific data become available, in particular regarding appropriate storm surge allowances for the Point Atkinson / Vancouver Harbour area, and regarding the rate of SLR due to global changes. An adaptive management approach is warranted.

Key Terms & Acronyms

BERC	Burrard Environmental Review Committee
DFL	Designated Flood Level
FCL	Flood Construction Level
FCRP	Flood Construction Reference Plane: The vertical elevation of an estimated future Natural Boundary from which the FCL is determined.
HHWLT	Higher High Water Large Tide
LiDAR	Light Detection and Ranging: Typically an airborne system for collecting a set of three dimensional terrestrial coordinates.
BC MoE	BC Ministry of Environment
SLR	Sea Level Rise: An allowance for increases in the mean elevation of the ocean associated with the future climate change, including any regional effects such as crustal subsidence or uplift.
Storm Surge	A change in water level caused by wind and atmospheric pressure variation on the sea surface. The typical effect is to raise the level of the sea above the predicted astronomical tide level, although in some situations, such as when winds blows offshore, the actual water level may be lower. The magnitude of a storm surge in Burrard Inlet will be dependent on the severity and duration of the storm event in the North Pacific, its track relative to the BC coast, and the regional and local seabed bathymetry.

End Notes

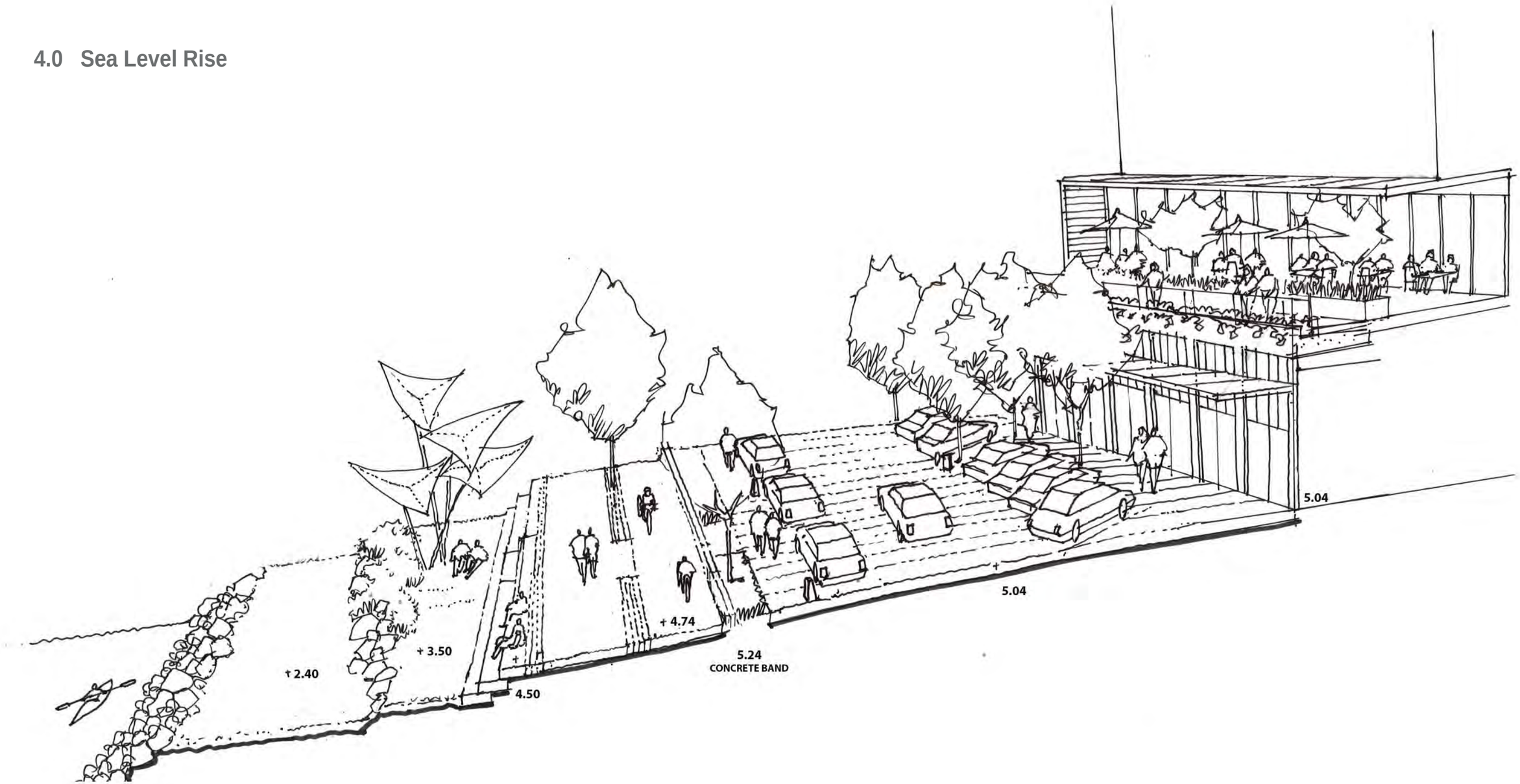
i.

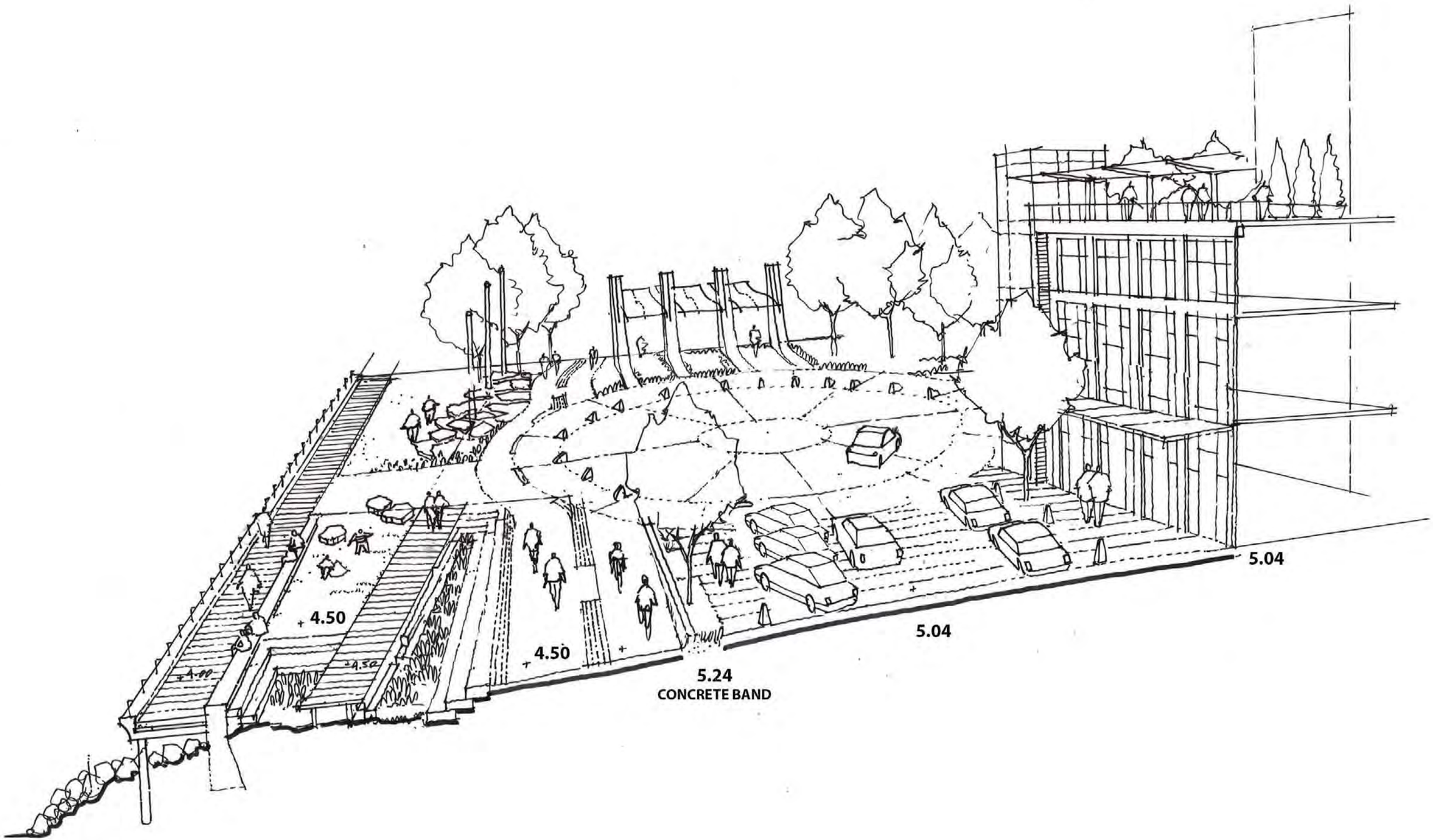
- BC MoE: Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Land Use – Draft Policy Discussion Paper, January 2011
- BC MoE: Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Land Use - Guidelines for Management of Coastal Flood Hazard Land Use, January 2011
- BC MoE: Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Land Use – Sea Dike Guidelines, January 2011

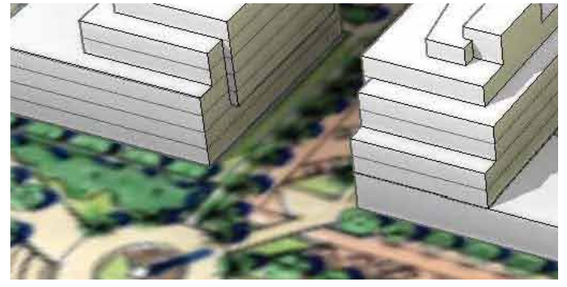
ii.

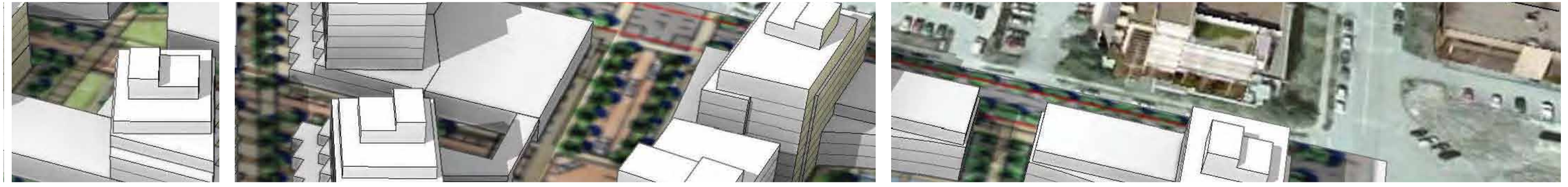
BC MoE: Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Land Use - Guidelines for Management of Coastal Flood Hazard Land Use, January 2011

4.0 Sea Level Rise




4.50
4.50
5.24
CONCRETE BAND
5.04
5.04





5.1 Overall Summary

Building	Description	GFA
Lot A		
A-1	Office	5,814 m²
A-1		5,814 m²
A-2	Market Housing	5,419 m²
A-2	Office	326 m²
A-2		5,745 m²
A-3	Office	6,830 m²
A-3		6,830 m²
A-4	Market Housing	4,878 m²
A-4		4,878 m²
Lot A		23,267 m²
Lot B		
B-1	Market Housing	4,868 m²
B-1		4,868 m²
B-2	Rental/Seniors Housing	7,186 m²
B-2		7,186 m²
B-3	Market Housing	6,052 m²
B-3	Office	310 m²
B-3		6,362 m²
B-4	Market Housing	5,583 m²
B-4		5,583 m²
Lot B		23,999 m²
Lot C		
C-1	Office	4,983 m²
C-1	Retail	365 m²
C-1		5,348 m²
C-2	Market Housing	3,655 m²
C-2		3,655 m²
C-3	Market Housing	3,974 m²
C-3	Retail	1,364 m²
C-3		5,338 m²
C-4	Market Housing	3,523 m²
C-4	Retail	1,068 m²
C-4		4,590 m²
C-5	Market Housing	5,905 m²
C-5	Office	389 m²
C-5	Retail	1,078 m²
C-5		7,372 m²
Lot C		26,304 m²
Lot D		
D-1	Market Housing	6,942 m²
D-1	Office	324 m²
D-1	Retail	717 m²
D-1		7,982 m²
D-2	Hotel	9,865 m²
D-2		9,865 m²
D-3	Market Housing	5,346 m²
D-3	Office	683 m²
D-3		6,029 m²
D-4	Market Housing	4,995 m²
D-4		4,995 m²
D-5	Market Housing	4,989 m²
D-5		4,989 m²
Lot D		33,859 m²
Grand total		107,429 m²

Proposed exclusions deducted from FSR:

1. All amenity areas up to 1500 sf/builidng including rooftop amenity and support spaces such as storage for garden tools and equipment, and elements such as elevators and stairs rquired to provide access to roofspace.
2. Above grade uses/parking below proposed new FCL (“dynamic response elements such as storefront offices along Harbourside Drive and Commercial office and retail to be raised with time will be counted in FSR)
3. Above grade and FCL storage, mech.,elec., and bike storage
4. Balconies (no limitation to open balconies)
5. Adaptable design features will be integrated throughout the building and within individual homes to ensure homes are liveable for all. In accordance with the Adaptable Design Policy, 20% of the units will be designed to Level Two or better guidelines.

In exchange, the following exclusions are being requested:

- For each Level Two home, 20 square feet will be excluded from floor area calculations; and
- For each Level Three home, 45 square feet will be excluded from floor area calculations.

Height Calculation

Height is calculated from the new Flood Construction Level of 5.24m geodetic to the top of roof structure. Balcony guards, planters, parapets, rooftop amenity, stair and elevator access and mechanical penthouses are to be excluded in the calculation for height.

Legend

- Hotel
- Market Housing
- Office
- Rental/Seniors Housing
- Retail

5.2 Zone Analysis - A

Lot A Area Schedule	
	GFA
A-1	
Office	5,814 m²
	5,814 m²
A-2	
Market Housing	5,419 m²
Office	326 m²
	5,745 m²
A-3	
Office	6,830 m²
	6,830 m²
A-4	
Market Housing	4,878 m²
	4,878 m²
Grand total	23,267 m²

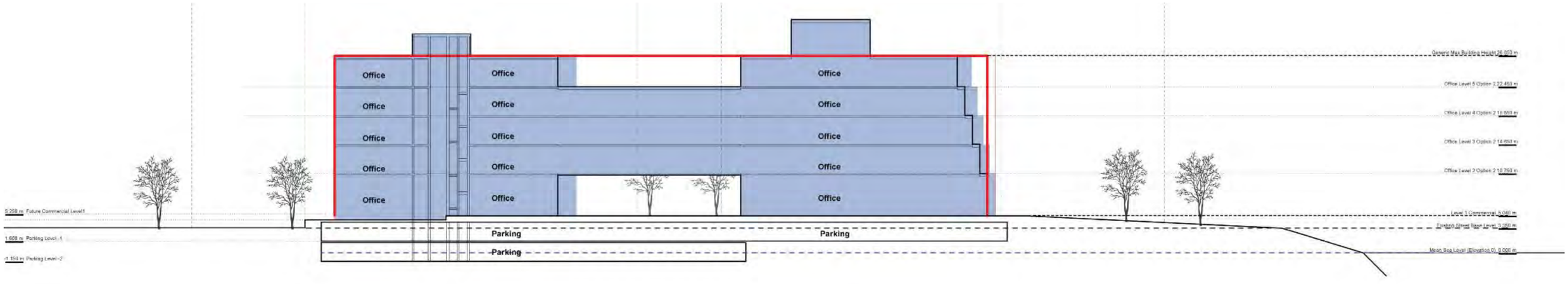
Parcel A – Use and Form

Form: Generally 3 to 4 buildings within 21.34m in height max.
Use: Mixed office and Market Residential

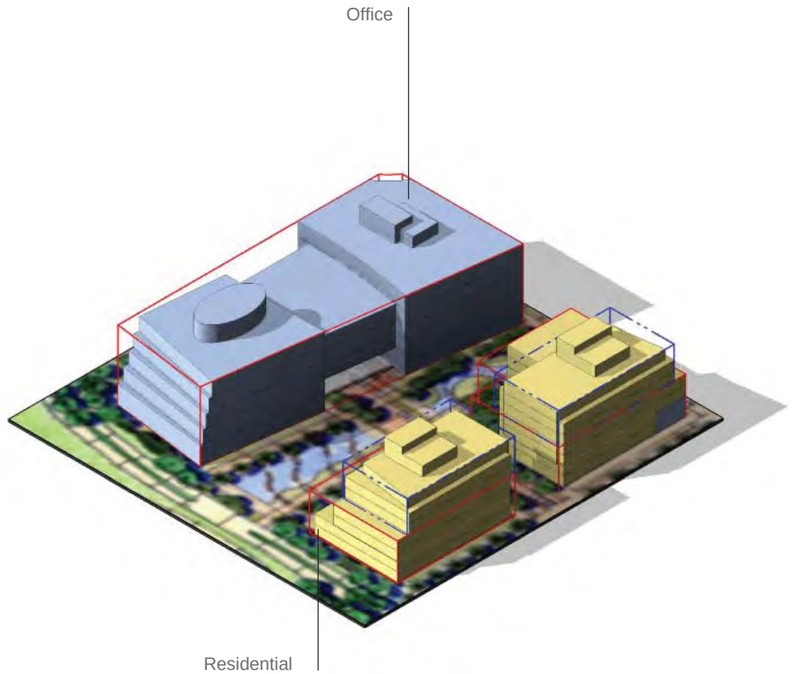
Sub-Parcel A-1/A-3
Use: Office. Storefront Office potential along Harbourside Drive
Form: To be formed either as 2 buildings or as 2 buildings connected to reduce apparent mass. South portion to be formed and detailed to be a “landmark element” along the park stepbacks and/or interesting form and detail required to achieve this objective. Both buildings to be maintained within the “overall form envelope” of 21.34m.
Combined useable and green roofscape encouraged and rooftop amenity to 45 sm and stair access/mech space are not counted in height.

Sub-Parcel A-2
Use: Market Residential. Storefront Office along Harbourside Drive
Form: To be formed as 1 building. Minor stepback at 1 or 2 penthouse levels generally to create capping form. Up to 4 storey podium/wing element to be expressed along harbourside drive and courtyard. Continuous interlocking vertical elements between levels encouraged. Building to be maintained within the “overall form envelope” of 21.34m oriented north/south. Combined useable and green roofscape encouraged and rooftop amenity to 45 sm and stair access/ mech space are not counted in height.

Sub-Parcel A-4
Use: Market Residential
Form: To be formed as 1 building
Minor stepback at 1 or 2 penthouse levels generally to create capping form
Up to 4 storey podium/wing element to be expressed along park to south
Building to be maintained within the “overall form envelope” of 21.34m oriented north/south. Continuous interlocking vertical elements between levels encouraged. Combined useable and green roofscape encouraged and rooftop amenity to 45 sm and stair access/mech space are not counted in height.

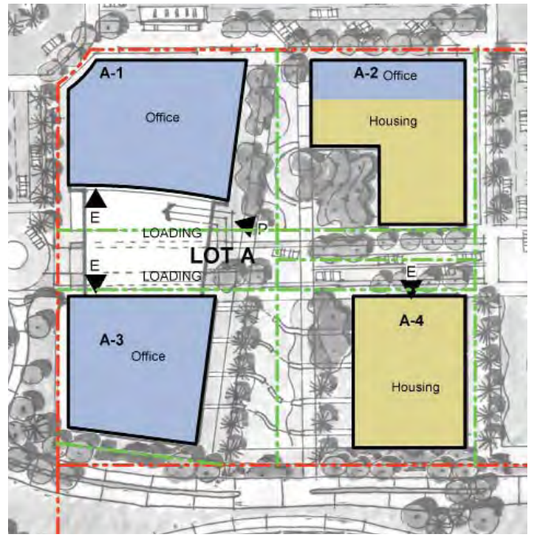


Zone A Section 1

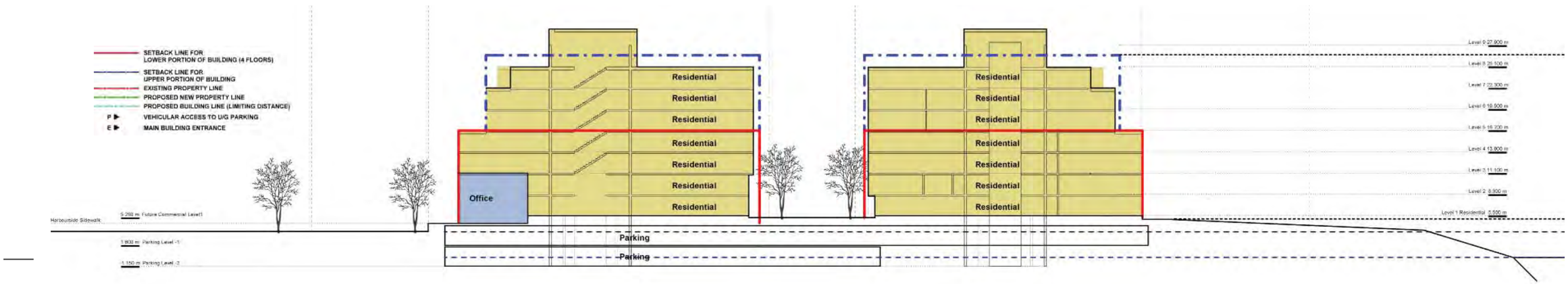


3D massing Sketch

Buildout Paramaters Plan



Ground Floor Plan



Zone A Section 2

5.2 Zone Analysis - B

Lot B Area Schedule	
	GFA
B-1	
Market Housing	4,868 m²
	4,868 m²
B-2	
Rental/Seniors Housing	7,186 m²
	7,186 m²
B-3	
Market Housing	6,052 m²
Office	310 m²
	6,362 m²
B-4	
Market Housing	5,583 m²
	5,583 m²
Grand total	23,999 m²

Parcel B – Use and Form

Form: Generally 3 buildings within 21.34m in height max. and 1 building within 27.43m height max.
Use: Market Residential and Affordable Rental

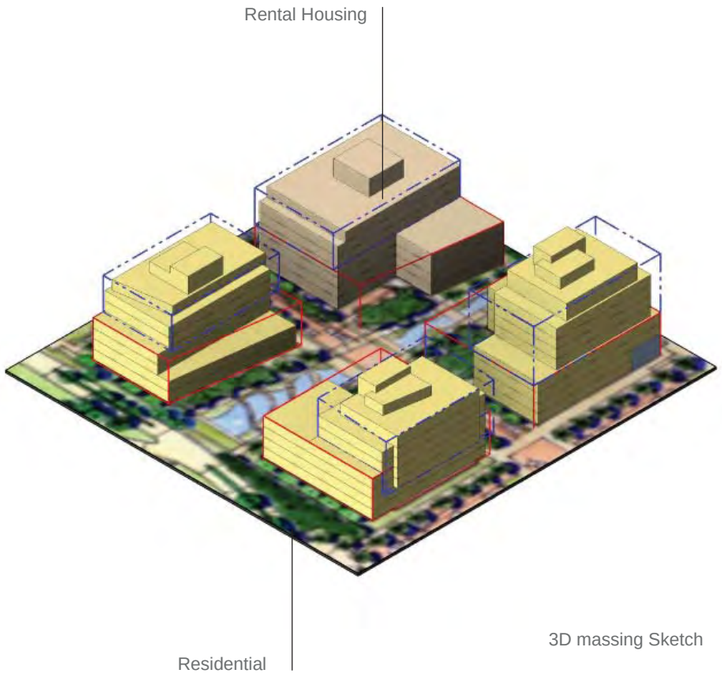
Sub-Parcel B-1
Use: Market Residential
Form: To be formed as 1 building. Minor stepback at 1 or 2 penthouse levels generally to create capping form. Up to 4 storey podium/wing element to be expressed along park to south. Building to be maintained within the “overall form envelope” of 21.34m oriented north/south.Continuous interlocking vertical elements between levels encouraged. Combined useable and green roofscape encouraged and rooftop amenity to 45 sm and stair access/mech space are not counted in height.

Sub-Parcel B-2
Use: Afordable Rental Residential
Form: To be formed as 1 building. Minor stepback at 1 or 2 penthouse levels not required, material/fenestration change is adequate. Up to 4 storey podium/wing element to be expressed along Harbourside Drive and courtyard. Building to be maintained within the “overall form envelope” of 21.34m oriented north/south Continuous interlocking vertical elements between levels encouraged. Combined useable and green roofscape encouraged and rooftop amenity to 45 sm and stair access/mech space are not counted in height.

Sub-Parcel B-3
Use: Market Residential. Storefront Office along Harbourside Drive
Form: To be formed as 1 building. Minor stepback at 1 or 2 penthouse levels generally to create capping form. Up to 4 storey podium/wing element to be expressed along Harbourside Drive and courtyard. Building to be maintained within the “overall form envelope” of 27.43m oriented north/south. Continuous interlocking vertical elements between levels encouraged. Combined useable and green roofscape encouraged and rooftop amenity to 45 sm and stair access/mech space are not counted in height.

Sub-Parcel B-4
Use: Market Residential
Form: To be formed as 1 building. Minor stepback at 1 or 2 penthouse levels generally to create capping form. Up to 4 storey podium/wing element to be expressed along park to south. Building to be maintained within the “overall form envelope” of 21.34m oriented north/south. Continuous interlocking vertical elements between levels encouraged. Combined useable and green roofscape encouraged and rooftop amenity to 45 sm and stair access/mech space are not counted in height.

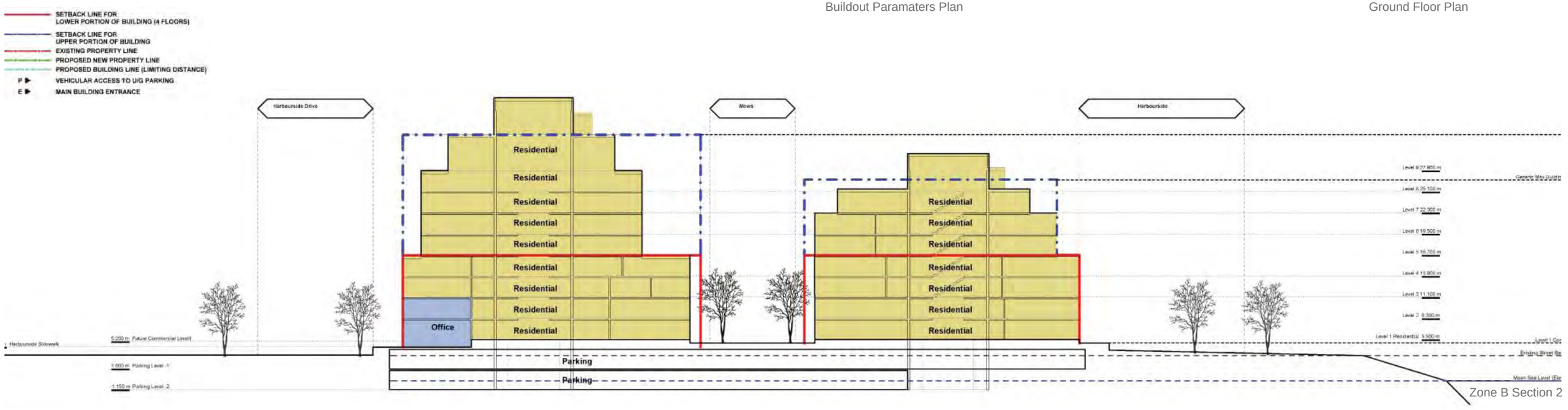
Zone B Section 1



3D massing Sketch

Buildout Paramaters Plan

Ground Floor Plan



Zone B Section 2

5.2 Zone Analysis - C

Lot C Area Schedule	
	GFA
C-1	
Office	4,983 m²
Retail	365 m²
	5,348 m²
C-2	
Market Housing	3,655 m²
	3,655 m²
C-3	
Market Housing	3,974 m²
Retail	1,364 m²
	5,338 m²
C-4	
Market Housing	3,523 m²
Retail	1,068 m²
	4,590 m²
C-5	
Market Housing	5,905 m²
Office	389 m²
Retail	1,078 m²
	7,372 m²
Grand total	26,304 m²

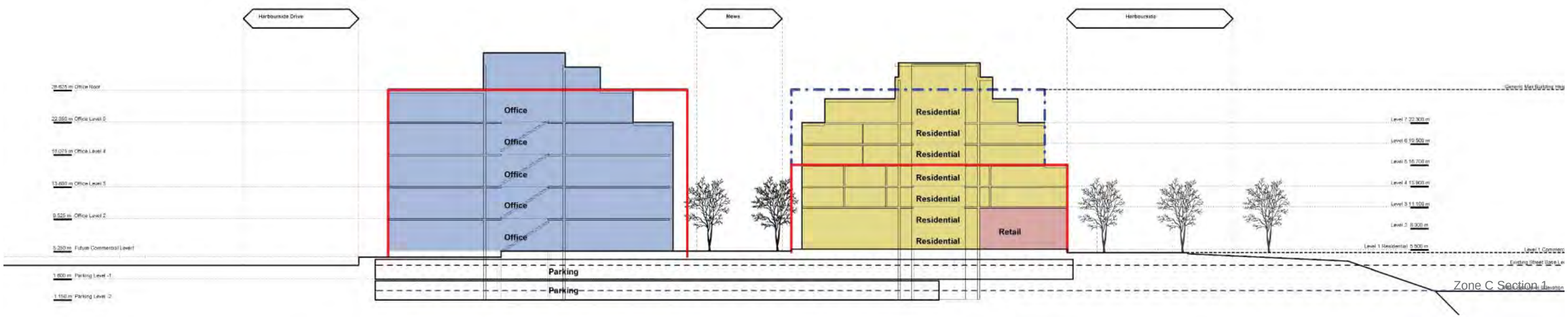
Proposed exclusions deducted from FSR:

Form: Generally 4 buildings within 21.34m in height max. and 1 within 27.43m height max.
Use: Market Residential, Office and Commercial Retail
Sub-Parcel C-1
Use: Office. Storefront Office potential along Harbourside Drive
Form: To be formed as 1 building. Up to 2 storey podium/wing element to be expressed along park to south. Building to be maintained within the “overall form envelope” of 21.34m oriented north/south. Continuous interlocking vertical elements between levels encouraged. Combined useable and green roofscape encouraged. Rooftop amenity to 45 sm and stair access/mech space not counted in height/density

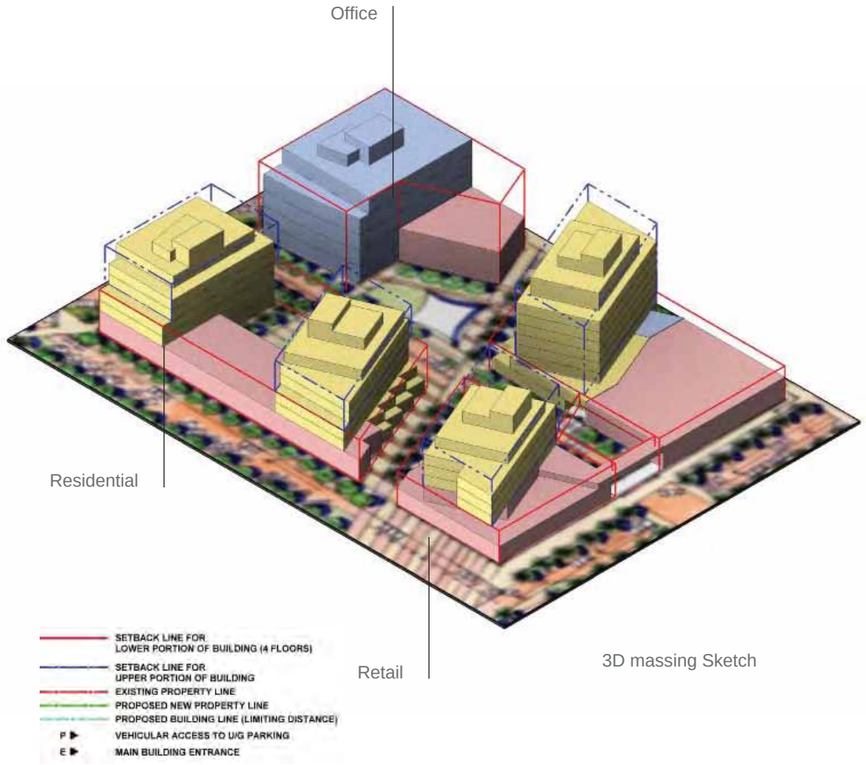
Sub-Parcel C-2, C-3
Use: Market Residential and Commercial Retail
Form: To be formed as 2 buildings
Eastern building to be oriented to frame view of the Lions
Minor stepback at 1 or 2 penthouse levels generally to create capping form
Up to 4 storey podium/wing element to be expressed along Harbourside Place to south. Buildings to be maintained within the “overall form envelope” of 21.34m oriented north/south. Continuous interlocking vertical elements between levels encouraged. Combined useable and green roofscape encouraged
Rooftop amenity to 45 sm and stair access/mech space not counted in height/density.

Sub-Parcel C-4
Use: Market Residential and Commercial Retail
Form: To be formed as 1 building
Building to be oriented to frame panorama view of the Lions to Grouse Mountain
Minor stepback at 1 or 2 penthouse levels generally to create capping form
Up to 1 storey Retail podium element to be expressed to Fell Avenue
Buildings to be maintained within the “overall form envelope” of 21.34m oriented north/south. Continuous interlocking vertical elements between levels encouraged. Combined useable and green roofscape encouraged. Rooftop amenity to 45 sm and stair access/mech space not counted in height/density. Publically accessible partial roof use on Retail podium with elevator access

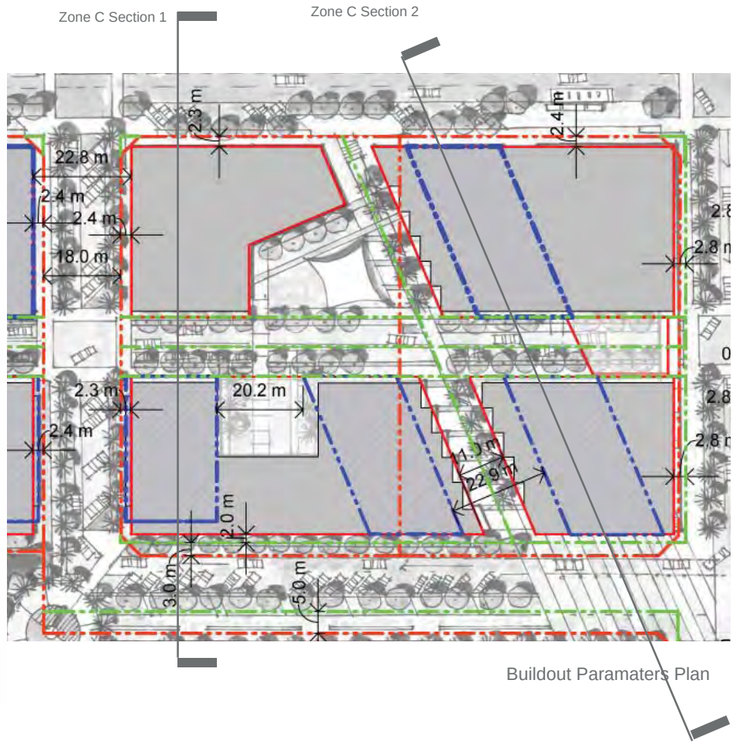
Sub-Parcel C-5
Use: Market Residential and Commercial Retail. Storefront Office along Harbourside Drive
Form: To be formed as 1 building. Building to be oriented to frame panorama view of the Lions to Grouse Mountain. Minor stepback at 1 or 2 penthouse levels generally to create capping form. Up to 1 storey Retail podium element to be expressed to Fell Avenue. Buildings to be maintained within the “overall form envelope” of 27.43m oriented north/south. Continuous interlocking vertical elements between levels encouraged. Combined useable and green roofscape encouraged. Rooftop amenity to 45 sm and stair access/mech space not counted in height/density. Publically accessible partial roof use on Retail podium.



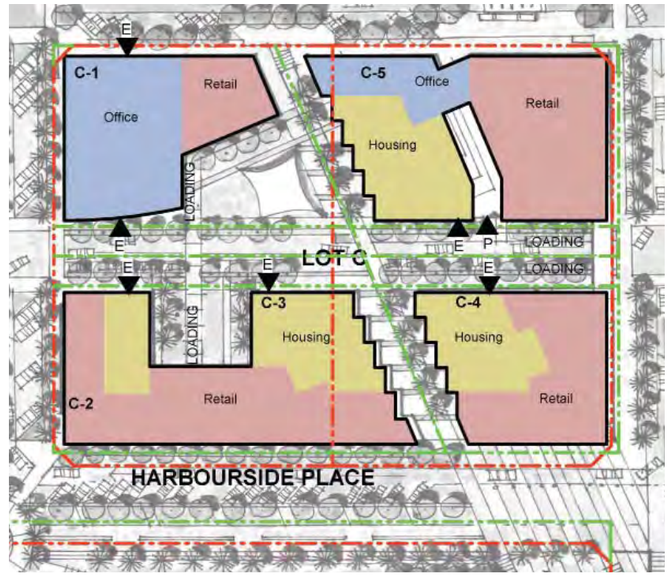
Zone C Section 1



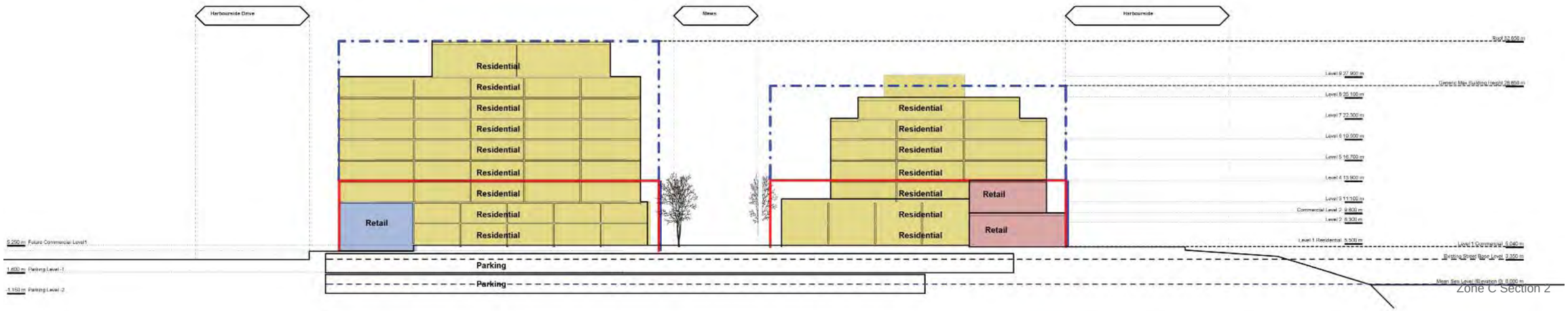
3D massing Sketch



Buildout Paramaters Plan



Ground Floor Plan



Zone C Section 2

5.2 Zone Analysis - D

Lot D Area Schedule	
	GFA
D-1	
Market Housing	6,942 m²
Office	324 m²
Retail	717 m²
	7,982 m²
D-2	
Hotel	9,865 m²
	9,865 m²
D-3	
Market Housing	5,346 m²
Office	683 m²
	6,029 m²
D-4	
Market Housing	4,995 m²
	4,995 m²
D-5	
Market Housing	4,989 m²
	4,989 m²
Grand total	33,859 m²

Parcel D – Use and Form

Form: Generally 3 buildings within 21.34m in height max. and 2 within 27.43m in height
Use: Market Residential and Affordable Rental

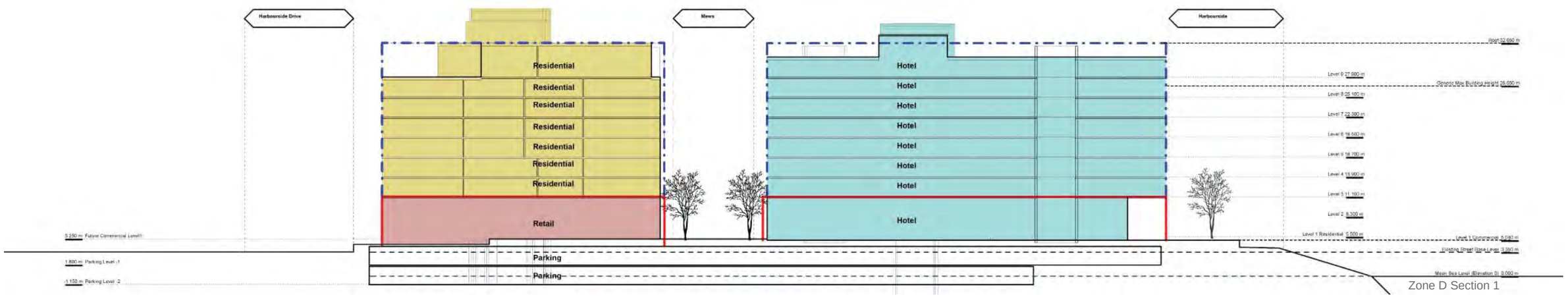
Sub-Parcel D-1
Use: Market Residential and Commercial Retail. Storefront Office along Harbourside Drive
Form: To be formed as 1 building
Building to be oriented to frame panorama view of the Lions to Grouse Mountain
Minor stepback at 1 or 2 penthouse levels generally to create capping form.
Up to 1 storey Retail podium element to be expressed to Fell Avenue. Up to 2 storey Conference wing to be expressed to Courtyard and Mews. Building to be maintained within the “overall form envelope” of 27.43m oriented north/south. Continuous interlocking vertical elements between levels encouraged. Combined useable and green roofscape encouraged. Rooftop amenity to 45 sm and stair access/mech space not counted in height/density.

Sub-Parcel D-2
Use: Hotel and Commercial Retail
Form: To be formed as 1 building
Building to be oriented to frame panorama view of the Lions to Grouse Mountain
Stepback at upper levels not required. Material change and high quality material and details required to make this a “landmark building’ Up to 1 storey Retail podium element to be expressed to Fell Avenue. Building to be maintained within the “overall form envelope” of 27.43m oriented north/south. Continuous interlocking vertical elements between levels encouraged
Combined useable and green roofscape encouraged
Rooftop amenity to 45 sm and stair access/mech space not counted in height/density

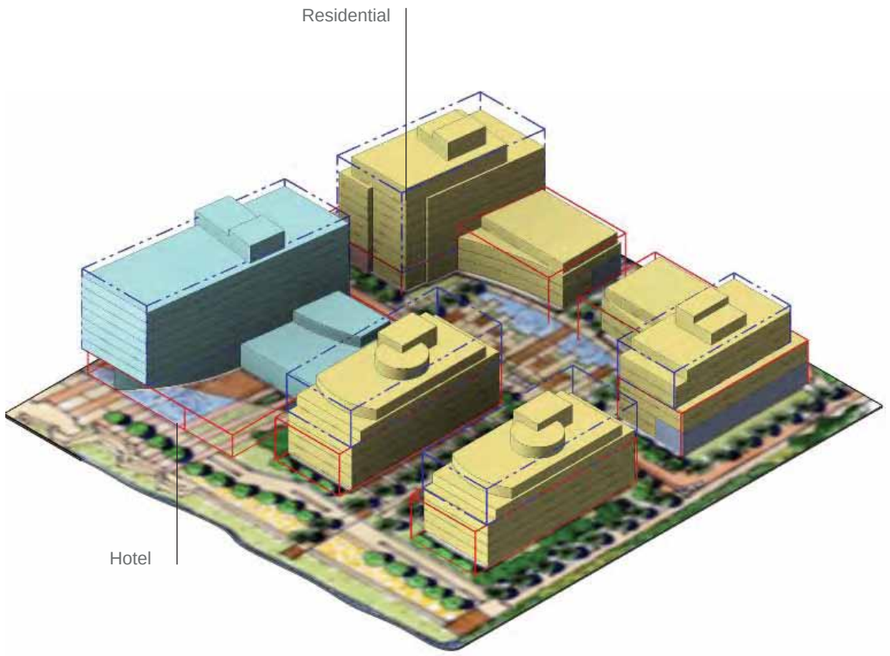
Sub-Parcel D-3
Use: Market Residential. Storefront Office along Harbourside Drive and Gostick Ave
Form: To be formed as 1 building
Minor stepback at 1 or 2 penthouse levels generally to create capping form
Up to 4 storey podium/wing element to be expressed along Harbourside Drive.
Building to be maintained within the “overall form envelope” of 21.34m oriented north/south. Continuous interlocking vertical elements between levels encouraged. Combined useable and green roofscape encouraged. Rooftop amenity to 45 sm and stair access/mech space not counted in height/density.

Sub-Parcel D-4
Use: Market Residential
Form: To be formed as 1 building
Minor stepback at 1 or 2 penthouse levels generally to create capping form
Up to 4 storey podium/wing element to be expressed along Harbourside Drive.
Building to be maintained within the “overall form envelope” of 21.34m oriented north/south. Continuous interlocking vertical elements between levels encouraged. Combined useable and green roofscape encouraged. Rooftop amenity to 45 sm and stair access/mech space not counted in height/density.

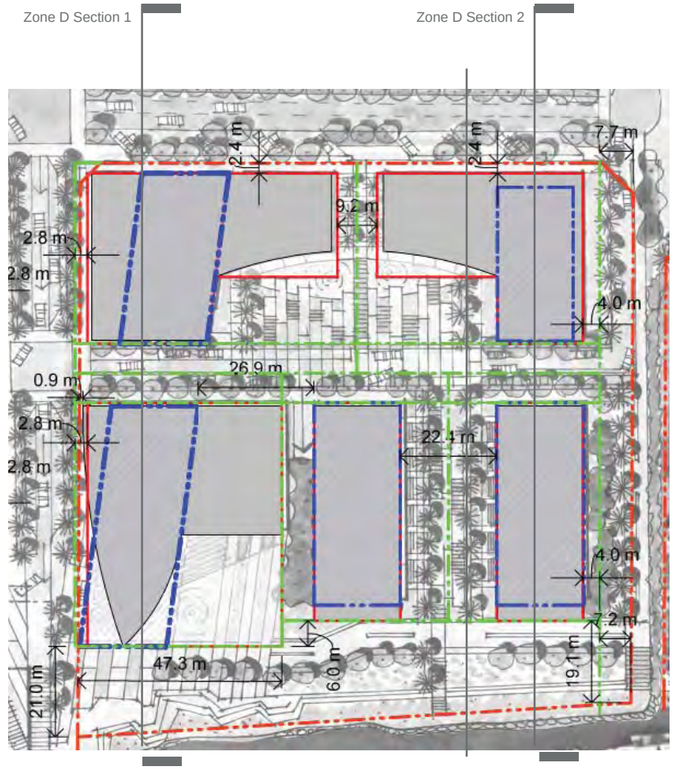
Sub-Parcel D-5
Use: Market Residential
Form: To be formed as 1 building
Minor stepback at 1 or 2 penthouse levels generally to create capping form
Up to 4 storey podium/wing element to be expressed along Harbourside Drive.
Building to be maintained within the “overall form envelope” of 21.34m oriented north/south. Continuous interlocking vertical elements between levels encouraged. Combined useable and green roofscape encouraged. Rooftop amenity to 45 sm and stair access/mech space not counted in height/density.



Zone D Section 1

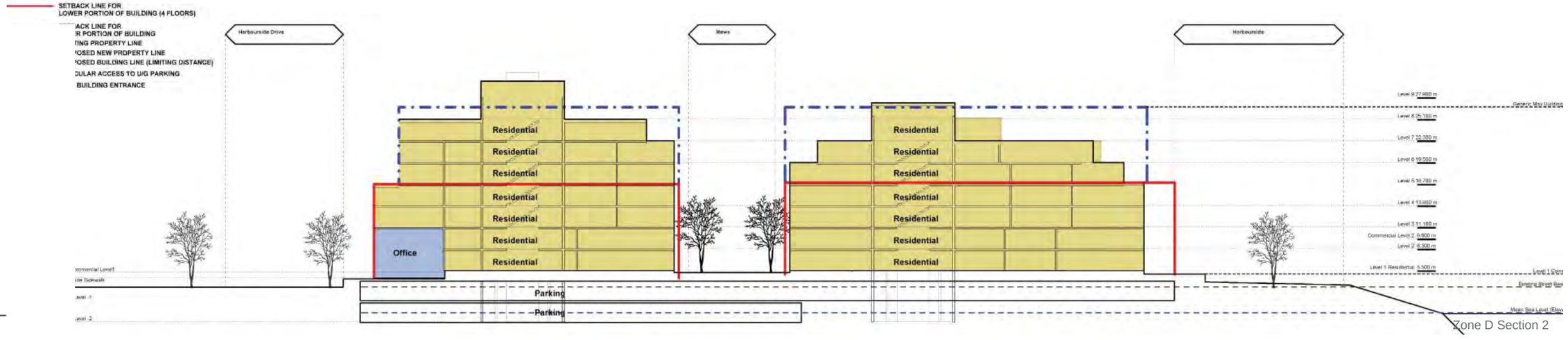


3D massing Sketch



Buildout Paramaters Plan

Ground Floor Plan



Zone D Section 2

5.3 Shadow Study

The diagrams to the right record the shading generated by the indicative building massing when recording the access of daylight onto the public realm on the spring equinox. The main diagram (far right) shows shading at 12 noon, the smaller diagrams (right) record shadows at 10am and 2pm respectively.

10am Spring Equinox

2pm Spring Equinox

12 Noon Spring Equinox

5.4 Visual Impact Analysis

Key plan

V01

V01Existing

V01 Proposed

V10

V10 Existing

V10 Proposed

V13

V13 Existing

V13 Proposed

V19

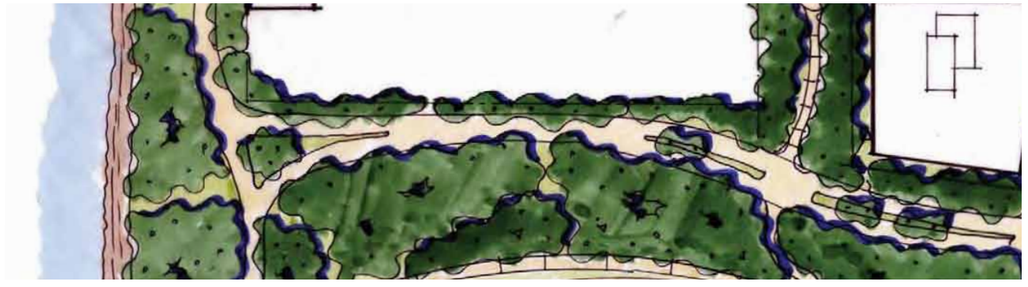
V19 Existing

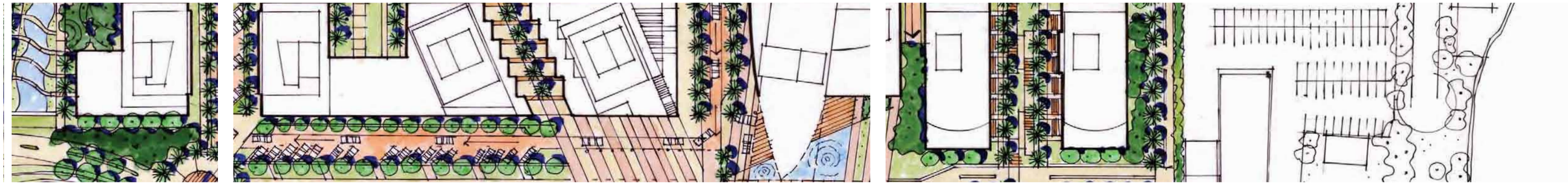
V19 Proposed

V23

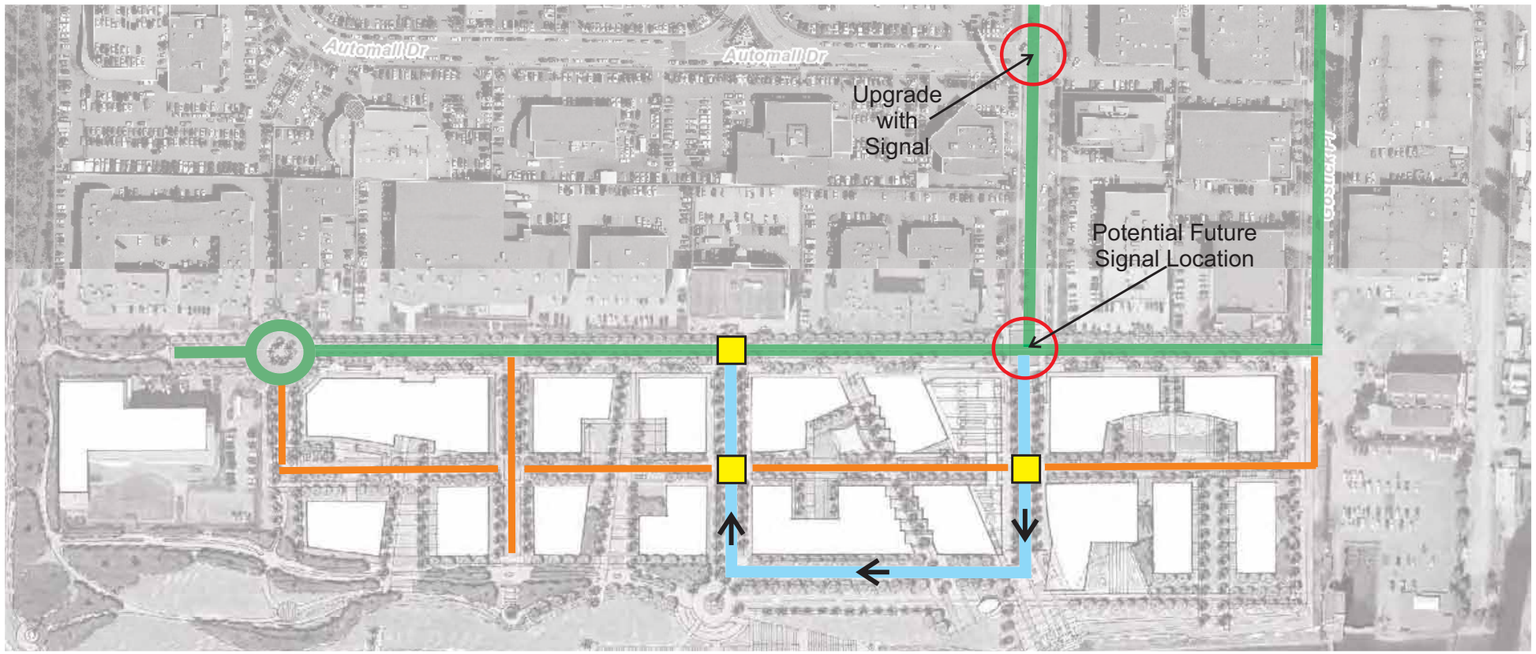
V23 Existing

V23 Proposed





6.0 Movement



Street Connections

Legend

- Public Street
- Public Street (new one-way flow)
- New Mews / Street
- Potential Speed Table Location

Introduction

Concert Properties and Knightsbridge Properties are planning to rezone 4 parcels of land at Harbourside Business Park (Harbourside) in the City of North Vancouver. An OCP Amendment in June 2012 permitted the broadening of land uses on these sites to include residential through allowing a higher floor space ratio (FSR). For the rezoning application, transportation was identified as one of the key matters for detailed consideration, and the Transportation Study has been developed based on the City of North Vancouver's guidance.

Existing Conditions

The main point of vehicle access to Harbourside is at the Fell Avenue overpass. It accommodates around 85% of all Harbourside's vehicle movements, while Bewicke Avenue is a secondary access with 15% of movements.

Vehicle movements to and from Harbourside are currently imbalanced due to the employment-focused uses with a 70% / 30% directional split at each of the peak times and this puts added pressure on the street system. This imbalanced demand also effects transit provision at Harbourside, which does not operate outside the weekday morning and afternoon peak periods.

Travel behaviour at Harbourside shows that 68% of employee movements are auto driver. Transit use represents 20% of movements, of which it is estimated that 10% walk to Marine Drive (which forms part of the Frequent Transit Network in Metro Vancouver).

Peak-hour time periods for vehicle movements at Harbourside are between 8am and 9am in the morning and 4:30pm and 5:30pm in the evening. Vehicle movements collected between 2010 and 2012 were broadly similar and did not suggest vehicle growth on the 1st Street and Marine Drive corridors.
Bewicke Avenue rail crossing was identified as a location for signal and barrier control from a North Shore Study, conducted on behalf of Port Metro Vancouver. Vehicle delays at the railway crossing are typically once per peak-hour period.

Walking, Cycling and Transit

Accessibility to Harbourside is steadily improving and indeed since 2010, when Bunt conducted its study work to support the OCP, the following changes have or are soon to be completed:

The Mackay Avenue pedestrian-bicycle bridge - opened;
A new dedicated transit service to Harbourside - implemented;
Bewicke Avenue upgraded to a greenway (Copping to Bewicke Park) – under construction; and,
Mosquito Creek pathway upgraded - currently progressing with adjacent development plans.
Concert Properties and Knightsbridge Properties through the rezoning application for the Harbourside Drive parcels are planning to further improve accessibility with changes to pedestrian and cycle networks; TDM measures; and, providing more supporting local amenities.

Development Plan

The development plan is to increase the floor to space ratio (FSR) of the 4 development parcels from 1.0 to 2.2 (including rental) and this will accommodate new office space at around 215,000sqft (19,980 m2) Gross Floor Area (GFA), retail at around 45,000sqft (4,180 m2) GFA, 850 residential units (with 110 rental), and a hotel with 100 rooms.

A prime focus for the design is to create an environment where street space is shared more equally through maximizing public realm and having pedestrian-focused street design. Strong synergies are expected through the new residential and retail (local services, cafes / restaurants, food, etc.) uses planned, while complementing with the existing and future office / light industrial activities. Overall they are expected to lower and better balance transportation demands at Harbourside.

Harbourside Place is planned to operate one-way (westbound) and would also include a short section of Fell Avenue. This arrangement will allow a direct access to the waterfront, create a simple circulatory system, and allow for the development of a more compact and convivial street environment.

A new internal mews street (east-west) will be introduced within the block structure and this will be intersected with north-south mews streets along with pedestrian corridors. This structure will maximize permeability while serving as connections to parking and loading.

A new segregated Spirit Trail route will be developed (6-metres wide) and this will be integrated to the existing sections, including the greenway being developed on Bewicke Avenue.

Integral to the plan will be a new transportation node(s) on Harbourside Drive and which will be positioned close to activities (e.g. café), have a wifi access, covered waiting area, and more generally, a prominent design using surface materials and signage.

Parking and Loading

Street parking within Harbourside is currently close to capacity (circa 95%), while on-site parking has a lower utilization at around 55%, perhaps reflective of inflexible and / or less intensive use. Around one-quarter of the car drivers interviewed in the employee survey said they parked on-street.
Planned parking rates for each of the land uses are presented below:

1. Employment at 2.5 to 2.7 spaces per 100 m2 GFA;
2. Market residential at 1.3 per space per unit (inclusive of 0.1 visitor space per unit) and rental at 0.4 spaces per unit (inclusive of visitor) and both supported with car-sharing vehicles;
3. Commercial retail parking will be in publically accessible locations and is planned at 3 spaces per 100 m2 GFA; and,
4. Hotel is proposed at 0.7 spaces per bed and includes provision for complementary and supporting uses.

All new buildings are expected to meet the projected parking demands and will not add to the weekday peak day-time street supply.

A parking management plan will be developed to address current issues through extending the existing 2-hour time limit to the majority of parking at Harbourside along with 1-hour restrictions at high turnover locations (i.e. Dog Park / Kings Mill Walk, retail frontages). Overall, street parking supply is planned to increase with the development plan.

Bicycle parking provision will be consistent with the City of North Vancouver's bylaw requirement, while its location and design will follow best practice. It will be complemented with a bike station and community-based bike share scheme to maximize opportunities for cycling.

Loading is planned to serve retail, office, residential, and hotel uses and opportunities will be explored to share loading given the expected differing main demand periods.

TDM

The employee survey identified the potential for Transportation Demand Management measures with 50% of the employees located on the North Shore; 8% within reasonable walking distance; and, 22% within reasonable cycling distance. Transit represents 20% of current movements and with the high trip origins on the North Shore (50%) and the City of Vancouver (25%), it confirms the potential for this mode.

6.0 Movement

Pedestrian and Bicycle Connections

Legend

- Existing Public Street (no operational change)
- Existing Public Street (one-way flow)
- New Mews / Street (low volume)
- Sidewalk
- Spirit Trail (Separated Multi-Use Path)
- Spirit Trail (Pedestrian Path)
- Pedestrian/Bicycle Link
- Bus Node
- Potential Raised Intersection Location

A TDM strategy is being developed in consultation with TransLink's Strategic Planning and Travel Smart representatives together with on-going consultations with local bus and bicycle share operators. Through the TDM strategy, the developer is committed to the following measures:

- Implementing a bus service to augment existing operations (i.e. increase frequency and extend operational times) up until the service can be sustained without subsidy or the Waterfront Spirit Trail is open to Lonsdale. The maximum committed period is 4-years and it would be introduced after the first year of development;
- Provide up to 5 car share vehicles (including start-up costs and dedicated spaces), and place in publically accessible locations;
- Work with TransLink's Travel Smart group to develop a user-friendly and safe interface for people to ride-share;
- Provide a location and operational funding for a bike station along with developing a community-based bike share program (once the Spirit Trail is open);
- Work with the City of North Vancouver to determine funding for the greenway development on Bewicke Avenue (Copping Street to West 2nd); and,
- Commit to working with the Squamish First Nation and City of North Vancouver to open up a Waterfront Spirit Trail to Lonsdale Quay from Harbourside.

With regard to the bus service improvement, Concert Properties has been working closely with TransLink'sStrategic Planning and Travel Smart representatives to develop a transit improvement option by supplementing the existing TransLink bus operation times to / from Harbourside, while working in parallel with a private operator to develop a fall-back option.

Preference for the developer is to supplement the TransLInk service, specifically for reasons of transparency and consistency, but should this not proceed then the fall-back option with private operator will progress. A decision would be made closer to the public hearing on which option to progress, based on how matters stand with the respective parties.

The ferry service has not been included as a TDM measure; previous work from TransLink suggests that the feasibility of the ferry service is not cost-effective. However, infrastructure has been provided to accommodate its future potential as the developer may go ahead with the ferry service as part of the hotel operation.

Marketing is critical to the success of the TDM strategy and Concert Properties will continue to work closely with TransLink's Travel Smart representatives to maximize opportunities for travel choice at Harbourside with the focus on lowering the number of single-occupant vehicle trips.

Trip Generation

Compact mixed use development patterns typically generate lower vehicle movements when compared to similar spatially separated land use patterns. However to ensure a robust assessment, the trip rates adopted for the rezoning essentially follow the ITE rates, which are typically based on low-density / single-use / open surface parking suburban locations.

Trip Distributions were developed for each land use, with employment/ hotel based on existing Harbourside vehicle patterns; residential using TransLink's Travel Diary Survey; and, commercial / retail on the Retail Study's Trade Areas. At full build-out of the development plan, it is projected to generate up to 600 vehicle movement in the morning peak-hour and 900 in the afternoon peak-hour periods, where a proportion of these are expected to be internal to Harbourside. At each peak-hour, new vehicle movements on Fell Avenue are projected at up to 460 (am) and 690 (pm), while Bewicke Avenue is up to 120 (am) and 170(pm). During the afternoon peak-hour (critical time period), about 350 new vehicle movements would be added to the current exiting main volume on Fell Avenue, which is equivalent to around 6 vehicles per minute. With the TDM measures and improved accessibility at Harbourside , this level could reduce to 280 vehicle movements or 5 per minute.

Operational Capacity Analysis

The City of North of Vancouver provided a traffic model to assess the existing and future traffic conditions on the local street network and this has been used to assess whether changes are required to manage vehicle flows.

Future projections take into consideration background traffic growth and committed developments in the local area along the rezoning development plan (using the ITE trip rates). No adjustments were made for Transportation Demand Management measures or improved accessibility to the area, and as a result, the assessment is considered to be robust.

The potential need for intersection changes based on existing demands, traffic growth, and the development movements are summarized in table below.

Intersection	Changes	Trigger Point		
		Existing	Background Growth	Develop-ment
Fell/ Marine	Northbound right-turn lane becomes shared with the through lane, and a 25m northbound lane is added to the north leg	No	Yes	-
Fell / 1st	Left-turn bay added to the northbound approach while southbound through lane removed	No	No	Needs monitored
Fell/ Automall	New traffic light within the existing street geometry	Yes	-	-
West 16th Street and Marine Drive	None suggested – development influence less than 5% of existing volume	Yes	-	-
Bewicke/ Marine / Keith	Potential contribution to wider study as this change is driven by current and traffic growth influences	No	Yes	-
Fell at Harbourside	New traffic light	No	No	Yes

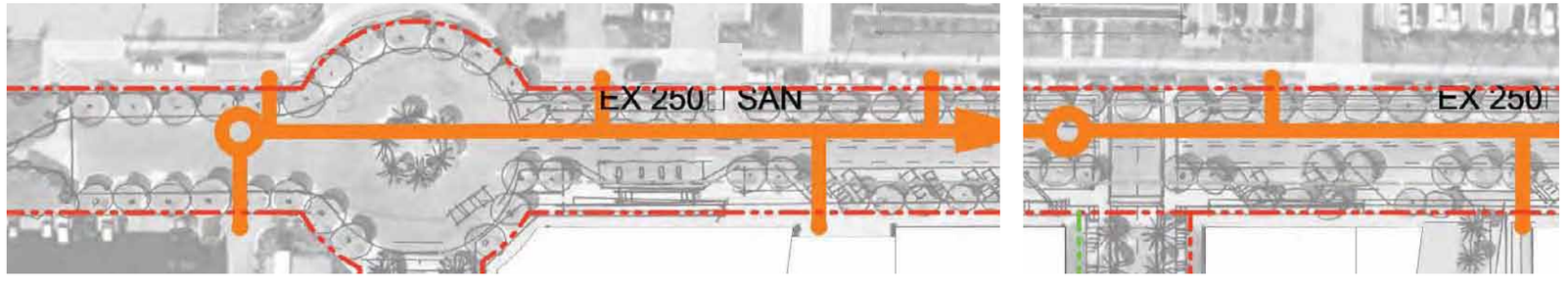
At the Marine Drive / Keith Road / Bewicke Avenue intersection, a significant change is likely needed to address the strategic capacity challenges of the City and it would be prudent to make a contribution to a separate study on looking at wider street network options, opportunities to manage demand, etc. Bewicke railway crossing has been identified for upgrading to barrier control and signals as part of the North Shore Safety review. This improvement is a likely contribution item for the development plan and could be introduced in combination with advanced signage to warn drive to use Fell Avenue instead (when a train is passing).

Emergency access for Harbourside is currently being reviewed with the North Shore Emergency Response Unit and the outcome of this exercise will determine whether the current vehicle access arrangements at Bewicke Avenue and Fell Avenue are adequate to meet the stated requirements or whether other options are needed.

A monitoring plan is proposed that will repeat many of counts in the transportation study to understand whether future vehicle movements are consistent with the study's projections. It will identify if further changes are required to the street network in addition to that set out in the report.

Conclusion

A comprehensive transportation review and strategy has been developed for the Harbourside Waterfront rezoning application and this has provided an understanding on how future travel demands can be managed through changes to walking, cycling, and vehicle infrastructure along with a supporting Transportation Demand Management measures for maximizing travel opportunities.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7.0 Infrastructure Design

Preliminary Water Layout

Preliminary Sanitary layout

The proposed development is located in the Harbourside area of North Vancouver. The subject property is bounded by Harbourside Drive to the north, Bodwell High School to the west, Burrard Yacht club to the east, and the Burrard inlet to the south.

The subject property currently contains a 3 storey commercial building and Lions Gate Christian Academy with parking areas which front Harbourside Drive and Harbourside Place. The Bruce Street road allowance was previously consolidated with the subject property. The proposed development generally consists of 13 residential towers, 1 rental housing tower, 3 office towers, 1 hotel tower, and ground floor commercial components in 5 of the towers. The project will involve a major redevelopment of the site including re-grading of the existing site roads. The total site area is approximately 4.9ha.

Roads

The Harbourside Village development proposal includes minor changes to the local road network. Generally some location and alignment changes are proposed, along with re-grading sections of Harbourside Drive and Harbourside Place to future sea level rise elevation of 5.24m. This elevation change will be achieved by grading the existing Harbourside Place and Fell Avenue roads up at approximately 5% from Harbourside Drive intersections to the onsite lane. Right-of-ways and road dedications for the proposed roadworks on Fell Avenue and Harbourside Place will allow for fire truck access and street parking. Road upgrades are to be constructed per City of North Vancouver / TAC standards.

Water

The existing water system consists of a series of 200mm and 300mm watermains looped throughout the property. The existing water system was sized to provide a minimum fire flow of 225l/s throughout the property. Subsequent analysis provided by the City confirmed that the system capacity would be well in excess of this requirement. The proposed increase in density should not change the minimum fire flow requirement and the increase in domestic demand is small compared to the total fire and domestic water demand. No impacts to the water system are anticipated.

Apartment Units = approx. 862, including 79 Rental Housing Units (per HCMA)
Total Commercial Space = 24,518m² (per RHA)
Fire Flow (FF) = 225l/s (per CNV Development Bylaw)
Maximum Day Demand (MDD) = 26.7l/s
Peak Hour Demand (PHD) = 40.0/s
Design Flow (greater of MDD+FF / PHD) = 251.7l/s

Sanitary

The existing sanitary system consists of a series of 250mm and 300mm sanitary mains generally routed from the south extent of the property north to a pump station at the east end of Automall Drive. The existing gravity system generally has capacity for the proposed density increase with the exception of the existing 250mm sanitary main on Fell Ave directly south of Automall Drive. In this section of the sanitary system, the Peak Wet Weather Flow flows approximately 45% full. With the proposed density increase, the Peak Wet Weather Flow could increase to approximately 80% full. The City of North Vancouver prefers their sanitary mains operate at less than 50% full; therefore, while the main has adequate hydraulic capacity, we recommend that this section of pipe will be upgraded. The existing pump station consists of a Flygt duplex pump system with two 10hp pumps operating alternately. At the system head of approximately 6m, these pumps have a pumping capacity of approximately 65-70l/s each. The proposed density would increase the peak flow to the pump station from approximately 43l/s to 53l/s. Therefore, it is expected that no upgrades to the pump station would be required. The pump station should be analyzed in further detail once residential populations are finalized to confirm these assumptions. Additionally, the City should have SCADA data available for the existing pump station to confirm design flow assumptions.
Based on the proposed development plans, the estimated peak sanitary flows have been estimated as follows:

Apartment Units = approx. 862, including 79 Rental Housing Units (per HCMA)
Total Commercial Space = 24,518m² (per RHA)
Site Area = 4.9ha
Average Dry Weather Flow (ADWF) = 8.1l/s
Peak Wet Weather Flow (PWWF) = 30.0l/s

7.0 Infrastructure Design

Preliminary Storm Layout

Preliminary Utilities layout

Storm

The existing storm system consists of three separate systems to convey flows from the site to the existing watercourse along the west boundary of the property or south to the ocean. Due to the extents of the proposed buildings, any sections of Existing Storm main which are currently located within the subject property lines will need to be relocated outside of property lines.
See Figure 1.5 – Preliminary Storm Layout

While specific site coverage and grading are unknown at this time, effective impervious areas are expected to be the same as assumed during the original subdivision design. Therefore, it is assumed the previous storm sizing will be adequate. (See Figure 4.1 for details):

Catchment Area Fell = 6.3ha
Catchment Area Harbourside = 9.3ha
Postdevelopment Runoff Coefficient = 0.80
Estimated Postdevelopment Peak Flow (10yr storm event) = 980l/s

The property is already zoned for commercial development which has a very high impervious site coverage rate so the proposed additional density will not increase the overall runoff rate. No impacts to the storm sewer system are anticipated.

Harbourside Flood Plain

The subject property is located on the Harbourside flood plain and has been the subject of several City of North Vancouver flood hazard studies. Golder Associates has been retained to review the proposed development plans as they relate to Harbourside. Their report has concluded that the impacts to the proposed development will be limited to utilizing an on-site future sea level rise elevation of 5.24m.

Stormwater Management Plan

A stormwater management plan will be required for this site. Based on the proposed site plans, the postdevelopment impervious areas are estimated to be on the order of 60%. The stormwater objectives, per the City of North Vancouver Development Servicing Bylaw, are as follows:

- Reduce, to the extent practical, the rate and volume of stormwater runoff from the proposed development up to the MAR storm event.
- Rainfall data: CNV municipal hall (MAR storm event = 80mm)

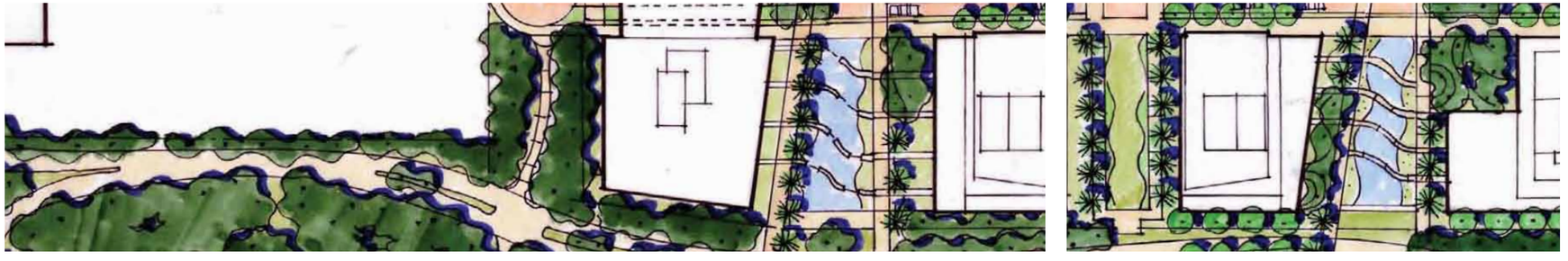
The proposed development includes underground parkade structures with extents covering 100% of the site. Stormwater BMP's based on infiltration to groundwater will not be possible. The effective impervious area will be reduced, to the extent possible, with above grade landscape areas and rooftop gardens. To meet the stormwater objectives, a minimum soil depth of 300mm is recommended. It is assumed that these measures will be sufficient to satisfy the stormwater objectives. Rate control during the 10-year return period storm event will be achieved with detention tank(s). Conveyance during the 100-year return period event will be managed through site grading.

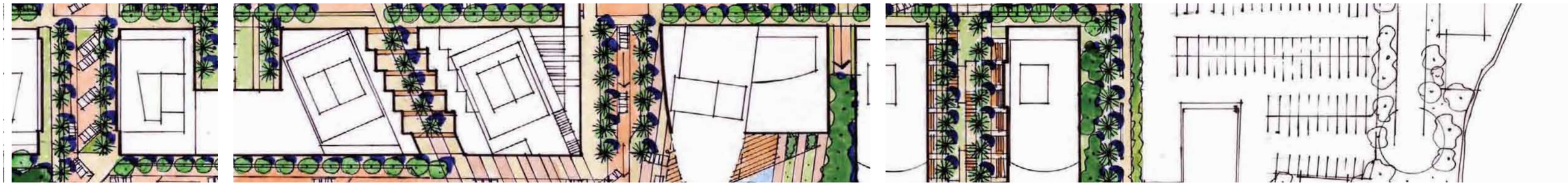
Outside Utilities (BC HYDRO / TELUS / SHAW / FORTISBC)

BC Hydro / Tel has existing underground infrastructure along both sides of Harbourside Drive.

FortisBC has existing 75mm gas mains on each side of Harbourside Drive and a 50mm gas main on Gostick Place. We do not anticipate any issues providing gas service to the proposed development.

Any Utilities located inside of the subject property lines will need to be relocated to accommodate underground parking which will have extents to the property line. We are in early discussions with BC Hydro/Telus/Fortis regarding the relocation of these services and anticipate that the vaults will be located in the proposed road corner bulges. As part of the detailed design for the project, coordination with BC Hydro, Telus, Shaw and FortisBC will be required for their respective utility designs.





8.0 Phase 1

Legend

- Banners
- Spirit Trail
- Interim path
- Development phase

Phase 1A - Lot C

- Redevelopment of Fell Street and Harbourside Place (as far west as possible)
- Sidewalk Edge along Buildings C4 and C5
- Street paving - finished special paving treatment along buildings C4 and C5
- Foot of Fell Street - Promenade and Linear Park along Harbourside Place
- Spirit Trail - 6m wide separated bikeway and walkway at final elevation of 4.5m (FCRP 2100) alongside Harbourside Place
- Spirit Trail - Temporary grade transition to existing Spirit Trail alignment alongside dog park
- Interim transition of Spirit Trail to existing grade alongside Lot 4 consisting of a 4m wide combined asphalt walkway/bikeway
- Harbourside Drive - Angled Parking, 'Loading Dock' walkway and Transit Stop at intersection of Harbourside and Fell adjacent to building C-5
- Harbourside Mews - finished construction between Buildings C-5 and C-4
- Lion's Lane - Partial construction adjacent to buildings C-5 and C-4
- Waterfront Park - construction of view pier in front of C2 and C3 at elevation 4.5m
- Street Paving - interim asphalt treatment along remaining sections of N/S Street prior to construction of C1, C2 and C3.
- Park extension - tiered waterfront park to be constructed with replacement of existing LokBlock wall with rip rap armouring, perched beach and cut stones
- Banner Installation on street lights along Harbourside Drive, Fell Avenue, Gostick Place, Copping Street and Bewicke Avenue extending up to Marine Drive
- Installation of railway safety arms on Bewicke Ave
- Addition of cyclist and pedestrian paths on Bewicke Bridge

8.0 Phase 2

Legend

- Banners
- Spirit Trail
- Interim path
- Development phase

Phase 1B - Lot C

- N/S Street - finished special paving treatment along buildings C1 and C2
- Harbourside Drive - Angled Parking and ‘Loading Dock’ walkway adjacent to building C-1
- Harbourside Mews - finished construction between Buildings C1, C2 and C3
- Lion’s Lane and courtyard - Completed construction
- Finished construction of Fell Avenue including Fell Street Landing, pier and wharf.

8.0 Phase 3

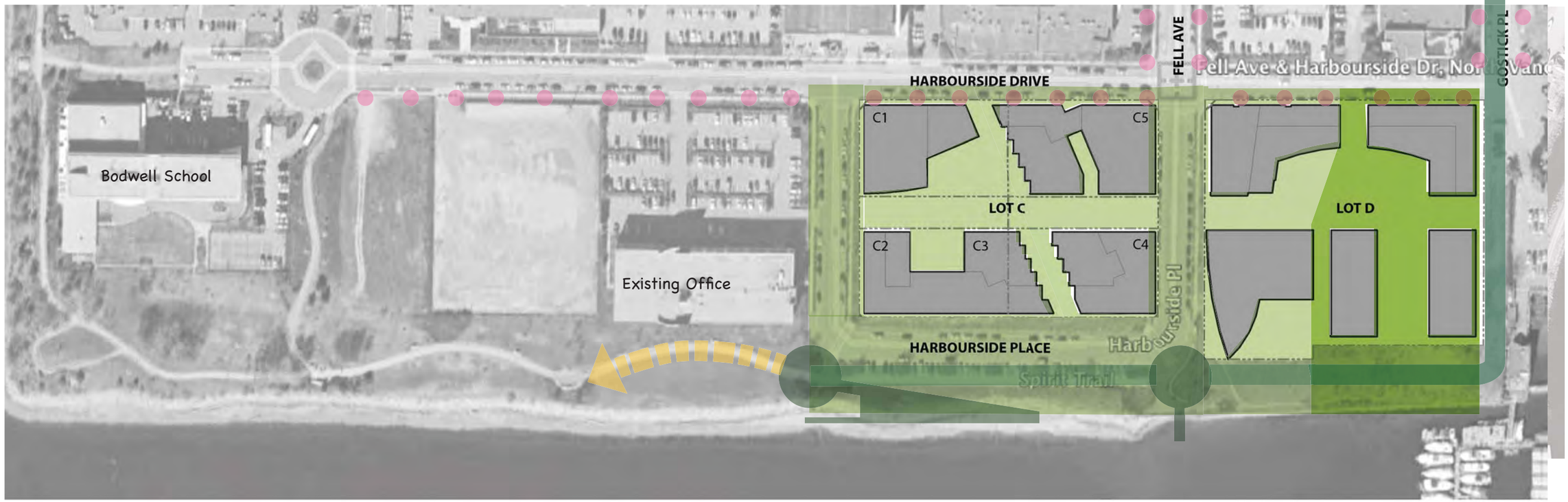
Legend

- Banners
- Spirit Trail
- Interim path
- Development phase

Phase 2A - Lot D

- Spirit Trail - 6m wide separated bikeway and walkway at final elevation of 4.5m (FCRP 2100) around south perimeter of Lot D
- Riparian Improvements to Lower Mosquito Creek
- Angled parking and “Loading Dock” walkway adjacent to building D1

8.0 Phase 4



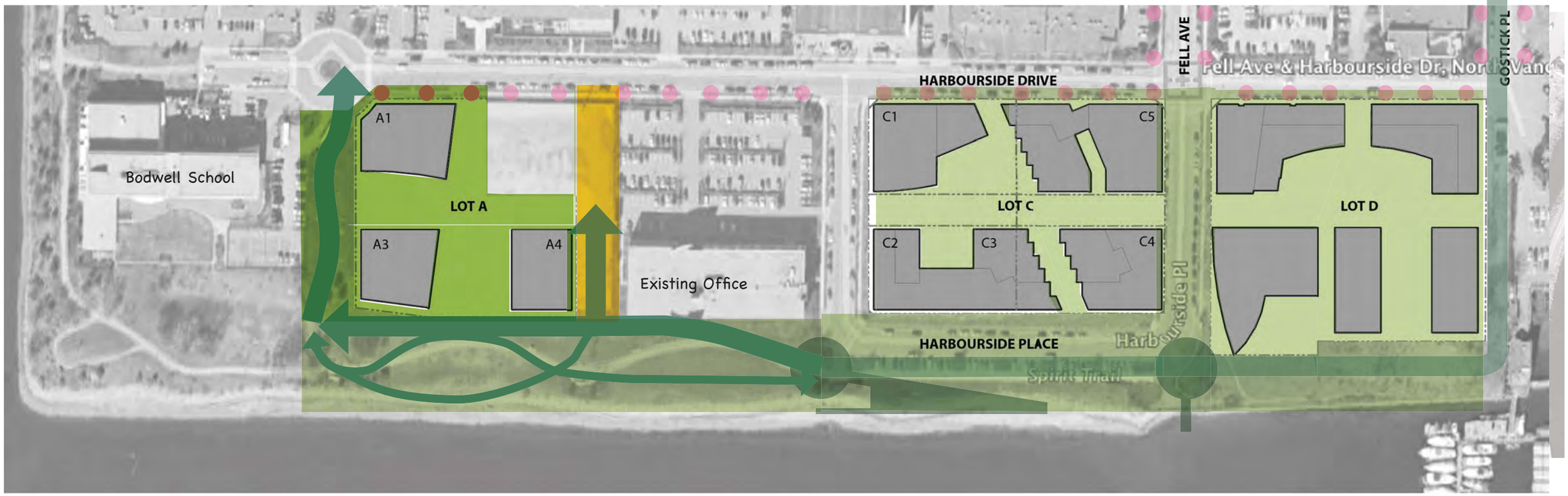
Legend

- Banners
- Spirit Trail
- Interim path
- Development phase

Phase 2B - Lot D

- Angled parking and “Loading Dock” walkway adjacent to building D3
- Construction of final section of separated bikeway/walkway along east side of Lot 4
- Construction of fire lane/mews on east side of building D3 connecting with Harbourside Drive

8.0 Phase 5



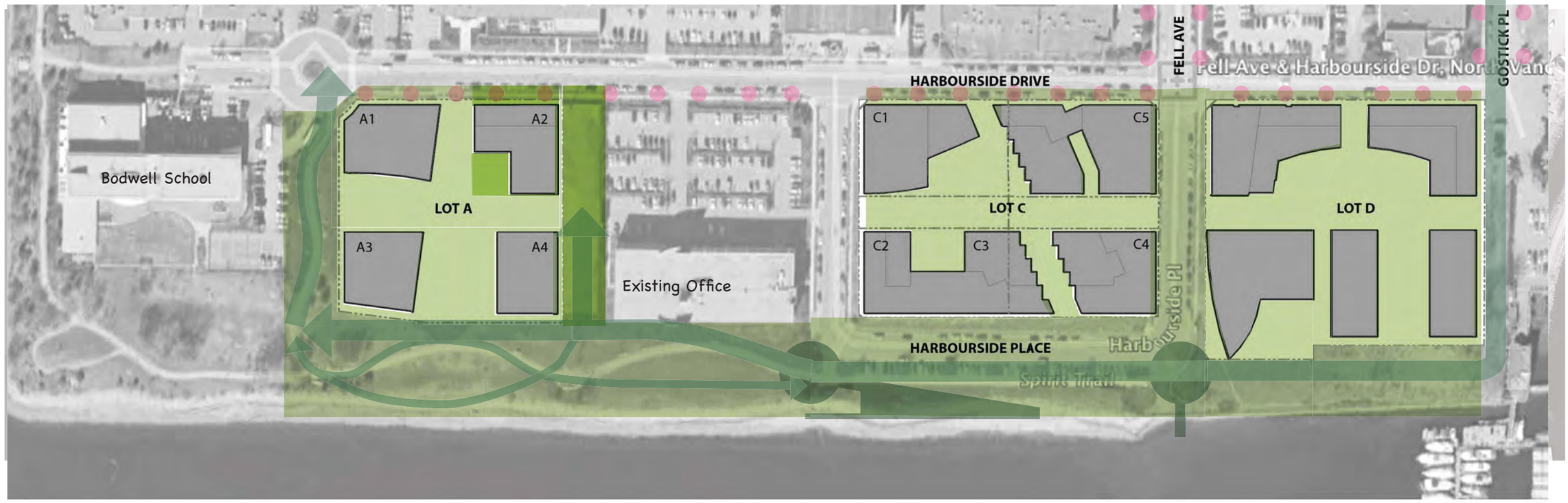
Legend

- Banners
- Spirit Trail
- Interim path
- Development phase

Phase 3A - Lot A

- Spirit Trail - Grade of the Spirit Trail is raised to elevation 5.04 alongside buildings A-3 and A-4. 6m wide separate bikeway and walkway is constructed.
- KingsMill Park - Secondary 2.0m pedestrian waterfront trail is constructed to provide pedestrian access to water's edge.
- Regraded Spirit Trail connection with landscaped retaining wall defining property line with Bodwell School to meet FCL requirements
- Harbourside Drive - Angled Parking, and 'Loading Dock' walkway adjacent to buildings A-1
- Interim street and trail extension regraded to FCL requirements on east side of Lot A

8.0 Phase 6



Legend

- Banners
- Spirit Trail
- Interim path
- Development phase

Phase 3B - Lot A:

- Harbourside Mews - finished construction through Lot A
- Completed park extension on east side of building A2
- Final N/S street and trail extension regraded to FCL requirements on east side of buildings A2 and A4

8.0 Phase 7

Legend

- Banners
- Spirit Trail
- Interim path
- Development phase

Phase 4A - Lot B

- Harbourside Drive - Angled Parking, and ‘Loading Dock’ walkway adjacent to buildings B2 and B3

8.0 Phase 8

Legend

- Banners
- Spirit Trail
- Interim path
- Development phase

Phase 4B - Lot B

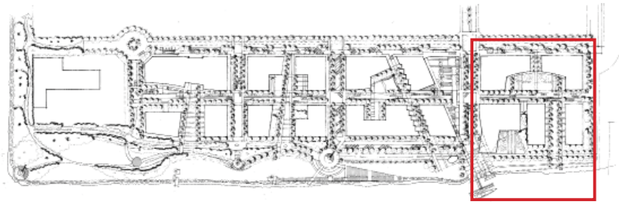
- Construction of landscape courtyard and sidewalk/trail frontages adjacent to buildings B1 and B4


aquabus

9.1 Harbourside Waterfront and Context

9.2 Public Realm Character Precincts

Harbourside Waterfront takes on the overarching character of “industrial chic” inspired by the working industrial waterfront that defines its marine context. Within this established character of buildings a number of character sub-precincts emerge that respond to the east west gradient transitioning from Marine to Urban to Natural in response to adjacent contexts. The Marine precinct is inspired by the working waterfront of the Burrard Yacht Club with features that include narrow boardwalk extensions reflective of marina wharfs, and an internal courtyard that is reflective of a dry-dock service yard. The Urban precinct is the heart of the community, comprised of a mix of retail services, housing and hotel - uses that define this section of the community as the village centre. The Natural precinct is a curious overlay of the industrial-chic aesthetic with an ecological expression within the open space characterized by boardwalks through urban wetlands and natural water features in the courtyards that create strong green linkages to the distinctively natural character of the westerly section of Kings Mill Walk.



9.2 Marine Precinct



















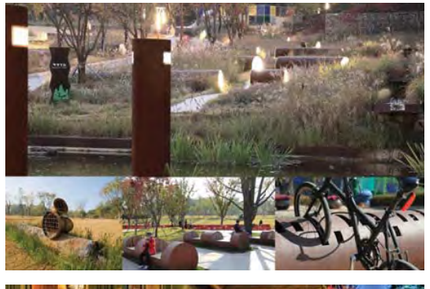
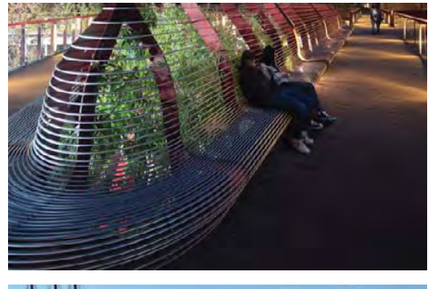
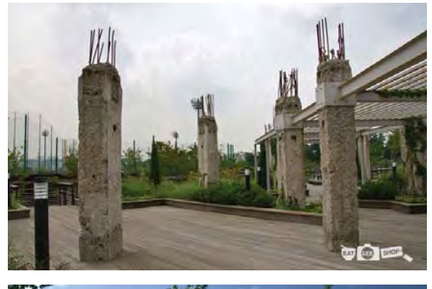




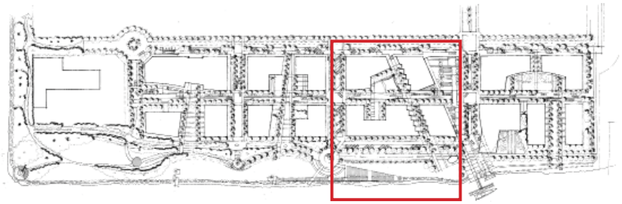








9.2 Urban Precinct





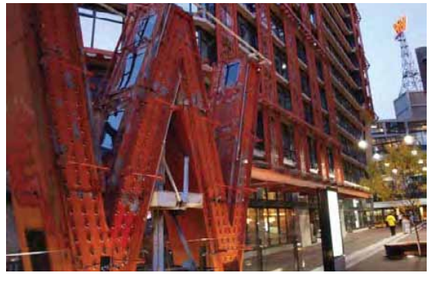




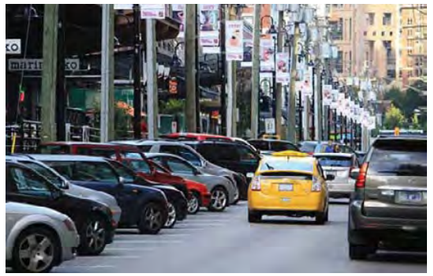














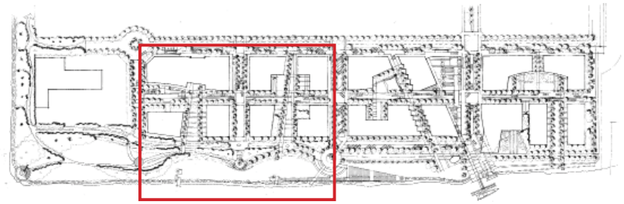












9.2 Natural Precinct







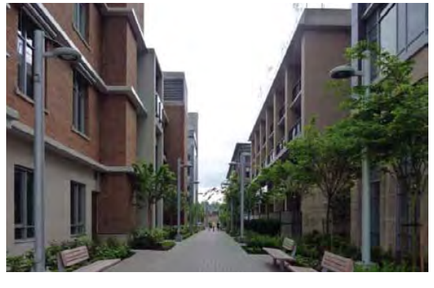


























9.3 Building Character

A certain blocky low-rise building form has emerged through the public process which has directed buildings toward a square-shouldered mid-rise massing, which could be seen as appropriate within the development's industrial waterfront. An "industrial chic" language comprised of elegant, robust, well finished but somewhat "gritty" building details and materials is possible.

In contrast and to add richness a more "shiny" overlay of nautically derived forms and finishes ties in with the "marine" precinct and makes obvious allusion to the waterfront setting.

A variety of styles is the intention of these images right.


TAKING



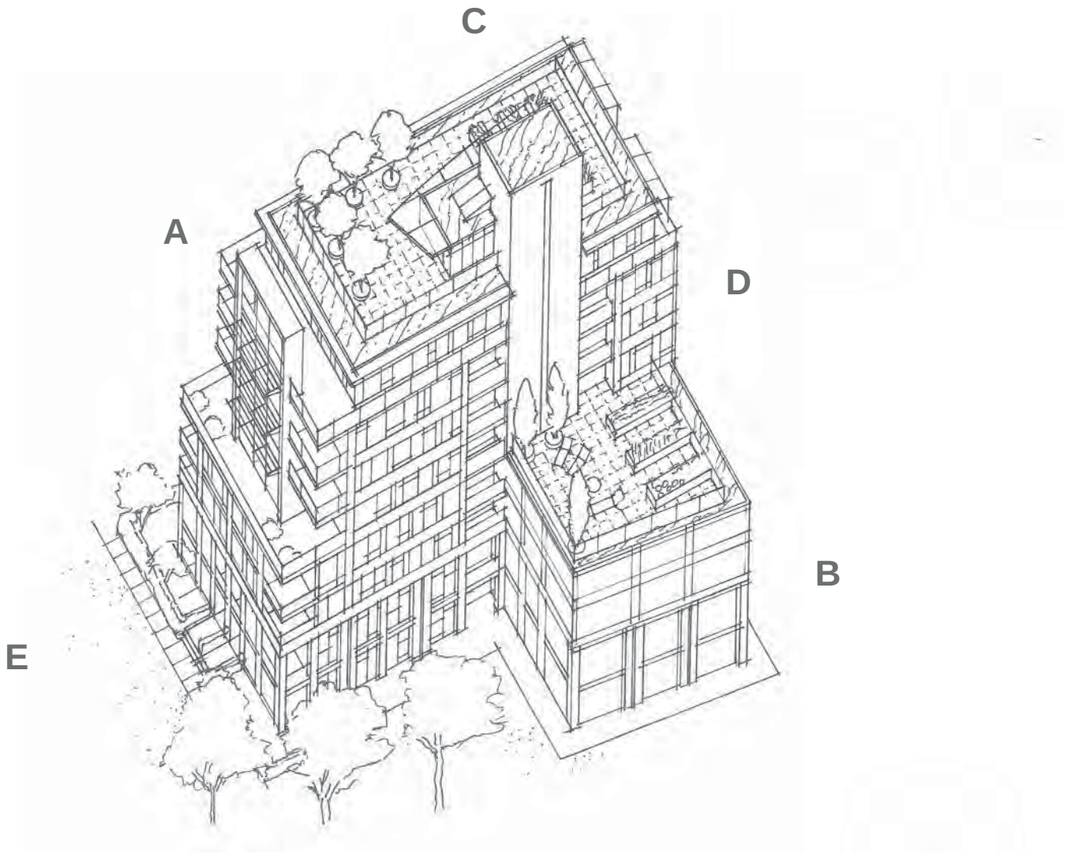










9.3 Building Character

The diagram left demonstrates the following features:

A Step-back at upper floors:
Create a minor step back at the penthouse and/or sub-penthouse levels together with material change, (except for the 2 landmark structures, hotel and southwest office building elements).

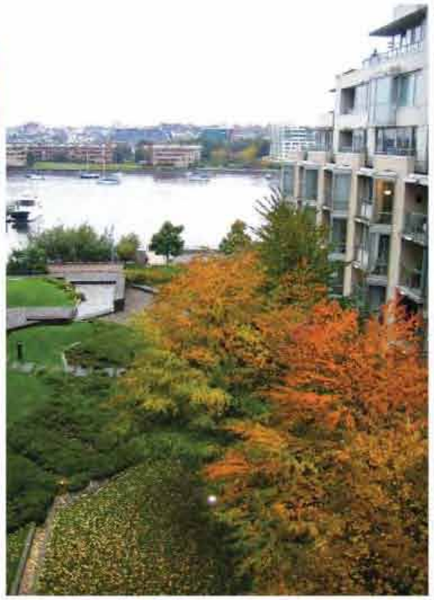
B Podium and wings:
Keep form to a 4 storey maximum expression immediately along the parks, with the exception for landmark buildings in key locations which are allowed to exceed this maximum. Provide some stepping along the north side of the mews

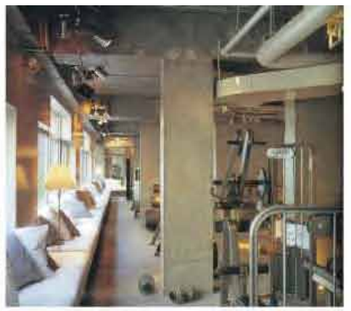
C Rooftops:
Allow for roof access, and small amenity support areas and trellises to encourage useable roof areas. Roofs are to be developed as a combination of useable areas, green roof, and urban agriculture where appropriate.

D Interconnecting forms:
Allow for a variety of interconnecting form elements that link between base, middle and top components.

E Base expression:
Create a 2 storey street scale expression exploring different approaches to fenestration, recessed entries, balcony relationships, and materiality all relating to a human scale along street frontages and courtyard exposures.

F Street detail:
Create a finer grain of detail, together with useable entrance terraces, fencing, signage, canopies, planters and lighting etc. at street frontages, appropriate to residential or commercial usage.





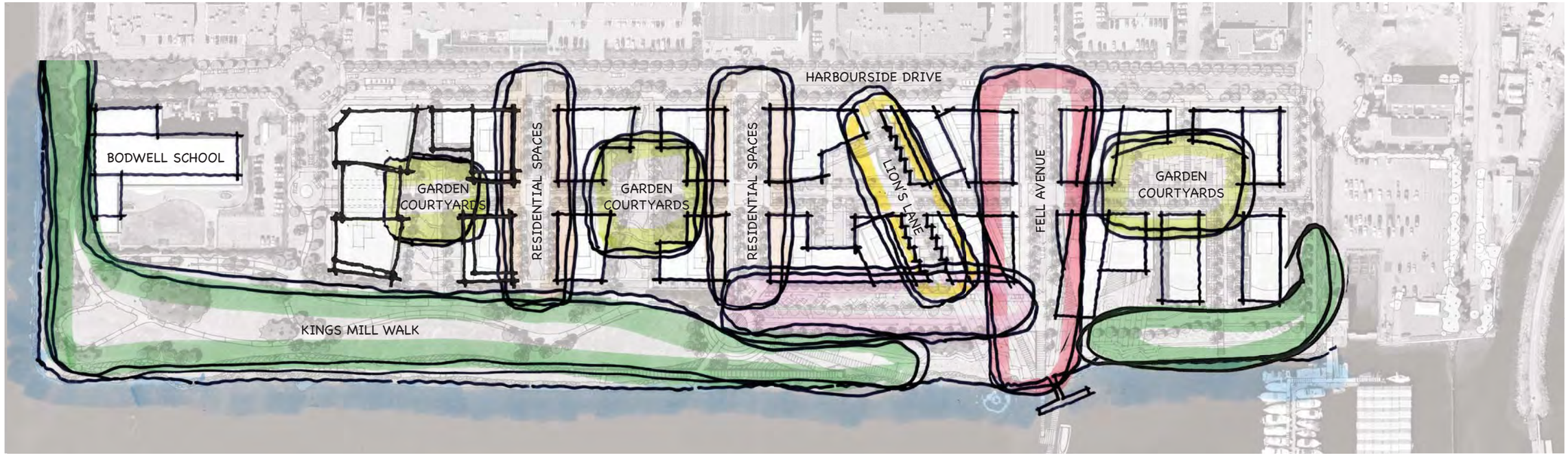








9.4 Character - Sub Precincts



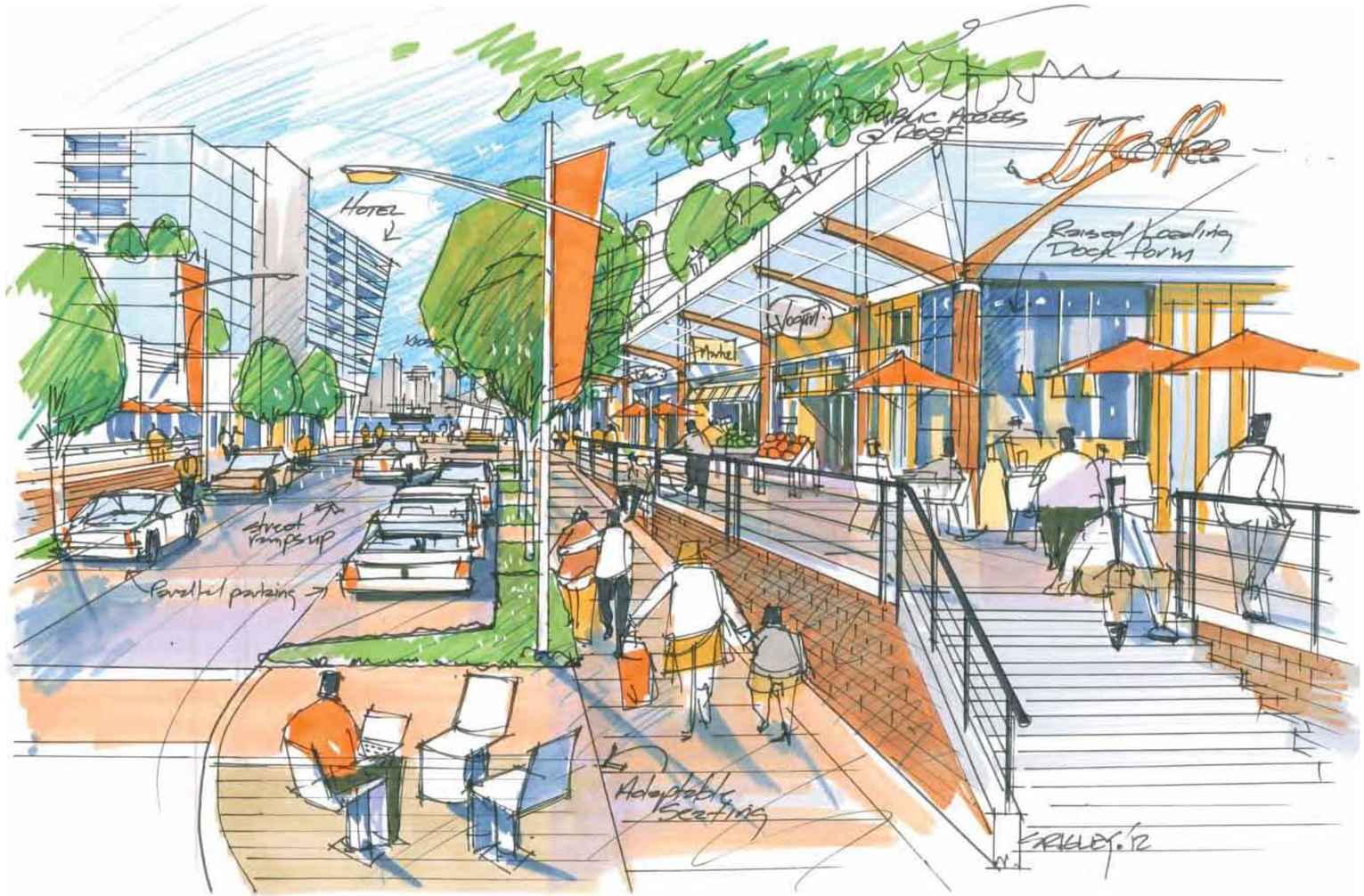
0 20 40 60 m

A number of sub-precincts have been identified that are influenced by the relationship of the buildings and the spaces they front or contain. The following images are intended to provide considerations for these areas and are meant to be neither mutually exclusive nor overly prescriptive.

9.4.1 Fell Avenue

Fell Avenue forms the real entrance to Harbourside Waterfront and is intended to be an animated and active retail street. A variety of canopy types provide weather protection and storefronts open to the sidewalks. Cafes with outdoor seating and shops displaying their products are supported along this route.

A food and beverage kiosk with public washrooms incorporated, forms a visual focal point to the west side of Fell Avenue Plaza. Fell Avenue Plaza extends the street corridor to the water's edge with a pier extension and wharf, as well as intertidal terraces that contribute to active and passive recreational opportunities.




CAMPARI
CAMPARI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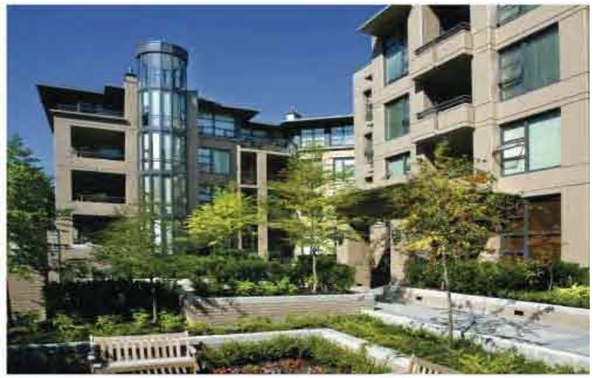
9.4.2 Garden Courtyards and Mews

A series of interconnected garden courtyards forms the heart of the residential uses through the centre of the project. Water features and sculptural landscape elements merge with rich indigenous, sustainable planting to create a sequence of visual delights.

An intentionally narrow and intimate Mews connects these elements and combines innovative “traffic-calming” interventions with mixed vehicular, cyclist and pedestrian use to create a contrasting street experience.



9.4.3 Harbourside Drive

Harbourside Drive is a unique street in that it partially responds to the effects of sea level rise due to the existing commercial buildings to the north. The street is intended to be elevated at a later date by the City, at which time the storefront offices fronting Harbourside Drive can be elevated. As proposed, an elevated walkway system perched on a variety of “dock-like” platforms will provide access to the storefront offices on the south side. The character of this street will reflect a Yaletown-like ambiance and complement the adjacent uses.

9.4.4 Harbourside Place

A promenade by nature, Harbourside Place is the activity centre for Harbourside Waterfront. Flanked on one side by shops and restaurants, it is complemented to the south by spectacular views of the working harbour and the Vancouver skyline beyond. Outdoor seating, shops display, sculptural artwork and a ferry dock create a vibrant character area.












9.4.5 King's Mill Walk

Kings Mill Walk and its existing program will be maintained and enhanced. The existing dog park will be maintained in terms of its area and program and will be better integrated with future phases of development alongside the proposed raised elevation for the Spirit Trail. This will create an improved grade-separated buffer with the residential development to the north. Further enhancements to the park would be concentrated on the eastern sections of the site, particularly with respect to a significant increase in existing park space to the south of sub-area D.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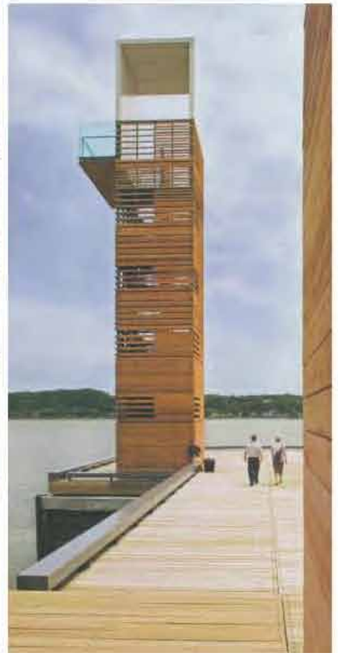

9.4.6 Lions Lane

Lions Lane is proposed to be a very intimate pedestrian street with a spectacular view of The Lions. Single storey work spaces or residential townhouses will flank each side and a semi-protected open space and “bike station” will provide a community benefit at the north terminus.

9.4.7 Residential Streets

North/south streets (excluding Fell Avenue) are designed to be principally residential in nature with slightly raised individual entry terraces to units and overlooking windows and entry doors. A two-storey material expression is intended to create an intimate street scale.

9.4.8 Street Furniture

Creating a viable, animated public realm is contingent on attracting and retaining street-side life and activity. Maximizing places to relax, dine, and people watch, are contingent on the provision of street furniture that is both fixed and moveable. Where street side retail is proposed, outdoor patios with seating are encouraged within the sidewalk environment. Integrated fixed seating elements such as set walls, intertidal terraces, benches and platforms within the streets and parks are intended to attract a greater amount pedestrian activity and use within public spaces.


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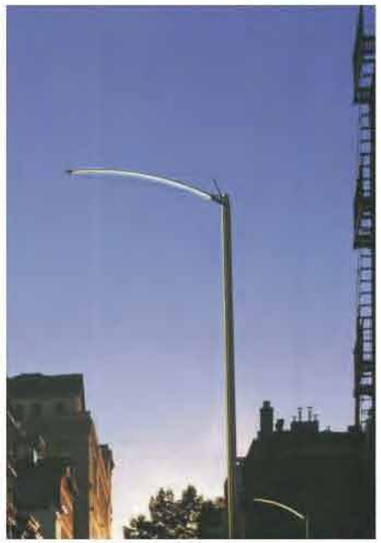
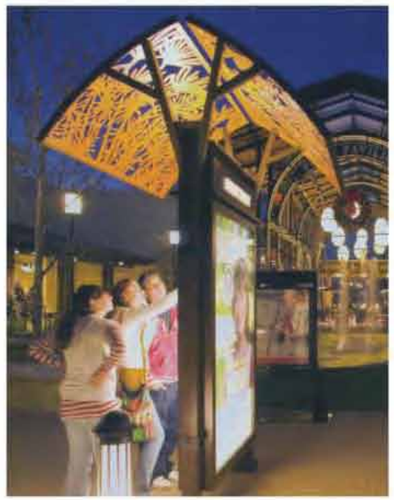


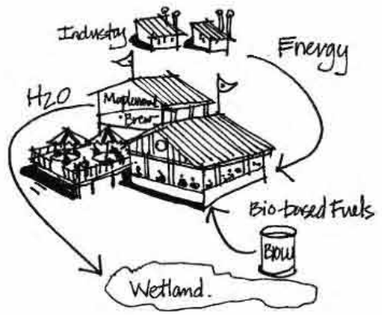



IRVINGTON

9.4.9 Sustainability

The entire project is designed around a high level of sustainability practices and components. While many of these considerations will affect the functionality of Harbourside Waterfront, it is desirable to express these elements and systems wherever possible, in both landscape and building components.

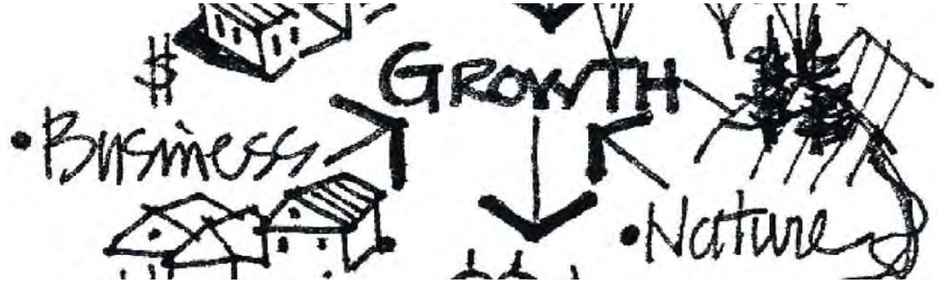
The Harbourside Waterfront neighbourhood will aim to achieve certain performance targets, in particular a high light level of sustainability and green building performance and an overall aim to reduce GHG emissions and improve energy efficiency.


Industry
Energy
H2O
Bio-based Fuels
Wetland.


Industry
Health
GROWTH
Business
Nature
Housing
Culture

9.5 Harbourside Waterfront Vision

Harbouside Waterfront Rezoning Submission - November 2012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GROWTH
•Business
•Nature

10.0 Sustainability

Concert has envisioned the development as an embodiment of four pillars:

- “A Community in Balance”
- “Resilient Design”
- “A Gathering Place on the Working Waterfront”
- “Multi-Modal Transportation Excellence”

This document outlines our plan for a holistic sustainable approach to the continued development of Harbourside Waterfront. Concert sees Harbourside Waterfront as an opportunity to make an important contribution to the City’s ongoing efforts to advance sustainable energy use and greenhouse gas reductions. This means doing things differently, working outside the current box and considering a variety of issues relating to sustainability, livable community and resiliency… …all at once.

The sustainability strategy outlined below expands on these concepts, within a scale-based framework. While the detailed description of each sustainability initiative or feature has been provided in the appended table, an overview of their implementation and verification processes is discussed under “Process”. It is followed by a section dedicated to the discussion of energy and emissions as the City’s long-term priority is to achieve a carbon-neutral community.

Concert is committed to working collaboratively with the City of North Vancouver to achieve measurable targets for energy and carbon

i. Introduction: Towards a Sustainable Community

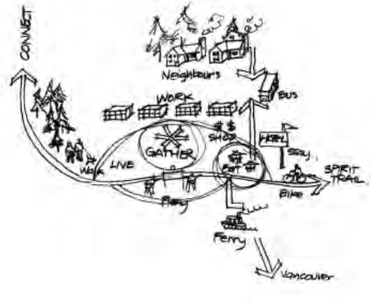
This development will make an important contribution to advancing the City's commitments to sustainability. It cannot be emphasised enough, but all of the facets discussed below are interconnected.

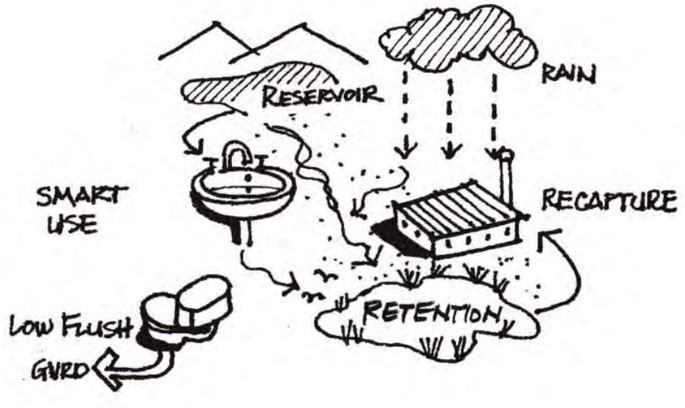
Our vision imagines a development in harmony with its location. It encompasses a comprehensive approach which equally addresses social, economic and environmental sustainability. It is the vision for a "complete community", self-reliant as much as its resources allow and in a balanced, positive relationship with the environment. What follows is a brief description of multiple facets of this approach.

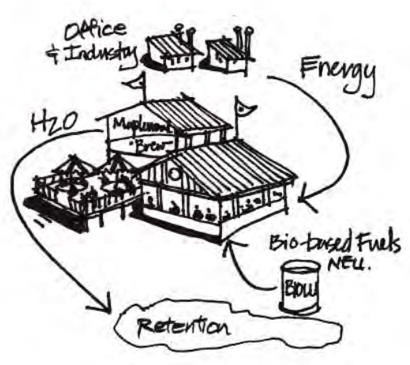
- A Socially and Economically Diverse Community where everyone feels safe, comfortable and welcome to live, work, shop and play; offering a variety of job opportunities; attracting people from near and far. A community culturally enmeshed with the larger social fabric of the City of North Vancouver, providing spaces for use by local artists, craftspeople and cultural entities. Harbourside is seen as a development that becomes a destination for people with diverse cultural interests and backgrounds. A place that is engaged day and night in activity and interaction.
- A Healthy Community evolved through extensive urban design and infrastructure to support many lifestyles; with ample outdoor space for physical activity and social connection and interaction. Incorporating internal and external community spaces to cater to a variety of users, ranging from plazas and streets that will host famers markets and festivals to small spaces for cafes and intimate gatherings.

Concert will strive to produce a built environment that minimizes exposure to pollutants and chemicals; and construction practices which reduce air, water, noise and light pollution.

- Transportation Choice and High Connectivity a community planned and designed to incorporate basic services within walking distance, promoting reduced car use; utilising multi-modal transportation systems, aimed at reducing emissions through provision of transit services, pedestrian and bicycle friendly street design combined with connection to our neighbour's and the CNV's existing infrastructure of trails etc.
- A Resilient, Sustainably Built Community informed by the City's goals. Harbourside will include the durability and flexibility to allow people to age in place, while addressing environmental risk and the challenges of depleted resources, and continually maintaining the design concept that attracted people in the first place.
- A Low Carbon and High Energy Performance Community will define Harbourside's buildings, transportation and waste profile, making an important contribution to the City's climate action and energy goals. Concert is committed to meeting high energy and carbon performance. Final performance also depends on the buildings' heating system for which Lonsdale Energy Corporation will be responsible and with whom Concert is committed to collaborating.
- A Lasting Legacy in Sustainable Development for the residents of the City of North Vancouver and Harbourside; building on our previous experience, Concert will aim to create a current day success story that inspires others to emulate.







ii. Concert's Gold Standard

Concert is committed to high-performance LEED Gold standard buildings, and infrastructure designed and built to the standards set out by industry leading green building practices and rating systems; the buildings and systems will be supplemented with passive design strategies and restorative landscape and green spaces.

Harbourside will be a place where everyone can learn about sustainability, environmentally responsible living, resiliency and climate change – from Concert and its consultants to the City and the future residents and users of Harbourside.

Concert will be using many aspects of LEED ND to inform broader neighbourhood design; and in parts as a method of verification that some goals have been met. We will evaluate the appropriateness of the new Canadian LEED ND standard for certifying this particular neighbourhood, and confirm, prior to completion of the re-zoning process, whether the entire standard shall be pursued.

iii. Methodology

The Sustainability section sets out the sustainable features and initiatives of the development at three scales/categories of buildings, site and habitat (within the development boundary) and neighbourhood (development as a whole and its connection to its surroundings). At this stage (rezoning application stage), the focus will be on the two latter categories. However, to meet the City of North Vancouver requirements specifically with regards to energy and water, the "buildings" category will propose performance targets and related green building commitments.

The overall format of the sustainability section is based on discussing each sustainability issue within the following framework:

- Goal – Taking into consideration Concert's own sustainability policies, CNV's sustainability policies as well as provincial and national code requirements, the overall reason for adopting and addressing the issue will be outlined under the "Goal" heading.
- Targets – Targets are either quantitative or qualitative. Quantitative targets are those which will be measured based on standard industry metrics. Qualitative targets are those for which there are no standard metrics or cannot be measured within the framework of this rezoning application, these will include code or by-law compliance as well.
- Strategies – The goal provides flexibility in how targets will be achieved. The overall approach will be non-prescriptive but preferred approaches are outlined. "Committed" strategies are those which Concert will be committed to have delivered upon completion of various stages and phases of the development.
- Verification – Concert will provide third party verification for key priorities; e.g. energy performance. Therefore, where appropriate, a third party or an equivalent verification method such as LEED is outlined. Equivalent verification methods will be agreed with the City of North Vancouver. Where there is no specific quantitative target or code/by-law compliance requirements, verification will be based on a statement by Concert or corresponding consultant.

iv. Process

Sustainability requires a multidisciplinary approach involving all stakeholders throughout the process of design and construction. Therefore, Concert will implement an Integrated Design Process (IDP) at various stages of development.

Sustainability is intrinsically an evolving concept. Jurisdictions having authority adjust their policies and goals as knowledge of sustainability expands and more sustainable technologies become available. The scale of the Harbourside development entails a phased process of design and construction spanning several years. Therefore, Concert has adopted a multi-staged, multi-pronged approach to sustainability that recognizes the abovementioned changing nature of sustainability and time.

- Rezoning Application – The overarching goals of the development - especially in relation to the CNV's 2107 goals – have been determined. The goal is providing flexibility for future evolution of both sustainability concepts and legislative policies.
- Development Permit (DP) – Concert and the CNV will review the sustainability strategy at the beginning of each phase to ensure its relevance and, if necessary, make adjustments. A sustainability strategy that pertains to the scope of the proposed development will be included with the Development Permit application. Overall compliance and verification paths will be confirmed.
- Building Permit (BP) – Specific design strategies will be identified at the building scale. The Building permit application will include a sustainability strategy with building-scale verification methods negotiated and determined.
- Occupancy Permit (OP) – Following construction, alignment of the as-

built project with sustainability strategy commitments will be verified as per the verification methods identified.

The table below summarizes the proposed implementation, compliance and verification timeframe for sustainability initiatives pursued in Harbourside Development:

SUSTAINABILITY INITIATIVES		IMPLEMENTATION			
		Rezoning	DP	BP	OP
Design	Land Use Mix and Urban Form	■			
	Transportation Strategies	■			
	District Energy Supply	■	■		
	Infrastructure	■	■		
	Climate Adaptation	■	■		
	Habitat	■	■		
	Green Space & Landscape	■	■	■	
	Energy and Water Performance Targets*	■	■	■	
	Building Form and Passive design		■	■	
	Building Energy Systems & Cooling Strategy		■	■	
	Social and Economic Well-Being	■	■	■	■
Verification	Verification of Design**		■	■	■
	Verification of Completion and Performance**				■

* In many projects, these targets would often not be confirmed until the detailed design or building permit stage; however they are being included at the rezoning stage based on the City's request.
** Verification of features or performance would be as per the verification descriptions in this document.

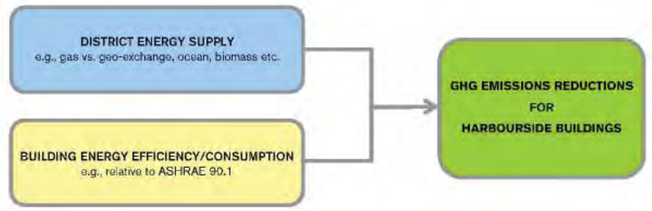
v. Energy and Emissions Strategy Discussion

The City of North Vancouver's 100-Year Sustainability plan envisions a net zero carbon community by the city's 200th anniversary in 2107. The Community Energy and Emissions Plan (2010) delineates the road map to achieve this goal and builds on deep emission reductions from a variety of sectors, including energy supply and use, transportation, buildings, land use and solid waste. The bulk of GHG emissions in the City result from two major sectors: buildings and transportation. For Harbourside, future GHG emissions will be reduced through two major tactics: reducing demand for energy, and where possible, utilizing low-carbon energy sources.

Reducing Building Emissions

The implementation of low-carbon energy sources will involve the LEC, in partnership with Concert, to identify and work towards more efficient and lower emitting opportunities. This has interdependency with energy efficiency decisions; these important considerations are discussed in the following sections.

As shown above, the level of GHG emissions reductions possible for



Harbourside buildings will be primarily determined by the amount of energy consumed for heating (and thus building energy efficiency), and the carbon intensity of the energy supplied for heating and hot water by the LEC. However, potential investments by Concert into alternative/low carbon energy supply will need to be balanced with potential investments in building energy efficiency, and the investment required for DE connectivity in residential buildings.

For commercial buildings, typical building energy systems are generally more consistent with district energy requirements; initial discussions suggest that cost premiums for DE compatibility are less than for residential. However alternative approaches whereby buildings provide energy to each other at a neighbourhood scale shall be investigated. For primarily residential buildings, cost premiums for DE compatibility are generally higher when compared with typical practice, and it is more difficult to recover energy efficiency investments through energy cost savings, due to strata ownership.

Building Energy Efficiency

Based on the desired zoning and density, the proposed development will take advantage of the provisions in the Energy Efficiency Bylaw, which requires conformance to ASHRAE 90.1 2010. Concert's goal is to construct buildings that are as energy efficient as possible while being technically and economically viable. All buildings will be built to meet the LEED Gold standard.

Due to the long lifetime of building envelopes relative to mechanical equipment, and to reduce the demand for heating and cooling, Harbourside will prioritize the energy performance of technically and financially viable efficient building envelopes relative to other technology solutions as a design principle. This will include elements such as passive design, better insulation and improved thermal performance of wall and window assemblies.

District Energy Requirement

Concert's ultimate goal is providing a sustainable, resilient community and buildings that work towards the City's 2107 target. Concert will connect to the LEC hot water system, as required, as part of the plan for the community. The system will be scalable and Concert will work with the LEC to investigate alternate energy sources that result in lower emissions, whilst meeting the needs of the LEC and the Harbourside community.

SUSTAINABILITY STRATEGIES

i. BUILDINGS

	Goal	Target	Strategy: Committed	Strategy: Considered	Verification
BUILDINGS: COMMERCIAL					
Office	Achieving high standards of sustainability and green building performance	LEED-Canada CS Gold *Concert's commitment is to deliver building projects that meet LEED credit requirements, retain accredited green building professionals, and execute the LEED/CaGBC project certification process.*	• Achieving at least 20% cost improvement in the proposed building performance compared with baseline building performance rating as defined by ASHARE 90.1 • Bicycle end-of -trip facilities	• Encouraging tenants to pursue LEED-Canada CI certification	• CaGBC • External LEED consultant
Hotel	Achieving high standards of sustainability and green building performance	LEED-Canada NC Gold *Owner's commitment is to deliver building projects that meet LEED credit requirements, retain accredited green building professionals, and execute the LEED/CaGBC project certification process.*	• Achieving at least 20% cost improvement in the proposed building performance compared with baseline building performance rating as defined by ASHARE 90.1 • Bicycle end-of -trip facilities	• Applicable LEED-Canada CI Credits	• CaGBC • External LEED consultant

	Goal	Target	Strategy: Committed	Strategy: Considered	Verification
BUILDINGS: RESIDENTIAL/MIXED-USE					
Energy	Reducing energy demand and use at the scale of building and residential unit and balancing energy efficiency with low carbon energy supply to achieve emissions reductions	Achieving at least 20% improvement in the proposed building performance compared with the baseline building performance rating as defined by ASHRAE 90.1-2007* **The energy target will be reviewed, and if necessary revised, to use the version of ASHRAE 90.1 which is referenced in the latest version of LEED Canada-NC rating system at the time of DP.* *Concert may consider more aggressive energy targets, depending on the outcome of renewable district energy supply decisions and the associated investment required*	• Whole-building energy modelling, including optimization for District Energy connectivity and performance. • Priority on building envelope efficiency and passive design • Efficient lighting and HVAC systems • Energy conservation information for residents • ENERGY STAR appliances, e.g. clothes washers, refrigerators and dishwashers	• Place vegetation at strategic locations around buildings to minimize energy consumption and costs associated with heating and cooling • Post-occupancy energy monitoring and optimization	• Energy Modelling Verified by Qualified Energy Modeller
Water	Reducing potable water use and generation of wastewater by each residential unit	Exceeding LEED-Canada NC Prerequisite WEp1: Water Use Reduction	• Low-Flow Fixtures • Dual-Flush or High Efficiency Toilets • ENERGY STAR clothes washers	• Educational rainwater collection systems (e.g. rain barrels) where possible • Drought-tolerant and water efficient species	• Consultant or Concert • External LEED consultant
Materials	Considering the whole lifecycle of materials and their impact on the environment and human health				
Waste Management	Reducing the amount of all streams of waste to landfill	Full achievement of LEED-Canada NC Credit MRc2 Construction Waste Management – targeting 50%	• Developing and implementing Construction Waste Management Plan • Recycling storage space in all buildings • Recycling education program for residents	• Organic waste management (Green Bin program in collaboration with CNV)	• Consultant or Concert • External LEED consultant
Healthy Materials	Minimizing environmental and human exposure to emissions from products, materials and finishes	LEED Canada-NC Credits EQc4.1 to EQc4.4: Low-Emitting Materials	• Compliance with 3rd party indoor environmental quality (SCAQMD) rules • Educational program for residents • Formaldehyde-free materials	• Minimizing the use of PVC • No use of petrochemical fertilizers and pesticides	• Consultant or Concert • External LEED consultant
Low-Impact Materials	Reducing the environmental impact of materials and products used in the construction of the buildings	• Minimum 10% recycled content as calculated in LEED-Canada • Minimum 50% of wood to be FSC-Certified or equivalent, Pine Beetle killed or salvaged	• Using materials with high recycled content • Incorporating BC-based manufactured and harvested materials and products, where possible • Looking for opportunities to salvage and reuse materials	• Rapidly renewable materials	• Consultant or Concert • External LEED consultant
End-of-Trip Facilities	Reducing the adverse effects of vehicle use by providing facilities for alternative means of transportation especially cycling	Meeting the requirements of the City of North Vancouver for the provision of end-of-trip facilities	• Provision of secure bike lockers	• Exceeding the City requirements, where possible	• Consultant or Concert

ii. SITE and PUBLIC REALM

	Goal	Target	Strategy: Committed	Strategy: Considered	Verification
SITE and PUBLIC REALM: HABITAT					
Ecological and Habitat Protection	Protecting the existing habitat within the site boundary and its immediate adjacency	• Protection of existing ecologically sensitive areas including existing riparian habitat in conformance to Vegetation and soil protection zones (VSPZ) • Achievement of Sustainable Sites Initiative Guidelines and Performance Benchmarks 2009 Prerequisites 4.1 and 4.2 and Credits 4.4-4.6. *The latest version of Sustainable Sites Initiative Guidelines and Performance Benchmarks will be used at the time of DP. The current one at the time of this rezoning application is the 2009 version.*	• Controlling and managing known invasive plants found on site • Using appropriate, non-invasive plants • Minimizing soil disturbance in design and construction • Preserving all vegetation designated as special status • Preserving or restore appropriate plant biomass on site • Using native plants • Preserving plant communities native to the eco-region	• Studying the impact of development on fish and bird habitat	• Consultant
Ecological Enhancement	• Improving the ecological conditions of site, where possible, to encourage the expansion of existing natural habitat or creation of new ones	• Achievement of Sustainable Sites Initiative Guidelines and Performance Benchmarks 2009 Credits 3.3 and 4.9 *The latest version of Sustainable Sites Initiative Guidelines and Performance Benchmarks will be used at the time of DP. The current one at the time of this rezoning application is the 2009 version.*	• Protect riparian, wetland, and shoreline buffers • Restore plant communities native to the eco-region	• Marine + riparian habitat enhancements to saltwater shoreline • Riparian enhancements to Mosquito and Mackay Creeks up to Harbourside Drive	• Consultant
Microclimatic Impact	Providing a comfortable and sustainable outdoor environment and to reduce the adverse microclimatic impacts of the development through a seasonal approach to design	• Thermal comfort, e.g.: temperature, humidity and air flow/wind. • Acoustic comfort, e.g. blocking noise while enhancing natural sounds of ocean and wildlife • Visual comfort e.g. reducing glare	• Where possible, designing building mass to minimize unwanted microclimatic conditions such as excessive local wind speeds, frozen streets and sidewalks and over exposure to rain and precipitation • Where possible, maximizing desirable effects such as ocean breeze, shading by buildings and trees in summer. • Use of deciduous trees to provide shading in summer and allow daylight to pass through in winter	• Using land use zoning and adjacencies to mitigate adverse microclimatic impacts of development • Taking advantage of landscape features (e.g. berms, shrubs or dense vegetation) to block noise or undesirable visual impact	• Consultant
Land Contamination Management	minimizing risks of soil contamination caused by construction activities as well as remediation of contaminated sites when required	Achievement of Sustainable Sites Initiative Guidelines and Performance Benchmarks 2009 Prerequisite 4.3 and Credits 4.4, 7.2 and 7.3 *The latest version of Sustainable Sites Initiative Guidelines and Performance Benchmarks will be used at the time of DP. The current one at the time of the rezoning application is the 2009 version.*	• Prepare and communicate to contractors a soil management plan • Define locations for soil protection zones • Minimize soil disturbance in design and construction • Restore soils disturbed during construction • Restore soils disturbed by previous development	• Define areas for soil remediation due to construction or previous development activity	• Consultant

	Goal	Target	Strategy: Committed	Strategy: Considered	Verification
SITE and PUBLIC REALM: GREEN SPACE					
Vegetation and Plants	Enhancing the local ecological conditions through landscape deign	Achievement of Sustainable Sites Initiative Guidelines and Performance Benchmarks 2009 Prerequisites 4.1, 4.2 and Credits 4.7 and 4.9 *The latest version of Sustainable Sites Initiative Guidelines and Performance Benchmarks will be used at the time of DP. The current one at the time of this rezoning application is the 2009 version*	▪ Native plants ▪ Salt-tolerant plants where required such as areas susceptible to high tides or storm surge ▪ Controlling and managing known invasive plants found on site during site development. ▪ Using appropriate, non-invasive indigenous plants ▪ Restore plant communities native to the ecoregion		▪ Landscape Architect
Irrigation	Minimizing, and where possible eliminating, use of potable water for irrigation	▪ Mown lawn less than 50% of planted area ▪ Irrigation design, installation and operation to follow sustainable best practices and specifications of the Irrigation Industry Association of BC. ▪ Reducing potable water use for irrigation by at least 50%	▪ Water-wise landscaping choices that minimize irrigation ▪ High efficiency irrigation – e.g., drip or emitter ▪ Weather-based irrigation controllers ▪ Any irrigation systems to divide irrigated landscape into hydrozones ▪ Irrigation installers to have Irrigation Technician II certification ▪ Using native plants	▪ Utilize a Water Budget Calculator for landscape areas	▪ Landscape Architect
Low-Impact Landscape Maintenance	Reducing the adverse effects of landscape maintenance activities on the environment	Minimizing the use of petrochemical fertilizers or pesticides	▪ Encouraging "silent landscaping" maintenance practices	▪ Encouraging the use of environmentally friendly lawn mowers such as manual or electric mowers leaf blowers and power tools	▪ Concert
Rainwater Management	Play a responsible role in the local water cycle, and protect water quality to avoid significant impacts in Vancouver Harbour	▪ Meet requirements of Urban Runoff Quality Control Guidelines for BC, during and after construction ▪ Total Suspended Solids at the point of discharge to receiving waters: – 25 mg/l during dry conditions – 75 mg/l during storm events ▪ Landscape areas meet BC Landscape Standard and meet depth and hydraulic conductivity requirements (300 mm, 12 mm/hr)	▪ Spill Prevention Plan ▪ Erosion & Sediment Control Plan ▪ Surface parking areas subject to motor vehicles provide water quality treatment – e.g., pervious pavement with reservoir, soil infiltration systems, or constructed wetlands ▪ Practices to minimize off-site migration of nutrients, including organic or slow release fertilization ▪ Providing sampling points of access	▪ Design of features highlighting interaction of site with rainfall, runoff and the sea. ▪ Site signage explaining water stewardship features, esp. those not readily visible. ▪ Utilize park space to collect runoff from development sites for water features that provide landscape amenity ▪ Green roofs ▪ Rain gardens ▪ Rainwater collection tanks or cisterns for irrigation	▪ Landscape Architect, Civil Engineer
Urban Agriculture	Creating opportunities for local food production	For 30% of all units that do not have access to a private outdoor space of more than 100 ft². *Requirement in accordance to the City of Vancouver Urban Agricultural Guidelines for the Private Realm*	▪ Provision of urban agricultural plots and edible landscaping in common areas within private development sites for use by residents	▪ Bee keeping ▪ Community food exchange ▪ Urban Farmer management ▪ Usufruct management	▪ Concert

	Goal	Target	Strategy: Committed	Strategy: Considered	Verification
SITE and PUBLIC REALM: URBAN SPACE					
Form, Massing and Orientation	Designing the development in concert with local, site-specific environmental conditions to facilitate employing passive, natural systems	▪ Optimized solar exposure ▪ Facilitating passive ventilation			
Existing trails and public Spaces	Enhancing the existing network of trails and public green spaces	In conjunction with the City integrating the existing network of trails and green spaces with those of the development to create a seamless passage through/by the development	▪ Designing a smooth transition from existing to the new ▪ Designing the development network of trails, pathways and public spaces to provide diversity for users	▪ Improving the condition of existing trails and public spaces at the interface with the development	▪ Consultant
Diverse Social/Community Spaces	Creating open spaces in a range of types and scales catering to various social and community activities	▪ Providing usable, appropriately sized open spaces (e.g. plazas, squares, etc.) within walking distance of all residential buildings within the development boundary ▪ Designing open spaces dedicated to or capable of accommodating outdoor community amenities ▪ Flexible outdoor open spaces	▪ Urban agriculture ▪ Outdoor patio space ▪ Children's play areas ▪ The plaza at the foot of Fell street as open community space ▪ Designing development-bound portion of Fell street to accommodate local market use ▪ Providing Harbourside Community-specific open space ▪ Providing neighbourhood and the larger community outdoor open spaces	▪ Urban ecology ▪ Outdoor fitness	▪ Concert
Heat Island Effect	Reducing Heat Island Effect caused by the development	Meeting the requirements of LEED-Canada NC Credit SS-7.1: Heat Island Effect, Non-Roof (excluding City owned infrastructure and streets)	▪ Shading of ground plane and roof though increased tree canopy coverage, ▪ Light colour materials where appropriate	▪ Open-grid paving system ▪ Green roofs	▪ Consultant
Outdoor Lighting	Minimizing adverse impacts of lighting without compromising the safety and security of the public	Meeting the requirements of LEED-Canada NC Credit SS-8: Light Pollution Reduction for outdoor lighting where it does not interfere with safety and security	▪ Full cut-off lighting on streets and private development sites ▪ Low level lighting ▪ Timed lighting ▪ Photosensor-equipped lighting		▪ Consultant
Noise Pollution	Reducing noise generated by the development and mitigating its impact on both occupants within the development and neighbouring natural and built environment	▪ Minimizing the use of noise-generating landscape and site maintenance equipment ▪ Minimizing construction noise during various phases of development	▪ Considering adjacencies in the design of outdoor spaces ▪ Minimizing noise from construction site after hours or on weekends, where possible		▪ Concert
Air Pollution/Minimizing Exposure to Tobacco Smoke	Controlling and managing sources of air pollution and mitigating its impact on environment and human health	▪ Minimizing exposure to tobacco smoke during construction and after occupancy ▪ Minimizing dust generation from construction activities ▪ Minimizing engine idling	▪ Implementing a construction air quality management plan ▪ No smoking policy for all public outdoor and indoor spaces and common public areas within residential buildings ▪ No smoking policy for all indoor and outdoor spaces of the development.	▪ Using signage and other educational materials and media to encourage an idle-free development	▪ Concert

iii. NEIGHBOURHOOD

	Goal	Target	Strategy: Committed	Strategy: Considered	Verification
NEIGHBOURHOOD: CLIMATE, ENERGY & EMISSIONS					
Climate Adaptation	Create resiliency in the community infrastructure and its facilities to support adaptation to a changing climate change with minimal property damage and disruption to community life. The design of the development will consider managing increasing frequency and duration of droughts, extreme temperatures, and over-precipitation as they affect the occupants, natural settings and habitat, landscaping and structures.				
Sea Level Rise & Flood Management	▪ Develop a strategy framework that manages the growing flood risk over the century and supports a resilient Harbourside Waterfront, meeting specific socio-economic and environmental objectives ▪ Contribute to the living and working experience of the neighbourhood in short and long term ▪ Exploit design features through adaptation ▪ Improve ecosystem health and functions within site constraints ▪ Support the City and provide a foundation for further City action across the Harbourside neighbourhood in the short term, and flexibility for adaptive management in the future ▪ Manage private and public risks while minimizing costs	▪ Define and build to a 2100 flood construction level that conforms to provincial guidelines and is based on accepted engineering and science knowledge at the time rezoning ▪ Manage flood risks of Harbourside Waterfront buildings, sites and roads for above average service lives ▪ Develop flexible building, site, park and street designs that permit sea level rise adaptations over time *The targets and strategies have been set based on the best available data and knowledge at the time of this rezoning application*	▪ Establish a concrete band dike feature seaward of all buildings at the flood construction level to protect the most critical infrastructure ▪ Establish a series of terraces from the shore up to the concrete band that dissipate wave energy and can be used for recreation and leisure, and active transportation along a greenway ▪ Establish habitable finished floor elevations above the 2100 flood construction level to permit use into the next century ▪ Support long term option for elevating floor levels in commercial buildings by establishing extra height ground floor ceilings ▪ Design edge conditions to maximize adaptability to new circumstances	▪ Design elements that increase understanding of sea level rise and other climate change effects.	▪ City of North Vancouver + Consultant
Energy & Power	Minimizing GHG emissions from the community's various sources of energy				
District Energy Supply	Work with the City in a collaborative process to help develop an efficient, low carbon district energy solution, whether this is part of the current LEC or a more efficient, lower emission localised system.	All buildings to have hydronic heating systems and meet LEC connectivity requirements, if deemed necessary as part of the district energy strategy agreed with the City. *Concert would also be open to non-district energy solutions, should the City deem this as a viable alternative*	If deemed necessary to connect to LEC as part of the *DE* Alternatives Review: ▪ In-building hydronic systems designed to work with District Energy ▪ *DE* mini-plant space	▪ District cooling ▪ Low carbon supply options – e.g., geo-exchange, biomass, sewer heat recovery – balancing investment appropriately with building energy efficiency and other factors	▪ To be determined by City
Transportation & Land Use	Minimizing the community's overall GHG emissions associated with its various modes of transportation				
Mixed-Use Development	To create a multi-modal community where vehicle trips would be minimized by providing work and live opportunities within walking distance of each other	Reduce by 10% the projected peak period vehicle trips	▪ Develop land uses supportive of the existing and future needs at Harbourside to reduce external trips and lower peak vehicle demand periods (i.e. 4:30 to 5:30pm)		▪ Concert
Transit Initiative	To extend the operational hours of the existing service to cover the period 7am to 7pm	Increase transit use from 20% to 30% for employees and target 30% for new residents	▪ Work with TransLink to provide a subsidy for extending operations or introduce new private service subject to fair and realistic time/cost parameters	▪ Considering incentives for the use of public transit by construction team	▪ Concert
Bicycle Initiatives	Develop innovative bicycle strategies to support projected bike parking supply	To achieve 4% to 6% of all trips by cycling	▪ Introduce a public bike station ▪ Design bike lanes within the development ▪ Provide end-of-trip facilities to exceed CNV minimum requirements	▪ Develop a community-based bike share system with the opening of the waterfront Spirit Trail	▪ Concert + Consultant
Street Design	Pedestrian- and bicycle-friendly streets with integrated sustainable features such as planting and storm water control features	▪ Maximizing pedestrian safety and comfort ▪ Facilitating safe and comfortable use of streets by bicycle ▪ Aesthetically desirable streets and sidewalks ▪ Designing streets that encourage abandoning car use while providing easy vehicular access when necessary	▪ Increase route choice / permeability both on and off-street ▪ Reduce pedestrian crossing distances at intersections and look to introduce speed tables ▪ Facilitating traffic flow by making Fell Street one-way within the development ▪ Designing and specifying aesthetically pleasing street furniture		▪ Consultant
Parking	Provide on-site parking at a level consistent with the sustainability objectives and market demands, and look to manage street demand for visitor use	▪ Provide parking to minimum market demand ▪ Discourage the use of car by restricting parking time	▪ Increase street parking to support existing and future demands ▪ Extend time-limit restrictions to prioritize parking for visitor use ▪ Allow for shared parking opportunities to maximize utilization		▪ Concert + Consultant
Ride Sharing	Review best practice in developing a practical and safe ride sharing program amongst all businesses	Increase passenger in vehicle proportion from 4% to 8% amongst employees	▪ Work with TransLink's Travel Smart to develop a practical and safe system for Harbourside	▪ Encouraging construction team to car-pool and use car-sharing during construction of the development	▪ Concert
Electric/Alternative Fuel	Facilitating and promoting the	15% of stratified parking spaces	▪ Investigate the practicalities of	▪ Investigating the introduction of	▪ Concert + Consultant

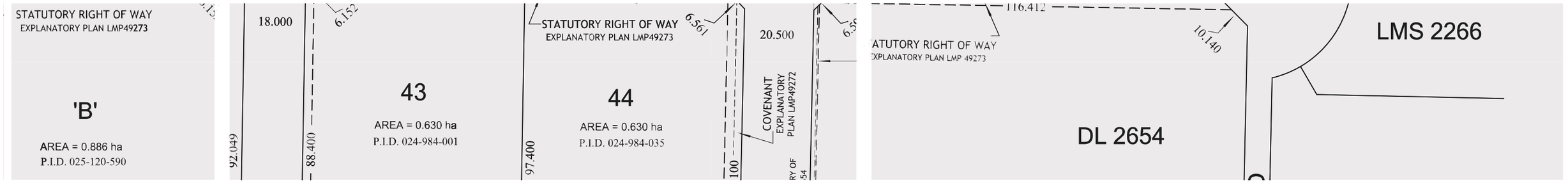
iii. NEIGHBOURHOOD

	Goal	Target	Strategy: Committed	Strategy: Considered	Verification
NEIGHBOURHOOD: CLIMATE, ENERGY & EMISSIONS					
Greenway Development	Work with the City of North Vancouver to identify locations where greenway improvements can be introduced	Improving the existing network of trails and creating new open spaces within the development for public use	▪ Fund the completion of the greenway on Bewicke to 2nd Street ▪ Work with Squamish First Nation and the City to open up the waterfront Spirit Trail	▪ Upgrades to Spirit Trail	▪ Concert + Consultant
Transit node / hub	Develop a more formal arrival and departure point for transit users on Harbourside Drive	Supportive of the extended bus operations to achieve 30% of trips by transit	▪ Locate café or similar services close to node ▪ Provide Wi-Fi access (for bus tracking) ▪ Provide weather-protected, safe and secure location ▪ Providing appropriate Signage and lighting	▪ Provide bike storage space near node	▪ Concert + Consultant
Marketing and Monitoring Transportation Demand Management	Develop a system where existing and future employees and visitors along with new residents are aware of the multi-modal opportunities	Linked with the initiatives for increased walking, cycling, transit, and passenger levels	▪ Work with TransLink's Smart Growth to employ best practices in development of a system that can be easily managed	▪ Educational programs for the future residents and occupants of the development and for construction team during development	▪ Concert + Consultant
Pedestrian Facilities and Network	Prioritizing pedestrian accessibility and comfort in the design of public realm and open spaces	15% of all new development trips by walking	▪ Provide pedestrians with more route choices than other street users ▪ Prioritize pedestrian movement through design (north/south and east/west pedestrian routes through the development, speed tables, curb extensions) ▪ Slow vehicular traffic through the development ▪ Provide safe, well-lit sidewalks and pedestrian paths ▪ Provide adequate pedestrian-specific street furniture		▪ Consultant

	Goal	Target	Strategy: Committed	Strategy: Considered	Verification
NEIGHBOURHOOD: SOCIAL AND ECONOMIC WELL-BEING					
Social Diversity & Vitality	Creating a socially diverse community accommodating various layers of society regardless of their race, age, and economic status	Creating a unique gathering place with abundant social, cultural and recreational opportunities, supported by robust connections to surrounding places - by Spirit Trail, by road and potentially by water.	• Creating a waterfront destination welcoming all residents of the City of North Vancouver and beyond • Ensuring the development design caters to a wide range from seniors and families to single-occupant households • Plaza at the foot of Fell street as a community space serving the larger community, the City residents • Street-level retail and commercial to enliven Harbourside Drive	• Market rental housing • Spirit trail and other facilities such as the dog park could become real destinations, enhanced by a lively community surrounding them	• Concert
Equitable Access	Providing easily accessible public and private spaces based on principles of Universal Design	Exceeding code requirements	• Considering a comprehensive range of users with special needs such as people with disabilities, the elderly, mothers with strollers, young kids, etc • A minimum of 20% of units designed for level 2 or better guidelines.		• Consultant
Safe Community	Providing safe, secure and pleasant public and private spaces	Creating a safe and welcoming community where residents and visitors could safely enjoy its commercial and recreational services and spaces at all time	• Implementing principles of CPTED (Crime Prevention Through Environmental Design) • Mixed-use development brining 24-7 liveliness to the neighbourhood boosting safety and security in an area which is currently too quiet after hours.		• Concert + Consultant
Healthy Community	Enhancing physical and mental health and well-being of the community by facilitating a healthy lifestyle	Creating a walkable community with ample outdoor spaces for physical activity and social interaction	• Providing places for social interaction (mental health) • Providing physical exercise opportunities (bicycle paths, running/jogging trails, etc.) • Integrating with the existing network of trails and bicycle routes • Creating indoor spaces that have access to daylight and fresh air • Using low-emitting materials and finishes • Minimizing the use of toxic materials and air-polluting, dust-generating practices during construction	• Encouraging health food retail stores, fitness and yoga studios as well as other health and well-being centres to move into the development commercial space	• Concert + Consultant
Community Outreach & Involvement	To follow a transparent process of development which is inclusive and respectful of the community and neighbours	Implementing an Integrated Design Process (IDP) to welcome feedback and involvement of various stakeholders in the process of design	• Several public presentations • Using various media (development web site, bulletins and brochures, local newspaper, etc.) to promote public engagement and input in the process of designing the development		• Concert + Consultant
Services and Amenities	Providing necessary community services and amenities within easy reach of the residents, occupants and visitors	Targets are developed in consultation with the City of North Vancouver.	• Commitment to working with the City of North Vancouver for on-site amenities or financial contributions that support community and city initiatives.		• Concert
Economic Well-Being	Enhancing local economy by attracting investment, enhancing existing economic infrastructure and providing new economic opportunities	Committing to working co-operatively with the City, local residents and municipal authorities to create an innovative development that is suited to the needs of the community, achieves the highest quality construction and generates an attractive economic return for both the City and Concert shareholders.	• Mixed-Use development • Ample retail and commercial space to generate local employment • Colourful and inviting streets featuring a continuum of entrepreneurial activity • Employment for hotel • Local employment through generating construction job opportunities	• Hotel for employment should market conditions permit • An "artisan mews" concept would provide innovative spaces for a cornucopia of small enterprises that would stimulate the local economy and enrich the Village experience	• Concert
Mixed-Income Development	Providing a range of housing options to create a economically diverse community	• A true mixed-used community, offering exceptional opportunities to live, work, shop, and play • A waterfront hub on the Spirit Trail, a place for all with exceptional and varied opportunities for recreation, culture and community, on the City's longest stretch of accessible waterfront.	• Provide a minimum of 10% of the development area as market rental housing • Provide a range of housing types and costs to ensure a continuum of housing affordability		• Concert
Education	Educating the public, as a whole, and the development residents, in particular, about sustainability, climate change, resiliency and complete communities	Qualitative Target	• Virtual or audio tours of the sustainable features of the development • Providing sustainability manuals for residential occupants		• Concert

NEIGHBOURHOOD: INFRASTRUCTURE	
Roadways and Parking	Providing alternative means of transportation and develop a walkable community to reduce demand on municipal road and parking infrastructure. Hence, reducing the capital required for new infrastructure and the associated maintenance costs.
Utilities: Water & Wastewater	Reducing the community's overall potable water demand directly reduces the amount of wastewater generated. Therefore, the reduction in potable water use (through strategies such as low-flow fixtures) reduces the demand for additional infrastructure and maintenance costs for both potable water and sewer systems.
Stormwater	By implementing stormwater management strategies and best practices, the development stormwater run-off will be reduced which in turn reduces the demand on the city's stormwater system and its expansion.

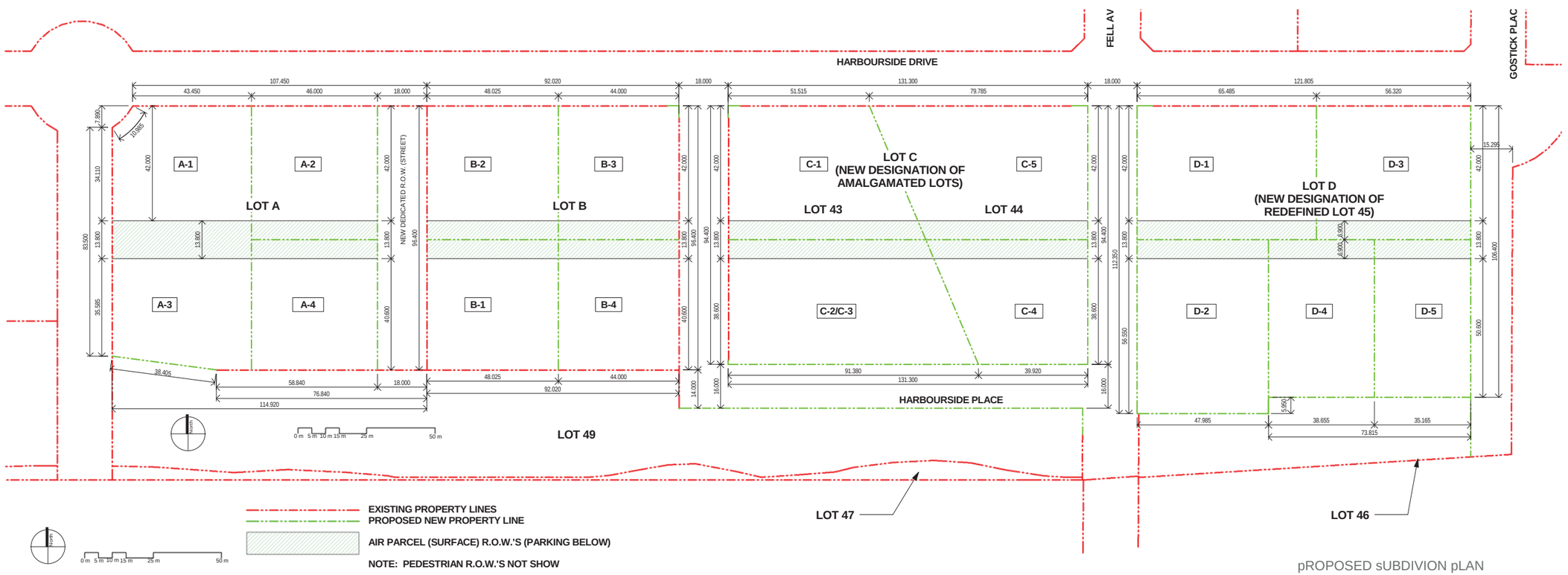

STATUTORY RIGHT OF WAY
EXPLANATORY PLAN LMP49273
40
AREA = 0.813 ha
P.I.D. 024-983-977
PLAN LMP49271
78.540
69.566
20.000
88.511
31.589
STATUTORY RIGHT OF WAY
EXPLANATORY PLAN LMP49273
'A'
AREA = 1.10 ha
P.I.D. 025-120-581
96.400


STATUTORY RIGHT OF WAY
EXPLANATORY PLAN LMP49273
'B'
AREA = 0.886 ha
P.I.D. 025-120-590
18.000
6.152
88.400
92.049
43
AREA = 0.630 ha
P.I.D. 024-984-001
STATUTORY RIGHT OF WAY
EXPLANATORY PLAN LMP49273
6.561
97.400
44
AREA = 0.630 ha
P.I.D. 024-984-035
20.500
100
COVENANT
EXPLANATORY
PLAN LMP49272
116.412
10.140
LMS 2266
DL 2654

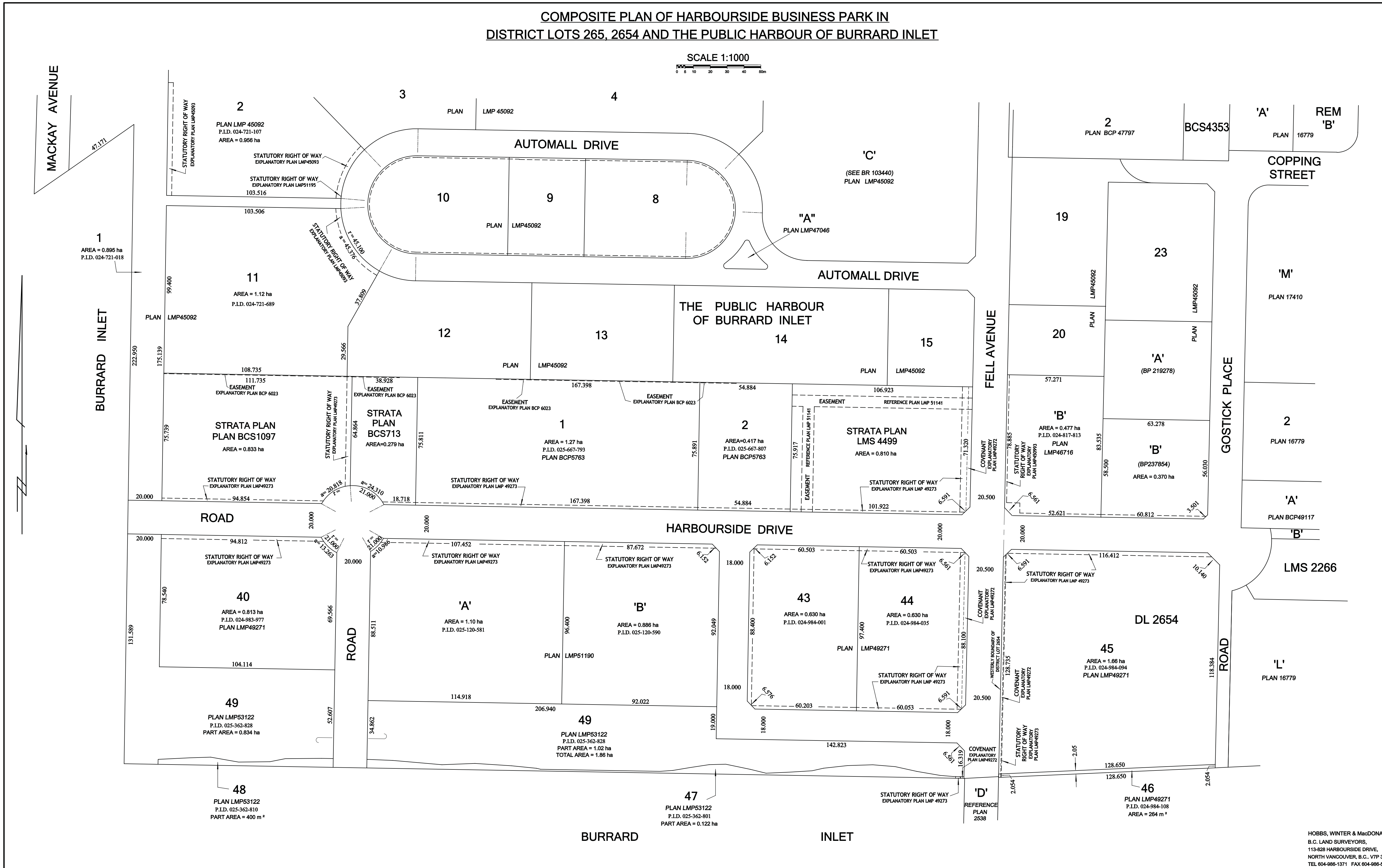
11.0 Subdivision Plan

The subdivision plan presented here is the plan as currently registered with BC Land Titles office. Lots A, B, 43, 44 and 45 are the lots designated for rezoning in this application. It is these lot areas that form the basis in the determination of the total floor space ratio (FSR) buildable in this development and rezoning application. The lot areas and FSR calculations include future Rights-of-Way, park spaces and roads all of which is currently under the ownership of Concert Properties and Knightsbridge Properties.

It is the Owners' intent that Statutory Right of Ways shown in this subdivision plan will be removed and all services and utilities will be re-routed to below municipal streets and roadways. Once agreement in principle has been reached with the City of North Vancouver for the determination of FSR allowable, rights-of-ways, new roads, and new dedicated park space it is the Owners' intent to register a new subdivision plan with the BC Land Titles office.



pROPOSED sUBDIVION pLAN


COMPOSITE PLAN OF HARBOURSIDE BUSINESS PARK IN
DISTRICT LOTS 265, 2654 AND THE PUBLIC HARBOUR OF BURRARD INLET
SCALE 1:1000
MACKAY AVENUE
AUTOMALL DRIVE
THE PUBLIC HARBOUR OF BURRARD INLET
FELL AVENUE
GOSTICK PLACE
COPPING STREET
HARBOURSIDE DRIVE
ROAD
BURRARD INLET
STRATA PLAN PLAN BCS1097
STRATA PLAN BCS713
STRATA PLAN LMS 4499
DL 2654
LMS 2266
BURRARD INLET
HOBBS, WINTER & MacDONALD,
B.C. LAND SURVEYORS,
113-828 HARBOURSIDE DRIVE,
NORTH VANCOUVER, B.C., V7P 3R9

Acknowledgements | 12.0

Urban Design / Development Parcels
Richard Henry Architect
Richard Henry

Hughes Condon Marler Architects
Karen Marler
Charles Leman
Paul Rigby

Musson Cattel Mackey Partnership
Mark Whitehead

Place Maker
Calum Srigley

Landscape Architecture / Public Realm
PWL Partnership Landscape Architects Inc.
Derek Lee
Bruce Hemstock
Joe Zhou
Mary Wong

Sustainability
Hughes Condon Marler Architects
Kourosh Mahvash
Karen Marler

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Bud Fraser
Alex Boston
David Reid

Transportation
Bunt & Associates Engineering Ltd.
Paul Dorby
Peter Joyce

Resiliency / Sea Level Rise
HB Lanarc/Golder
Alex Boston
David Reid

Infrastructure
Cruez Engineering
Fred Ciambrelli
Andrew Fraser

Acoustics
Brown Strachan Associates

Economic Impact Analysis
G.P. Rollo & Associates

View Analysis and Animation
Gene Redvenus

Model Maker
A B Scale Model